Upper Silver Creek Watershed-Based Plan



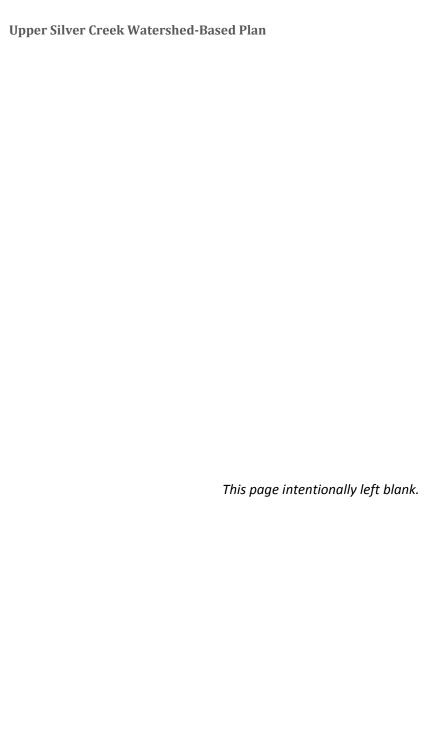
A Guide to Protecting and Restoring Watershed Health

November 2015









Upper Silver Creek Watershed-Based Plan

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FINAL REPORT

November 2015

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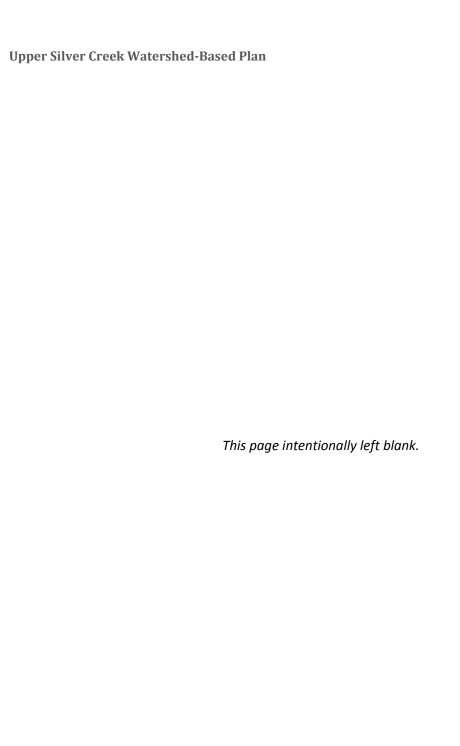
for





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Scott Ristau acted as project manager for IEPA's Bureau of Water. Janet Buchanan and Mary Vandevord (HeartLands Conservancy) worked closely with watershed partners to produce the watershed planning document. Matt Brandmeyer and Steve Brendel (Madison County) provided support at all stages of the project from Madison County Planning and Development.

Key partners and stakeholders include IEPA, Madison County, HeartLands Conservancy, the Madison County Soil and Water Conservation District (SWCD), the Madison County Stormwater Commission, the National Great Rivers Research and Education Center (NGRREC), Midwest Streams, Madison County Board members, the Madison County Farm Bureau, Township Highway Road Commissioners for Hamel, Jarvis, Marine, New Douglas, and Olive townships, City of Staunton, Village of Marine, City of Edwardsville, Village of Glen Carbon, Village of St. Jacob, City of Troy, Village of Hamel, Village of Worden, and Village of Alhambra.

These stakeholders played an important role in providing input on watershed goals and objectives, water quality and flooding issues, Best Management Practices, and potential recommendations. Fostaire Helicopters was hired to fly many of the streams and videos to take georeferenced videos that were subsequently assessed by Midwest Streams for streambank erosion, channelization, and riparian condition. NGRREC staff assessed current and projected pollutant load estimates for the watershed, collected water quality monitoring data, and set up a monitoring plan for the coming years.

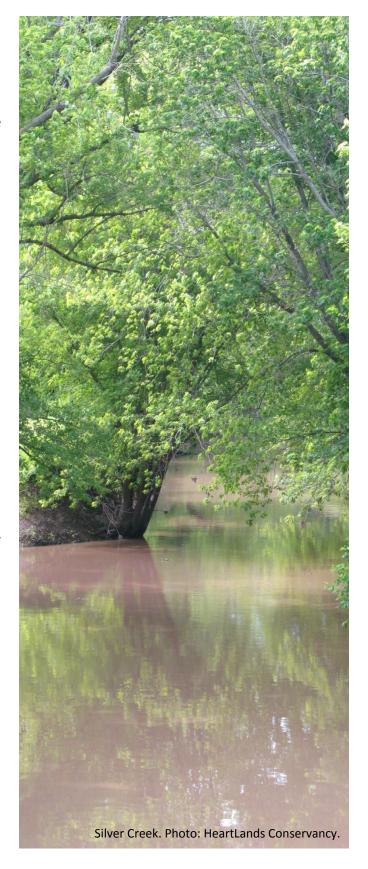


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Upper Silver Creek Watershed-Based Plan



EXECUTIVE SUMMARY

Introduction

The upper Silver Creek watershed is the area of land which drains to Silver Creek in Madison County. The watershed includes surface water bodies (e.g., streams), groundwater (e.g., aquifers), and the surrounding landscape, which is largely agricultural land. Thirteen municipalities fall wholly or partly within the watershed boundaries.

In 2013, Madison County received a grant from the Illinois Environmental Protection Agency (IEPA) through Section 604(b) of the Clean Water Act to develop a watershed-based plan for upper Silver Creek, a tributary of the Kaskaskia River that is on the federal list of impaired waters (the 303(d) list). The County

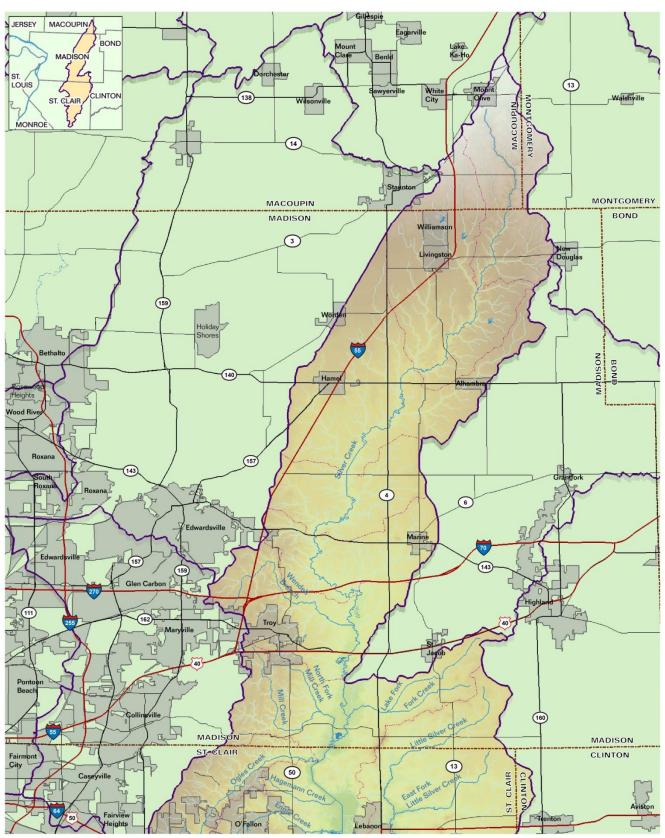
Executive Summary Contents

- 1. Introduction
- 2. Goals & Objectives
- 3. Critical Areas & Estimated Impairment Reductions
- 4. Recommendations: The Management Measures Action Plan
- 5. Monitoring Plan
- 6. Information & Education Plan
- 7. Implementation
- 8. Measuring Success

partnered with HeartLands Conservancy to fully analyze the watershed and make recommendations toward improving water quality. Recognizing that flooding in the watershed is also a point of concern, the County and HeartLands Conservancy worked together to provide additional recommendations to mitigate the adverse effects of flooding in the area. The Madison County Stormwater Plan provides the framework for this plan and other stormwater management efforts in the county.

This Watershed-Based Plan provides assessment and management information for the upper Silver Creek watershed, including analysis of the actions, participants, and resources needed to develop and implement the plan. The plan offers guidance for managing watershed resources on public property, as well as providing a platform to encourage other watershed stakeholders (landowners, residents, businesses, developers, public agencies, and non-profits) to participate. The plan is not regulatory, meaning it does not become law. The intent is to encourage voluntary improvements to water quality and stormwater management in the watershed, for agricultural, urban, and riparian lands and waters.

Watershed location, municipalities, major roads, and topography



The Upper Silver Creek Watershed

The Upper Silver Creek Watershed is located 20 miles northeast of St. Louis, Missouri. The majority of the watershed lies within Madison County, Illinois, and small portions lie within Macoupin and Montgomery counties. The watershed's 480 miles of streams drain roughly 120,000 acres of land. Silver Creek flows south from the project area to join the Kaskaskia River, which ultimately drains into the Mississippi River.

The Upper Silver Creek Watershed project area contains numerous subwatersheds, called HUC12s and HUC14s. "HUC" stands for Hydrologic Unit Code, the number that indicates the general location and size of the watershed. Many of the issues identified in the watershed are assessed at the subwatershed level.

The majority of the watershed's population of approximately 26,200 lives in unincorporated areas where farming is the primary land use. Agricultural land makes up 75% of the watershed, with most of that land in row crop farming. All or portions of thirteen municipalities, fourteen townships, and three counties are located within the watershed.



Goals and Objectives

The purpose of the Upper Silver Creek Watershed-Based Plan is to promote a healthy, functioning watershed that sensitively balances farming, development, and natural ecosystems, including restoring surface water quality to Silver Creek. The plan guides the development, enhancement, and implementation of actions to achieve the following goals:

GOALS
GOAL 1: Improve Surface Water Quality
GOAL 2: Reduce Flooding/Mitigate Flood Damage
GOAL 3: Promote Environmentally Sensitive Development
GOAL 4: Support Healthy Habitat
GOAL 5: Develop Organizational Frameworks
GOAL 6: Conduct Education and Outreach

Issues identified

Analysis of the existing and predicted future conditions in the watershed (Appendix A: Watershed Resource Inventory) included collecting data from several government data sources, delineating HUC14 watershed boundaries, using the USEPA's Spreadsheet Tool for Estimating Pollutant Loads (STEPL), conducting an aerial assessment of stream and riparian conditions, field checks at 117 field locations, and stakeholder engagement. From this research, the following issues were identified:

Surface water issues

- **IEPA Primary Sources of Impairment.** The primary sources of impairment to Silver Creek are animal feeding operations (non-point source pollution), crop production (crop land or dry land), and municipal point source discharges (storm sewers).
- **Soil Erosion from Agricultural Land.** With 75% of the watershed in agricultural use, soil erosion is common, carrying nutrients and sediments from fields to waterways.
- **Soil Erosion from Streams.** Streambank and channel erosion contributes approximately 63% of the sediment loading.
- **Private Sewage and Animal Waste.** Poorly maintained private sewer systems and runoff of animal waste contribute bacteria such as *E. coli* to surface water.
- Littering. Trash and debris is an issue in places where roads cross the creek and its tributaries.

Flooding issues

- **Prevalent Flooding.** Flooding is highly prevalent both inside and outside of floodplains, with frequent damage to homes, businesses, and crops, leading to health impacts and monetary loss.
- Extensive Floodplain. Almost 11% of the watershed is in the 100-year floodplain.
- **Flooding Outside of Floodplains.** The flatter, higher ground at the edges of the watershed experiences flash floods/urban flooding from time to time, often as a result of large areas of impervious surfaces, changes in local hydrology (such as ditches installed or filled in), and severe storm events.

Land cover and development issues

- **Population Growth and Development.** Population growth in the watershed will likely be accompanied by new development on agricultural land or forest. This development may exacerbate existing water quality and flooding issues.
- **Poor Aquifer Replenishment.** Replenishment of aquifers has declined as impervious surfaces increased in developed areas.

Habitat issues

- **Invasive Species Present**. Invasive species crowd out native trees and shrubs that protect streambanks from erosion.
- **Unprotected Habitat for Endangered Species.** Where their native habitat is not preserved as open space, endangered species cannot be expected to thrive over the long term.
- **Poor Riparian Conditions.** Approximately 9% of the riparian area, the area directly adjacent to streams on either side, is in "poor" ecological condition (Appendix A, p.87).

Organizational needs/issues

• **Need for Partner/Stakeholder Collaboration.** There is a need for more communication to and between potential partners, with information about funding and technical resources.

Critical Areas and Estimated Impairment Reductions

Critical Areas

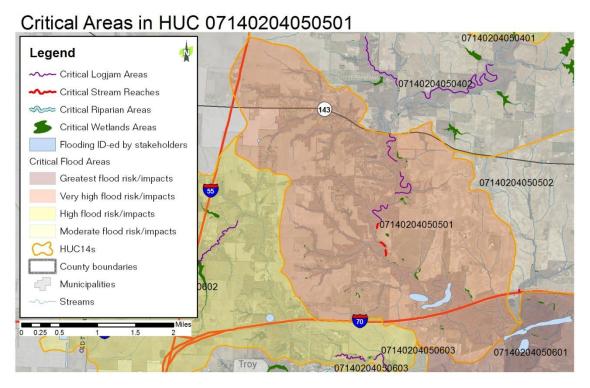
"Critical Areas" were identified at locations in the watershed where existing or potential future causes and sources of pollutants or existing functions are significantly worse than other areas of the watershed, OR there is significant potential for the area to make a difference in making improvements towards one or more of the plan's goals. The Critical Areas were identified using survey and stakeholder information, aerial and field assessments, and U.S. Department of Agriculture (USDA) modeling.

The following Critical Areas were identified:

- 1. Critical Stream Reaches: Highly degraded stream reaches (2.75 miles)
- 2. Critical Logiam Areas: Stream reaches with high susceptibility to logiams (37.5 miles)
- 3. Critical Riparian Areas: Highly degraded riparian areas (34.7 miles)
- 4. Critical Flooding Areas: Areas of prevalent flooding (HUC14s ranked by flood damage impact)
- 5. Critical Wetland Areas: Areas suitable for wetland restoration (500 acres)

Impairment Reduction Targets

The "Impairment Reduction Targets" in this plan were set at levels that can feasibly be reached by the implementation of a suite of Best Management Practices (BMPs), or Management Measures, over time. The targets include a 25% reduction in phosphorus loading and a 15% reduction in nitrogen loading by 2025 (based on Illinois Nutrient Loss Reduction Strategy), a 20% reduction in sediment loading (based on estimated impacts of proposed BMPs) by 2045, and a 68% reduction in fecal coliform loading (based on 35 Ill. Adm. Code 302) by 2045.



Recommendations: The Management Measures Action Plan

The "Action Plan" is designed to provide partners with recommendations that address the plan's goals, objectives, and impairment reduction targets. **Programmatic Measures**, including general remedial, preventive, and policy watershed-wide measures, and **Site-Specific Measures**, on-the-ground practices that can be implemented to improve surface and groundwater quality and flooding, are recommended. These measures are prioritized for implementation on the Critical Areas identified. All recommendations are for guidance only and are not required by any federal, state, or local agency.

Programmatic Measures recommended

Protection and management of natural areas

- Conservation Development design, which protects natural features like streams, steep slopes, and forest in new development (especially subdivisions).
- Open space and natural area protection from the design stage through to the stage where the landowner owns the property.
- Green infrastructure incentives, which promote the protection of forest, wetlands, and other green infrastructure.
- Long-term management and maintenance of natural areas, through management agreements with responsible entities.

Restoration of natural areas

- In-lieu fee ecological mitigation, a type of program that funds the restoration of ecologically sensitive wetlands and streams to mitigate for the losses of those features to new development.
- Native landscaping, which encourages the use of native plants on public and private property.
- Stream Cleanup Team, which removes litter and debris from streams and waterbodies.

Wastewater management

- Sewage Treatment Plant upgrades, which reduce the pollutant loading in wastewater discharge from wastewater facilities.
- Private sewage monitoring, a proactive program that samples private sewage systems to check for water quality problems and to encourage regular maintenance.

Natural resource policy

- Flood Damage Prevention Ordinance, which limits inappropriate development in floodplains, adopted by counties and municipalities.
- Riparian Buffer Ordinance, which limits development in riparian areas (areas adjacent to streams and waterbodies), encouraging forest and grassland that helps to filter and slow down runoff.
- Watershed-Based Plan integrated into community policies and programs.

Funding

- Federal and state programs such as the Conservation Reserve Enhancement Program (CREP) and the Environmental Quality Incentives Program (EQIP) are available to landowners in the watershed to finance practices that prevent soil erosion, among other benefits.
- Financial support for stormwater infrastructure, such as a Stormwater Utility, that is dedicated to upgrades and maintenance of detention basins, ditches, and other conveyance structures.

Site-Specific Measures recommended

Agricultural

- Contour buffer strips, which are narrow strips of perennial vegetation that slow surface runoff and trap sediment, significantly reducing sheet and rill erosion and removing pollutants from runoff.
- Cover crops, which prevent erosion, improve soil health, break pest cycles, and suppress weeds.
- Grassed waterways, which are vegetated channels designed to slow surface water to reduce soil erosion and flooding.
- Ponds, which store stormwater, settle out sediments, and allow nutrient uptake by aquatic organisms.
- Reduced tillage (conservation tillage/no-till), which leads to a reduction in soil erosion and the transport of associated nutrients, such as phosphorus, to the waterways.
- Riparian buffers, which are vegetated zones immediately adjacent to streams that protect the stream channel.
- Terraces, which consist of ridges and channels constructed across the slope of a field, reducing soil erosion and surface runoff on sloping fields.
- Waste (manure) management through a Comprehensive Nutrient Management Plan and waste storage structures can eliminate unwanted runoff, incorporate manure nutrients into crop nutrient budgets, and efficiently apply manure to cropland, reducing water pollution and increasing soil health.
- Water and Sediment Control Basins (WASCOBs), which are small earthen ridge-and-channel structures or embankments built across a small watercourse in a field. They hold runoff, reducing the amount of sediment and sediment-borne phosphorus leaving the field and preventing the formation of gullies.
- Wetlands, which function as one of the most effective pollution removal practices.

Urban areas

- Detention basins (new and retrofitted), which store flows during and incrementally release the stored water.
- Pervious pavement, which allows infiltration of stormwater into a below-ground storage area through holes in the pavement.
- Rain gardens, which temporarily store and infiltrate rain water, significantly slowing the flow of water, improving water quality, and providing wildlife food and habitat.
- Rainwater collection and reuse, using rain barrels or cisterns.
- Single property flood reduction strategies, which differ from property to property, based on the sources of flooding and appropriate flood reduction strategies.
- Stormwater system maintenance and expansion, which is crucial for the efficient conveyance of stormwater.

In-stream

- Streambank and channel restoration, which includes stabilization and grade control structures. These reduce erosion and, in some cases, provide flood storage.
- Logjam removal, which removes debris from the stream channel, reducing scouring in the stream channel and the risk of floods overtopping the channel.

Together, these practices can make changes in the watershed that will meet and exceed the Impairment Reduction Targets. Significant participation from local landowners, farmers, residents, municipalities, and developers will be needed to achieve these targets.

Monitoring Plan

Water quality monitoring in the upper Silver Creek watershed will provide data that can be used to support future resource management decisions and assess the effectiveness of Management Measures that are implemented. The National Great Rivers Research and Education Center (NGRREC), a partner on this plan, will conduct this monitoring in the near term. Water samples will be taken from streams throughout the watershed, to determine seasonal and annual changes in water quality. A stationary, continuous sampler and a moveable sampler will be used to collect samples to test for nitrogen, phosphorus, and several other parameters. As funding allows, the collection and analysis of monitoring data should be continued on a 3-5 year cycle through the year 2025.

Information and Education Plan

The Information and Education component supports the achievement of the plan's long-term goals and objectives. The cumulative actions of partners across the watershed can accomplish these goals and objectives.

Recommended information and outreach activities include:

- Municipal outreach;
- Watershed plan outreach;
- An Agricultural BMP Workshop;
- A BMP or Demonstration Project Tour;
- A public events booth;
- Field days;
- Educational signs;
- School projects; and
- Watershed protection awareness.

Implementation

Management Measures for Critical Areas are prioritized for short-term implementation (e.g., wetland restoration projects in Critical Wetlands Areas). Funding sources for plan implementation include state and federal programs such as the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), and the Conservation Stewardship Program.

Measuring Success

A set of Progress Report Cards was developed for the watershed with milestones for the short-term (1-10 years; 2016-2026), medium-term (10-20 years; 2026-2036), and long-term (20+ years; 2036+) timeframes. The scorecard can be used to identify and track plan implementation and effectiveness. Checking in on the measurement indicators at appropriate milestones helps watershed partners to make corrections as necessary and ensure that progress is being made towards achieving the plan's goals.

SECTION 1: INTRODUCTION

Simply stated, a "watershed" is the area of land that drains into a common waterbody, such as a creek or the Kaskaskia River. It can be thought of as a large bathtub: when a drop of water hits anywhere in the tub, it eventually finds its way to the drain (the lowest point). In this instance, the rim of the bathtub defines the watershed boundary. On land, a watershed boundary is determined by topography, and it includes surface water bodies (e.g., streams, rivers, lakes, reservoirs, and wetlands), groundwater (e.g., aquifers and groundwater basins), and the surrounding landscape.

A single watershed encompasses a wide variety of land uses, businesses, demographics, and natural resources. These components all influence watershed function. The upper Silver Creek watershed, which is a largely agricultural are in southwestern Illinois (Figure 1), has been a source of excessive phosphorus and sediment to Silver Creek, earning it a place on the Illinois EPA 303(d) list of impaired waters for several successive years. The 2015 Illinois Nutrient Loss Reduction Strategy identified the need for statewide reductions in nutrient pollution into waterways in Illinois, for the benefit of people, the economy, and the environment both in the state and downstream.

In 2013, Madison County, received a grant from the Illinois Environmental Protection Agency (IEPA) through Section 604(b) of the Clean Water Act to develop a watershed-based plan for upper Silver Creek, a tributary of the Kaskaskia River that is on the federal list of impaired waters (the 303(d) list; see Figure 3). The County partnered with HeartLands Conservancy to fully analyze the watershed and make recommendations toward improving water quality and removing Silver Creek from the 303(d) list. Recognizing that flooding in the watershed is also a point of concern, the County and HeartLands Conservancy worked together to study flooding in the watershed and provide additional recommendations to mitigate the effects of flooding in the area.

A Watershed-Based Plan is a strategy that provides assessment and management information for a geographically defined watershed. The plan offers guidance for managing watershed resources on public property, as well as providing a platform to encourage other watershed stakeholders (land owners, residents, businesses, developers, public agencies, and non-profits) to participate. The plan is not regulatory, meaning it does not become law. The intent is to encourage voluntary improvements to water quality and stormwater management in the watershed.



Figure 1. Location of the upper Silver Creek watershed in Illinois.

Purpose

The purpose of the Upper Silver Creek Watershed-Based Plan is to promote a healthy, functioning watershed that sensitively balances farming, development, and natural ecosystems, including restoring surface water quality to Silver Creek and its tributaries. The plan should enhance, manage, and protect the watershed's human, natural, and socio-economic resources through a long-range plan that will identify strategies and resources that promote the health and safety of human inhabitants, improve surface and groundwater quality, prevent flood damage, protect wildlife, and increase environmental education.

Upper Silver Creek Watershed

The upper Silver Creek watershed is located 20 miles northeast of St. Louis, Missouri, in southwestern Illinois. The majority of the watershed lies within Madison County, and small portions lie within Macoupin and Montgomery counties. The watershed's 480 miles of streams drain roughly 120,000 acres of land. Silver Creek flows south from the project area to join the Kaskaskia River, which ultimately drains into the Mississippi River.

The Upper Silver Creek Watershed project area contains numerous subwatersheds, called HUC12s and HUC14s (Figure 2). "HUC" stands for Hydrologic Unit Code, the number that indicates the general location and size of the watershed. When the watershed planning process began, the smallest subwatersheds delineated in the project area were HUC12's. As part of this watershed planning process, 20 smaller HUC14 subwatersheds were delineated to provide a more detailed analysis and recommendations in the watershed.

Wendell Branch, Mill Creek, and Lake Fork are major tributaries to Silver Creek in the watershed project area. Wendell Branch drains the Troy area, Mill Creek drains the area south of Troy, and Lake Fork drains the area south of St. Jacob. East Fork Silver Creek joins the watershed at the northern end of HUC 07140204050901, bringing water from Highland and Silver Lake.

The watershed is home to approximately 26,245 people. The majority of these people live in unincorporated areas where farming is the primary land use. Agricultural land makes up 75% of the watershed, with most of that land in row crop farming. All or portions of thirteen municipalities, fourteen townships, and three counties are located within the watershed (Table 1).

Table 1. Jurisdictions in the watershed.

	Area within
	watershed
Jurisdiction	(acres)
County (including municipalities)	120,089
Macoupin	10,408
Madison	107,943
Montgomery	1,738
Municipalities	6,685
Alhambra	428
Edwardsville	100
Glen Carbon	61
Hamel	746
Livingston	683
Marine	453
Mount Olive	392
New Douglas	33
St Jacob	53
Staunton	113
Troy	2,496
Williamson	994
Worden	135
Unincorporated Areas	113,428
Macoupin County	9,904
Madison County	101,786
Montgomery County	1,738
Township (County)	120,089
Cahokia (Macoupin)	223
Mount Olive/Staunton (Macoupin)	10,172
Alhambra (Madison)	15,582
Edwardsville (Madison)	260
Hamel (Madison)	11,726
Jarvis (Madison)	18,953
Leef (Madison)	277
Marine (Madison)	8,849
New Douglas (Madison)	4,629
Olive (Madison)	19,475
Omphghent (Madison)	1,888
Pin Oak (Madison)	18,576
St. Jacob (Madison)	7,596
Walshville (Montgomery)	1,725

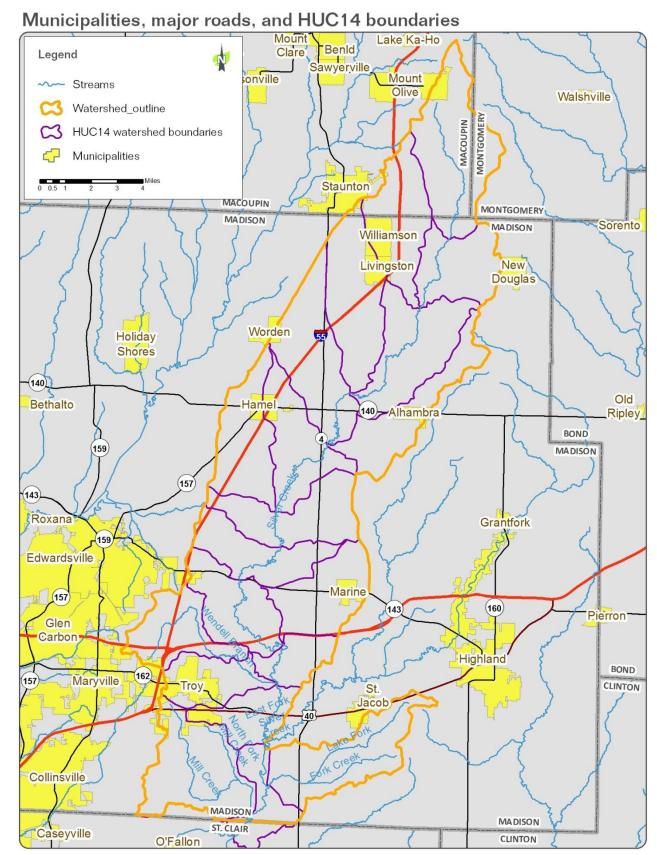


Figure 2. The upper Silver Creek watershed, containing 20 HUC14 subwatersheds and all or portions of 13 municipalities.

Impaired Waters

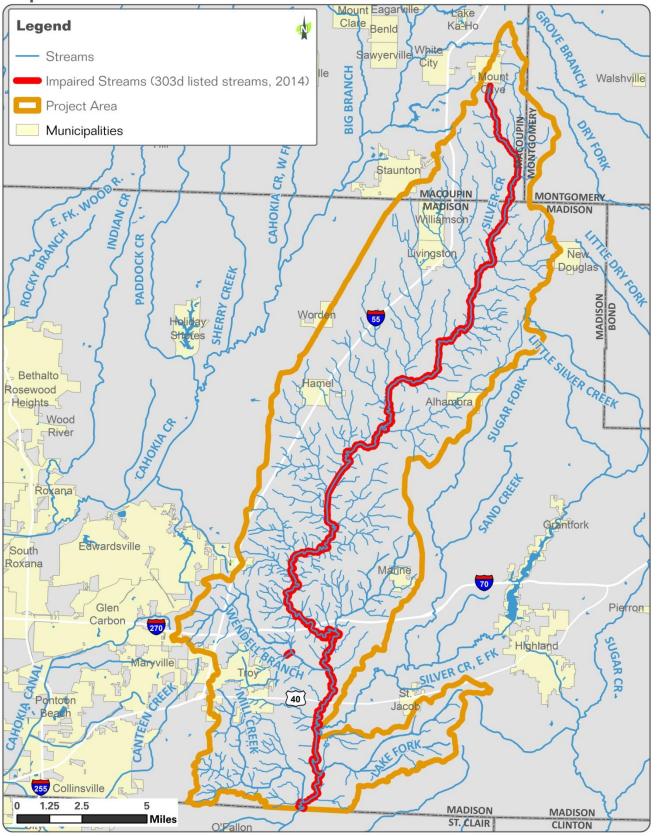


Figure 3. 303(d) listed waters in the upper Silver Creek watershed, Silver Creek and Troy Creek (a tributary to Wendell Branch).

Watershed-Based Plan Overview

This plan is consistent with guidance found in Appendix C of the Nonpoint Source Program and Grants Guidelines for States and Territories (2013) and the Chicago Metropolitan Agency for Planning's "Guidance for Developing Watershed Action Plans in Illinois" (2007).

The two major components of the Upper Silver Creek Watershed-Based Plan are the Watershed Resource Inventory and the Watershed-Based Plan.

Watershed Resource Inventory

The Watershed Resource Inventory (Appendix A) essentially reviews the existing conditions within the watershed. The inventory documents existing conditions in Silver Creek and its tributaries including channelization, erosion, and riparian area condition. Information including existing soil types, demographics, land use / land cover, geology, and climate is included. Existing pollutant loads of nitrogen, phosphorus, and sediment are estimated from existing land uses using the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) from the U.S. Environmental Protection Agency (USEPA).

Watershed-Based Plan

Based on the Watershed Resource Inventory and input from stakeholders and the public, a Watershed-Based Plan was developed. The plan identifies potential Best Management Practices (BMPs) for prevention, remediation, restoration, and maintenance to achieve water quality, natural resources, and flood control objectives. For each BMP, the plan identifies pollutant load reduction and other benefits, approximate costs, and a schedule for implementation. Sources of financial and technical support are also identified, and measures of success and milestones are established to measure the ongoing progress of the plan at meeting its goals. The major sections of the Watershed-Based Plan are identified below.

Watershed-Based Plan Overview

SECTION 1: Introduction

SECTION 2: Goals and Objectives

SECTION 3: Critical Areas & Estimated Impairment Reductions

SECTION 4: Management Measures Action Plan

SECTION 5: Monitoring Plan

SECTION 6: Information & Education Plan

SECTION 7: Implementation SECTION 8: Measuring Success

Appendix A: Watershed Resource Inventory

Appendix B: Madison County Flood Survey Report
Appendix C: Landowner/Farmer Survey Report

Appendix D: Critical Areas

Appendix E: Management Measures (BMPs)

Appendix F: Monitoring Plan Appendix G: Funding Sources Appendix H: Progress Report Cards

Plan Development Process

The plan was developed through a Technical Committee consisting of experts in stormwater management, water quality, stream and soil health, conservation, and urban planning. The Committee was represented by Madison County Planning and Development, HeartLands Conservancy, National Great Rivers Research and Education Center (NGRREC), Madison County Soil and Water Conservation District, and Midwest Streams. The Technical Committee helped to guide the process and formulate the Watershed Resources Inventory (Appendix A), and provided technical guidance on recommendations and subsequent drafts of the plan. The plan addresses the nine elements required by USEPA (below).

Stakeholders in the watershed were also involved in the development of the plan. In 2014, the project team met with municipalities, townships, and other stakeholder groups to gather information and assess concerns in the watershed. Following those meetings, the County sent a Flood Survey to 2,000 randomly selected addresses in the watershed and put the survey online. More than 500 responses were received (Appendix B). The project team hosted two open house events, one in Hamel and one in Troy, to promote the survey and gather initial input from residents and land owners in the watershed. These open houses helped the Technical Committee determine "hot spots" for problems in the watershed, and provided an educational opportunity about water quality and stormwater management to Madison County residents. In 2015, further stakeholder meetings and two additional open house events were held to get feedback on and discuss the initial draft of the plan. The draft was then modified and submitted to IEPA.



Stakeholder meeting with farmers, summer 2014. Photo: HeartLands Conservancy.

USEPA Nine Elements

Element A: Identification of the causes and sources or groups of similar sources of pollution that will need to be controlled to achieve the pollutant load reductions estimated in the watershed-based plan;

Element B: Estimate of the pollutant load reductions expected following implementation of the management measures described under Element C below;

Element C: Description of the BMPs (non-point source management measures) that are expected to be implemented to achieve the load reductions estimated under Element B above and an identification of the critical areas in which those measures will be needed to implement

Element D: Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement the plan;

Element E: Public information/education component that will be implemented to enhance public understanding of the project and encourage early and continued participation in selecting, designing, and implementing/maintaining non-point source management measures that will be implemented;

Element F: Schedule for implementing the activities and non-point source management measures identified in this plan that is reasonably expeditious;

Element G: Description of interim, measurable milestones for determining whether non-point source management measures or other control actions are being implemented;

Element H: Set of environmental or administrative criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards;

Element I: Monitoring component to evaluate the effectiveness of the implementation efforts over time.

Madison County Stormwater Plan

The Madison County Stormwater Plan is the overall framework for stormwater management in the county which guides regulations, identifies flood and water quality problems, establishes BMPs, and prioritizes projects. The upper Silver Creek watershed is one of ten watersheds for which a Watershed-Based Plan will be developed as part of the Stormwater Plan. This Watershed-Based Plan will serve as a template for these future plans. Direction and approval for the Stormwater Plan comes from the Madison County Stormwater Commission, whose members include County Board members and municipal representatives.

The Stormwater Plan also references stormwater runoff which is transported through Municipal Separate Storm Sewer Systems (MS4s). Madison County acts as the Coordinator for the MS4 Co-Permittee Group which consists of 26 communities (including the county itself). MS4 members within the upper Silver Creek watershed are shown in Table 2. The Group works together to help the individual communities and townships meet the 6 minimum control measures of their ILR40 permits. The minimum requirements are: 1) Public education and outreach, 2) Public participation/involvement, 3) Illicit discharge detection and elimination, 4) Construction site runoff control, 5) Post-construction runoff control, and 6) Pollution prevention/good housekeeping.

Table 2. Municipal Separate Storm Sewer System (MS4) Co-Permittee Group members in the Upper Silver Creek watershed.

Municipalities
City of Edwardsville
City of Troy
Village of Glen Carbon
Townships
Edwardsville Township
Jarvis Township
Pin Oak Township

Current nutrient standards

This plan takes into account the several Illinois standards for nutrients, which have been in place since the 1970's.

The standards for total phosphorus concentrations in waters include the following concentrations:

- Lakes of 20 acres or more in size (302.205): 0.05 mg/L
- Streams at the point of entry into a lake (302.205): 0.05 mg/L
- 302.205 dischargers to the lake (304.123(b)): 1 mg/L
- New or expanding facilities with an average flow of 1 million gpd* (304.123(g)): 1 mg/L

IEPA has drafted a regulatory update that would identify low-phosophorus streams and establish a 0.04mg/L total phosphorus water quality standard to ensure those streams are protected from increases. For nitrate-nitrogen, a 10 mg/L standard applies at designated public water supply intakes (302.304).

Illinois also has narrative water quality standards that prohibit unnatural algae or plant growth for general use waters (302.203). Drafted updates would also prohibit excess plant and algae growth that is offensive to the senses, physically harmful to aquatic life, and that may be shown to cause eutrophication when the minimum dissolved oxygen standard is exceeded.

^{*} Industrial facilities under this effluent standard receive a permit limit of 1 mg/L if they discharge ≥25 total P/day.

SECTION 2: GOALS AND OBJECTIVES

A set of long-term goals and objectives were developed to address the challenges and issues associated with maintaining a healthy watershed (Table 3). These goals address the issues identified in the Watershed Resources Inventory, Community Flood Survey, and input from residents, land owners, businesses, and government officials.

Each goal and objective aligns with a challenge/issue to be addressed, a set of recommended BMPs, the roles of organizations implementing those BMPs, specific and general projects using those BMPS, and ranking of the priority of the recommended BMPs. At the end of this section, Table 4 lists the goals of this plan alongside the known impairments in the watershed and their associated causes and sources.

Table 3. Goals and objectives of the Watershed-Based Plan.

Goals	Objectives		
	Decrease pollutant loading to Silver Creek.		
	Reduce phosphorus by 25% by 2025.		
	Reduce sediment by 20%.		
	Reduce nitrogen by 15% by 2025.		
Improve Surface Water	Maintain Dissolved Oxygen (DO) levels above standard minimums.		
Quality	 Maintain manganese concentrations below 1,000 μg/L. 		
	Reduce fecal coliform by 68%.		
	Create a private sewage assessment strategy.		
	Monitor water quality and identify trends.		
	 Increase awareness of consequences of littering/illegal dumping. 		
	 Increase stormwater captured, stored, and infiltrated. 		
	Limit development in the 100-year floodplain.		
Reduce Flooding/Mitigate	 Institute development standards that minimize impervious surfaces. 		
Flood Damage	 Preserve the natural flow of streams and slow peak stream flow. 		
	 Promote ongoing maintenance of stormwater storage features. 		
	Provide information about flood damage prevention and insurance.		
	Conserve sensitive lands.		
	 Increase the acreage of forest, native grassland, and wetlands. 		
Promote Environmentally	 Use wetland mitigation banking or in-lieu fee programs. 		
Sensitive Development	Implement low-impact development strategies.		
	Work with municipalities to amend policies and regulations to include conservation,		
	native landscaping, stormwater management, and low-impact design.		
	Promote healthy ecosystems within streams and riparian areas.		
	Monitor fish and aquatic macroinverterbrate communities.		
Support Healthy Habitat	Identify and protect key natural features and wildlife corridors.		
	Prioritize "green" stormwater management approaches.		
	Create an invasive species removal strategy.		
Develop Organizational	Formalize a network of partners to implement the plan.		
Frameworks	Leverage funding from a variety of sources to implement the plan.		
	Identify opportunities to assist stakeholders with watershed management.		
Conduct Education and	Connect watershed stakeholders to decision-makers and experts.		
Outreach	Offer opportunities for public education and participation in watershed matters.		
	Develop public recognition programs focused on the watershed plan's goals.		

GOAL 1: IMPROVE SURFACE WATER QUALITY

The cornerstones of this plan are to improve surface water quality in the upper Silver Creek watershed so that the streams can be safely used by residents and to remove Silver Creek and its tributaries from IEPA's 303(d) list of impaired waters.

Numerical reductions for impairments in the watershed are based on observed conditions and monitoring data, as well as Illinois water quality standards. The main water quality parameters of concern are sediment, phosphorus, and fecal bacteria (E. coli). The Watershed Impairment Reduction Targets table (Section 3) provides details on the sources of these reduction targets.

For **phosphorus**, the objective is to achieve a 25% reduction in the annual total phosphorus load by 2025 is based on the Illinois Nutrient Loss Reduction Strategy.

For **sediment**, the objective is to achieve a 20% reduction in the annual sediment load by 2045 (the long-term watershed planning horizon). This reduction is based on estimates from a suite of BMPs that also address the needed phosphorus reduction.

For **nitrogen**, the objective is to achieve a 15% reduction in the annual total nitrogen load by 2025 is based on the Illinois Nutrient Loss Reduction Strategy.

For **Dissolved Oxygen (DO)**, the objective is to consistently maintain levels higher than the minimum concentrations set in Illinois standards (35 III. Adm. Code 302, set by the Illinois Pollution Control Board in 2011). These standards are different for March to July and August to February.

Water Quality Objectives:

- 1.1 Decrease overall pollutant loading to Silver Creek.
- 1.2 Achieve a 25% reduction in phosphorus from the watershed by 2025.
- 1.3 Achieve a 20% reduction in sediment from the watershed by 2045.
- 1.4 Achieve a 15% reduction in nitrogen from the watershed by 2025.
- 1.5 Maintain Dissolved Oxygen (DO) levels above standard minimums.
- 1.6 Maintain manganese concentrations no higher than 1,000 μg/L.
- 1.7 Achieve a 68% reduction in fecal coliform from the watershed by 2045.
- 1.8 Create a strategy to improve the assessment and maintenance of private sewage systems (i.e., septic tanks) for correct functioning.

For **manganese**, the objective is to maintain samples no higher than Illinois' "general use" water quality standard of 1,000 μ g/L, and to achieve a general reduction.

For **fecal coliforms** such as E. coli bacteria, the objective is to achieve a 68% reduction by 2045 in order to reach the Illinois Pollution Control Board standard of 200 cfu/100ml.

The Issues:

Primary Sources of Impairment. The primary sources of impairment to Silver Creek listed on the IEPA 303(d) list are: animal feeding operations (non-point source pollution), crop production (crop land or dry land), and municipal point source discharges (storm sewers). Fertilizers and erosion on crop land contribute to significant phosphorus and sediment loading. Point sources of pollution come from ten facilities that require a NPDES permit discharging wastewater into the watershed.

Soil Erosion from Agricultural Land. Because 75% of the watershed is agricultural (and most is row crops), farming practices factor significantly in the amount and type of pollutants reaching the waterways. In Madison County, 75% of corn and 37% of soybeans are produced using conventional tillage practices, which contribute to high soil erosion. Conservation tillage (reduced tillage) and no-till practices contribute significantly less sediment and nutrients. Only 1% of corn and 7% of soybeans in Madison County are in no-till crop production. In-field and edge-of-field best practices, such as nutrient removal wetlands and riparian buffers, are not widely used in the watershed. An estimated 32% of sediment and 87% of phosphorus in the watershed comes from cropland (see Appendix A, p.144).

Soil Erosion from Streams. In addition to soil erosion from farmland, streambank and channel erosion contributes much of the sediment loading in the watershed. Streambank erosion has a very high sediment delivery rate (100%) to the stream. Streambanks contribute an estimated 63% of sediment in the watershed to streams (see Appendix A, p.144). Stream erosion is especially problematic in areas that are becoming increasingly urbanized, due to the increased volume of water reaching streams in "flashy" surface flow during storm events. Streambank erosion is also exacerbated by logjams, which are woody vegetation and/or other debris which obstructs a stream channel and backs up stream water. Logjams can be both a cause and a result of streambank erosion. They can alter flow, directing water outwards to the streambanks, increasing scouring and bank erosion. Logjams result from streambank erosion when a stream is incising or meandering excessively, causing large woody vegetation on the banks to be undercut and fall into the stream. Beavers can also cause logjams.

Private Sewage and Animal Waste. Large spikes in fecal coliform levels have occurred at monitoring gauges on Silver Creek. The watershed has more than 3,000 private sewage systems (i.e. septic systems). USEPA uses a figure from the U.S. Census Bureau that at least 10% of septic systems nationwide have stopped working, while local government officials estimate that the failure rate in this watershed is actually much higher (up to 90% in older developments). Waste from livestock and other animal feeding operations (AFOs) can also contribute nutrients and bacteria to surface water. Private sewage and animal waste are considered point sources of pollution that emanate from specific locations. Furthermore, while all the municipalities in the watershed have separate storm and sanitary sewer systems, aging infrastructure has led to instances of infiltration of stormwater into the sanitary system, resulting in de facto combined sewers and, potentially, combined sewer overflows.

Littering. Trash and debris is an issue in places where roads cross the creek and its tributaries. People throwing trash out of car windows or dumping unwanted or hazardous materials leads to debris deposits that are eyesores, harm fish and wildlife, and create obstructions in the creek.

GOAL 2: REDUCE FLOODING AND MITIGATE FLOOD DAMAGE

Manage and mitigate floods to improve water quality, reduce property damage and health risk, and reduce infrastructure maintenance costs.

Within the upper Silver Creek watershed, there is a need for further outreach and dissemination of resources about flood damage prevention and flood insurance; a decrease in impervious surface area; preservation and slowing of natural stream flow; an increase in flood storage and infiltration features such as detention basins, wetlands, and no-till agriculture; and changes in policy to discourage development in flood-prone areas.

The Issues:

Prevalent Flooding. Flooding is highly prevalent in the upper Silver Creek watershed, both inside and outside of floodplains, and in rural and urban areas. The Madison County Community Flood Survey, administered in 2014, revealed significant and widespread flooding problems affecting residents and property owners in the watershed (Appendix B). Frequent flooding damaged homes and businesses, causing health and safety impacts, as well as monetary loss.

Floodplain. FEMA has identified almost 11% of the watershed as 100-year floodplain. This area is almost entirely riverine floodplain around Silver Creek and its larger tributaries. Five communities in the watershed are enrolled in the National Flood Insurance Program, but seven are not fully covered by a Flood Insurance Rate Map.

Flooding Outside of Floodplains. The flatter, higher ground at the edges of the watershed is not in the floodplain, but it has still been flooded by flash floods/urban flooding from time to time. This flooding is a result of increased impervious surfaces (developed areas), changes in local hydrology (such as ditches installed or filled in), and severe storm events with heavy

Flood Management Objectives:

- 2.1 Increase the amount of stormwater captured, stored, and infiltrated in the watershed, particularly upstream of areas with periodic or regular property damage caused by flooding.
- 2.2 Limit development in the FEMA identified 100-year floodplain.
- 2.3 Institute development standards that seek to minimize the amount of impervious surfaces in new development and redevelopment projects.
- 2.4 Preserve the natural flow regime of streams in the watershed, and identify opportunities to slow peak stream flow and recharge groundwater where increases in flood height are acceptable.
- 2.5 Promote ongoing maintenance of stormwater storage features (e.g. detention basins and ponds) to maximize storage capacity.
- 2.6 Provide information and outreach about flood damage prevention and flood insurance.

rainfall. Sixty-two percent of the flooding reported in the Madison County Community Flood Survey did not occur in floodplains (Appendix B).

GOAL 3: PROMOTE ENVIRONMENTALLY SENSITIVE DEVELOPMENT PRACTICES

Promote development practices that protect environmentally sensitive lands (e.g., steep slopes, wetlands, and forests), conserve soil, limit new impervious surfaces, and increase the use of native vegetation.

The Issues:

Population Growth and Development. Madison and St. Clair counties combined lose 1/3 acre of agricultural land to development every minute, according to the USDA's National Agricultural Statistics Service (NASS) for 2007-2012. The population in the watershed area is projected to increase over the next few decades. New development will likely occur within and around municipalities and unincorporated areas, consuming as much as 40,000 acres of farmland and 7,000 acres of forest/grassland in the watershed. Development policy among the watershed communities does not actively promote green infrastructure as a way to manage stormwater and allow infiltration. Streams are dynamic, and react to changes in the watershed above them – especially increases in impervious surface area associated with new development. Without changes in policy, local flash flooding and poor water quality will pose significant risks to both new and existing development. Municipalities in the watershed also need stronger policies to protect steep slopes from erosion, preserve native vegetation, and maintain biodiversity of the ecosystem as development occurs.

Aquifer Replenishment. The water table is very shallow over much of the watershed, and rainfall slowly replenishes groundwater supplies removed by people or evapotranspiration. However, replenishment of aquifers has declined as impervious surfaces have increased in area. Continued development outside municipalities – urban sprawl – has added impervious surface which does not allow infiltration and replenishment of the water table. Future development is likely to continue this trend. Additionally, conventional row crop agriculture, which covers most of the area in the watershed, results in less infiltration of rainwater compared to conservation and no-till farming practices due to the destruction of natural soil structure. The Illinois State Geological Survey has documented 1,193 water wells in the watershed, including municipal water supply, irrigation, industrial, and

Development Objectives:

- 3.1 Conserve sensitive lands by taking them out of crop production and/or protecting them from development. These lands include cropland that frequently floods, steep slopes, and forested lands adjacent to waterways (riparian areas).
- 3.2 Increase the acreage of forest, native grassland, and wetland in the watershed while reducing the acreage of impervious surface area and turf grass. Reconnect forest tracts for habitat connectivity.
- 3.3 Use wetland mitigation banking or in-lieu fee programs to offset the environmental impacts of new development.
- 3.4 Implement low-impact
 development (LID) strategies so
 that important watershed
 processes and water resource
 functional values are protected.
 Development should allow high
 infiltration, use minimal impervious
 surface area, protect trees and
 native vegetation, and have
 adequate stormwater and
 sediment detention.
- 3.5 Work with municipalities to amend their comprehensive plans, zoning ordinances, and subdivision regulations to include conservation, native landscaping, stormwater management, and low-impact development standards.

commercial wells. Reductions to aquifer replenishment may become an issue for the several municipalities and private residences that use these wells for their drinking water supply and other purposes. No wellhead protection plan is in place for the watershed area.

GOAL 4: SUPPORT HEALTHY FISH AND WILDLIFE HABITAT

Improve and protect habitat in streams and water bodies to promote biodiversity.

The Issues:

Invasive Species. Invasive species, such as bush honeysuckle, tree-of-heaven, garlic mustard, and climbing euonymous (wintercreeper), are threats to many natural areas because they crowd out native trees and shrubs that protect streambanks from erosion. Invasives also crowd out food sources of animals and insects, further degrading the ecosystem.

Endangered Species. Endangered species such as the Indiana bat and leafy prairie clover may be present in the watershed. Removing invasive species and protecting native habitat around streams will provide locations for endangered species to thrive.

Riparian Conditions. The forested corridor (or riparian area) along Silver Creek provides habitat for neo-tropical migratory songbirds which fly through and/or nest there after migrating from Central and South America. The songbirds require dense forest interior conditions without holes or gaps, which encourage nest predators such as raccoons, opossums, skunks, and cowbirds. Approximately 9% of the riparian area along streams is in "poor" ecological condition (Appendix A, p.87).

Poor Macroinvertebrate Diversity. The quality and diversity of macroinverterbate populations indicates the health of the ecosystem and quality of water for human consumption. Monitoring of macroinvertebrate populations within the Upper Silver Creek Watershed indicate very poor to fair conditions over time, and the watershed lacks diversity of macroinvertebrate populations.

Habitat Objectives:

- 4.1 Promote healthy ecosystems within streams and riparian areas to provide habitat for a wide variety of native fish, invertebrate, plant, and animal species.
- 4.2 Monitor fish and aquatic macroinvertebrate communities alongside water quality data to assess suitability of habitat.
- 4.3 Identify and protect key natural features and corridors for wildlife, including wetlands, forest, and grassland, to prevent the loss or degradation of fish and wildlife habitat.
- 4.4 Prioritize "green" stormwater management approaches that use native vegetation to naturally filter pollutants over conventional structural approaches, such as riprap and piped conveyance.
- 4.5 Create a strategy to remove invasive species within the watershed, and educate landowners about invasive species and how to safely remove them.

GOAL 5: DEVELOP ORGANIZATIONAL FRAMEWORKS TO IMPLEMENT WATERSHED GOALS

Facilitate partnerships with stakeholders and leverage resources to implement the watershed plan.

The Issues:

Existing Partners. There are many potential partners in the region dedicated to different aspects of water quality and stormwater management, including federal agencies, state agencies, non-profits, land trusts, land owners, institutions, and local governments. To effectively implement the watershed plan and the County's stormwater management goals, a network of these partners should be established to tackle certain issues and objectives.

Organizational Framework Objectives:

- 5.1 Formalize a network of partners dedicated to implementing the watershed plan and other water quality and stormwater management issues throughout the County.
- 5.2 Leverage funding from a variety of sources to implement the watershed plan.

Existing Operations. The plan can be most effective when its goals, strategies, and recommendations are integrated into the operations of partner organizations. When an organization or community has made a commitment to the plan by adding its recommended BMPs to its operations schedules and budgets, those BMPs become much easier to implement.

Funding and Programs. There are a variety of funding sources and programs available to implement goals and objectives of the watershed plan. Existing resources include IEPA Section 319, Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), foundation grants, and various other programs.

GOAL 6: CONDUCT EDUCATION AND OUTREACH

Promote public awareness, understanding, and stewardship of the watershed and the Watershed-Based Plan.

The Issues:

Need for Knowledge. The public engagement process for the plan revealed a need for education on water quality and flooding for the general public.

Access to Technical Resources and Funding. The public engagement process also revealed that many land owners in the watershed want to help. Many came to meetings requesting technical support and assistance with obtaining funding to implement BMPs on their land. Municipalities also need access to resources and funding to implement projects in city limits.

Key Stakeholders. Because a large proportion of the watershed is private property, education and outreach efforts to engage landowners and other key stakeholders are needed to achieve the goals of this plan. A single regulatory agency or group cannot be as effective as a combined effort with other groups all working towards the same goal. Many people will work hard to help make the watershed better if they understand what to do and how it will help.

Education and Outreach Objectives:

- 6.1 Identify opportunities to assist municipalities, counties, state and federal agencies, and other stakeholders with watershed management and conservation efforts.
- 6.2 Connect watershed residents, farmers, and business owners to decision-makers and experts with knowledge about water quality, flooding issues, and solutions.
- 6.3 Offer effective opportunities for public education, training, and participation in watershed matters, including information-based resources and demonstration projects.
- 6.4 Develop public recognition programs focused on the watershed plan's goals.

Table 4. Causes and sources of watershed impairments and the associated goals that address them.

IEPA or other impairment	Cause of impairment	Known or potential source of impairment	Goals
		Streambank & channel erosion;	
		Agricultural row crop runoff;	
		Failing private sewage systems;	
	Nutrients: Phosphorus	Wastewater treatment plants;	
	(known impairment)	Lawn fertilizer;	
	and Nitrogen	Level of landowner education;	
Water Quality - Aquatic Life	(potential impairment)	Livestock operations (manure)	1
, ,	Sediment: Total	Streambank & channel erosion;	
	Suspended Solids /	Agricultural row crop runoff;	
	Turbidity	Construction sites;	
Water Quality - Aquatic Life	(known impairment)	Livestock operations (manure)	1
The state of the s	(massing and massing)	Heated stormwater runoff from urban areas;	_
	Low dissolved oxygen	Lack of natural riffles in streams (incl. channelized	
Water Quality - Aquatic Life	(known impairment)	streams)	1
Trate: Quality /iquatic life	(mierri)	,	
		Naturally high manganese levels in soil and rocks;	
		Atmospheric deposition from industry (e.g. primarily	
	Manganese	coal-fired power plants);	
Water Quality - Aquatic Life	(known impairment)*	Discharges from industrial operations;	1
		Failing private sewage systems;	
	Fecal coliform	Wastewater treatment plants;	
Water Quality - Aquatic Life	(potential impairment)	Livestock operations (manure)	1
	Invasive/non-native plant		
	species & degradation in	Existing and introduced invasive species populations;	
	riparian and other natural	Logjams, trash/debris, and other obstructions in	
	areas	streams;	
Habitat Degradation	(known impairment)	Level of public education	3, 4, 6
0		Inadequate protection policy;	, ,
	Loss and fragmentation	Lack of land acquisition funds;	
	of open	Traditional development design;	
	space/wetlands/natural	Streambank, channel, and riparian area modification;	
	habitat	Lack of restoration and maintenance funds;	
Habitat Degradation	(known impairment)	Wetland & riparian buffer loss	3, 4, 5
Transfer Degradation	(milestini paintine)	Channelized streams;	3, ., 3
		Agricultural drain tiles;	
	Encroachment in 100-	Wetland & riparian buffer loss;	
	year floodplain	Logjams and other obstructions in streams;	
Structural Flood Damage	(known impairment)	Existing and future urban impervious surfaces;	2, 3, 5
Structural Flood Dalliage	(Known impairment)	Existing and future urban impervious surfaces;	2, 3, 3
		Inadequate stormwater infrastructure (e.g. too few	
		detention basins);	
		The state of the s	
	Urban flooding / floob	Poor stormwater infrastructure design & function;	
	Urban flooding / flash	Lack of funding for stormwater infrastructure;	
Characterial Flaced Decree	flooding	Agricultural drain tiles;	1 2 5
Structural Flood Damage	(known impairment)	Traditional development design	2, 5

^{*} Manganese may not be a significant impairment. Manganese measurements taken before 1997 are higher than those taken recently, perhaps due to better measurement procedures and a more accurate detection level.

SECTION 3: CRITICAL AREAS & ESTIMATED IMPAIRMENT REDUCTIONS

For this plan, a "Critical Area" is best described as a location in the watershed where existing or potential future causes and sources of pollutants or existing functions are significantly worse than other areas of the watershed, OR there is significant potential for the area to make a difference in making improvements towards one or more of the Watershed-Based Plan goals. The following Critical Areas were identified:

- 1. Highly degraded stream reaches (Critical Stream Reaches);
- 2. Stream reaches with high susceptibility to logiams (Critical Logiam Areas);
- 3. Highly degraded riparian areas (Critical Riparian Areas);
- 4. Areas of prevalent flooding (Critical Flooding Areas); and
- 5. Areas suitable for wetland restoration (Critical Wetland Areas).

The location and extent of each Critical Area was informed by data collected in the Watershed Resource Inventory, including an aerial assessment of streambank condition, riparian area condition, and channelization. The Agricultural Conservation Planning Framework (ACPF), a GIS model developed by USDA, also provided location data for Critical Areas on agricultural land. ACPF tools establish runoff pathways and a flow network for the watershed, and among the outputs of the tools are possible beneficial locations for different types of practices placed in fields, at field edges, and in riparian zones. All of the Critical Areas identified in the watershed are shown in Figure 4. Figure 5 shows the Critical Areas in more detail in each HUC14 subwatershed. Each individual type of Critical Area is shown in maps in Appendix D, with more information about the sources of data behind the selection of Critical Area locations.

The Management Measures recommended are focused on these Critical Areas, but are also recommended for application elsewhere in the watershed where conditions are suitable.

Critical Stream Reaches

Critical stream reaches exhibit highly eroded banks or stream beds, or degraded channel conditions, that are a major source of total suspended solids (sediment), phosphorus and nitrogen carried with it.

2.75 miles of stream reaches have been identified as high priority "Critical Stream Reaches", using aerial assessment and field verification data on streambank erosion, streambed erosion, and channelization. The Critical reaches have high streambank erosion and high channelization.

Streambank stabilization and channel restoration BMPs, including bioengineering, will greatly reduce sediment and nutrients transported downstream, increase dissolved oxygen levels, and improve habitat.



Severe streambank erosion on Silver Creek near Troy, spring 2014. Photo: HeartLands Conservancy.



Logjam in the Silver Creek watershed, summer 2014. Photo: NGRREC.

Critical Logiam Areas

Critical areas for logjams were delineated from known locations of logjams identified in the aerial stream assessment for this Watershed-Based Plan and in the 2008-2009 Madison County Stream Cleanup project. The Critical Areas are stream reaches that are within 0.25 mile of another reported logjam along the same stream. These areas represent current or likely locations of logjams, but not where they would cause the greatest flood impacts or damage. **37.5 miles** of stream reaches have been identified as Critical Logjam Areas. Localized assessment is recommended for these reaches to determine whether logjam removal is appropriate and cost-effective at specific locations. The American Fisheries Society's 1983 "Stream Obstruction Removal Guidelines" are a reliable source for determining what types of logjams should be removed.

Critical Riparian Areas

Critical riparian areas are areas adjacent to stream reaches that:

- 1) Have limited or no vegetated buffer beside the stream (i.e., "poor" riparian condition as determined by aerial assessment), and/or
- 2) Receive significant surface runoff and groundwater and have high ecological significance (i.e., riparian areas that are determined as "Critical Zones" by the ACPF see Appendix D).

Along the stream corridors, **183,036 feet (34.7 miles)** were identified as Critical Areas. Removal of invasive species and revegetation of these areas with appropriate native vegetation will increase surface water infiltration and reduce sediment and nutrient flows to the streams.

Critical Flooding Areas

For flooding, instead of individual locations being identified as critical areas, the data collected was weighted to assign a flood risk/impact rank to the HUC14 subwatersheds. This method also allowed flood location data given by residents to be grouped and averaged. The Critical Flooding subwatershed areas were ranked using the following four factors:

- Flooding and flood impacts reported from the Madison County Community Flood Survey (specifically, flood prevalence, frequency, neighbors' flooding, and flood damage);
- 2) Extent of the 100-year floodplain;
- 3) Areas between 90 and 100% impervious cover; and
- 4) Flooding events reported by stakeholders at small group meetings and Open House events.



Flood overtopping a road that crosses Silver Creek, 2013. Photo: Village of Marine.

The **top 10** of the **20** ranked **HUC14** subwatersheds for flooding are shown in Figures 4 and 5. Darker colors represent a higher rank of flood risk/impact. In these HUC14s, which often see repeated flooding in specific locations, best practices include structural detention basin systems and wetlands, along with multiple non-structural elements that increase infiltration of surface runoff. Topographic maps should be consulted to determine the most effective BMP locations. Because there is more floodplain area, more impervious cover, and a greater population in the southern part of the watershed, this area is weighted more heavily by these criteria in ranking critical flooding areas.

Critical Wetland Areas

Critical wetland areas, which are highly suitable for restoration/construction of wetlands, include:

- 1) Areas on agricultural land that are highly suitable for nutrient removal wetlands and have high, very high, or critical runoff risk, as determined by the ACPF (set of GIS tools from USDA); and
- 2) Areas identified as having a high restoration rank (8 to 13 on a scale of -2 to 13) from the Missouri Resource Assessment Partnership (MoRAP) assessment of wetland importance.

Because the ACPF tool is directed at agricultural land, the nutrient removal wetlands output by the model are all in agricultural fields. And because the MoRAP wetland restoration assessment used hydric soils and proximity to existing wetlands as criteria for its algorithms, the areas with high restoration rank values are largely in or close to the stream corridor. Combined, and accounting for a small amount of overlap, there are **500.4 acres** of critical wetland.

Critical Areas

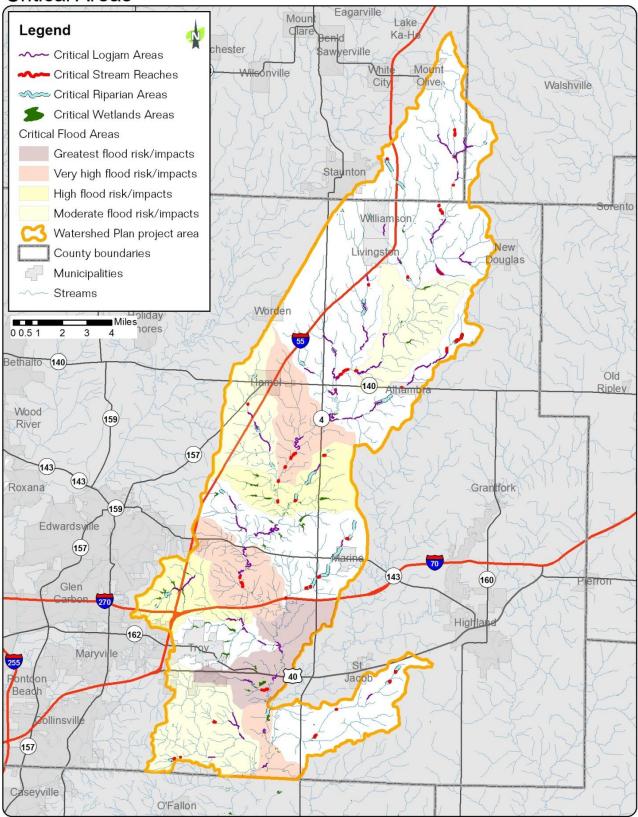
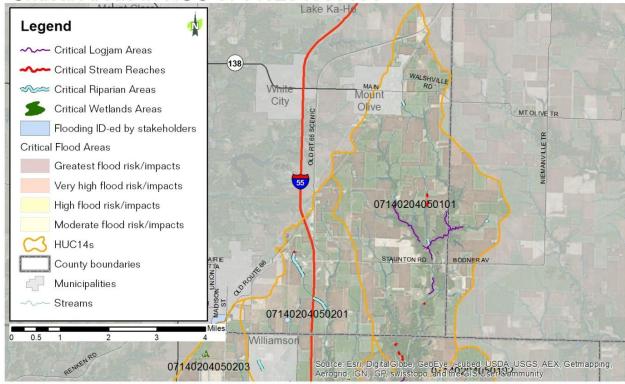


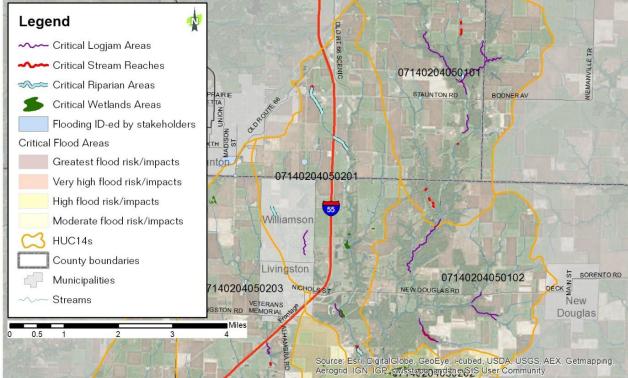
Figure 4. Critical Areas for stream reaches, logjams, riparian areas, wetlands, and flooding. See Appendix D for maps of each individual Critical Area type.

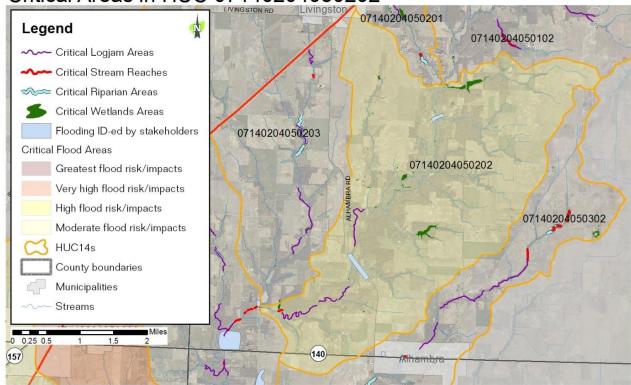
Figure 5. Seventeen Critical Areas in the watershed, shown by HUC14 subwatershed.

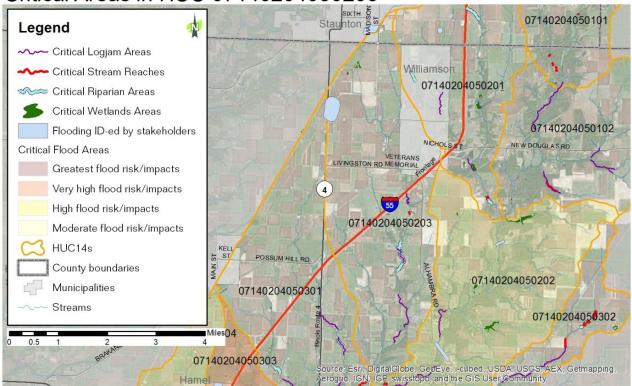
Critical Areas in HUC 07140204050101

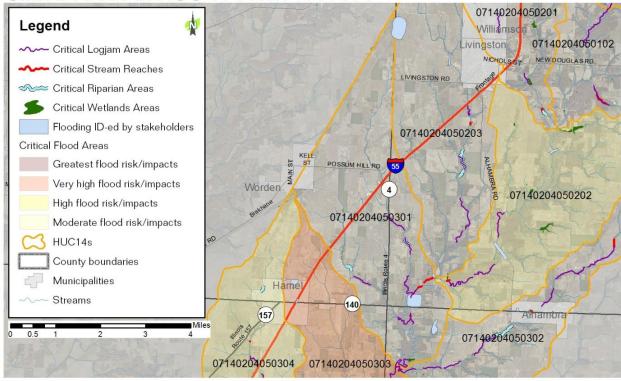


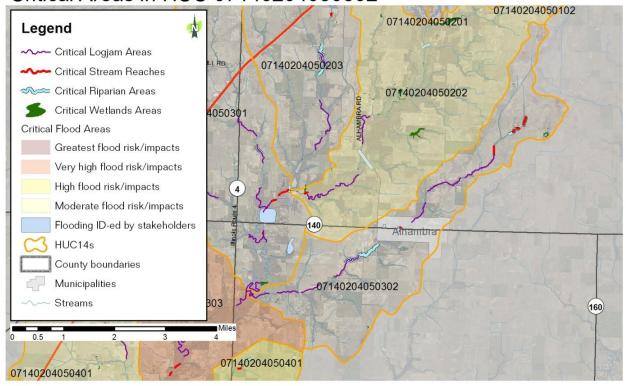




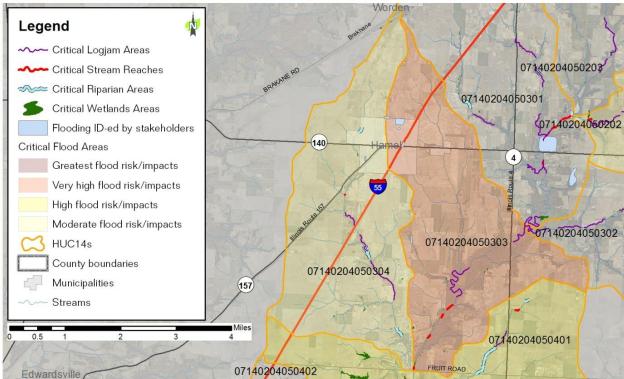




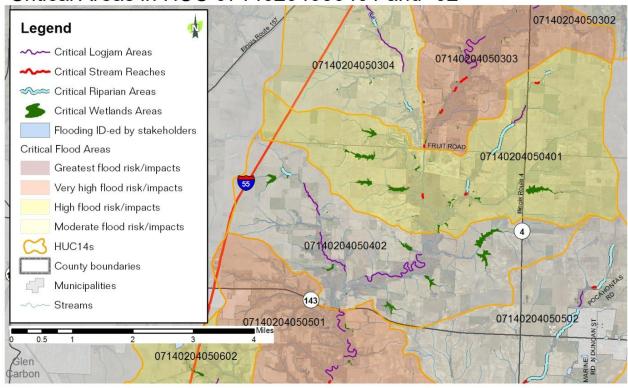


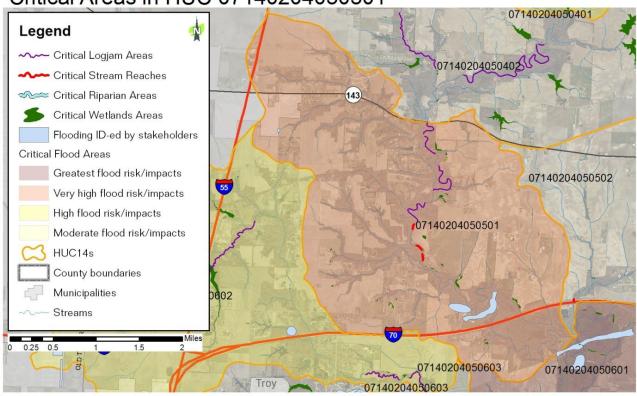


Critical Areas in HUC 07140204050303 and -04

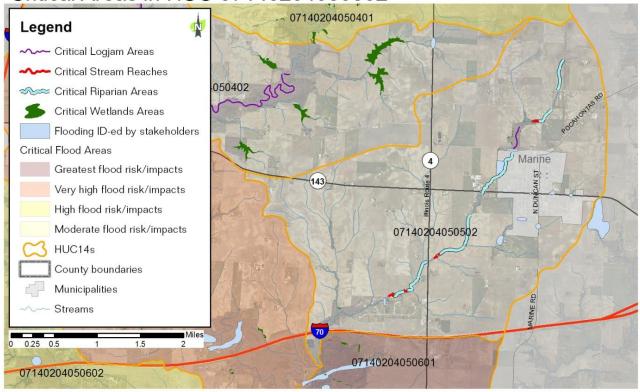


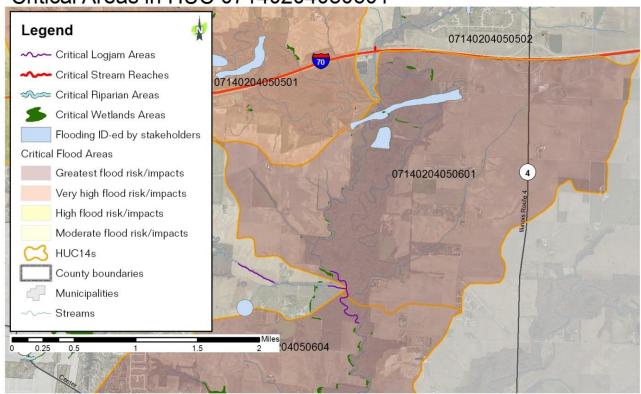
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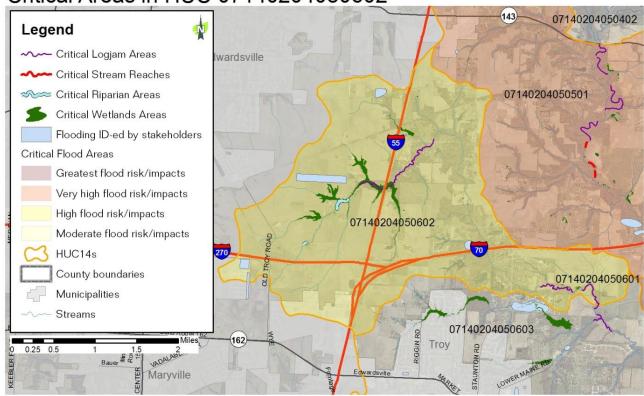


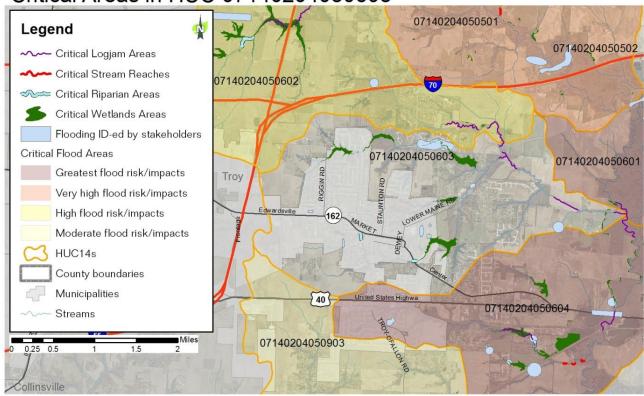


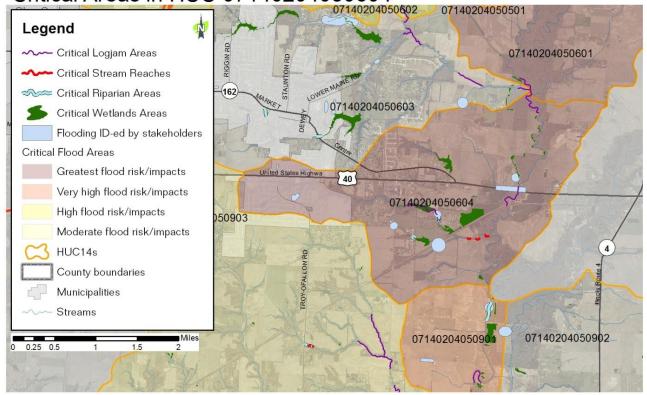


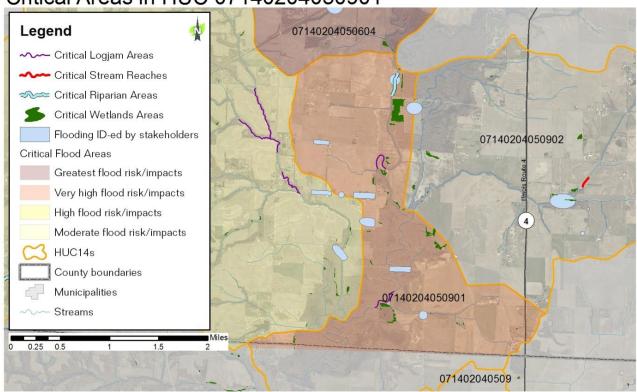




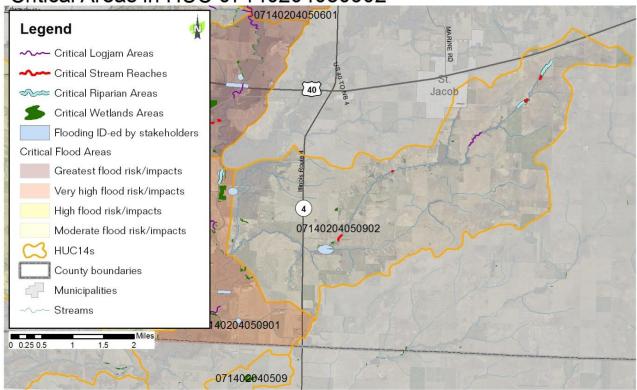


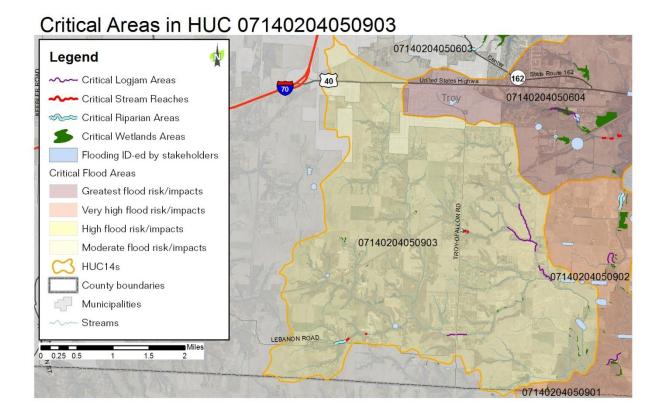












Watershed Impairment Reduction Targets

Establishing "Impairment Reduction Targets" is an important part of the watershed planning process. It enables calculations to be made about how implementation of a suite of Management Measures can be expected to reduce watershed impairments over time. The Implementation Reduction Targets for this Watershed-Based Plan are based on the Illinois Nutrient Loss Reduction Strategy, published by IEPA in 2015. The Strategy describes a comprehensive suite of BMPs for reducing nutrient loads from wastewater treatment plants and urban and agricultural runoff. Its targets are a 25% reduction in phosphorus and a 15% reduction in nitrogen by 2025, with an eventual target of 45% reduction for both nutrients. This Watershed-Based Plan adds a target of a 20% reduction in sediment (Table 5).

Additional watershed-wide impairment reduction targets were established for dissolved oxygen, manganese, fecal coliform, flood damage, habitat degradation, wetlands, surface water infiltration, and private sewage.

Table 5. Watershed-wide impairment reduction targets, their basis, and reductions from Critical Areas and other areas recommended.

Impairment: Cause of	Basis for Impairment	Reduction Target	Reduction from Critical Areas and other areas
Impairment			
Water Quality/Aquatic Life: Phosphorus	264,952 lbs/year of phosphorus loading, based on STEPL model	25% or 66,238 lbs/year reduction in phosphorus loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy	6,194 lbs/year reduction from critical stream reaches and other poor condition stream reaches 11,561 lbs/year reduction from critical riparian areas and other riparian areas 600 lbs/year reduction from critical wetland areas 60,224 lbs/year reduction from other agricultural areas 5,345 lbs/year reduction from other urban areas
TOTAL	I.	I.	77,330 lbs/year or 29.3% total phosphorus reduction
Water Quality/Aquatic Life: Sediment	60,230 tons/year of sediment loading, based on STEPL model	20% or 12,046 tons/year reduction in sediment loading by 2045 (the long-term watershed planning horizon), based on estimated impacts of proposed BMPs. Similar target to phosphorus; sediment is its primary transport mechanism.	567 tons/year reduction from critical stream reaches and other poor condition stream reaches 1,207 tons/year reduction from critical riparian areas and other riparian areas 90 tons/year reduction from critical wetland areas 10,258 tons/year reduction from other agricultural areas 645 tons/year reduction from other urban areas
TOTAL			12,199 tons/year or 20.3% total sediment reduction
Water Quality/Aquatic Life: Nitrogen	1,178,496 lbs/year of nitrogen loading, based on STEPL model	15% or 176,774 lbs/year reduction in nitrogen loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy	26,648 lbs/year reduction from critical stream reaches and other poor condition stream reaches 43,889 lbs/year reduction from critical riparian areas and other riparian areas 1,173 lbs/year reduction from critical wetland areas 299,509 lbs/year reduction from other agricultural areas 22,345 lbs/year reduction from other urban areas
TOTAL	•		366,917 lbs/year or 31.1% total nitrogen reduction
Water Quality/Aquatic Life: Dissolved Oxygen	Minimum 2 mg/L (mean 7.7 mg/L) dissolved oxygen, based on samples collected from the Silver Creek between 1972 and 2011 by the Illinois Water Science Center and IEPA	No samples lower than the minimum concentration in streams: March – July: 5.0 mg/L at any time, 6.0 mg/L daily mean averaged over 7 days August – February: 3.5 mg/L at any time, 4.0 mg/L daily mean averaged over 7 days, 5.5 mg/L daily mean averaged over 30 days Based on 35 III. Adm. Code 302 (Illinois Pollution Control Board (IPCB), 2011).	72,600 feet streambank and channel restoration, including riffle pools and other structures that increase reaeration 57,394 feet (99%) of poor condition riparian areas ecologically restored, including 100% Critical Riparian Areas

Upper Silver Creek Watershed-Based Plan

Impairment: Cause of Impairment	Basis for Impairment	Reduction Target	Reduction from Critical Areas and other areas
Water Quality/Aquatic	Mean 417 μg/L, median 290	No samples higher than the general use	Soil erosion control practices also reducing manganese:
Life: Manganese	μg/L, and maximum 3200 μg/L	water quality standard of 1,000 μg/L,	49 acres contour buffer strips
	dissolved manganese, based on	and a general reduction in the mean	29,032 acres cover crops
	samples collected from Silver	concentration.* Source: Lower Kaskaskia	494 acres grassed waterways
	Creek (1972-2011, Illinois Water	River TMDL Report, 2012.	29,032 acres reduced tillage (conservation tillage/no-till)
	Science Center and IEPA)		100,000 feet terraces
			881 acres Water and Sediment Control basins
Water Quality/Aquatic	Median 630 cfu/100ml fecal	68% or 430 cfu/100 ml reduction by	Reductions following maintenance and replacement as a
Life: Fecal coliform	coliform concentrations, based	2045, to reach geometric mean of 200	result of private sewage inspections
	on samples collected from Silver	cfu/100 ml in a minimum of 5 samples	Reductions following waste (manure) management
	Creek (1972-2011, Illinois Water	taken over ≤30 days; based on 35 III.	systems installation
	Science Center and IEPA)	Adm. Code 302 (IPCB, 2011).	
Flood Damage	26% of Flood Survey	100 acres dry detention basins installed	100 acres dry detention basins installed
	respondents experienced	100 acres wet detention basins installed	100 acres wet detention basins installed
	flooding in the last 10 years,	Retrofits & maintenance of existing	Retrofits & maintenance on all 67 identified existing
	reporting a total of >\$330,016 in	detention basins	detention basins (average size: 1.4 acres)
	costs over that time	Critical Flooding Areas prioritized	Single property flood reduction strategies
Habitat Degradation:	57,918 feet of riparian areas are	100% Critical Riparian Areas restored	57,394 feet (99%) of poor condition riparian areas
Invasive/non-native	currently in poor condition, per	Majority of riparian areas in poor	ecologically restored, including 100% Critical Riparian
plant species in riparian	the aerial assessment results. Of	condition restored	Areas
areas; hydrologic	this, 183,036 feet are Critical	100% Critical Logjam Areas assessed	100% Critical Logjam Areas assessed
changes due to loss of	Riparian Areas. 37.5 miles	5% Critical Logjam areas have logjams	9,900 feet or 5% Critical Logjam areas have logjams
wetlands; logjams	Critical Logjam Area identified.	removed	removed
Wetlands: flood	Thousands of acres of wetlands	100% Critical Wetlands Areas restored	500 acres (100%) Critical Wetlands Areas restored
storage and filtration	lost since pre-settlement; loss of		
functions	ecosystem functions		
Reduced infiltration to	Current 3% impervious cover;	Preservation of open space and	Preservation of open space and infiltration measures in
groundwater	2.8% annual increase in	infiltration measures used in new and	all new and redevelopment, e.g. designed for
	impervious cover (2006-2011);	redevelopment	Conservation Development and green infrastructure
	current 6,981 acres developed	Increase in rain gardens	20,000 sq. ft of rain gardens installed
	open space (2011 NLCD) or	Increase in pervious surfaces in new and	100 rain barrels/cisterns installed
	1,289 acres open space (EWG)	redevelopment	
Private sewage	Over 3,000 private sewage	Reduction in in-stream measured fecal	Reduction in in-stream measured fecal coliform at the
	systems estimated in watershed	coliform (see fecal coliform target above)	USGS gauge site
	Estimated 10% private sewage	Proactive inspection programs for	Proactive county/municipal inspection programs for
	failure rate nationwide	private sewage, not just complaint-based	private sewage, beyond complaint-based assessment

^{*} Note: The public water supply standard is 150 µg/L (eg for Mount Olive & Staunton surface water public supply).

SECTION 4: MANAGEMENT MEASURES ACTION PLAN

Earlier sections summarized the upper Silver Creek watershed's characteristics and causes and sources of impairment. This section provides action steps developed to recommend Management Measures (i.e., Best Management Practices or BMPs) that address the plan's goals.

The Action Plan is divided into two subsections:

- **Programmatic Measures:** general remedial, preventive, and policy watershed-wide Management Measures that can be applied by various stakeholders.
- **Site-Specific Measures:** locations where specific Management Measures can be implemented to improve surface and groundwater quality, green infrastructure, and flooding.

Programmatic Measures include policy changes, environmental monitoring, design processes, and other measures that can be applied by various partner and stakeholder organizations across the watershed. Information and education measures can be considered programmatic measures, but these are outlined separately in the Information and Education Plan section.

Site-Specific Measures: Management Measures (often structural) can be implemented on the ground to improve surface and groundwater quality, green infrastructure, and flooding. Potential locations for these Management Measures have been identified in Critical Areas and with modeling from the USDA's Agricultural Conservation Planning Framework (ACPF). The locations are included on CD in Appendix I. The Site-Specific Management Measures can be divided into agricultural, urban/other, and in-stream types.

Each Management Measure that addresses the goal of improving surface water quality does so by either reducing the availability of pollutants, reducing the pollutants generated, slowing the transport or delivery of pollutants, or causing deposition of the pollutant off-site before it reaches the stream. See Appendix E for in-depth descriptions of the recommended BMPs.

Table 6 shows all Management Measures recommended in this Action Plan, with the primary goal addressed by each measure. Secondary and/or tertiary goals addressed are also identified. Estimates of the pollutant load reduction efficiencies of each measure are also listed for sediment, Total Suspended Solids, phosphorus, and nitrogen.

Values for stormwater quantity control, flood control, flood mitigation, or volume control efficiency were difficult to find for general practices in the literature. The Management Measures descriptions note which practices provide such flood control benefits.

Table 7 shows the Site-Specific Management Measures recommended, along with associated costs and estimated pollutant reductions for sediment, Total Suspended Solids (TSS), phosphorus, and nitrogen.

Note: All recommendations in this section are for guidance only, and are not required by any federal, state, or local agency. Funding for BMPs will be consistent with IEPA's nonpoint source management plan.

Summary of all Management Measures recommended

Table 6. All Management Measures recommended, goals addressed (see goal numbers in Section 2), and pollutant load reduction efficiency.

load reduction efficiency.	Goals addressed			Pollutant load reduction efficiency					
	Primary	Secondary	Tertiary	%	% TSS				
	goal	goal	goal	sediment	removal	% P	% N		
	ddressed	addressed	addressed	removal*	*	removal	removal		
		natic Measure		1	Į.	1	1		
Conservation Development	3								
Federal and state programs (CRP, CREP, etc.)	1	3	4						
Financial support for stormwater infrastructure	2	5							
Flood Damage Prevention Ordinance	2								
Green infrastructure incentives	3								
In-lieu fee mitigation	1	2	3						
Long-term management of natural areas	5	3							
Native landscaping	4	3	2						
Open space and natural area protection	3	5	_						
Private sewage monitoring	1								
Riparian Buffer Ordinance	3	1	5						
Sewage Treatment Plant upgrades	1		<u> </u>						
Stream Cleanup Team	4	2							
Watershed-Based Plan integrated in community efforts	5								
	_	nagement M	02511205						
Agricultural management practices	pecific ivia	magement ivi	easures						
In-Field Practices									
Contour buffer strips	1	4		53%	53%	61%	53%		
Cover crops	1	7		75%	75%	29%	31%		
Reduced tillage (conservation tillage/no-till)	1			75%	75%	45%	55%		
Terrace	1			58%	58%	35%	28%		
	1			75%	75%	70%	65%		
Waste (manure) management Edge-of-Field Practices	1			75%	75%	70%	03%		
Grassed waterways	1			80%	80%	45%	55%		
Ponds	1	2		58%	67%	48%	31%		
Riparian buffers	1	4		53%	53%	43%	38%		
Water and sediment control basins (WASCOBs)	1	2		58%	58%	35%	28%		
Wetlands	1	2	4	78%					
	1		4	78%	78%	44%	20%		
Urban Area Measures	1 2	1	T .	F.00/	C10/	100/	210/		
Dry detention basins, new	2	1		58%	61%	19%	31%		
Wet detention basins, new	2	1	4	58%	67%	48%	31%		
Detention basin retrofits (vegetated buffers, etc.)	2	1	4	53%	73%	45%	40%		
Detention basin maintenance (dredging, invasives, etc.)	2	1		n/a	n/a	n/a	n/a		
Pervious pavement	2	_		70%	18%	55%	60%		
Rain gardens	1	4	2	67%	67%	27%	35%		
Rainwater harvesting & reuse	1	2		n/a	n/a	n/a	n/a		
Single property flood reduction strategies	2			n/a	n/a	n/a	n/a		
Storm drain system maintenance and expansion	2	1		n/a	n/a	n/a	n/a		
In-stream Measures	T	T	T	T	T	1	1		
Streambank & channel restoration	1	4		98%	90%	90%	90%		
Logjam removal	2	1	4	n/a	n/a	n/a	n/a		

^{*}Independently calculated sediment and TSS values were used where available. Where only one sediment or TSS value was available, the corresponding sediment and TSS reduction efficiency was used (purple cells).

Summary of Site-Specific Management Measures recommended

Table 7. A summary of the BMPs (Site-Specific Management Measures) recommended in this plan, including amount, cost, and pollutant load reduction. Information and Education Plan and Monitoring Plan costs are also shown. See Appendix I for a large data table with location information.

% Reduction From Current Total:				20.3%	20.2%	29.3%	31.1%
			. , , -	,===	, ,	, , , , , , , , , , , , , , , , , , , ,	
TOTAL			\$ 47,730,491	12,199	24,293,785	77,730	366,917
Water Quality Monitoring Plan			\$ 25,820***				
Information and Education Plan*			\$ 20,000				
Logjam removal	9,900	linear feet	\$ 297,000	n/a	n/a	n/a	n/a
Streambank & channel restoration	72,600	linear feet	\$ 5,445,000	567	1,046,837	6,194	26,64
In-stream .	•		•	•	•	•	
Storm drain system maintenance and expansion	10,000	linear feet	\$ 765,000	n/a	n/a	n/a	n/a
Single property flood reduction strategies	168	properties	\$ 168,000	n/a	n/a	n/a	n/a
Rainwater harvesting and reuse	100	rain barrels/cisterns	\$ 22,500	n/a	n/a	n/a	n/a
Rain gardens	20,000	sq. ft	\$ 159,800	1	1,691	4	2:
Pervious pavement	100	acres	\$ 7,250,000	192	98,950	1,789	8,39
Detention basin maintenance	94	acres	\$ 88,290	n/a	n/a	n/a	n/a
Detention basin retrofits	94	acres	\$ 1,356,001	135	376,417	1,373	5,25
Wet detention basins, new	100	acres	\$ 4,570,000	158	368,314	1,561	4,33
Dry detention basins, new	100	acres	\$ 4,160,000	158	335,330	618	4,33
Urban Area Measures	300	ucics	, 11,000,071	1 30	179,770	1 300	1,17
Wetlands	500	acres	\$ 11,585,871	90	179,770	600	1,17
Water and sediment control basin	881	acres	\$ 2,300,000	117	233,446	841	2,84
Waste (manure) management	100,000	structures	\$ 2,500,000	0.3	3,454	19	7
Terraces	100,000	inear feet	\$ 330,000	0.3	608	11,561	45,00
Reduced tillage (conservation tillage/no-till) Riparian buffers	29,032 286,968	acres linear feet	\$ 967,639 \$ 2,878,289	5,014 1,207	10,028,700 2413753	35,602 11,561	187,213 43,889
Ponds	100	acres	\$ 1,500,000	13	30,859	131	36
Grassed waterways	494	acres	\$ 1,976,161	91	182,036	606	3,18
Cover crops	29,032	acres	\$ 1,550,023	5,014	10,028,700	22,943	105,52
Contour buffer strips	49	acres	\$ 11,081	6	11,757	81	30
Agricultural management practices	1	Γ	1	1	1	1	r
BMP Name	Amount	Unit	Cost	(tons/yr)	Solids (lbs/yr)**	(lbs/yr)	(lbs/yr)
				Sediment	Total Suspended	Phosphorus	Nitrogen

% Reduction From Current Total:			20.3%	20.2%	29.3%	31.1%
**	1	 C	F: 1			

^{*} Amount estimated for information and outreach activities over 20 years, inclusive of materials but not staff time. Final costs will vary.

^{**} TSS pollutant reduction estimates were used where available. If a separate TSS value could not be found, sediment values in tons/year were converted to lb/year TSS.

^{***} Cost estimate for three years of water quality monitoring per the Monitoring Plan.

Management Measure selection

BMPs were identified from several sources, including the Association of Illinois Soil and Water Conservation Districts (Illinois Urban Manual), USEPA (e.g., the Water Quality Scorecard), and stakeholder engagement. Full descriptions of each Management Measure selected are located in Appendix E.

The Management Measures were selected based on the following factors:

- Performance: Research-based pollutant reduction estimates and flood mitigation attributes for each BMP;
- Cost: The costs associated with installation and maintenance of each BMP;
- Public acceptance; and
- Ease of construction and maintenance.

Pollutant load reduction values and flow/flooding reduction values associated with the Management Measures were identified from several sources, including the U.S. Environmental Protection Agency's Region 5 Load Estimation Model Users Manual and the International Stormwater Best Management Practices (BMP) Database.

Cost estimates were assembled from several sources, including the Illinois Nutrient Loss Reduction Strategy draft (2014), experienced local contractors, and other watershed-based plans. More information on the sources of pollution reduction efficiency values and cost estimates used can be found in Appendix E.

Some BMPs may be more effective when implemented in a treatment train, such as a grassed waterway leading to a detention basin. Combination effects of BMPs depend on the specific practices chosen and their location. The Spreadsheet Tool for Estimating Pollutant Loads (STEPL) can be used to assess combined BMP efficiencies in more detail when a treatment train is proposed.

Management Measures on public land

To increase the ease with which this plan can be implemented when funds become available for the counties and municipalities in the watershed, it is recommended that a shortlist of 5-10 projects are identified for implementation on public land. These projects should improve life safety, address multiple goals of this plan, involve multiple partners, and implement a range of Management Measure types when possible. A shortlist of these projects will help Madison County in its efforts to help communities in the watershed address the needs they identified in the stakeholder engagement process, and provide a near-term jumping off point for plan implementation by and for local government.

Programmatic Management Measures

Programmatic Management Measures are general remedial, preventive, and policy Management Measures that can be applied across the watershed by various stakeholders, including policy-makers.

Conservation Development

Conservation Development, also known as Low Impact Development (LID), Cluster Design, or Open Space Design, is a set of tools for designing development in a way that protects open space, aquatic habitat, and other natural resources. Conservation Development subdivisions are characterized by compact, clustered lots surrounding a common open space, which often includes a waterway, waterbody, or detention area. This facilitates development density needs while preserving the most valuable natural features and ecological functions of a site.

Open space designs have many benefits in comparison to conventional subdivisions: they can reduce impervious cover, stormwater pollutants, construction costs, grading, and the loss of natural areas. Despite these benefits, many communities' zoning ordinances do not permit Conservation Development designs, because of code requirements for minimum lot sizes, setbacks, frontage distances, and more. These ordinances should be amended to allow for the implementation of Conservation Development design.

Federal and state programs

Federal and state agricultural easement and working lands programs such as the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), and the Agricultural Conservation Easement Program (ACEP) are designed to reimburse farmers and landowners for implementing practices that protect soil and water health.

Financial support for stormwater infrastructure

Maintenance of wastewater treatment systems imposes costs on communities that are usually recaptured through municipal property taxes or a sewer fee. Stormwater infrastructure, however, does not often have such dedicated funding, even as municipal separate storm sewer systems (MS4s) are required to meet minimum control measures. Green infrastructure is also not often funded through typical stormwater programs. Several policy approaches can assign dedicated funding for stormwater infrastructure that prevents flooding and allows infiltration. One such approach is to create a Stormwater Utility that charges fees to landowners based on how much stormwater runs off their land.

Flood Damage Prevention Ordinance

All three counties and five communities in the watershed are members of the National Flood Insurance Program (NFIP), and as such, have a Floodplain Ordinance in effect. These ordinances require specific development standards for structures and activities in the 100-year floodplain (as designated by FEMA). Due to increasing flood risk and flood insurance rates due to climatic changes and inadequate or undereffective policies, these ordinances would benefit from an update. In a 2014 report, HeartLands Conservancy reviewed flood prevention BMPs and recommended that Madison County adopt an updated, stand-alone Flood Damage Prevention Ordinance. Subsequently, HeartLands Conservancy created a draft ordinance based on state and regional best practices. The practices recommended include more stringent standards for development in floodplains so that flood damage becomes less likely and less severe.

Green infrastructure incentives

Green infrastructure can be defined as our region's natural resources, including open space, woodlands, wetlands, gardens, trees, and agricultural land. It can also be defined as the nodes and corridors of vegetation over the region, or the site-scale structures and landscaping that recreate natural processes. Green infrastructure results in a higher diversity of plants and animals, removal of non-point source pollution, infiltration of stormwater, and healthier ecosystems. Communities can offer incentives for developers that design for or implement green infrastructure, including flexible implementation of regulations, fee waivers, tax abatement, and streamlining the development review process. These incentives can be granted on a case-by-case basis.

In-lieu fee ecological mitigation

In-lieu fee mitigation is an opportunity to assist developers in meeting their mitigation needs while directing mitigation to high quality sites in the watershed. Under an in-lieu fee program, a developer can pay a fee in lieu of having to restore or protect wetland on the development site, or to mitigate losses of those sites by protecting or restoring wetlands off-site. The fee goes to a third party organization which can direct the funds to high quality ecological sites for which restoration efforts will have the most environmental impact. HeartLands Conservancy is in the final stages of becoming an Approved Program Sponsor within the American Bottoms and Lower Kaskaskia River watersheds. Once approved, project implementation should begin in 2016. Mitigation sites will include both wetlands and streams.

Long-term management of natural areas

Developers should be encouraged to protect sensitive natural areas/open space and create naturalized stormwater management systems (including green infrastructure). These practices are key components of Conservation Development design. Developers should be encouraged to donate natural areas and systems to a public agency or conservation organization for long-term management. This ensures that the natural areas have regular maintenance over time and remain aesthetically pleasing and functional spaces. Alternatively, Homeowners Associations (HOAs) can explicitly take on the management of the natural areas, writing rules about maintenance and fees into their bylaws.

Managing stormwater issues associated with development and urban sprawl

Comprehensive plans and ordinances provide the framework and standards that guide development. Comprehensive plans identify the type of development and land use that would be appropriate for areas within a certain jurisdiction, so that new development is directed to locations for which it is most appropriate. Comprehensive plans should be regularly updated to help to protect valuable natural areas from development and guide new development in ways that minimize negative water quality and flooding impacts. Ordinances are used to control and oversee issues including stormwater management, weed control, division of land, and land development. Ordinance effectiveness and implementation should be periodically reviewed.

Native landscaping

The use of native plants in landscaping on public and private property should be encouraged as a way to enhance stormwater management structures, slow down surface runoff, extend green infrastructure networks, and support wildlife. For example, the Rock Hill Trails subdivision, east of Wood River in unincorporated Madison County, displays several species of native plants in lanscaping put in place through an Illinois EPA 319 grant. Changes to weed control ordinances (or other ordinances that specify plant species to be used in landscaping) may be needed to allow appropriate growth of native plants. Likewise, the removal of invasive species is important in promoting biodiversity.

Open space and natural area protection

Several actions can be taken to encourage the protection of natural areas and open space in new development. These include establishing a dedicated source of funding for open space acquisition and management, creating agriculture zoning districts with very large minimum lot sizes, adopting an open space and parks plan, and adopting regulations to protect steep slopes, wetlands, and other sensitive natural areas.

Private sewage monitoring

Private sewage inspections are required by Madison County during real estate transactions and are performed following complaints, but these can occur many years apart for a single property. More regular inspections (e.g., every 3 to 5 years) should be considered by watershed jurisdictions. An



Open space and natural area protection / land conservation. Photo: USEPA.

intensive inspection of private septic systems in areas with recurring problems should also be considered. Data on private sewage violations and water quality parameter exceedances should be collected and mapped. Connections to public sewer systems should be encouraged in new development. Counties and municipalities can create a Special Service Area (SSA) to fund improvements to localized private sewage problems.

Riparian buffer ordinance

A riparian buffer is an undisturbed naturally vegetated strip of land adjacent to a body of water. Among their many benefits, riparian buffers improve water quality, store floodwater, and provide habitat for wildlife. In this region, oak-hickory forest or prairie grassland are appropriate vegetation types. A riparian buffer ordinance protects a riparian area of a certain width from new development and other disturbances, and promotes revegetation/reforestation.

Sewage Treatment Plant upgrades

Upgrades to wastewater treatment plants in the watershed should be installed so that the limits set in state permits are not exceeded. These improvements can include nutrient removal technologies. Additionally, Sewage Treatment Plants (STPs) can create agreements with a land conservation organization and IEPA to provide payments on a conservation easement that reduces nutrient discharge from agricultural land, in order to offset the plant's discharge. This is a form of Nutrient Credit Trading. USEPA's draft "Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants" document, published in August 2015, is a good source of information about optimizing nutrient removal in different types of treatment systems.

Stream Cleanup Team

A Stream Cleanup Team with funding and resources dedicated to stream cleanup in the watershed would help to improve water quality, reduce flood risk (by removing debris), and monitor stream health. Many county residents were vocal in their support of the grant-funded Stream Cleanup Team that operated in 2008-2009. The program could be expanded from its previous scope to include an education component and roles for volunteers.

Watershed-Based Plan supported and integrated into community plans

Watershed partners, including communities, should adopt or support the Watershed-Based Plan and incorporate its goals and recommended actions into their policies (such as ordinances and comprehensive plans).

Site-Specific Management Measures

The following BMPs are recommended for agricultural, urban/other, and in-stream areas. A watershed-wide summary of these practices, including the amount, cost, and pollutant load reduction, is shown in Table 7. See Appendix E for more detailed descriptions of these BMPs.

Agricultural Measures

Site-Specific Measures for agricultural land are either:

- In-Field Practices, including use of cover crops, reduced tillage techniques, and terraces; or
- Edge-of-Field Practices, including nutrient removal wetlands and riparian buffers (typically larger, sometimes structural practices that are terrain-dependent).

Contour buffer strips, cover crops, reduced tillage, and terraces are in-field practices.

Contour buffer strips

Contour buffer strips are strips of perennial vegetation that alternate with wider cultivated strips down a slope; the crop rows are farmed along the contour. The narrow strips of perennial vegetation are not part of the normal crop rotation. They slow surface runoff and trap sediment, significantly reducing sheet and rill erosion and removing pollutants from runoff.

Cover crops

Cover crops can provide multiple benefits: preventing erosion, improving soil's physical and biological properties, supplying nutrients, improving the availability of soil water, breaking pest cycles, and suppressing weeds. Planted in the fall and/or spring, they take up unused fertilizer, build soil structure, and release nutrients for the following crop to use. The species of cover crop selected along with its timing and management determine the specific benefits.

Reduced tillage (conservation tillage/no-till)

Reducing the extent of tillage is known as conservation tillage; when no tillage is used, it is called no-till. Reducing tillage leads to a reduction in soil erosion and the transport of associated nutrients, such as phosphorus, to the waterways. No-till allows natural soil structure to develop, which results in increased infiltration and reduced runoff.

Terraces

Terraces consist of ridges and channels constructed perpendicular to the slope of a field to intercept runoff water. Terracing is a soil conservation practice that reduces soil erosion and surface runoff on sloping fields. Terraces may be parallel on fairly uniform terrain or vary from parallel when the terrain is undulating. Over 140,000 feet of terraces have been put in place on farmland in neighboring St Clair County between 2010 and 2015 thanks to the efforts of NRCS and other partners.

Grassed waterways, ponds, riparian buffers, waste (manure) management structures, Water and Sediment Control Basins (WASCOBs), and wetlands are typically edge-of field practices.

Grassed waterways

A grassed waterway is a vegetated channel designed to convey surface water at a non-erosive velocity to reduce soil erosion and flooding. Grassed waterways prevent gully erosion and protect water quality. They are most appropriate for areas where there is soil erosion from concentrated runoff.

Ponds

Ponds are popular features that also have significant pollutant removal benefits when well sited and designed. Also known as wet ponds, stormwater ponds, or wet retention ponds, they are constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season). As stormwater runoff enters the pond, the sediment settles out and some nutrient uptake takes place. Nitrogen removal through denitrification can also occur in ponds.

Riparian buffers

Riparian buffers are vegetated zones immediately adjacent to a stream. They protect the stream channel and provide room for streams to move naturally; support habitat; reduce erosion; offer recreational space; and protect water quality. Buffers function as a vegetated filter strip and as overbank erosion protection during peak flows. The vegetation can be native forest, grasses, or shrubs.

Waste (Manure) Management

Livestock produce waste materials, including primarily manure, that need to be well-managed to maintain water quality. Writing a Comprehensive Nutrient Management Plan helps farmers to integrate waste management into overall farm operations. Such a plan can recommend waste storage structures and strategies that increase waste storage time, eliminate unwanted runoff, incorporate manure nutrients into crop nutrient budgets, and efficiently apply manure to cropland without runoff (e.g. manure injection). When these structures and strategies are in place, manure is a useful asset to cropland that provides benefits to soil health. St. Clair county NRCS has implemented 91 acres of nutrient management between 2010 and 2015.

Water and Sediment Control Basins (WASCOBs)

Water and Sediment Control Basins (WASCOBs) are small earthen ridge-and-channel structures or embankments that are built across a small watercourse or area of concentrated flow within a field. They are designed to hold agricultural water so that sediment and sediment-borne phosphorus settle out, reducing the amount of sediment leaving the field and preventing the formation of gullies.

Wetlands

Wetlands, also known as Nutrient Removal Wetlands, consist of a depression created in the landscape where hydric soils allow aquatic vegetation to become established. They are among the most effective stormwater practices in terms of pollutant removal, removing 78% sediment, 44% phosphorus, and 20% nitrogen from runoff according to U.S. EPA's STEPL tool. Wetlands can easily be designed for flood control by providing flood storage above the level of the permanent pool. The wetlands and surrounding buffers also offer environmental benefits such as increases in wildlife habitat and carbon sequestration. Wetlands can be natural or "constructed", meaning that they mimic naturally occurring wetlands. Wetland restoration is an important tool for bringing back the ecosystem services of nutrient removal and flood storage to a drainage area.

Selected Agricultural Management Measures (Best Management Practices, or BMPs).



Above: Terraces. Photo: NRCS.



Above: Grassed waterways. Photo: USDA



Above: Contour buffer strips. Photo: NRCS.



Above: Cover crops. Photo: USDA.

Left: Water and Sediment Control Basin (WASCOB). Photo: Friends of Northern Lake Champaign.

Urban Area Measures

Detention basins

A detention basin is a constructed basin that receives, temporarily stores, and then gradually releases stormwater. They are designed to store flows during the most critical part of the flood and release the stored water as the flood subsides. While detention does not reduce the total volume of runoff from a flood event, it does reduce the peak flow rate and peak. Many are also designed to treat stormwater during storage by removing sediments, nutrients, and other pollutants. Older detention basins may no longer function properly due to inadequate maintenance. Some would benefit from improvements that improve function, such as extended detention outlet structures, planting vegetation, removing sediment, and altering flow-through patterns. Retrofitting existing detention basins can be cheaper than constructing new detention basins. New detention basins (dry and wet), retrofits to existing detention basins (e.g. addition of native vegetation, volume increases), and maintenance of existing basins (e.g. removing silt) are recommended in this plan.

Pervious pavement

Pervious pavement, also referred to as porous or permeable pavement, allows infiltration of stormwater into a below-ground storage area through holes in the pavement. It reduces the amount and rate of stormwater runoff over the ground surface, and is a useful practice for areas requiring a smooth, paved surface that would normally be covered with impervious concrete or asphalt. Pervious pavement is suitable for parking lots, private roads, fire lanes, residential driveways, sidewalks, and bike paths, where the subsoil is of a suitable composition. Pervious pavement does require periodic cleaning with a vacuum to remain effective over time.



Pervious pavement. Photo: Philadelphia Water.

Rain gardens

Rain gardens are vegetated basins that temporarily store and infiltrate rain water. Situated near the lowest point of a small drainage area (such as a single residential lot), they significantly slow the flow of water, improve water quality, and provide food and shelter for birds, butterflies, and insects. Rain gardens can be used in combination with roof downspout disconnection and redirection, so that rainwater from a roof is channeled to the rain garden to infiltrate into the soil, reducing stormwater runoff.



Rain garden. Photo: USEPA.

Rainwater harvesting and reuse

Rainwater harvesting is the collection of rainwater from roofs in structures such as rain barrels or cisterns, so that it can be used or released at a later time. Harvesting and re-using water is a great way of decreasing stormwater runoff during times of peak flow, minimizing water use, and lowering water bills.

Single property flood reduction strategies

Property owners can use a number of practices to reduce flood damage, including many low-cost options. The key to successfully mitigating future damages is to identify the source(s) of flooding at the site scale. It is important to educate property owners about these sources of flooding and appropriate flood reduction strategies.

The Illinois Urban Flooding Awareness Act Final Report, published in June 2015, identified typical causes of basement flooding (overland flow, infiltration, or sewer backup), and mitigation options available to address these causes. These include structural inspections, drain tile, downspout disconnection, rain gardens, and pervious pavement. The full table can be viewed in Appendix E.

Storm drain system maintenance and expansion

Storm drain systems require regular maintenance to function as planned. Cleaning out culverts, ditches, clogged drains, and storm drain inlets reduces the amount of pollutants, trash, and debris entering receiving waters. In some cases, stormwater infrastructure is not appropriately sized to accommodate the flow it receives, due to changes in the upstream drainage area or inappropriate sizing. In some areas, a stormwater pipe designed to convey the 10-year storm based on rainfall data through 1960 would only carry the 6.6-year rainfall estimated from a dataset extending to the 1980's. Culverts, ditches, and detention basins that often overflow should be assessed for potential enlargement. Upgrades are made in response to storm drain system inspections, citizen complaints, and/or updated modeling of the system.



Downspout disconnection, a single property flood reduction strategy. Photo: National Downspout Services.



Storm drain cleaning. Photo: Ann Arundel County, Maryland.

Stone toe protection, one form of streambank restoration that prevents streambank erosion. Photo: Montgomery County, Maryland.

In-Stream Measures

Streambank and channel restoration

Streambank and channel restoration includes several practices. Streambed erosion (incision) is the first consideration for treatment; treatment methods include pool-riffle complexes. Streambank stabilization methods use a combination of bioengineering with native vegetation and hard armoring. These practices are typically implemented together, and often with riparian buffer improvements. They improve water quality by reducing sediment transport and increasing oxygen. Some practices, such as two-stage channels, help to store floodwater during periods of high flow. Riffle-pool sequences help support healthy fish and wildlife habitat by increasing water depth, maintaining water depths during low flow periods, and increasing dissolved oxygen (DO).

Logjams - assessment and removal

A logjam is any woody vegetation, with or without other debris, which obstructs a stream channel and backs up stream water. Beaver populations can increase the number of logjams in an area. Reports of beavers were made by residents in the southern end of the watershed along Silver Creek. Logjams occur naturally, providing beneficial stream structure and cover for fish and wildlife and allowing nutrient-rich sediments to be deposited on adjacent floodplain. Adding and maintaining logjams is sometimes a management improvement for fish habitat.

However, the benefits of logjams can sometimes be outweighed by the drawbacks. Logjams can impact water quality and impede the ability of streams in the watershed to drain and convey water from the land in a timely manner. They increase the impacts of flood events and contribute sediment when water scours the streambanks beside the logjam, taking soil and debris from the bank into the stream channel. Logjams can be beneficial or harmful depending on their size, location, the extent to which they stabilize streambanks, and the condition and land use of the riparian area. The decision to remove a logjam should be made following a thorough site inspection.



Logjam removal. Photo: Downriver Citizens for a Safe Environment, Michigan.

SECTION 5: MONITORING PLAN

Water quality monitoring in the upper Silver Creek watershed will provide data that can be used to support future resource management decisions and assess the effectiveness of agricultural and urban BMPs that are implemented. The National Great Rivers Research and Education Center (NGRREC), a partner on this plan, is well-situated to conduct this monitoring.

Continuous and discrete monitoring

Continuous monitoring at the U.S. Geological Survey (USGS) gauge 05594450 located on the main stem of Silver Creek (near Route 40, east of Troy) will provide a broad assessment of the effect of land management practices in the watershed on surface water quality throughout the year. It will also allow trends to be identified by comparing new monitoring data to historical water quality data collected by USGS and the Illinois Water Sciences Center (IWSC) from this same location during several periods from 1974 to 2011.

In addition to continuous monitoring at the USGS gauge, secondary monitoring stations will be added upstream from the USGS gauge in order to identify the relative contributions of HUC14 watersheds to overall water quality in the larger watershed. A sampling location will be identified near the outflow of each HUC14 and water samples will be collected quarterly to determine seasonal variations in water quality. Additional sampling will be done during major storm flow events. See Appendix F for more detail on the recommended Monitoring Plan components. The estimated cost of continuous and discrete monitoring by NGRREC over a three year period (through 2018) is \$25,820.

Parameters to be monitored

The following parameters will be monitored, although not all parameters will be measured for each sampling event or at each location.

- Flow
- Sediment (Total Suspended Solids)
- Total Phosphorus
- Total Nitrogen
- Non-Purgeable Organic Carbon (NPOC)
- Soluble reactive phosphate (SRP)
- Nitrite+nitrate-nitrogen (NO₂+NO₃-N)
- Ammonium-nitrogen (NH₄-N)
- Macroinvertebrate population diversity and associated stream health



ISCO sampler collecting water quality data. A sampler like this will be used for water quality monitoring in the upper Silver Creek watershed. Photo: the University of Delaware.

Monitoring timeline

NGRREC's sampling schedule began in October 2015 with the selection of discrete HUC14 sampling sites (Table 8). As funding allows, the collection and analysis of monitoring data should be continued on a 3-5 year cycle through the year 2025. Opportunities for continuing or expanding the monitoring program should be evaluated in order to further assess water quality conditions throughout the watershed, the causes and sources of pollution, the impact of nonpoint source pollution, and changes in water quality related to implementation of the Watershed-Based Plan as well as social indicator data related to the plan's goals and objectives. Quality Assurance Project Plans (QAPP) should be developed for those monitoring opportunities that are selected for implementation in support of the Watershed-Based Plan.

Table 8. Water quality monitoring timeline. Monitoring activities likely to be conducted primarily by NGRREC and Illinois RiverWatch.

		201	5		20	16											20	17					2018 - 2025
	Monitoring Activity	Se O		N	Ja	F	М	M A		J	J A		s	0	N	D	Ja F	F	М	Α	М	J	
	Develop Standard Operating Procedures for collection																						
	and laboratory analysis of samples																						
	Bi-weekly sampling of USGS gage site 05594450																						
2.1	Install continuous monitoring equipment																						
2.2	Monitor TSS, TP, TN, NPOC																						
2.3	Evaluate and adjust continous monitoring plan																						
2.4	Monitor TSS, TP, TN, NPOC based on revised plan																						
	Discrete sampling at the HUC14 level																						
3.1	Establishment HUC 14 discrete sampling sites																						
3.2	TSS, TP, TN, NPOC, SRP, inorganic N																						
3.3	Analyze for soluble Mn																						
3.4	Evaluate and adjust discrete monitoring plan																						
3.5	Continue discrete monitoring based on revised plan																						

SECTION 6: INFORMATION & EDUCATION PLAN

This section is designed to address USEPA Element E by providing an Information & Education component to spark interest in and enhance public understanding of the Watershed-Based Plan, and to encourage early and continued participation in selecting, designing, and implementing its recommendations. It explores Goal 6 of this plan, "Promote public awareness, understanding and stewardship of the upper Silver Creek watershed and the Watershed-Based Plan."

The upper Silver Creek watershed faces challenges and threats from high nutrient and sediment loads, streambank erosion and channelization, increasing development and land use changes, invasive species, and widespread flooding. Key audiences lack the knowledge and resources to make informed decisions and adopt constructive behaviors to mitigate these challenges and threats.

Since a significant amount of the upper Silver Creek watershed is held as private property, education and outreach efforts to engage those landowners and other key stakeholders are needed to improve water quality and achieve other goals of this plan. A single regulatory agency or group working alone cannot be as effective in reducing stormwater pollution as a combined effort with other groups in the watershed all working towards the same goal. Many people will commit to protecting and improving the watershed if they understand what to do and how it will help.

This Information and Education Plan will serve as an outline for outreach that supports achievement of the long-term goals and objectives of the Watershed-Based Plan. The cumulative actions of individuals and communities across the watershed can accomplish these goals and objectives. County, municipal and township staffs, elected officials, and other key stakeholders have tools at their disposal to establish best practices in their activities and procedures. Developers can follow guidelines that consider watershed health, and residents in the watershed can be actively involved in monitoring, protecting, and restoring Silver Creek and its tributaries. As these stakeholders become aware of the creek's location and needs and adopt specific behaviors to improve its health, the threats and challenges in the watershed will decrease. Public information and stakeholder education efforts will ultimately inspire watershed residents and community members to adopt recommended behaviors that improve the water quality and overall health of the watershed.

Information and Education Process

To develop the strategies for the Information and Education Plan, the following questions were asked:

- Who can affect this issue?
- What actions can people take to address it?
- What do people need to know before they can take action?



Watershed residents at a 2015 open house event. Photo: HeartLands Conservancy.

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The list of activities has been divided into three broad timeline categories: short-term, medium-term, and long-term. The full list of objectives and activities can be found in Table 9. A rough estimate of the cost of the outreach activities outlined in this plan (Table 9) is \$20,000, which includes many unforeseeable component costs including staff time and costs for rental and materials.

Target Audiences

Key stakeholder audiences that can effect significant changes in watershed health, and who should be reached by outreach and education, include:

- Madison County Government Departments and elected officials
- Municipal staff, township staff, and elected officials (including Municipal Separate Storm Sewer System (MS4) Co-Permittee Group Members)
- Homeowners associations (HOAs)
- Developers
- Residents with property adjacent to Silver Creek and its tributaries
- Residents throughout the watershed
- Farmers and farm groups
- Students and schools/universities

Decision-makers are an important audience that can impact all the other audiences by controlling long-term regulatory actions and policy initiatives. Madison County staff, members of the Technical Committee, and watershed residents can be messengers to reach the decision-maker audience.

Jurisdictions with Phase II MS4s are required to educate their communities on the pollution potential of common activities such as littering, disposing of trash and recyclables, disposing of pet-waste, applying lawn-chemicals, washing cars, changing motor-oil on impervious driveways, and household behaviors like disposing leftover paint and household chemicals.

Some of the homeowners' associations (HOAs) for subdivisions in the area have a shared detention or retention basin. However, these basins are often not covered by a maintenance agreement, and after some time will fill up with sediment and deteriorate in function. For new subdivisions, it is important for HOAs to designate funding and a maintenance schedule for management of detention and retention infrastructure. If possible, existing HOAs should adopt maintenance by-laws.

Residents of the watershed often feel a deep connection to their neighborhood and to the land on which they live. Several families in the watershed can trace their ancestry back for generations to European settlers who put down roots in the area in the 1800's. Outreach with messages that emphasize sustaining the rich soil and the landscape for the next generation is likely to resonate with this audience.

Residents with property adjacent to Silver Creek and its tributaries will be more willing to make changes to the creek on their property if they understand how it can enhance their property and its value. They should also be made aware of landscaping BMPs along the creek, in terms of beneficial or harmful structures, vegetation, and management practices.

Activities and Tools

Before the plan is complete

Making this Watershed-Based Plan available to stakeholders, and informing them of its location and contents, is a major component of the Information and Education Plan. To this end, the Plan document will be promoted and available for download on the Watershed-Based Plan website hosted by HeartLands Conservancy, www.heartlandsconservancy.org/uppersilvercreek. Printed copies of the Executive Summary and the full Plan will also be shared with key watershed stakeholders. Emails to stakeholders engaged in the planning process provided updates on the Plan's progress and point to the website for all Plan materials.

Landowner/farmer survey

Another key component of the Information and Education Plan is a survey to that was sent out to over 1,000 landowners in the watershed who own parcels of at least 5 acres in size. HeartLands Conservancy and Madison County collaborated to send out this survey in summer 2015, and responses continue to be received. The aim of the survey was to create awareness among landowners about the types of grants that are available to them to implement the BMPs recommended in this Watershed Plan. This will help in creating a seamless transition between the planning and implementation processes, and will keep momentum going after the Plan is complete. See Appendix C for the Landowner/Farmer Survey and its preliminary results.

After the plan is complete

Table 9 outlines each objective followed by recommended strategies that can be implemented to achieve the goals/objectives. For each activity, a target audience, suggested strategies, schedule, lead and supporting agencies, the desired outcomes and issues addressed, and estimated costs to implement is provided. Periodic review of the Watershed-Based Plan is recommended, with meetings of the plan partners held twice a year, at six month intervals. Larger annual meetings may be held to include stakeholders and the public. Plan revision should be considered at 5-year intervals.

Table 9. Information and Education Plan recommended programs and strategies. Acronyms used: HLC: HeartLands Conservancy; NGRREC: National Great Rivers Research and Education Center; SWCD: Soil and Water Conservation District; CREP: Conservation Reserve Enhancement Program.

Program	Target Audience(s)	Strategies	Schedule	Lead & Supporting Orgs	Desired Outcomes/Issues Addressed	Est. Cost
Objective 6.1: Identi	Municipalities	 Coal, state, and federal agencies and stakeholders with Connect officials and staff to resources about water quality, best practices for stormwater management, and flooding Provide sample permitting language, ordinances, and lists of preferred practices Discuss projects for shortlist of Management Measures on public land Invite FEMA to present about floodplain management and flood insurance. Share case studies of conservation development Present at municipal council and committee meetings Share sample funding structures for infrastructure changes Share GIS data and maps from the Watershed-Based Plan to aid municipal decision- making 	Long- Term	Madison County	 Municipalities adopt green infrastructure practices as part of development plans, permits and ordinances. Developers follow recommended practices in new and retrofitted developments. More stormwater is infiltrated, water quality is improved, problematic flooding is reduced, and wildlife habitat is preserved. 	Staff time
Watershed- Based Plan Outreach	Watershed residents, developers, municipalities	 Mail or e-mail Executive Summary of the Watershed-Based Plan to municipalities and key stakeholders Final plan and recommendations on web page. Post progress updates. Press release announcing completed plan. Meetings of the watershed plan partners held twice a year, at six month intervals. Possible larger annual meeting to include stakeholders and the public. Plan revision considered at 5-year intervals. 	Short- Term	Madison County, HLC, other partners	 Majority of watershed residents have knowledge of watershed conditions, possible behavior improvements, and key contacts to get involved and implement projects. The public begins to alter activities leading to watershed improvement. 	Printing: \$200

Program	Target Audience(s)	Strategies	Schedule	Lead & Supporting Orgs	Desired Outcomes/Issues Addressed	Est. Cost
Agricultural BMP Workshop	Rural Landowners, Farmers	 to decision-makers and experts with knowledge about and demonstrate recommended BMPs. Provide information about available funding for BMPs. 	Medium- Term	SWCD or HLC	Farmers and landowners learn about and implement BMPs, as well as funding/ program support.	\$500 Materials + Staff time
BMP or Demonstration Project Tour	Watershed residents, developers, municipalities, farmers	 Take participants on a tour of BMPs in this area, such as NGRREC or a farm enrolled in CREP. Host a demonstration project event, such as a demonstration on cover crops. 	Short-term	Madison County, NGRREC, Farm Bureau, SWCD	 Landowners/ stakeholders learn about BMPs and can visualize them on their property. Increase in landowners implementing BMPs. Soil erosion is reduced and stormwater is infiltrated. 	\$1,000 per tour
Public Events Booth	Watershed residents	Host a booth with materials about the plan, water quality, stormwater management, flooding, and BMPs at public events, such as county fairs, environmental fests, etc.	Ongoing	Madison County, HLC, NGRREC	 Residents understand importance of healthy watershed. Property owners in flood-prone areas understand and monitor development upstream to prevent flood problems from increasing. Residents understand the location of floodplains and why they should obtain flood insurance. 	\$150 per event

Program	Target Audience(s)	Strategies	Schedule	Lead & Supporting Orgs	Desired Outcomes/Issues Addressed	Est. Cost
Objective 6.3: Offer of	opportunities for education	n, training, and participation in watershed matters.				
Field Days	Residents, Students, Non Profits, Volunteer Groups	 Organize stream cleanup volunteer opportunities. Promote volunteer field days through media, social media, and community groups. "Adopt a Stream" program (similar to Adopt a Road) HOA Basin/Pond Maintenance Field Days 	Medium- Term	HLC, Madison County, Sierra Club, existing volunteer groups	 Amount of debris is reduced in streams. People develop an interest in watershed protection and conservation. Invasive species are removed and participants learn how to manage invasives on their own. Leverages in-kind donations for future grants. Riparian area and habitat conditions improve. Stormwater storage features are maintained/capacity is increased. 	\$500 per event
Educational Signs	Residents, Visitors	 Mark watershed boundaries with signs Post warning signs about littering and illegal dumping 	Medium- Term	Madison County	 People better understand the term "watershed". Littering and illegal dumping is reduced. Awareness of the watershed's boundaries are increased. 	\$2,000 (20 signs)
School Projects	Students, Parents	 Develop age-appropriate project opportunities for schools or colleges such as rain gauge maintenance, rainscaping, wildlife habitat restoration, and geocaching. 	Long-term	Madison County	 Students and parents develop interest in watershed protection and conservation. 	Equip- ment costs and staff time
Objective 6.4: Develo	op public recognition progr	rams focused on the Watershed-Based Plan's goals.				
Watershed Protection Awareness	All County Stakeholders	 Develop messaging based on goals in the Watershed-Based Plan and disseminate the message using media, social media, collateral (e.g. pencils, bumper stickers, temporary tattoos), and other materials. 	Medium- term	Madison County	 Increased interest and understanding of watershed protection and the Watershed- Based Plan's goals. Water quality and habitat conditions are improved. 	Cost of materials and ads

Additional resources

The following resources have been compiled either as other successful campaign examples, or as inspiration for ways to implement the activities identified in Table 10.

Table 10. Resources and tools for activities/campaigns.

Activity / Campaign	Activity / Campaign Tools and Resources
Examples	
"How's My	Quick information about waterways, presented in plain language, from USEPA.
Waterway?"	http://watersgeo.epa.gov/mywaterway/
	Links and information on streamflow, water quality, and groups working on
Surf Your Watershed	environmental protection in your watershed, from USEPA.
	http://cfpub.epa.gov/surf/locate/index.cfm
Storm drain stencilling	Free storm drain stencil kits with directions.
Storm drain stendining	http://prairierivers.org/articles/2008/09/stenciling/
	Illinois RiverWatch and the National Great Rivers Research and Education Center
Student and citizen	(NGRREC) (http://www.ngrrec.org/riverwatch/). Stream monitoring manual, kit
monitoring	supply lists, monitoring guidelines, identification keys, biotic index calculator, and
	volunteer training.
Native plants	List of Illinois native plant species: www.wildflower.org/collections
Flooding	How to prepare for and prevent flooding: www.ready.gov/floods
Green Infrastructure	Chicago Wilderness Green Infrastructure Vision and data:
Green initiastructure	www.cmap.illinois.gov/green-infrastructure
River/stream cleanup	American Rivers: www.americanrivers.org/take-action/cleanup. Living Lands and
Miver/stream treamup	Waters: http://livinglandsandwaters.org/
	Sustainable backyard tours in St. Louis:
	http://www.sustainablebackyardtour.com/grassrootsgreenstl.com/Home.html
Sustainable backyards	Urban farm and chicken coop tour in Alton:
Justaillable backyalus	http://www.sierraclubppg.org/index.cfm?page=2970&eventID=12083&view=event
	Conservation@Home program
	The National Wildlife Federation's Certified Wildlife Habitat program

SECTION 7: IMPLEMENTATION

Implementing the recommendations in this Watershed-Based Plan will take time and commitment from partners and stakeholders. No single stakeholder has all of the financial or technical resources to implement the plan. Successful implementation will require stakeholders working together, using their individual strengths. Key partners and stakeholders and their roles are listed in the Watershed Resource Inventory (Appendix A).

Implementation Schedule

The Implementation Schedule provides a timeline for when the recommended Management Measures should be implemented in relationship to each other, allowing reasonable amounts of time for preparing for and transitioning between projects.

The Management Measures are recommended for the short term (1-10 years), medium term (10-20 years), long-term (20+ years), ongoing (for maintenance activities), or as-needed. The "Information and Education Plan" also uses these schedule options. The schedule was arranged to accommodate practices based on practice type, available funds, technical assistance needs, and timeframe for each recommendation. Higher priority was given to practices that address an issue in a Critical Area, greater amount of the practice recommended, greater eligibility for state and federal programs, and perceived general knowledge of the practices. Projects in Critical Areas are given highest priority in the schedule, and planned for the short term where feasible (Table 11).

Table 11. Implementation schedule for Management Measures, watershed-wide. Acronyms used: NRCS: Natural Resources Conservation Service; SWCD: Soil and Water Conservation District; NGRREC: the National Great Rivers Research and Education Center; IEPA: Illinois Environmental Protection Agency; FEMA: Federal Emergency Management Agency; HOA: Homeowners Association; HLC: HeartLands Conservancy.

BMP/Management Measure Recommended	Responsible entity / entities	Priority	Sources of Technical Assistance	Implementati on Schedule
SITE-SPECIFIC MANAGEMENT MEASURES	l.			
Agricultural management practices				
Contour buffer strips	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Medium term
Cover crops	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Ongoing
Grassed waterways	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Medium term
Ponds	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Medium term
Reduced tillage (conservation tillage/notill)	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Ongoing
Riparian buffers	Landowners/ farmers	High: Critical Areas	NRCS, Ecological consultant/ contractor	Short term
Terraces	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Long term
Waste storage structure	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Medium term
Water and sediment control basin	Landowners/ farmers	Medium	NRCS, SWCD, contractor	Medium term
Wetlands	Landowners/ farmers	High: Critical Areas	USACE, NRCS, Ecological consultant/contractor	Short term
Urban/Other Measures				•
Dry detention basins, new	Developers, residents, municipalities, HOAs, landowners/farmers	Low	SWCD, contractor	Long term
Wet detention basins, new	Developers, residents, municipalities, HOAs, landowners/farmers	Low	SWCD, contractor	Long term
Detention basin retrofits (native vegetation buffers, etc.)	Municipalities, residents, HOAs, landowners/farmers	Medium	SWCD, contractor	Medium term
Detention basin maintenance (dredging, mowing, burning, invasives, etc.)	Municipalities, residents, HOAs, landowners/farmers	Medium	SWCD, contractor	Ongoing/ As needed
Pervious pavement	Developers, municipalities, residents	Low	NGRREC, IEPA	Long term
Rain gardens	Residents, industry/ commercial	Medium	NGRREC, IEPA	Medium term
Rainwater harvesting & reuse	Residents, industry/ commercial	Low	NGRREC, IEPA	Long term
Single property flood reduction strategies	Residents, industry/ commercial	High: Critical Areas	FEMA, contractors	Short term
Storm drain system maintenance and expansion	Municipalities, HOAs	Medium	Contractors	Ongoing/ As needed

Table 11 continued.

In-stream Measures				
Streambank & channel restoration	Landowners/ farmers, residents, municipalities	High: Critical Areas	Ecological consultant/ contractor	Short term
Logjam removal	Landowners/ farmers, residents, municipalities	High: Critical Areas	Ecological consultant/ contractor	Short term
PROGRAMMATIC MANAGEMENT MEASU	RES			•
Conservation Development	Counties, municipalities, developers	Medium	Urban planners, planning resources	Medium term
Federal and state programs (CRP, CREP, etc.)	Landowners/farmers, NRCS, SWCD	Medium	NRCS, SWCD, NGRREC	Medium term
Financial support for stormwater infrastructure	Counties, municipalities	Medium	Regional/statewide community examples	Long term
Flood Damage Prevention Ordinance	Counties, municipalities	Medium	IDNR, FEMA, HLC	Medium term
Green infrastructure incentives	Counties, municipalities, developers	Low	IEPA, HLC, regional/statewide community examples	Long term
In-lieu fee mitigation	Developers, HeartLands Conservancy	Medium	USACE, IDNR, HLC	Ongoing (as development occurs)
Long-term management of natural areas	Developers, HOAs, conservation organizations	Medium	IDNR, HLC	As needed
Native landscaping	Counties, municipalities, developers, residents	Low	IDNR, regional/statewide community examples	Long term
Open space and natural area protection	Counties, municipalities, developers	Medium	IDNR, regional/statewide community examples	Medium term
Private sewage monitoring	Counties, residents, some HOAs	Medium	Counties, IEPA	Ongoing
Riparian Buffer Ordinance	Counties, municipalities	Medium	IDNR, HLC	Medium term
Sewage Treatment Plant upgrades	Municipalities, STP operators	Low	IEPA, contractors	Long term
Stream Cleanup Team	Counties, residents	Low	Madison County, Sierra Club	Long term
Watershed-Based Plan supported and integrated into community plans	Counties, municipalities	Low	Watershed-Based Plan partners	Short term
Information and Education Plan	Several entities	High	Counties, HLC	Ongoing
Water Quality Monitoring Plan	NGRREC	High	NGRREC	Ongoing

Funding Sources

Many opportunities are available to secure funding for the varied and diverse Management Measure recommendations in this plan. Entities such as government agencies, non-profit organizations, and companies that provide funding for watershed improvement projects often require that partnerships are in place and funds are leveraged. Table 12 shows potential funding sources for agricultural and instream BMPs recommended in this plan. A longer list of potential funding programs and opportunities is included in Appendix G.

Funds can come from existing grant programs run by a public agency or other organization. An application must be submitted, and if the project meets the program criteria, funds may be awarded. Funds can also come from partner organizations through other avenues. Partners may wish to become involved if the project helps to achieve their objectives, is a priority, is attractive, or is a networking opportunity. Partnerships are critical for leveraging not only funds, but also other assets including political support; partners can leverage valuable goodwill and relationships that have the potential to lead to other support from secondary sources. Neighborhood associations, homeowner associations (HOAs), and others that live nearby should be involved if the project is to be successful over the long term. Their goodwill can be very important in leveraging funding and maintaining an effective project.

Identifying suitable partners to support a specific project involves assessing the organizations' jurisdictional, programmatic, and fiscal priorities and limitations. Different partners will be attracted to different projects. Because of the differences between partner organizations, the process for one project will not often be fully replicable. Given this fact, it is a wise practice to maintain relationships and communication with and between partners. This will help partners to enrich grant applications and identify other funding opportunities which might not readily be apparent. Each partner organization should have a specific staff member responsible for maintaining these connections. One or two enthusiastic individuals or "champions" who believe that engagement in this process is in the interests of all the partners can make a huge difference in the success of a partnership.

Table 12. Funding sources for agricultural and in-stream BMPs from state and federal programs. CRP: Conservation Reserve Program, from USDA. CPP: Conservation Practice Program, from USDA. EQIP: Environmental Quality Incentives Program, from USDA. CSP: Conservation Stewardship Program, from USDA. WRE: Wetland Reserve Easement program, from USDA. SSRP: Streambank Stabilization and Restoration Program, from the State of Illinois. 319: Illinois EPA funding under Section 319 of the Clean Water Act for addressing nonpoint source pollution.

BMP/Management Measure Recommended	Program(s) for which Practices are Eligible
Agricultural management practices	
Contour buffer strips	CRP, CPP, EQIP, 319
Cover crops	EQIP, CPP, CSP, 319
Grassed waterways	CRP, EQIP, CPP, 319
Ponds	EQIP (if sole livestock drinking water source), 319
Reduced tillage (conservation tillage/no-till)	EQIP (no-till only), CSP, 319
Riparian buffers	CRP, CREP, EQIP, 319
Terraces	EQIP, CPP, 319
Waste storage structure	EQIP, 319
Water and sediment control basin	EQIP, CPP, CRP (as part of selected other structures), 319
Wetlands	CRP, CREP, WRE, 319
In-stream Measures	·
Streambank & channel restoration	SSRP, 319

SECTION 8: MEASURING SUCCESS

The success of the Watershed-Based Plan can be measured by tracking several indicators at several milestone points in time. Success can be documented in terms of:

- Action Plan effectiveness: the absolute improvements seen in water quality, flooding, habitat, and other plan goals; and
- Action Plan implementation: the number and extent of Management Measures implemented, understood as a proxy for absolute improvements.

For both of these dimensions, measurement indicators were identified that would establish the progress made towards each goal of the plan. Interim milestones were established for each indicator so that improvements in effectiveness and extent of implementation could be tracked. Rather than waiting several years to measure the effectiveness of the plan, measuring ongoing improvement allows for more dynamic, directed, and effective implementation.

Measurement indicators

Measurement indicators were established to determine whether and how much progress is being made towards achieving each of the goals of the plan (Table 13).

Interim milestones

Milestones represent time periods or deadlines for meeting watershed plan objectives. Tracking milestones allows for adaptive management; if milestones are not being met, the most current information can be used to implement a course correction or a plan update.

Meetings of the watershed plan partners should be held twice a year, at six month intervals, in order to assess the progress of the plan and address deficiencies in its implementation. The partners may also hold a larger annual meeting to which stakeholders and the public will be invited. The need for a plan revision will be assessed at 5-year intervals. When deficiencies in plan implementation are identified, the plan's timeline and focus should be revised to address the issues. The watershed planning process of issue identification, goal-setting, and management measure recommendation should be reiterated, paying special attention to current data and new data sources.

A set of Progress Report Cards was developed for the watershed with milestones for the short-term (1-10 years; 2016-2026), medium-term (10-20 years; 2026-2036), and long-term (20+ years; 2036+) timeframes. The milestones and scorecard can be used to identify and track plan implementation and effectiveness. Checking in on the measurement indicators at the appropriate milestones helps watershed partners to make corrections as necessary and ensure that progress is being made towards achieving the plan's goals.

The Progress Report Cards provide for each goal:

- 1. Summaries of current conditions
- 2. Measures of progress (Measurement Indicators)
- 3. Milestones for short-, medium-, and long-term timeframes
- 4. Sources of data required to evaluate milestones
- 5. Notes section

Grades for each milestone term should be calculated using the following scale:

Grade	Percentage milestones met	
Α	80-100%	
В	60-79%	
С	40-59%	
Fail	<40%	

Lack of progress can be demonstrated where water quality monitoring results show no improvement, new environmental problems, lack of technical assistance, or lack of funds. These factors should be explained in the Notes section of the scorecard.

The Progress Report Cards should be used at every biannual meeting of the watershed plan partners, and should be fully filled out and evaluated every five years to determine if sufficient progress is being made and whether remedial actions are needed.

The Progress Report Cards can be found in Appendix H.

Table 13. Measures of success and measurement indicators for each watershed-based plan goal. Specific interim milestones incorporating these measurement indicators can be found in the Progress Report Cards in Appendix H.

Goal(s) Addressed	Measure of Success	Measurement Indicators
All goals	Projects & Practices Implemented: BMPs to manage stormwater runoff, including those that encourage infiltration, clean water of pollutants, and replenish groundwater.	Number and extent of Management Measures (BMPs) implemented on public and private land, wherever such data is available.
	Financial and Technical Assistance Secured: Sources of funding and technical assistance committed towards plan implementation.	Number of funding sources secured for plan implementation. Number of partnerships developed that provide technical and/or financial assistance.
Surface Water Quality	Use Impairments: The reduction of use impairments as defined by IEPA.	Removal of Silver Creek and Troy Creek from the IEPA 303(d) list.
	Pollutant Loads: A decrease in pollutants observed through water quality monitoring.	Concentrations and loads of in-stream pollutants including phosphorus and sediment (see Monitoring Plan), to measure against plan target reductions.
	Point-source Pollution Facility Upgrades: Upgrades to facilities such as sewage treatment plants and others that require a NPDES permit.	Nutrient removal technologies incorporated into upgrades of wastewater treatment plants in the watershed. New pollutant loads in effluent.
	Connecting to Public Sewers: Connection of new and existing properties to public sewers so that individual septic systems are no longer needed.	Percentage of new development projects with private sewer. Number of existing on-site treatment systems connected to public sewers.
	Inspection and Maintenance of On-Site Waste Systems: Local government codes and programs for on-site treatment systems.	Number and extent of local ordinances requiring regular inspection and maintenance of on-site sewage systems. Number of county/municipal programs inspecting more frequently than is complaint-driven.
Surface Water Quality / Flooding and Flood Damage	Wetlands: Restoring and creating wetlands, which are very effective at storing and filtering stormwater.	Number and acreage of wetland construction/restoration, enhancement, and protection.
Flooding and Flood Damage	Stream Discharge: Moderate peak flows and adequate minimum stream flows.	Stream flow data from the USGS gauge on mainstem Silver Creek, plus flow data collected under the Monitoring Plan at other HUC14 locations. Data correlated with rainfall.
	Flood Protection Ordinances: Enaction of local ordinances to restrict construction in floodplains and floodprone areas.	Number and extent of flood damage prevention ordinances, riparian buffer ordinances, and other actions by local governments to restrict construction in floodplains and riparian areas.
Environmentally Sensitive Development Practices	Infiltration: Practices allowing stormwater to infiltrate to groundwater.	Area of impervious surfaces in new development (see NLCD Percent Developed Impervious Surface dataset) and number of detention basins or other stormwater infrastructure constructed and retrofitted to allow more infiltration.

Table 13 continued.

Goal(s) Addressed	Measure of Success	Measurement Indicators
Environmentally Sensitive Development Practices	Land Conservation: Preservation of sensitive lands.	Acreage of land enrolled in conservation easements including CRP and CREP, and number of new development proposals using Conservation Development design to protect natural features.
	Green Infrastructure Implementation: Encouragement of green infrastructure and native landscaping, including incentives for developers that design for or implement it.	Number of counties/municipalities implementing green infrastructure incentives, eg flexible regulation implementation, fee waivers, tax abatement, and streamlined development review process. Number of ordinance changes allowing/encouraging native landscaping.
	In-Lieu Fee Mitigation: Program that allows and incentivizes wetland and streambank restoration in impactful locations	Number of acres wetland restored and number of feet streambank restored under in-lieu fee mitigation program.
Flooding and Flood Damage/ Fish and Wildlife Habitat	Riparian Buffers: Vegetated, undeveloped buffers adjacent to waterways.	Area and length of restored riparian corridors. Number and area of conservation easements for riparian areas. Number and extent of riparian buffer ordinances adopted by local government.
Fish and Wildlife Habitat	Improvements to Fish and Wildlife Habitat: Protection and restoration of stream areas for fish and wildlife.	Macroinvertebrate sampling results (diversity and stream health indicators) from RiverWatch volunteers and fish sample data collected by the Illinois Natural History Survey.
	Stream Cleanup Efforts: Programs with funding and resources for stream cleanup.	Number of programs and participants for stream cleanup activities in the watershed.
Flooding and Flood Damage/ Organizational Frameworks	Financial Support for Stormwater Infrastructure: Funding sources directed to infrastructure maintenance and upgrades.	Number of counties/municipalities with dedicated funding for stormwater infrastructure, eg a Stormwater Utility. Dollar amount of revenue.
Organizational Frameworks/ Environmentally Sensitive Development Practices	Protection through Policy: Several aspects of local policy can protect watershed resources, including ordinances and agreements.	Number of watershed partners adopt and/or support (via a resolution) this plan as a "guidance document". Number and extent of municipal ordinances that support: stormwater, flood management, green infrastructure, wetlands protection (eg in-lieu fee), and native landscaping.
	Open Space and Natural Area Protection and Management: protection of sensitive natural areas/open space, creation of naturalized stormwater management systems, and long-term management of those features.	Number of new and redevelopment projects protecting sensitive natural areas/open space and creating naturalized stormwater systems. Area of land donated to a public agency/conservation organization for long-term management. Number of HOAs with rules about management of the natural areas in their bylaws.
Education & Outreach	Public Involvement: Public awareness, understanding and action, which affect decisions in watersheds where individuals own most of the land.	Number of people reached by and involved in outreach efforts related to this Watershed-Based Plan. Percent of county residents who know which watershed they live in (survey).
	Education: Effective materials to encourage behavior changes for a healthier watershed.	Percent of attendees who rate watershed-related presentations and other public education and outreach activities and good or excellent and percent who commit to action or follow-up with the county. Percent of schools that incorporate a watershed-based project or learning session.

Glossary of Terms

Terms found in the Watershed-Based Plan and its Appendices:

100-year floodplain: Land adjoining the channel of a river, stream, watercourse, lake, or wetland that has been or may be inundated by floodwater during periods of high water that exceed normal bank-full elevations. The 100-year floodplain has a probability of 1% chance per year of being flooded.

303(d) list of impaired waters: The federal Clean Water Act requires states to submit a list of impaired waters to the U.S. Environmental Protection Agency for review and approval every two years using water quality assessment data from the Section 305(b) Water Quality Report. These impaired waters are referred to as "303(d) impaired waters". States are then required to establish priorities for the development of Total Maximum Daily Load analyses (TMDLs) for these waters and a long-term plan to meet them.

305(b): The Illinois 305(b) Water Quality Report is a water quality assessment of the state's surface and groundwater resources compiled by the Illinois Environmental Protection Agency and submitted as a report to the U.S. Environmental Protection Agency as required under Section 305(b) of the Clean Water Act.

Animal Feeding Operation (AFO): Agricultural operations where animals are kept and raised in confined situations. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures.

Aquifer: A layer of permeable rock, sand, or gravel through which groundwater flows, containing enough water to supply springs and wells.

Base flow: The flow to which a perennially flowing stream reduces during the dry season. It is commonly supported by groundwater seepage into the channel.

Bedrock: The solid rock that lies beneath loose material, such as soil, sand, clay, or gravel.

Best Management Practices (BMPs): See Management Measures.

Biodiversity: The variety of organisms (plants, animals and other life forms) that includes the totality of genes, species and ecosystems in a region.

Center for Watershed Protection (CWP): Non-profit 501(c)3 corporation founded in 1992 that provides government entities, watershed organizations, and others around the country with the tools to protect streams, lakes, rivers, and watersheds.

Channelization: The artificial straightening, deepening, or widening of a stream or river to accommodate increased stormwater flows, typically to increase the amount of adjacent developable land for urban development, agriculture, or navigation.

Conservation Development: A development designed to protect open space and natural resources for people and wildlife while at the same time allowing building to continue. See Appendix E for more detail.

Conservation easement: The transfer of land use rights without the transfer of land ownership. Conservation easements can be attractive to property owners who do not want to sell their land now, but would support perpetual protection from further development. Conservation easements can be donated or purchased.

Conservation Practice Program (CPP): Illinois Department of Agriculture program implemented by the Soil and Water Conservation Districts (SWCDs) in Illinois. Cost-share funds are available through the SWCDs for various conservation practices including Filter Strips, Grassed Waterways, No-Till, and Terraces. See Appendix G for more detail.

Conservation Reserve Enhancement Program (CREP): The country's largest private land conservation program, administered by the Farm Service Agency (FSA). An offshoot of the Conservation Reserve Program (CRP), CREP compensates farmers and landowners for removing environmentally sensitive land from production and implementing conservation practices. See Appendix G for more detail.

Conservation Reserve Program: A land conservation program administered by the Farm Service Agency (FSA), which provides a yearly rental payment for farmers who remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. See Appendix G for more detail.

Conservation Stewardship Program (CSP): U.S. Department of Agriculture program that helps producers maintain and improve existing conservation systems and implement additional activities to address priority resources concerns. See Appendix G for more detail.

Conservation tillage: Any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and runoff.

Contour Buffer Strip: Strips of perennial vegetation that alternate with strips of row crops on sloped fields. The strips of perennial vegetation, consisting of adapted species of grasses or a mixture of grasses and legumes, slow runoff and remove from it sediment, nutrients, pesticides, and other contaminants. See Appendix E for more detail.

Conveyance: The act or means of carrying or transporting water from place to place.

Cover crops: Crops that protect soil from erosion by covering the ground in the fall and sometimes in the spring. See Appendix E for more detail.

Designated use: Appropriate use of a waterbody as designated by states and tribes. Designated uses are identified by considering the use, suitability, and value of the water body for public water supply; protection of fish and wildlife; and recreational, agricultural, industrial, and navigational purposes. Determinations are based on its physical, chemical, and biological characteristics; geographical setting and scenic qualities; and economic considerations.

Detention basin: A man-made structure for the storage of stormwater runoff with controlled release during or immediately following a storm. Wet detention basins are also known as retention ponds. See Appendix E for more detail.

Digital Elevation Model (DEM): Grid of elevation points used to produce elevation maps.

Discharge (streamflow): The volume of water passing through a channel over a given time period, usually measured in cubic feet per second.

Dissolved oxygen (DO): The amount of oxygen in water, usually measured in milligrams/liter.

East-West Gateway Council of Governments (EWG): The metropolitan planning organization (MPO) for the 4,500 square miles encompassed by the City of St. Louis; Franklin, Jefferson, St. Charles, and St. Louis counties in Missouri; Madison, Monroe, and St. Clair counties in Illinois. EWG is a forum for local governments of the bi-state St. Louis area to work together to solve problems that cross jurisdictional boundaries.

Environmental Quality Incentives Program (EQIP): A program that provides financial and technical assistance to agricultural producers, helping them to plan and implement conservation practices that address natural resource concerns and improve natural resources on agricultural land and non-industrial private forestland. See Appendix G for more detail.

Erosion: The displacement of soil particles on land surfaces due to water or wind action.

Federal Emergency Management Agency (FEMA): Government agency within the Department of Homeland Security that responds to, plans for, coordinates recovery from, and mitigates against natural and man-made disasters and emergencies, including significant floods.

Flash flood: A rapid rise of water along a stream or low-lying area, usually produced when heavy localized precipitation falls over an area in a short amount of time. Flash floods are considered the most dangerous type of flood event because they offer little or no warning time and their capacity for damage, including the capability to induce mudslides.

Flood Damage Prevention Ordinance: Ordinance that imposes certain rules and limitations on development in floodplains in order to reduce the risk of flood damage. See Appendix E for more detail.

Geographic Information System (GIS): A computer-based approach to interpreting maps and images and applying them to problem-solving.

Geology: The scientific study of the structure of the Earth, focused primarily on the composition and origins of rocks, soil, and minerals.

Grassed waterways: Vegetated channels designed to prevent gully erosion by slowing the flow of surface water with vegetation. See Appendix E for more detail.

Green infrastructure: Green infrastructure can be defined as our region's natural resources, including open space, woodlands, wetlands, gardens, trees, and agricultural land. It can also be defined as the nodes and corridors of vegetation over the region, or the site-scale structures and landscaping that recreate natural processes. See Appendix E for more detail.

Groundwater recharge: Primary mechanism for aquifer replenishment which ensures future sources of groundwater for commercial and residential use.

Headwaters: Upper reaches of streams and tributaries in a watershed.

HUC or HUC Code: A Hydrologic Unit Code (HUC) that refers to the division and subdivision of U.S. watersheds. The hydrologic units are arranged or nested within each other, from the largest geographic area (regions) to the smallest geographic area (cataloging units). Where two digits follow "HUC", they refer to the length of the HUC code. For example, "HUC14" refers to the lowest-nested subwatershed level with a 14-digit long code, such as HUC 07140204050101.

Hydric soil: Soil units that are wet frequently enough to periodically produce anaerobic conditions, thereby influencing the species composition and/or growth of plants on those soils.

Hydrologic Soil Groups (HSG): Soil classifications from the Natural Resource Conservation Service based on the soil's runoff potential. The four Hydrologic Soils Groups are A, B, C and D. A's generally have the smallest runoff potential and D's the greatest.

Hydrology: The scientific study of the properties, distribution, and effects of water in relation to the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Hydrologic Soil Groups (HSG): Soils are classified by the Natural Resource Conservation Service into four Hydrologic Soil Groups, A, B, C and D, based on the soil's runoff potential. A's generally have the smallest runoff potential and D's the greatest.

Hydrophytic vegetation: Plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; one of the indicators of a wetland.

Illinois Department of Natural Resources (IDNR): State government agency established to manage, protect, and sustain Illinois' natural and cultural resources, provide resource-compatible recreational opportunities, and promote natural resource-related issues for the public's safety and education.

Illinois Environmental Protection Agency (IEPA): State government agency established to safeguard environmental quality so as to protect health, welfare, property, and quality of life in Illinois.

Illinois Nature Preserves Commission (INPC): Commission responsible for protecting Illinois Nature Preserves, state-protected areas that are provided the highest level of legal protection, and have management plans in place.

Illinois Pollution Control Board (IPCB): An independent agency created in 1970 by the Environmental Protection Act. The Board is responsible for adopting Illinois' environmental regulations and deciding contested environmental cases.

Impervious Cover Model: Simple urban stream classification model based on impervious cover and stream quality. The classification system contains three stream categories (sensitive, impacted, and non-supporting) based on the percentage of impervious cover.

Impervious cover/surface: An area covered with solid material or that is compacted to the point where water cannot infiltrate underlying soils (e.g. parking lots, roads, houses, etc.).

In-lieu fee: A payment made to a natural resource management entity for implementation of projects for wetland or other aquatic resource development, in lieu of (in place of) on-site restoration or site mitigation. See Appendix E for more detail.

Infiltration: Rainfall or surface runoff that moves downward from the surface into the subsurface soil.

Loess: An unstratified loamy deposit, usually buff to yellowish brown, chiefly deposited by the wind and thought to have formed by the grinding of glaciers.

Logjam: Any woody vegetation, with or without other debris, which obstructs a stream channel and backs up stream water like a natural dam.

Low Impact Development: Comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds.

Macroinvertebrates (aquatic): Invertebrates that can be seen by the unaided eye (macro). Most benthic invertebrates in flowing water are aquatic insects or the aquatic stage of insects, such as mayfly nymphs and midge larvae. They also include organisms such as leeches, clams, and worms. The presence of benthic (bottom-dwelling) macroinvertebrates that are intolerant of pollutants is a good indicator of good water quality.

Macroinvertebrate Biotic Index (MBI): Index method/calculation used to rate water quality using macroinvertebrate taxa tolerance to organic pollution in streams.

Management Measures: Also known as Best Management Practices (BMPs). Methods or techniques that are the most effective or practical means to achieving objectives including improving water quality, reducing flooding, and improving fish and wildlife habitat. These practices include non-structural practices such as site planning and design aimed to reduce stormwater runoff and avoid adverse development impacts, or structural practices that are designed to store or treat stormwater runoff to mitigate flood damage and reduce pollution.

Marsh: An area of soft, wet, low-lying land, characterized by grassy vegetation and often forming a transition zone between water and land.

Missouri Resource Assessment Partnership (MoRAP): Program at the University of Missouri which develops, analyzes, and delivers geospatial data for natural and cultural resource management. MoRAP partnered with the East-West Gateway Council of Governments to deliver mapped data on wetland importance and wetland restoration value.

Mitigation: Measures taken to eliminate or minimize damage from development activities such as construction in wetlands.

Municipal Separate Storm Sewer System (MS4): A system that transports or holds stormwater, such as catch basins, curbs, gutters, and ditches, before discharging into local waterbodies.

National Hydrography Dataset (NHD): Digital database of surface water features, such as lakes, ponds, streams, and rivers. The NHD is used to make hydrology and watershed boundary maps.

National Pollutant Discharge Elimination System (NPDES) Phase II: Permit program authorized by the Clean Water Act requiring smaller communities and public entities that own and operate a Municipal Separate Storm Sewer System (MS4) to apply and obtain a NPDES permit for stormwater discharges to surface water. Permittees must develop, implement, and enforce a stormwater program designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable. Individual homes that use a septic system, are connected to a municipal system, or do not have a surface discharge do not need an NPDES permit. The NPDES permit program is administered by <u>authorized states</u>. In Illinois, the Illinois EPA administers the program.

National Land Cover Database (NLCD): Database with mapped land cover categories produced by the Multi-Resolution Land Characteristics (MRLC) Consortium with land cover classifications based on Landsat satellite data and ancillary data sources such as topography, census and agricultural statistics, soil characteristics, wetlands, and other land cover maps.

National Wetland Inventory (NWI): U.S. Fish and Wildlife Service program that provides information on the characteristics, extent, and status of U.S. wetlands and deepwater habitats.

Native landscaping: A landscape that contains native plants or plant communities that are indigenous to a particular region.

Natural Resources Conservation Service (NRCS): Government agency under the U.S. Department of Agriculture (USDA) that provides technical assistance to landowners and land managers.

Nitrogen: A colorless, odorless, unreactive gas that constitutes about 78% of the earth's atmosphere. The availability of nitrogen in soil is important for plant growth and ecosystem processes, and nitrogen is used in many fertilizers.

No-till: No-till farming (also called zero tillage) is a way of growing crops or pasture from year to year without disturbing the soil through tillage. It uses herbicides to control weeds and results in reduced soil erosion and the preservation of soil nutrients. See Appendix E for more detail.

Nonpoint source pollution (NPS pollution): Any source of water pollution that is not from a discrete outflow point. Instead, NPS pollution comes from diffuse sources and is carried into waterways with runoff from the land. Pollutants can include oil, grease, sediment, and nutrients in excess fertilizer.

Nutrients: Substances needed for the growth of plants and animals, such as phosphorous and nitrogen. The addition of too many nutrients to a waterway causes problems to the aquatic ecosystem by promoting nuisance vegetation including excess algae growth.

Open space parcel: Any parcel of land that is not developed and is set aside for recreation or conservation purposes.

Overland flood: Flooding that occurs when rainfall collects on saturated or frozen ground. When surface runoff cannot find a channel, it may flow out over a large area at a somewhat uniform depth in sheet flow or collect in depressions as ponding.

Partners: Key watershed stakeholders who take an active role in the watershed management planning process and implementing the watershed plan.

Pervious pavement: Pavement type (also referred to as porous or permeable pavement) that allows water to infiltrate to the soil or a storage area below. See Appendix E for more detail.

Phosphorus: A nonmetallic element that occurs widely in many combined forms especially as inorganic phosphates in minerals, soils, natural waters, bones, and teeth and as organic phosphates in all living cells.

Point source pollution: Pollution that discharges in water from a single, discrete source, such as an outfall pipe from an industrial plant or wastewater treatment facility.

Pollutant load: The amount of any pollutant deposited into waterbodies from point source discharges, combined sewer overflows, and/or stormwater runoff.

Private sewage: Sewage systems that are the responsibility of the owners or occupiers of the properties connected to them. These systems can include septic tanks, lagoons, and leach fields.

Rain garden: Vegetated depression that cleans and infiltrates stormwater from rooftops and sump pump discharges, typically planted with deep-rooted native wetland vegetation. See Appendix E for more detail.

Rainwater Harvesting: The accumulation and storing of rainwater for reuse before it reaches an aquifer. See Appendix E for more detail.

Retention basin: A man-made structure with a permanent pool of water for the storage of stormwater runoff. Also known as a wet pond, or wet detention basin.

Retrofit: Modifications to improve problems with existing stormwater control structures such as detention basins and conveyance systems such as ditches and storm sewers. See Appendix E for more detail on detention basin retrofits.

Riparian: The riverside or riverine environment adjacent to the stream channel. For example, riparian, or streamside, vegetation grows next to (and over) a stream.

Riparian Buffer: An undisturbed naturally vegetated strip of land adjacent to a body of water, such as a stream or lake. Riparian buffers have water quality, flooding, and habitat benefits.

Riverine flood: The gradual rise of water in a river, stream, lake, reservoir, or other waterway that results in the waterway overflowing its banks. This type of flooding generally occurs when storm systems remain in the area for extended periods of time, when winter or spring rains combine with melting snow to create higher flows, or when obstructions, such as logjams, block normal water flow.

Runoff: The portion of precipitation that does not infiltrate into the ground and is discharged into streams by flowing over the ground.

Sediment: Soil particles that have been transported from their natural location by wind or water action.

Special Flood Hazard Area: The area inundated during the base flood is called the Special Flood Hazard Area or 100-year floodplain.

Special Service Area (SSA): Special taxing districts in counties and municipalities that are established by ordinance. Taxes from SSAs are used to pass on the costs of items such as streets, landscaping, water lines, and sewer systems in new development to homeowners who reside within it. See Appendix E for more detail.

Stakeholders: Individuals, organizations, or enterprises that have an interest or a share in a project.

Stream reach: A stream segment having fairly homogenous hydraulic, geomorphic, riparian cover, and land use characteristics.

Streambank stabilization: Techniques used for stabilizing eroding streambanks.

Streambank Stabilization and Restoration Program (SSRP): Illinois Department of Agriculture (IDOA) program designed to demonstrate effective streambank stabilization at demonstration sites using inexpensive vegetative and bio-engineering techniques. See Appendix G for more detail.

Subwatershed: Any drainage basin within a larger drainage basin or watershed.

Terrace: Ridges and channels constructed across the slope of a field to intercept runoff water, reducing soil erosion. See Appendix E for more detail.

Threatened and endangered species: A "threatened" species is one that is likely to become endangered in the foreseeable future. An "endangered" species is one that is in danger of extinction throughout all or a significant portion of its range.

Topography: The relative elevations of a landscape describing the configuration of its surface. **Total Maximum Daily Load (TMDL):** The highest amount of discharge of a particular pollutant that a waterbody can handle safely per day.

Total Suspended Solids (TSS): The organic and inorganic material suspended in the water column greater than 0.45 micron in size.

United States Army Corps of Engineers (USACE): Federal group of civilian and military engineers and scientists that provide services for planning, designing, building, and operating water resources and other Civil Works projects. These include flood control and environmental protection projects.

United States Department of Agriculture (USDA): Federal government agency that provides leadership on food, agriculture, natural resources, rural development, nutrition, and related issues. The USDA administers several programs to encourage land conservation and agricultural best practices.

United States Environmental Protection Agency (USEPA): Federal agency whose mission is to protect human health and the environment. USEPA enforces the Clean Water Act, among other laws.

United States Fish and Wildlife Service (USFWS): Federal government agency within the U.S. Department of the Interior dedicated to the management of fish and wildlife and their habitats.

United States Geological Survey (USGS): Federal government agency established with the responsibility to provide reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect quality of life.

Urban runoff: Runoff that runs over urban developed surfaces such as streets, lawns, and parking lots, entering directly into storm sewers rather than infiltrating the land upon which it falls.

Wastewater Treatment: Process that treats wastewater to alter its characteristics such as its biological oxygen demand (BOD), chemical oxygen demand (COD), pH, etc. in order to meet effluent or water discharge standards.

Water and Sediment Control Basin (WASCOB): Small earthen ridge-and-channel or embankment built across a small watercourse or area of concentrated flow in a field. See Appendix E for more detail.

Watershed: The area of land that contributes runoff to a single point on a waterbody (in this case, the outlet of Silver Creek from Madison County to St. Clair County).

Watershed-Based Plan: A strategy and work plan for achieving water resource goals that provides assessment and management information for a geographically defined watershed, including the analysis, actions, participants, and resources related to development and implementation of the plan.

Wetland: Lands that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation adapted for life in saturated soil conditions (known as hydrophytic vegetation). A wetland is identified based upon the three attributes: 1) hydrology, 2) hydric soils, and 3) hydrophytic vegetation. A wetland is considered a subset of the definition of the Waters of the United States.

Wetland Reserve Easement (WRE) program: Component of the Agricultural Conservation Easement Program (ACEP) that provides technical and financial assistance to restore, protect, and enhance wetlands. See Appendix G for more detail.

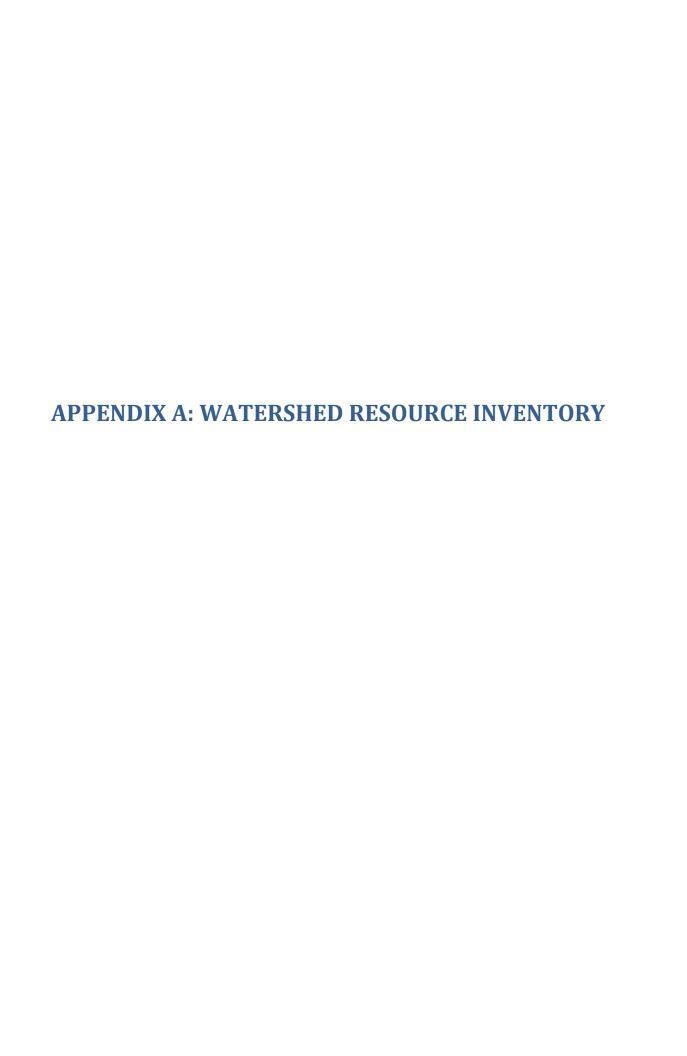


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Introduction

The Upper Silver Creek watershed is located 20 miles northeast of St. Louis, Missouri in southwestern Illinois. The majority of the watershed is in Madison County, and small portions fall within Macoupin and Montgomery counties. Waterways in the project area account for approximately 480 stream miles that drain roughly 120,000 acres of land. Silver Creek flows south from the project area to join the Kaskaskia River, which ultimately drains into the Mississippi River.

The majority of the watershed's population lives in unincorporated areas where farming is the primary land use. Portions of 13 municipalities are also present, of which Troy, Mount Olive, Marine, and Livingston have the largest population.

Silver Creek and a portion of Troy Creek appear on the Illinois Environmental Protection Agency's 303(d) impaired waters list. The causes identified for these impairments include dissolved oxygen, manganese, total phosphorus, and sedimentation/siltation. The named sources of these pollutants are animal feeding operations, municipal point source discharges, urban runoff, and crop production. In addition, the watershed experiences flooding inside and outside of its designated 100-year floodplains, causing damage to property and threatening life safety.



The Upper Silver Creek Watershed-Based Plan (Plan) aims to respond to these issues. Funded through a grant from the Illinois Environmental Protection Agency through Section 604(b) of the Clean Water Act and matching funds from Madison County, the Plan is directed towards guiding efforts to protect and restore surface water quality in the Upper Silver Creek watershed. Flood damage mitigation is also a priority in this planning effort thanks to additional support from Madison County. The Plan will aid stakeholders in implementing water quality and flooding solutions and help recommended improvement projects become eligible for state and federal grants.

This Watershed Resources Inventory (Inventory) constitutes the first step of the Plan. Existing conditions in several categories are identified:

- Watershed boundaries
- Topography and slope
- Climate
- Geology and soils
- Jurisdictions and demographics
- Land use/land cover and impervious cover
- Streambank and streambed erosion
- Channelization and riparian condition
- Flooding locations and impacts
- Water quality, including pollutant loads

Several challenges and threats to the watershed are identified in this Inventory. Manmade changes to the waterways and the landscape have contributed to declining surface water quality and unforeseen flooding issues. Approximately 15% of the streams studied in the watershed are highly channelized, and impervious cover in the watershed has been increasing at 2.8% per year on average. Streambank erosion is severe along 17% of the stream length assessed, causing sedimentation and siltation in the waterways. Fertilizer use on agricultural, commercial, and residential land is contributing to phosphorus loading, and old, failing, and improperly maintained septic systems are potential nutrient and bacteria threats.

Stakeholder outreach complemented the data collection for this Inventory and educated watershed residents and business owners about the aims of the Plan. Seventy-six key stakeholders have attended meetings with the planning team individually or in small groups, and more than 65 people attended two informational Open House events about the Plan. In a flood-themed survey to residents in the watershed, 512 people (so far) have provided feedback on their experiences with flooding over the past 10 years. Preliminary survey results show that the vast majority of respondents place "high" or "very high" importance on clean drinking water, prevention of flood damage, waterbodies suitable for recreation, and a healthy watershed that supports a wide variety of plant and animal life.

This Inventory contains the data to be used in identifying and prioritizing Best Management Practices (BMPs) in the next phase of the Watershed-Based Plan.

Watershed Boundaries

The Upper Silver Creek Watershed Plan project area is 120,091 acres in size (Table A.1). It is nested within the larger Lower Kaskaskia Watershed (HUC 07140204; Figure A.1) and HUC 0714020405, a HUC10 that extends from Macoupin and Montgomery counties south through Madison County into St. Clair County. "HUC" stands for Hydrologic Unit Code, the number that indicates the general location and size of the watershed and follows the term.

Table 1. Area of the hydrologic units nested in the Upper Silver Creek Watershed Plan project area.

Watershed	Area
Project area	120,091 acres
HUC10 level (Silver Creek), HUC 0714020405)	244,252 acres
HUC8 level (Lower Kaskaskia, HUC 07140204)	1,028,836 acres

Watershed Boundaries Legend MONTGOMERY Project Area MÁCOUPIN BOND MADISON HUC10, Silver Creek HUC8, Lower Kaskaskia BOND Streams & rivers MADISON BOND CLINTON MADISON MADISON ST. CLAIR CLINTON CLINTON ST. CLAIR S ST. CLAIR WASHINGTON RANDOLPH RANDOLPH PERRY RANDOLPH

Figure A.1. The Upper Silver Creek Watershed Plan project area in context of the Lower Kaskaskia HUC8 watershed.

Subwatersheds

The project area contains numerous smaller subwatersheds, or hydrologic units, including seven HUC12s and twenty HUC14s (Figure A.2). The HUC14s were delineated using methods employed by USGS to define watersheds in the Watershed Boundary Dataset (WBD), a component of the National Hydrography Dataset (NHD). Each HUC12 contains 2-4 HUC14s ranging between 2,758 and 9,613 acres in size. The following pages show the seven HUC12s with their component HUC14s and waterbodies (Figures A.4 through A.10).

NOTE: The HUC14s delineated for this Watershed-Based Plan have been given new HUC codes and names subsequently to the submission of this Watershed Resources Inventory. The new codes and names were assigned so that the HUC14s can be submitted to the USGS Watershed Boundary Dataset (WBD). The old HUC14s (Figure A.2) are used throughout this Watershed-Based Plan. Figure A.3 and Table A.2 show the old and new HUC14 names and codes.

Table A.2. Old and new HUC14 codes and new HUC14 names for the HUC14 subwatersheds. 10 out of 20 HUC14 codes were changed for submission to the Watershed Boundary Dataset (WBD).

Old HUC14 code (used in this Watershed Plan)	Final HUC14 code for submission to WBD	Final HUC14 name for submission to WBD	Same/different code?
7140204050101	7140204050101	Heeren Pond-Silver Creek	Same
7140204050102	7140204050102	Binney-Silver Creek	Same
7140204050201	7140204050201	Big Four Reservoir	Same
7140204050202	7140204050202	Village of Livingston-Silver Creek	Same
7140204050203	7140204050203	Village of Livingston	Same
7140204050301	7140204050301	Village of Worden-Silver Creek	Same
7140204050302	7140204050302	Village of Alhambra	Same
7140204050303	7140204050304	Village of Hamel-Silver Creek	Different
7140204050304	7140204050303	Village of Hamel	Different
7140204050401	7140204050401	Grigsby Lake-Silver Creek	Same
7140204050402	7140204050402	Willaredt Lake-Silver Creek	Same
7140204050501	7140204050502	Dales Twin Lakes-South Lake-Silver Creek	Different
7140204050502	7140204050501	Neudeckers Mountain	Different
7140204050601	7140204050603	07140204050603-Silver Creek	Different
7140204050602	7140204050601	Headwaters Wendell Branch	Different
7140204050603	7140204050602	Twin Lakes-Wendell Branch	Different
7140204050604	7140204050604	City of Troy-Silver Creek	Same
7140204050901	7140204050903	07140204050903-Silver Creek	Different
7140204050902	7140204050901	Lake Fork	Different
7140204050903	7140204050902	Mill Creek	Different

Subwatersheds: HUC12s & HUC14s

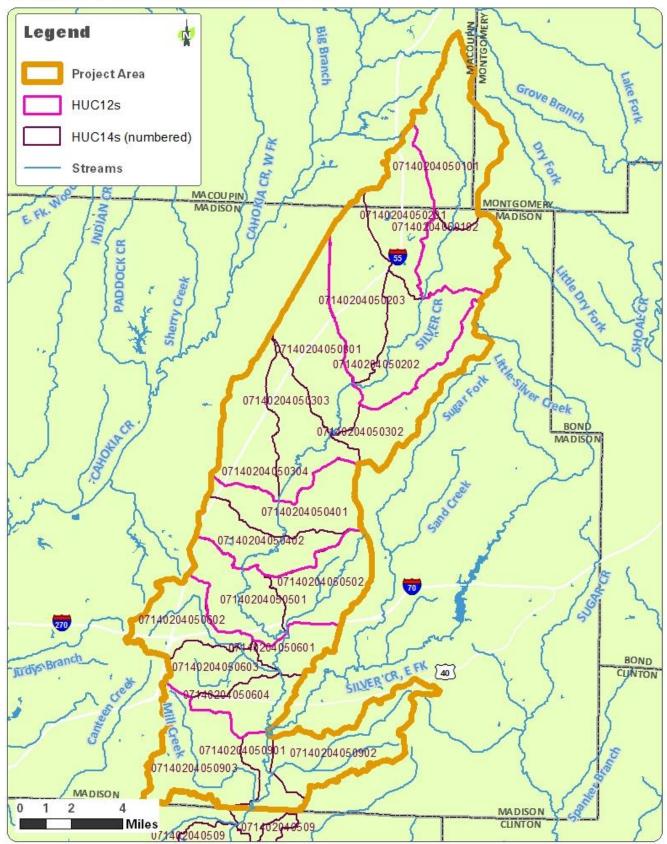


Figure A.2. The Upper Silver Creek Watershed Plan project area, with its 20 component HUC14s (old codes), seven component HUC12s, named streams from the NHD, and interstates.

HUC14 codes: final and old (used in this Plan)

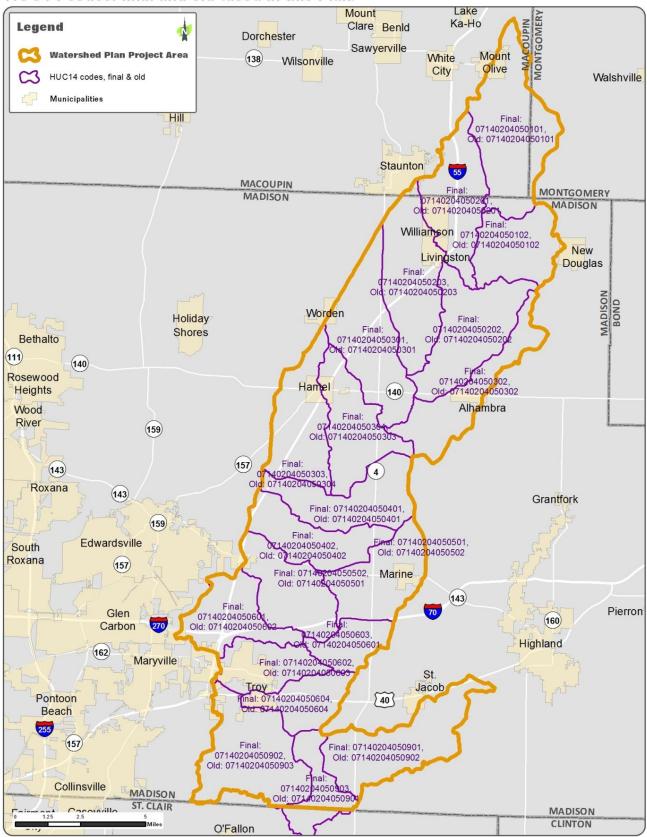


Figure A.3. Final and old HUC14 codes for each HUC14. The codes were reordered to reflect updated elevation data used in delineation. The "old" codes are used throughout this Plan (the final codes being confirmed too late in the planning process to update all of the modeling, maps, and tables).

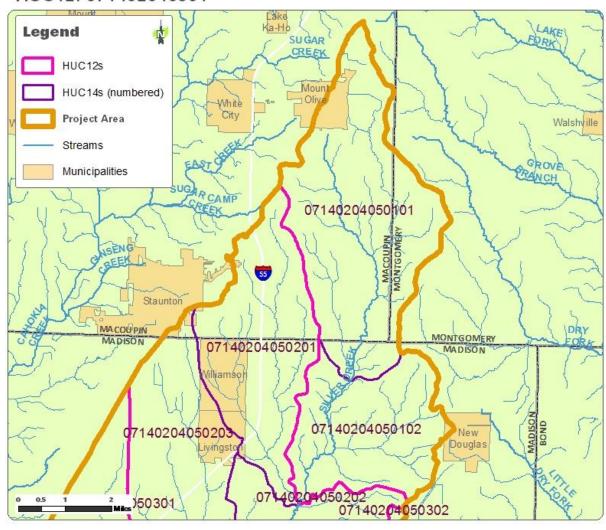


Figure A.4. HUC 071402040501 and HUC14s, streams, and municipalities present.

Table A.3. Area of HUC14 watersheds within HUC 071402040501 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050101	9,613.0	Mount Olive
07140204050102	5,272.6	New Douglas

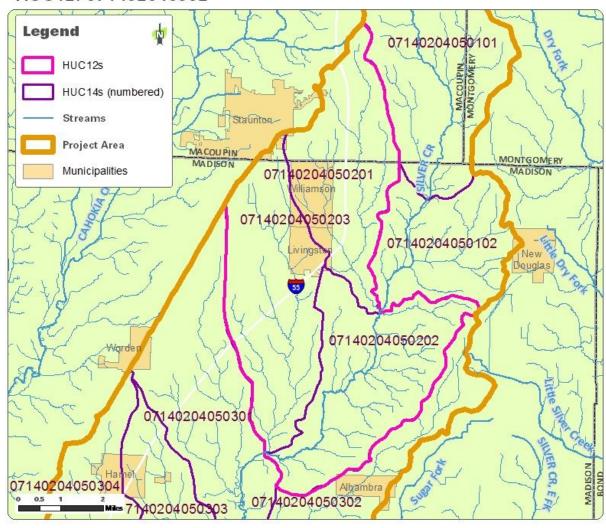


Figure A.5. HUC 071402040502 and HUC14s, streams, and municipalities present.

Table A.4. Area of HUC14 watersheds within HUC 071402040502 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050201	6,517.6	Williamson, Livingston, Staunton
07140204050202	07140204050202 7,750.1 Livingston, Alhambra	
07140204050203	7,755.7	Williamson, Livingston, Staunton

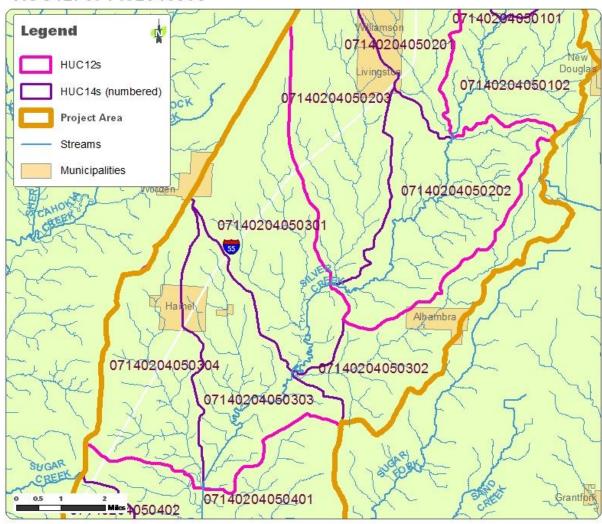


Figure A.6. HUC 071402040503 and HUC14s, streams, and municipalities present.

Table A.4. Area of HUC14 watersheds within HUC 071402040503 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050301	8,049.7	Worden
07140204050302	5,796.8	Alhambra
07140204050303	6,064.0	Hamel
07140204050304	6,224.9	Hamel

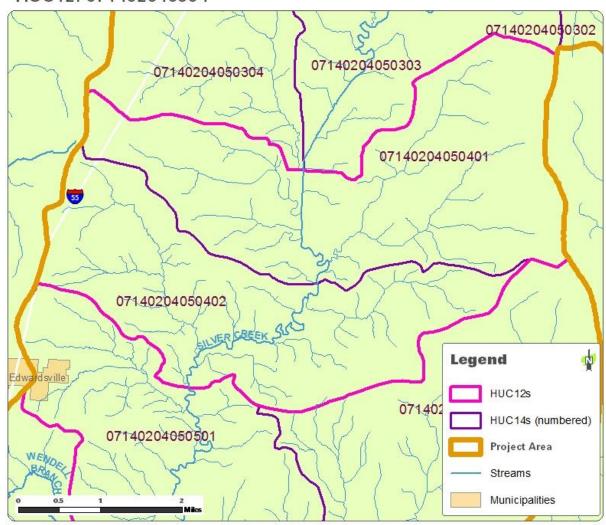


Figure A.7. HUC 071402040504 and HUC14s, streams, and municipalities present.

TableA.6. Area of HUC14 watersheds within HUC 071402040504 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050401	6,291.0	
07140204050402	5,188.4	

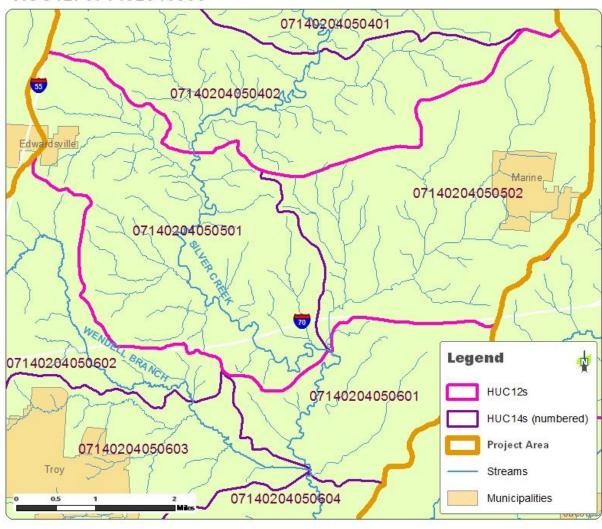


Figure A.8. HUC 071402040505 and HUC14s, streams, and municipalities present.

Table A.7. Area of HUC14 watersheds within HUC 071402040505 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050501	5,798.8	Edwardsville
07140204050502	5,842.8	Marine

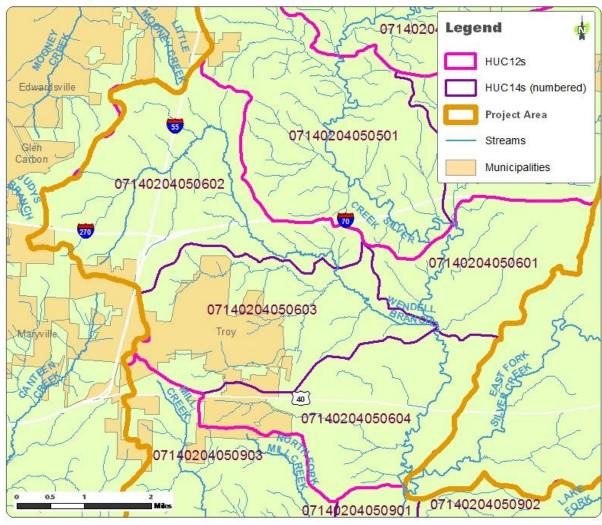


Figure A.9. HUC 071402040506 and HUC14s, streams, and municipalities present.

Table A.8. Area of HUC14 watersheds within HUC 071402040506 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050601	2,758.4	
07140204050602	5,011.9	Troy, Glen Carbon, Edwardsville
07140204050603	4,045.7	Troy
07140204050604	3,681.5	Troy

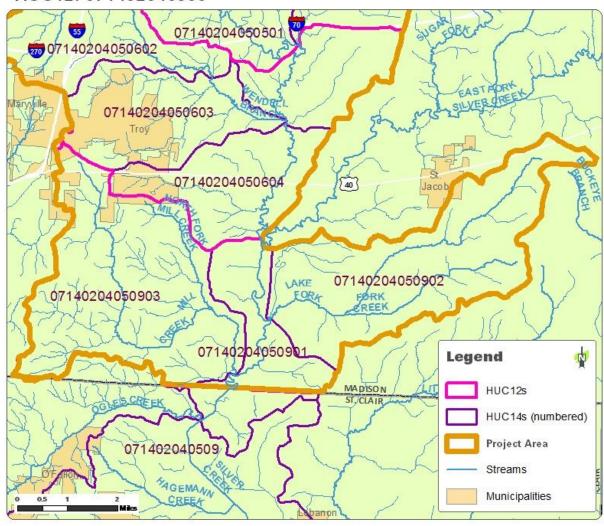


Figure A.10. HUC 071402040509 and HUC14s, streams, and municipalities present.

Table A.9. Area of HUC14 watersheds within HUC 071402040509 and municipalities wholly or partially within it.

HUC14 watershed	Area in acres	Municipalities present
07140204050901	3,394.4	
07140204050902	7,762.3	St. Jacob
07140204050903	8,321.3	Troy

Stream miles

There are 476 stream miles in the Upper Silver Creek Watershed Plan project area, as identified in the National Hydrography Dataset (NHD). The stream reaches are designated perennial and intermittent streams, or given a "connector" or "artificial path" designation. There are no canals or ditches identified in the NHD in the Upper Silver Creek watershed. See Watershed Drainage section for more information on stream reach delineation.

The tributaries in the watershed flow into the mainstem of Silver Creek, which eventually discharges into the Kaskaskia River, and ultimately into the Mississippi River in Randolph County (Figure A.1).

Direction of flow and major tributaries

Water flows from north to south in the watershed, with the northernmost tributary beginning in Macoupin County in HUC 07140204050101. The largest tributary to Silver Creek within the project area is Wendell Branch, which flows west to east from Edwardsville, Glen Carbon, and Troy.

East Fork Silver Creek is a separate HUC10 watershed to the east of the Upper Silver Creek watershed. It contains 215 stream miles and Highland Silver Lake, an impaired waterbody in the municipality of Highland, and flows into HUC 071402040509 approximately 3 miles west of St Jacob. Except for this addition of flow, Upper Silver Creek is a hydrologically self-contained watershed. The outflow of the watershed from the project area occurs in HUC 07140204050901, at the boundary line of Madison and St Clair counties.

Waterbodies

There are 732 identified waterbodies in the Upper Silver Creek watershed, with a mean area of 1.0 acre. The largest waterbody identified in the NHD within the project area is a swamp/marsh area 33 acres in size. The largest non-swamp/marsh waterbody is a perennial lake/pond 20 acres in size just east of Williamson.

Topography

In general, the land in the watershed is fairly flat or gently sloping, making it suitable for crop cultivation. The watershed has a gentle north-south slope of less than 7.5% (4.4 degrees), decreasing in elevation in the south (Figure A.11). Along Silver Creek itself, slopes are often as steep as 10% or more (visible in yellow, orange, and red in Figure A.12).

The highest point in the watershed, at its northern edge in Macoupin County, is an unnamed hill with an elevation of 690 feet. The highest tributaries to Silver Creek, including ephemeral streams, begin at elevations of around 675 feet. The outflow of Silver Creek from the watershed project area, the lowest point in the watershed, is at 433 feet (Figure A.11).

The moderate to steeply sloping terrain in the upper reaches of the watershed drains to a wider, flatter area approximately where East Fork Silver Creek meets the Upper Silver Creek in HUC 071402050409. This flat area is an important feature because it provides more flood storage than the upper reaches.

Topography

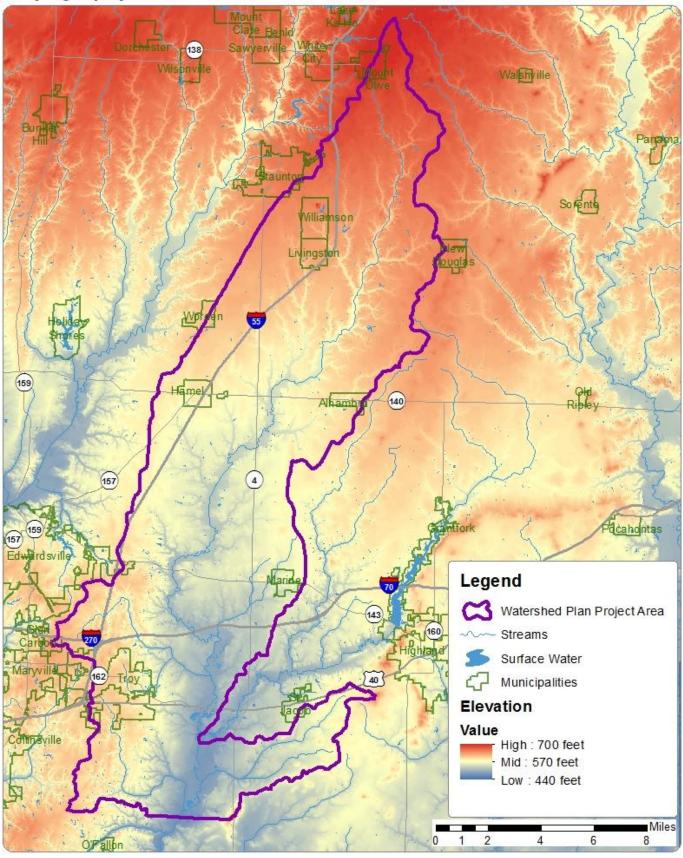


Figure A.11. Topography/elevation in the Upper Silver Creek watershed project area, from the Digital Elevation Model (DEM) in the USGS National Elevation Dataset. 1

Slope 138 159 157 157 Legend Watershed Plan Project Area Streams Surface Water Municipalities Slope 0 - 5% 5.01 - 10% 10.01 - 15% 15.01 - 20% 20.01 - 25% Miles 8

Figure A.12. Slope in the Upper Silver Creek watershed project area, in percent. $^{\mathrm{2}}$

Climate

The Upper Silver Creek Watershed study area experiences typical weather for southwestern Illinois, including great variation in temperature, precipitation, and snowfall from one year to the next.

Temperature

Southern Illinois experiences an average of just over 40 days at or above 90°F and an average 2 days at 100°F or higher every year. The average length of the frost-free growing season in southern Illinois is more than 190 days. The average annual temperature for the region is 55.4°F (measured between 1901 and 2000). Over the past 25 years, the average annual temperature in southwestern Illinois has increased, reaching a 25-year high of approximately 59.5°F in 2012 (Figure A.13).

Between 1988 and 2013, southern Illinois has experienced 853.2 days of maximum temperature equal to or greater than 90°F. This equates to an average of 32.8 days per year of temperatures over 90°F (data from monthly averages from gaging stations in all three counties). The maximum recorded temperature in the three counties between 1988 and 2014 was 106°F in July 2012, recorded in Alton, Madison County. The minimum recorded temperature in the three counties between 1988 and 2014 was -20°F in December 1989 at two gauge stations in Macoupin County.

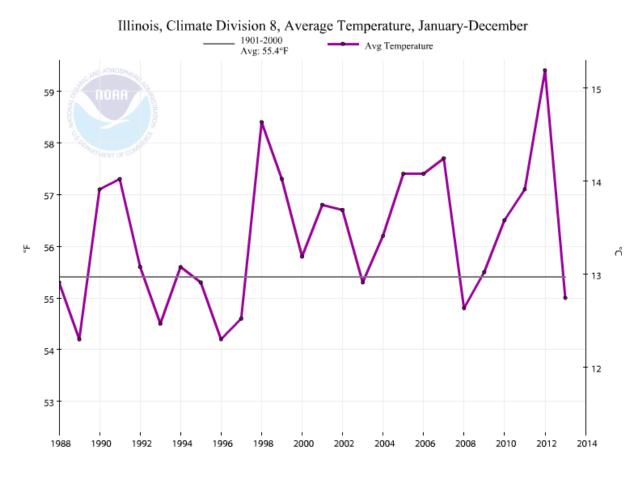


Figure A.13. Average annual temperatures in southwestern Illinois between 1988 and 2014, from NOAA's Climate At-A-Glance Time Series. The leftmost y axis shows average annual temperature in degrees Fahrenheit. 5

Precipitation

Average precipitation exceeds 48 inches a year in southern Illinois, which allows farms to rely on precipitation rather than irrigation for much of the year. Precipitation gauge stations in Mount Olive and Edwardsville measured an average annual precipitation of 40.21 inches and 38.73 inches, respectively, between 1971 and 2000, and 40.10 and 44.77 inches between 1981 and 2010. The average annual number of days with 0.1 inch or more of precipitation was 62 days (averaged between recorded data from the two stations between 1971 and 2000), with May as the wettest month and January as the driest. The average annual total snowfall recorded was 18.5 inches (between 1971 and 2000).

Flooding is the single most damaging weather hazard in Illinois. Rainstorms in Illinois produce 40 or more flash floods on average per year across the state, each with 4 to 8 inches of rainfall in a few hours in localized areas. The greatest recorded 24-hour precipitation event recorded in Edwardsville and Mount Olive is 7.05 inches of rain in August 1915 (Table A.10). Flash floods can occur at any time of year in Illinois, but they are most common in the spring and summer months. See Flooding section for more information on occurrences of flash flooding and general flooding.

TableA.10. Highest daily precipitation over 24 hours between 1893 and 2014 at gauge stations located in Edwardsville and Mount Olive. 10

Rank	Daily Precipitation (inches)	Date	Gauge Station
1	7.05	8/20/1915	Edwardsville
2	6.43	5/26/2009	Edwardsville
3	6.00	7/14/1912	Edwardsville
4	5.97	5/17/1943	Edwardsville
5	5.86	8/16/1946	Edwardsville
6	5.13	4/22/1944	Edwardsville
7	5.10	9/17/1969	Mt Olive*
8	4.87	4/22/1944	Mt Olive*
9	4.63	8/24/1977	Edwardsville
10	4.57	8/10/1961	Edwardsville

^{*} Data from Mount Olive gauge only available from 1940-2014.

Drought

There has been considerable variability in precipitation in the state over time, including major multi-year droughts in the 1930's and 1950's and major multi-year wet periods in the 1970's and 1980's. ¹¹ The National Climatic Data Center (NCDC) database reported 26 drought/heat wave events in Macoupin County from 1995 to 2010, with the most recent event in June 2009. ¹² Madison County experienced four drought events between 1983 and 2012, three of which occurred in 2005 or later. ¹³ There were three reported drought events in Montgomery County between 1983 and 2008. ¹⁴ Extreme heat often accompanied rainfall and surface water shortages during these events.

Tornadoes

Illinois experiences about 29 tornadoes annually, 63% of which occur in peak months April, May, and June. A significant recent tornado struck down in the city of Mount Olive in May 2013, damaging more than 40 homes and businesses in the downtown area, including City Hall. It was not declared a presidential disaster. In Madison County, 39 tornadoes were reported between 1950 and 2006. In Montgomery County, 31 tornadoes/funnel clouds were reported between December 1950 and 2010, and in Montgomery County, 28 occurrences were reported between 1950 and 2008. The greatest recorded magnitude among these events is F4 on the Fujita Scale (one event in Madison County). Typically, the area impacted by tornadoes in the three counties was less than four square miles. Montgomery County has calculated that the probability of a tornado hitting somewhere in the county in any given year is 47%. 18,19,20

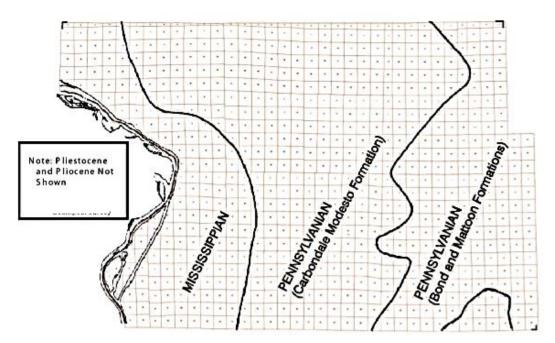
Geology

The bedrock underlying Southwestern Illinois is composed of Cambrian, Ordivician, Silurian, Devonian, Mississippian, and Pennsylvanian sedimentary rocks (i.e., sandstone, shale, dolomite, and limestone) resting on crystalline basement rocks consisting mainly of granite. Tilting and folding of the bedrock surface below Madison County resulted in the present bedrock surface topography. Figure A.14 shows the generalized bedrock geology beneath Madison County.²¹

Directly below the glacial drift in the central and eastern portions of the county, including below the Upper Silver Creek watershed, are Pennsylvanian rocks (Figure A.15). These rocks have relatively low permeability and consist mainly of shales, sandstone, thin limestone, and coal. The water-yielding character of these Pennsylvanian formations is variable but generally very low; the sandstones are the only formations that yield any appreciable amounts of water. The sandstones differ laterally in permeability and are not water-yielding at all sites. In some locations, small, local supplies of suitable groundwater may be obtained from shallow sandstone and creviced limestone, but the probability of obtaining a well in the Pennsylvanian aquifers yielding more than 20 gallons per minute (gpm) is low. Furthermore, as the depth of large aquifers increases, the water's mineral content also increases, limiting the uses of the groundwater.²²

Blanketing the bedrock are unconsolidated deposits from glacial drift, ranging in thickness from two to 200 feet across Southwestern Illinois. The glacial materials in the watershed and Madison County were deposited during the Pleistocene Epoch by the Illinoian glacial advance. The Illinoian Till Plain comprises much of the area east of the Mississippi River bluffs. A second glacial movement (Wisconsinan) did not advance on the area, but its deposits were widely transported here by wind and water. After the glaciers had receded and the deposits had dried, the wind picked up many of the fine-grained sand, silt, and clay (mostly silt) sediments and deposited them on the uplands in uniform layers known as loess. Since winds were generally from the northwest, the loess deposits are thicker on the uplands adjacent to the Mississippi River flood plain. The thickness of the glacial drift is highly variable. ²³

Figure A.14. Generalized Bedrock Geology in Madison County, Illinois. Data from Illinois State Geological Survey. 24



A map of Madison County's surficial geology reveals that the county is largely covered by loess deposits (Figure A.15). Near and in the Upper Silver Creek watershed, the deposits are mainly silt, silty clay, and fine sand.

Cross-sections of the landscape at lines A and B in Figure A.15 (shown in Figure A.16) show that the rock layers underlying the Silver Creek channel are, from bedrock to surface: Pennsylvanian bedrock; a mixture of loam, sand and gravel, and diamicton (Illinois; common in loess-covered terraces along Silver Creek); silt loam to silty clay loam with some fine sand (Wisconsin; lake deposits); mainly silt, silty clay, and fine sand (Hudson episode; river deposits); and on the stream banks, silt loam or loess (Wisconsin; loess). The thickness of the loess (windblown silt) is shown on the map as contours. The loess layer becomes thinner as you move eastward from the Mississippi River. The loess thickness is 20 feet thick in the lower part of the Upper Silver Creek watershed near Troy, but only five to 10 feet thick at the northern end of the watershed.

The valley fill material along Silver Creek is an important source of groundwater for industries and municipalities on the floodplain. Wells reaching to sand and gravel aquifers in underlying till plain deposits produce moderate amounts of water for small communities and rural households. Drinking water for most rural households using wells comes from low-yielding wells 35 to 150 feet deep. The numerous ponds throughout the watershed supply ample water for livestock and wildlife. ²⁵

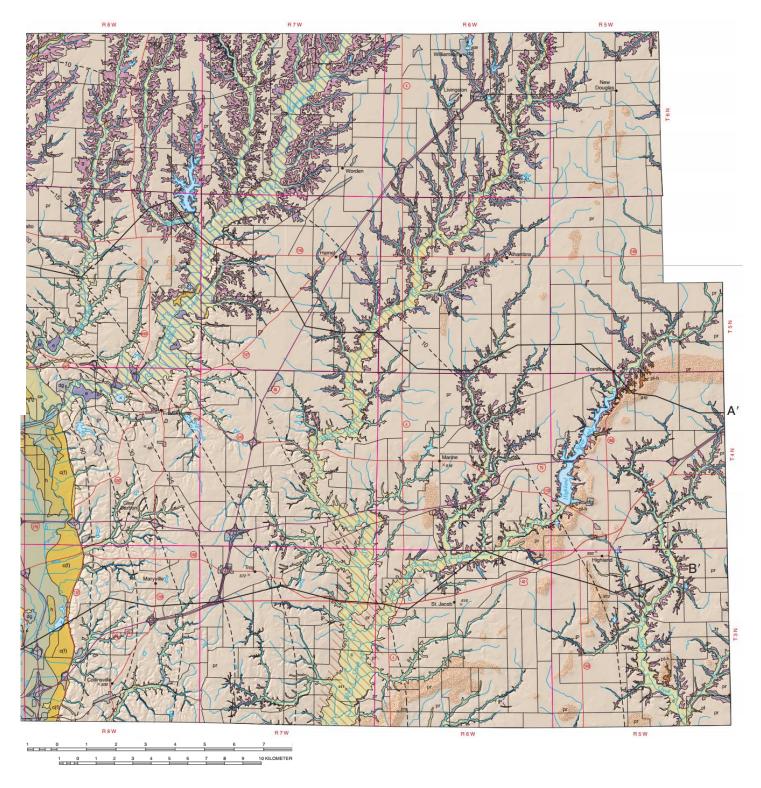


Figure A.15. Surficial geology of the Upper Silver Creek watershed area in Madison County. ²⁶

Legend on following page. Cross-sections at lines A' and B' are shown in Figure A.16. Maps of surficial geology for the portions of the watershed in Macoupin and Montgomery Counties were not available.

QUATERNARY DEPOSITS

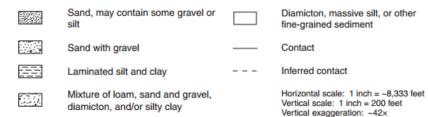
Description	Unit	Interpretation	ILLINOIS EPISODE (~200,000-	-130,000 years B.P.)	
HUDSON EPISODE (~12,000	years before present (B.P.)	to today)	Mixture of loam, sand and gravel,	Hagarstown Member,	Ice-contact sediments; deposited
Fill or removed earth; various sediment types	Disturbed ground	Man-made fill or excavations	and diamicton; weakly stratified; poorly to well sorted sands; may be fractured or faulted (from glacial processes)	Pearl Formation pl-h	mainly in ice-marginal, subglacial, or supraglacial channels; locally includes glaciotectonic faulting and deformation
Mainly silt, silty clay and fine sand; weakly to well stratified; includes some coarser beds	Cahokia Formation (undivided) c	River deposits (alluvium); mapped in valleys tributary to the Mississippi Valley		(stipples on map where buried) Pearl Formation	Outwash; common in
Silt loam with thin fine sand beds; weakly stratified	Cahokia Formation (fan facies)	Alluvial fan deposits; mainly reworked loess from bluffs east of American Bottoms	Sand with some gravel; stratified; may include silty or clayey zones, especially near surface	(outwash facies) pl (hachures on map where buried)	loess-covered terraces along Silver Creek
Silty clay loam, silty clay, and silty loam; massive to stratified;	Cahokia Formation (clayey facies)	Overbank alluvium, abandoned channel and swale fills; mapped		(nachures on map where buried)	
some fine sand lenses	c(c)	only in Mississippi Valley	Pebbly loam diamicton (mixture of clay, silt, sand, and gravel);	Glasford Formation (< 5 feet of loess cover)	Till and ice marginal deposits; includes subglacial and supraglacial deposits
Very fine, fine and medium sand; stratified; moderately to well sorted	Cahokia Formation (sandy facies) c(s)	Alluvium; point bar and channel deposits; mapped only in Mississippi Valley	generally massive; includes some sand and gravel lenses (especially in upper portion)	g	deposits
Silt loam, pebbly silt loam or pebbly silty clay diamicton	Peyton Formation py	Sediments moved downslope by gravity (colluvium); creep layers, slumps, or landslides	Silt loam to silty clay loam; massive to weakly stratified; locally fossiliferous.	Petersburg Silt (cross sections only) pb	Lake sediment; deposited under slackwater conditions or ice marginal setings.
Silty clay to silt with some fine sand; massive to stratified	Cahokia or Equality Formation (undifferentiated)	Overbank alluvium or lake deposits; occurs on or near the Wood River Terrace	PRE-ILLINOIS EPISODE (~700	,000–400,000 years B.P.)	
WISCONSIN EPISODE (~75,	ce 000–12,000 years B.P.)	WOOD FIVER TETTACE	Pebbly silty clay loam diamicton; generally massive; include sand and gravel lenses, zones of stratified silt near base	Banner Formation, (undivided) (cross sections only)	Till and ice marginal deposits; includes subglacial fill and supraglacial debris flows; may include lake sediment
Silt loam to silty clay loam with some fine sand; massive to stratified	Equality Formation e (hachures on map where buried)	Lake deposits; of slackwater origin during peak Mississippi River aggradation	Silty clay loam, silty clay, and silt loam; weakly stratified; contains some fine sand beds	Banner Formation, Canteen member (cross sections only)	Preglacial alluvium and lake deposits; may include some residuum or colluvium at base; occurs mainly in preglacial bedrock valleys
Fine, medium and coarse sand;	Henry Formation	Outwash (glacial meltwater	PRE-C	QUATERNARY DEPO	DSITS
stratified; generally coarsens at depth; some gravelly zones	h	deposits); on Wood River Terrace in northern American Bottoms	Description	Unit	Interpretation
Silt loam; massive; upper 3/5 of unit is more tan or gray (Peoria); lower portion has pinkish hue (Roxana)	Peoria and Roxana Silts pr	Loess (windblown silt); blankets all uplands; thickness contours shown on map; thins eastward from Mississippi Valley bluffs	Shale, siltstone, limestone, and sandstone; less commonly beds of coal and underclay	Pennsylvanian or Mississippian bedrock	Bedrock outcrops or bedrock within 5 feet of land surface; most common in bluff area west of Alton; includes Pennsylvanian and Mississippian rocks
		Illinois Episode till border (areas to southwest of line are driftless	s)		
	15	Loess thickness contour (in feet)	A—A′ Line of cross section	1	
	upland a	ess contours show the combined thickness of treas. The actual thickness at a given spot ma where post-depositional erosion of loess has be	y be much less, especially along valley	,	

Legend. Surficial geology of the Upper Silver Creek watershed area in Madison County. 27

Figure A.16. Cross-sections of surficial geology at lines A and B in Figure A.15.

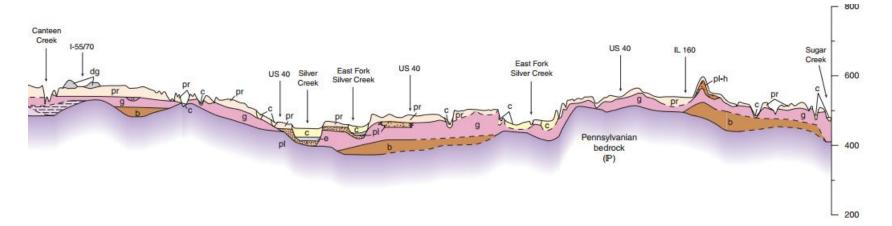
This excerpt of cross-section A extends from Canteen Creek to Sugar Creek, including Silver Creek. The excerpt of cross-section B extends from Cahokia Creek to East Fork Silver Creek, including Silver Creek. ²⁸ See legend for Figure A.15.

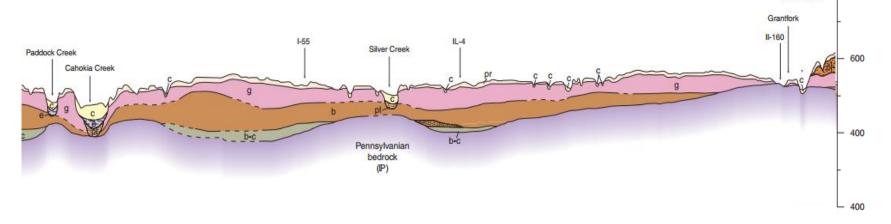
Legend



800

East Fork Silver Creek





Aquifers

There are three major sand and gravel aquifers in the Upper Silver Creek watershed, shown in dark blue in Figure A.17. Two of these are on the mainstem of Silver Creek, and the third is situated directly below Marine. They underlie 17,462 acres (15%) of the watershed (volume is unknown). Generally, the tops of such aquifers lie within 300 feet of the surface and the bases occur within 500 feet. The major aquifers are defined as geologic units capable of yielding 70 gallons of potable water per minute. Potable water is defined as containing less than 2,500 milligram per liter total dissolved solids. Major sand and gravel aquifers are commonly separated from shallower aquifers by layers of less permeable till or fine-grained lacustrine deposits.

There may be several potential aquifers 50 ft or less below the ground surface in the watershed, underlying 57,402 acres (48%) of the watershed area, as shown with blue/grey diagonal lines in Figure A.16. The locations of these potential aquifers were determined by the presence of coarse-grained materials and permeable bedrock including bedrock, sand and gravel, and alluvial units with characteristics that suggest a potential to store or conduct groundwater and yield potable water to wells and springs. These potential aquifers are defined as sand and gravel units at least five feet thick, sandstone at least ten feet thick, and fractured limestone or dolomite at least fifteen feet thick with a lateral extent of at least one square mile. Minor aquifers typically yield from five to seventy gallons of potable water per minute. Potable water is defined as water containing less than 2,500 mg/L of total dissolved solids (TSS).

Deep major bedrock aquifers are distributed beneath the entire watershed at depths greater than 500 feet below the ground surface. They are capable of yielding 70 gallons of water per minute. The deep aquifers beneath the watershed do not yield potable water (containing less than 2,500 milligrams per liter of TSS). Instead, they yield water containing 2,500 to 10,000 milligrams per liter of TSS, shown in light brown in Figure A.16, or water containing greater than 10,000 milligrams per liter of TSS, shown in darker brown.

Aquifers

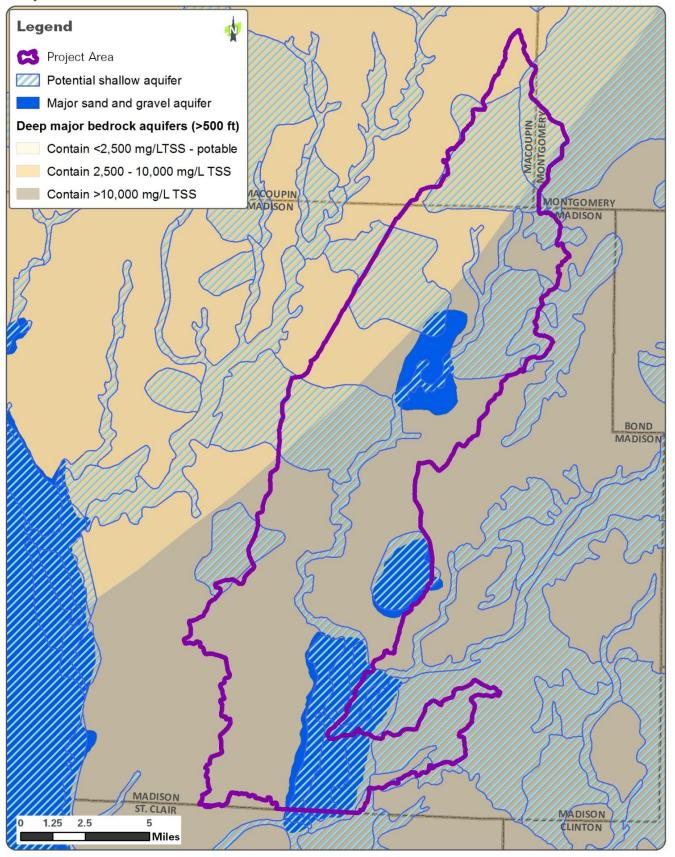


Figure A.17. Known and potential aquifers underlying the Upper Silver Creek watershed at various depths. ²⁹ These can be viewed online in Illinois SGS's Illinois Water Well (ILWATER) Interactive Map. ³⁰

Wells

Illinois State Geological Survey has documented 2,917 wells and borings in the Upper Silver Creek watershed, of which 1,193 are water wells (Figure A.18). There are also over 500 abandoned wells, over 500 test wells, and over 450 wells related to oil and gas production. Permits for drilling have been issued for 16 wells.³¹

Wells and borings

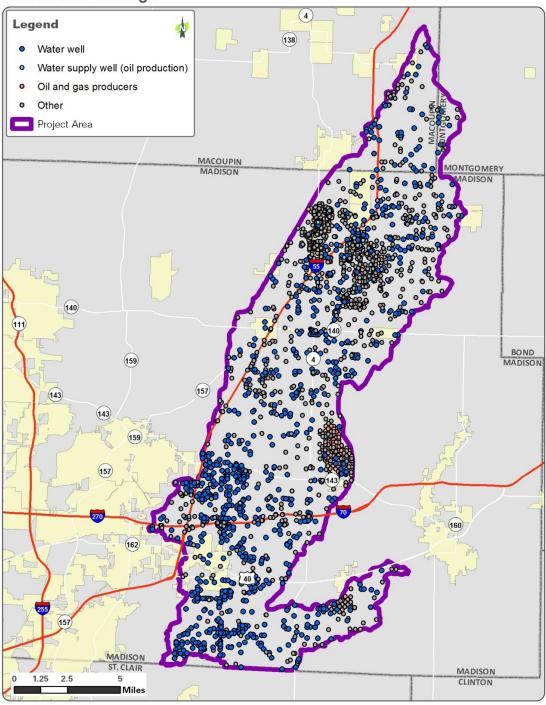


Figure A.18. Wells and borings from ISGS's Wells and Borings Database.

The water wells are fairly evenly distributed across the watershed, with the exception of clusters of wells to the north and south of Troy (Figure A.19). The water wells category includes municipal water supply, irrigation, industrial, commercial, and several types of test well. (More detailed information on well types and specifications is available to order from ISGS for a fee.) 33

Water wells

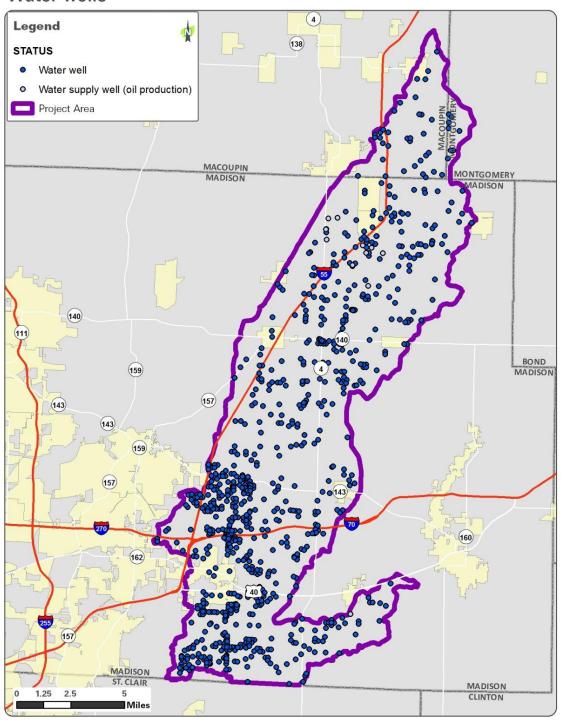


Figure A.19. Water wells and water supply wells for gas production from the ISGS Wells and Borings Database.

Drinking water

Thirteen drinking water supply systems are reported in the US EPA's Safe Drinking Water Information System (SDWIS) for the watershed (Table A.11). Edwardsville, Troy, and Ren Barn Rendezvous RV Park in Edwardsville withdraw groundwater for public supplies. Staunton and Mount Olive use surface water. Other communities purchase groundwater and surface water from entities such as the Bond Madison Water Company and Tri-Township Water District.

In 2012, Staunton and Mount Olive were identified in the Kaskaskia Basin and Vicinity 2050 Water Supply Assessment as having "at-risk" water supply systems, meaning that there is a 10-50% chance the systems will not meet expected demands during a drought of record.³⁴

TableA.11. Water supply systems with records in US EPA's Safe Drinking Water Information System. 35

		Water System	County(s)	Population	Primary Water
System	Water System ID	Name	Served	Served	Source Type*
Community Water System	IL1190250	Edwardsville	MADISON	24900	Groundwater
Community Water System	IL1191000	Troy	MADISON	16800	Groundwater
Transient Non-Community		Red Barn			
Water Systems	IL3141887	Rendevous	MADISON	25	Groundwater
Community Water System	IL1190300	Glen Carbon	MADISON	11500	Purch_groundwater
Community Water System	IL1190950	St. Jacob	MADISON	1602	Purch_surface_water
Community Water System	IL1190700	Marine	MADISON	960	Purch_surface_water
Community Water System	IL1191200	Worden	MADISON	936	Purch_surface_water
Community Water System	IL1190600	Livingston	MADISON	825	Purch_surface_water
Community Water System	IL1190050	Alhambra	MADISON	800	Purch_surface_water
Community Water System	IL1190450	Hamel	MADISON	800	Purch_surface_water
		Staunton			
		Reservoir			
		Road Water			
Community Water System	IL1175250	Соор	MACOUPIN	63	Purch_surface_water
Community Water System	IL1171050	Staunton	MACOUPIN	5030	Surface_water
Community Water System	IL1170700	Mount Olive	MACOUPIN	2150	Surface_water

^{*} Water intake locations are unknown; some systems may withdraw water from outside the watershed (especially purchased water).

Soils

A combination of physical, chemical, and biological variables such as topography, climate, drainage patterns, and vegetation have interacted over centuries to form the complex variety of soils found in the Upper Silver Creek watershed. Data provided by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was used to identify the soil types in the watershed. There are 123 soil types present in the watershed, each of which has a designated hydrologic soil group, hydric soil category, and erodible soil category. See full table of soil types and their attributes in the Data Tables section.

Hydrologic soil groups

Soils are classified by the Natural Resource Conservation Service into Hydrologic Soil Groups (HSGs) based on their infiltration and transmission (permeability) attributes. The ease with which certain soils drain water affects groundwater recharge and the type and location of suitable infiltration management measures (such as detention basins) at a given site.

HSGs are classified into four primary categories, A, B, C, and D, and three dual classes, A/D, B/D, and C/D. The soil texture, drainage description, runoff potential, infiltration rate, and transmission rate of the four primary categories are identified in Table A.12. Sandy type A soils drain much better and allow more infiltration than clay type D soils.

Soil type data was acquired from the U.S. Department of Agriculture's Soil Survey Geographic database (SSURGO) file. ³⁶ The SSURGO data for the project area included 123 soil types. The NRCS county level Soil Surveys contain definitions of the soil types and note the HSG of each soil type. This corresponding data was joined to the SSURGO map layer to create maps of the HSG categories of soils in the watershed.

Table A.12. The four primary Hydrologic Soil Groups (HSGs) and their texture, drainage description, runoff potential, infiltration rate, and transmission rate.

		Drainage			Transmission
HSG	Soil Texture	Description	Runoff Potential	Infiltration Rate	Rate
	Sand, Loamy	Well to			
	Sand, or Sandy	Excessively			
Α	Loam	Drained	Low	High	High
	Silt Loam or	Moderately Well			
В	Loam	to Well Drained	Moderate	Moderate	Moderate
		Somewhat			
С	Sandy Clay Loam	Poorly Drained	High	Low	Low
	Clay Loam, Silty				
	Clay Loam, Sandy				
	Clay Loam, Silty				
D	Clay, or Clay	Poorly Drained	High	Very Low	Very Low

TableA.13. Hydrologic soil groups including acreage and percent of watershed. Unclassified soil group areas are listed as water, miscellaneous water, urban land, or dumps. $^{37, 38, 39, 40}$

		Percent of
Hydrologic Soil Group	Area (acres)	watershed
Unclassified	935	1%
A (fast infiltration; low runoff potential)	1,720	1%
В	56,217	47%
B/D	11,993	10%
С	22,803	19%
C/D	9,488	8%
D (very slow infiltration; high runoff potential)	16,926	14%
Grand Total	120,082	100%

Hydrologic soil group B, which drains moderately well to well, is the most prevalent HSG in the watershed, covering 47% of its area (Table A.13). See Data Tables section for a breakdown of hydrologic soil groups by HUC14 subwatershed. Group D soils are most prevalent in the northern half of the watershed, occupying much of the upland area (FigureA.20). Group B/D soils cover large swaths of land in the middle of the watershed, as the soils transition down to Group B soils covering the majority of the lower watershed. Group C soils, which drain somewhat poorly and have low infiltration, are distinctly located along the waterways of Silver Creek and its tributaries. Unclassified soil group areas include water, miscellaneous water, urban land, or dumps.

Hydrologic Soil Group

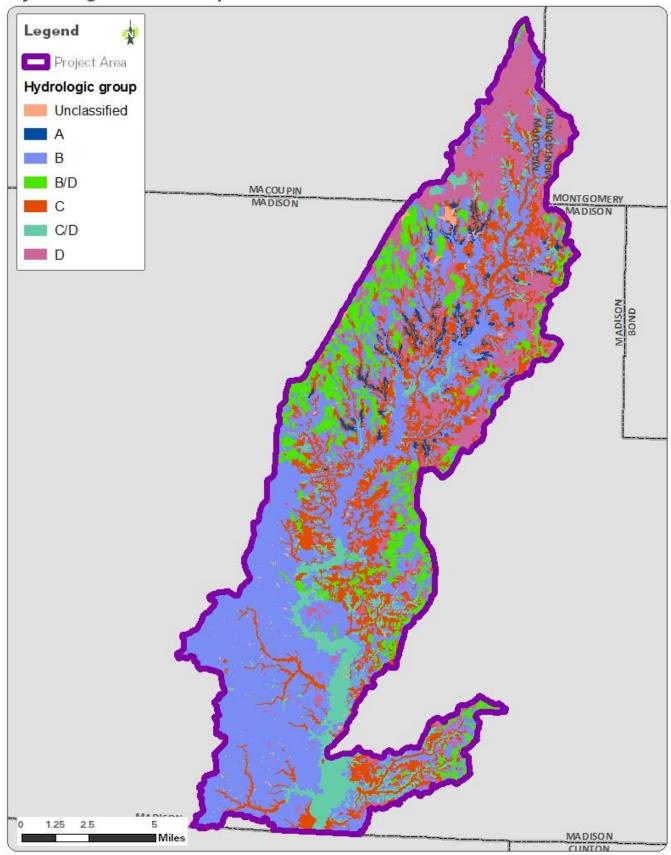


Figure A.20. Hydrologic soil groups in the watershed.

Hydric soil types

Hydric soils are soils that are wet frequently enough to periodically produce anaerobic conditions. They generally form over poorly drained clay material associated with marshes and other wetlands. The locations and attributes of existing wetlands are discussed in the Land Use/Land Cover section. The species composition and growth of vegetation growing on hydric soils is distinct from non-hydric soils. Hydric soils not only indicate the presence of existing wetlands, but also of drained wetlands where restoration may be possible.

Hydric soils were identified through the three NRCS county level Soil Surveys, which identify hydric soils by soil type. A hydric soil designation was then joined to the SSURGO map layer to identify the acreage and location of hydric soils in the watershed (Figure A.21). Fifteen soil types in the watershed were identified as hydric soils, covering a total area of 35,104 acres (Table A.14). Full data on soil types in the watershed and their hydric status is included in the Data Tables section.

Hydric soils constitute 29% of the soils in the watershed (Table A.15). Soils in areas of water, urban land, and dumps were considered to be non-hydric. See Data Tables section for a breakdown of hydric soils by HUC14 subwatershed. Areas of hydric soils of significant size are located in along the Silver Creek waterway and along the upland edges of the watershed to the north (Figure A.21).

TableA.14. Soil types and their hydric status and acreage in the watershed.

Map Symbol			Hydric Soils area
Code	Soil Type (SSURGO map unit name)	Hydric Soil?	(acres)
3070A	Beaucoup silty clay loam 0-2% slope frequently flooded	Yes	1,544
	Beaucoup silty clay loam undrained 0-2% slope		
1070L	occasionally flooded long duration	Yes	122
3334A	Birds silt loam 0-2% slope frequently flooded	Yes	5,078
657A	Burksville silt loam 0-2% slope	Yes	1383
112A	Cowden silt loam 0-2% slope	Yes	36
993A	Cowden-Piasa silt loam 0-2% slope	Yes	10,402
385A	Mascoutah silty clay loam 0-2% slope	Yes	1,457
474A	Piasa silt loam 0-2% slope	Yes	691
31A	Pierron silt loam 0-2% slope	Yes	1,163
703A	Pierron-Burksville silt loams 0-2% slope	Yes	862
16A	Rushville silt loam 0-2% slopes	Yes	32
50A	Virden silt loam 0-2% slope	Yes	1,903
885A	Virden-Fosterburg silt loams 0-2% slope	Yes	10,059
165A	Weir silt loam 0-2% slope	Yes	302
90A	Bethalto silt loam 0-2% slope	Some*	71
Total			35,104

Table A.15. Hydric soils by acreage and percentage. 41, 42, 43, 44

	Area	Percent of
Hydric Soil	(acres)	watershed
Hydric Soils	35,104	29%
Non-Hydric Soils	84,978	71%
Total	120,082	100%

Hydric Soils

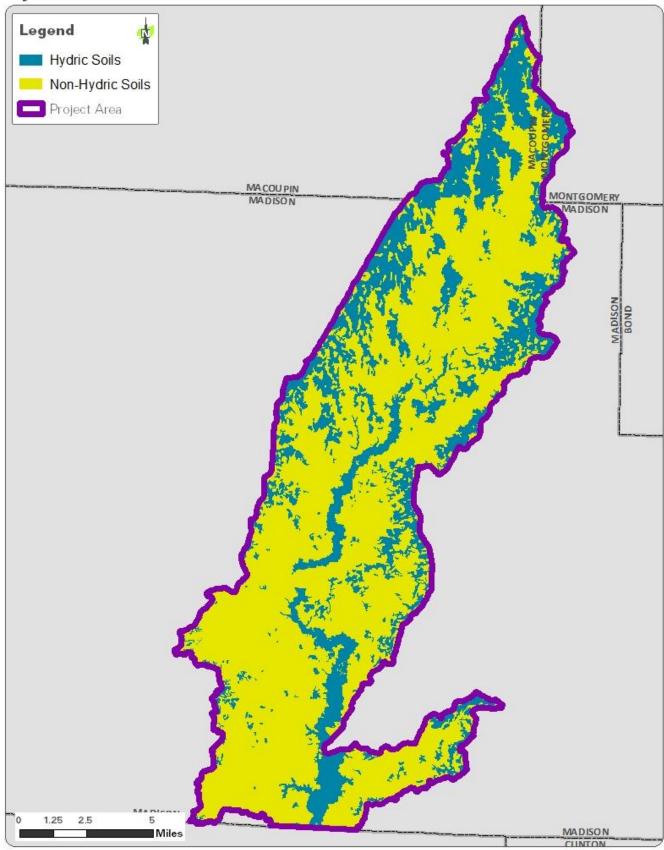


Figure A.21. Hydric and non-hydric soils in the watershed.

Highly erodible soils

Over time, soils exhibit some degree of risk of erosion from water and wind. Certain soils are highly erodible due to a combination of natural and human-influenced factors. Some of the natural properties of soils that make them susceptible to erosion include low permeability (<0.6 in/hour), high silt content (soil particles that measure between 0.002 to 0.53 mm diameter), significant slope (>5%), and low water holding capacity. Human activities that affect soil erosion include agriculture, especially tillage operations; livestock grazing; urbanization; and construction. No single soil property determines whether or not a soil will erode. Rather, it is a combination of all properties interacting simultaneously. The Natural Resources Conservation Service uses the Universal Soil Loss Equation (USLE) to calculate a potential average annual rate of sheet and rill erosion. That value is divided by a predetermined soil loss tolerance level (T) to determine if a soil is highly erodible. Variables that are inputted into the USLE include rainfall, the degree to which a soil resists water erosion, slope length, and slope steepness to determine the potential average annual rate of sheet and rill erosion. The T-level represents the maximum annual rate of soil erosion that could occur without causing a decline in long-term productivity.

The Madison County Soil Survey was used as the primary reference for identifying highly erodible soils in the watershed. The soil survey is the most authoritative source of soils data for the watershed because it is was developed with a considerable amount of field observations combined with GIS modeling. Calculations based solely on GIS modeling can overestimate or underestimate the extent of actively eroding soils. The Madison County Soil Survey identifies which soils are currently classified as eroded or severely eroded. These soils all shared the similar properties of steep slopes (5 to 18%) and high silt content (55 to 72%). Several soil types that exhibited these same properties but were not currently classified as eroded or highly eroded were also added to the list of highly erodible soils.

Highly erodible soils are present throughout the watershed, particularly on steep slopes (Figure A.22). A strong correlation between slope and high erodibility can be seen in the maps for these factors (Figure A.12 and Figure A.22). Large areas of highly erodible soils are present in the southwestern part of the watershed. Approximately 29% of soils in the watershed are highly erodible, according to Madison County Soil Survey data (Table A.16).

Table A.16. Soil erodibility by area and percentage in the watershed.

	Area	Percentage of
Soil erodibility	(acres)	watershed
Highly erodible	34,832	29%
Not highly erodible	85,250	71%
Grand Total	120,082	100%

Highly Erodible Soils

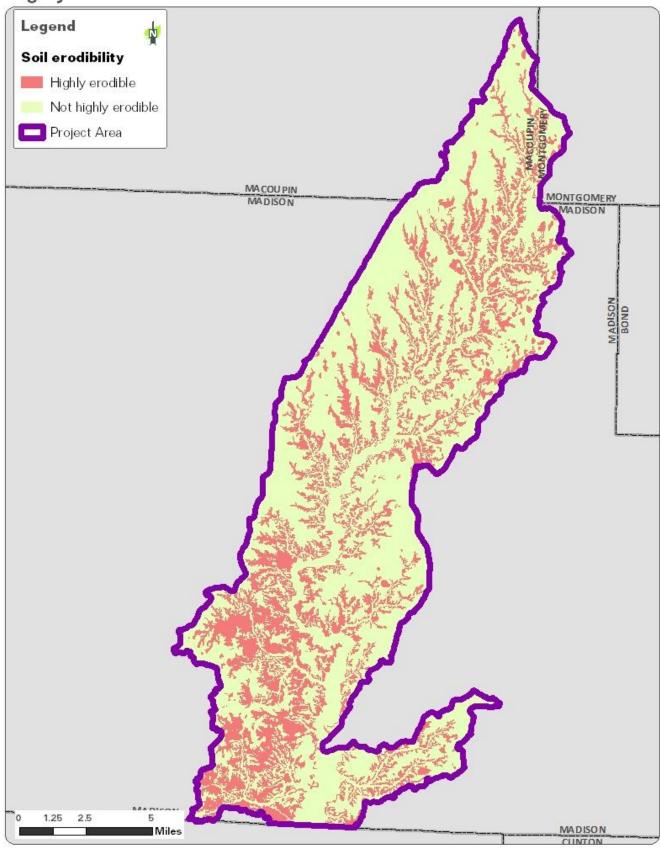


Figure A.22. Highly erodible soils, identified using erodibility classifications from the Madison County Soil Survey.

Water table

The depth of the water table is <50 centimeters in the soils covering 74% of the watershed (Figure A.23). 45, 46 The soils in 9% of the watershed have a water table 200 cm or more below the surface. These soils are concentrated in the southwest of the watershed.

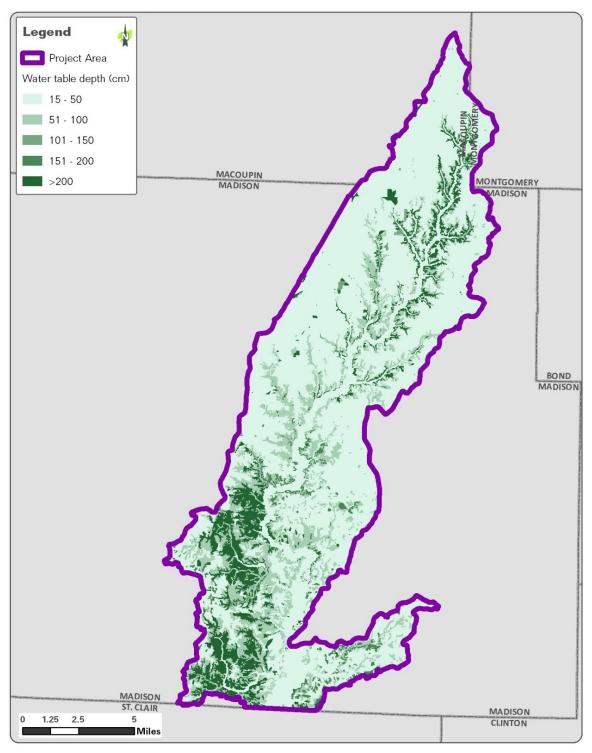


Figure A.23. Water table depth by soil type, according to county soil surveys. $^{47,\,48}$

Watershed Jurisdictions

The Upper Silver Creek watershed is located in three counties, 14 townships, and 13 municipalities (Table A.17 and Figure A.24).

Table A.17. County, township, unincorporated, and municipal jurisdictions within the watershed.

		Area within	
		watershed	% of
Jurisdiction	Area (acres)	(acres)	Watershed
County (inclusive of municipalities)	1,483,963	120,089	100%
Macoupin	555,563	10,408	9%
Madison	474,065	107,943	90%
Montgomery	454,335	1,738	1%
Municipalities	30,591	6,685	6%
Alhambra	490	428	0%
Edwardsville	12,919	100	0%
Glen Carbon	6,524	61	0%
Hamel	746	746	1%
Livingston	683	683	1%
Marine	454	453	0%
Mount Olive	740	392	0%
New Douglas	683	33	0%
St Jacob	492	53	0%
Staunton	1,979	113	0%
Troy	3,427	2,496	2%
Williamson	994	994	1%
Worden	460	135	0%
Unincorporated Areas	1,310,454	113,428	94%
Macoupin County	537,098	9,904	8%
Madison County	337,819	101,786	85%
Montgomery County	435,538	1,738	1%
Township	305,385	120,089	100%
Cahokia (Macoupin County)	23,588	223	0%
Mount Olive/Staunton (Macoupin County)	23,406	10,172	8%
Alhambra (Madison County)	22,393	15,582	13%
Edwardsville (Madison County)	23,047	260	0%
Hamel (Madison County)	23,464	11,726	10%
Jarvis (Madison County)	22,992	18,953	16%
Leef (Madison County)	18,791	277	0%
Marine (Madison County)	22,728	8,849	7%
New Douglas (Madison County)	13,403	4,629	4%
Olive (Madison County)	20,307	19,475	16%
Omphghent (Madison County)	21,556	1,888	2%
Pin Oak (Madison County)	23,130	18,576	15%
St. Jacob (Madison County)	23,033	7,596	6%
Walshville (Montgomery County)	23,548	1,725	1%

Jurisdictions Mount CAHORIA SOUTH LITCHFIELD Legend Municipalities Wals hville Unincorporated area MOUNT OLIVE/. STAV NTON DORCHESTER WALSHVILLE Townships MACOUPIN Project Area HUC12 outlines MA COU PIN Williamso MONTGOMERY MADISON HUC14 outlines MADISON Douglas Livings to: MORO **OMPHGHENT** DOUGLAS Holiday Shores 4 FORT RUSSELL doom BOND ALHAMBRA HAMEL LEEF MADISON CHOUTEAU SALINE MARINE ST. JACOB HELVETIA MADISON ST. CLAIR MADISON

Figure A.24. County, township, unincorporated, and municipal jurisdictions within the watershed.

Jurisdictional roles

Several government entities at federal, state, and local levels have jurisdiction over watershed protection.

Federal and state entities

The U.S. Army Corps of Engineers (USACE) regulates wetlands through Section 404 of the Clean Water Act. Buffers or wetland mitigation are commonly required for developments that impact wetlands. USACE also regulates land development affecting water resources (rivers, streams, lakes, wetlands, and floodplains) when "Waters of the U.S." are involved, a category that includes any wetland or stream/river that is hydrologically connected to navigable waters. Counties also regulate wetlands and other aspects of stormwater management through county Stormwater Ordinances.

The U.S. Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IDNR), Illinois Nature Preserves Commission (INPC), and Forest Preserve Districts play a critical role in protecting high quality habitat and threatened and endangered species, often on land that contains wetlands, lakes, ponds, and streams.

The Illinois Environmental Protection Agency (IEPA) Bureau of Water regulates wastewater and stormwater discharges to streams, rivers, and lakes through the National Pollutant Discharge Elimination System. The NPDES Phase I Stormwater Program applies to large and medium-sized Municipal Separate Storm Sewer Systems (MS4's), several industrial categories, and construction sites hydrologically disturbing 5 acres of land or more. The NPDES Phase II program covers additional MS4 categories, additional industrial coverage, and construction sites hydrologically disturbing more than 1 acre of land. Under the NPDES Phase II program, all municipalities with small, medium, and large MS4's are required to complete a series of Best Management Practices (BMPs) and measure goals for six minimum control measures, including public education and participation, illicit discharge detention, construction site runoff control, and pollution prevention.⁴⁹

For construction sites over one acre in size, which are covered by the NPDES Phase II Program, the developer or owner must comply with all requirements including developing a Stormwater Pollution Prevention Plan (SWPPP) that shows how the site will be protected to control erosion and sedimentation and completing final stabilization of the site. Several municipalities and companies in the Upper Silver Creek watershed have been issued NPDES permits by Illinois for stormwater discharges to MS4s.

The county Soil and Water Conservation Districts (SWCDs), under the Natural Resources Conservation Service (NRCS), influence watershed protection through soil and sediment control and pre and post-development site inspections. They also provide technical assistance to regulatory agencies and the public.

Local government

Watershed protection in Madison, Macoupin, and Montgomery Counties is primarily the responsibility of county and municipal level government. County Boards oversee decisions made by county governments and have the power to adopt, override, and alter policies and regulations. County departments, especially those with functions of planning, zoning, and development, help shape the

policies enacted in the unincorporated areas. Local municipalities also have ordinances that address other natural resource issues, which can include conservation development, Special Service Area (SSA) or watershed protection fees, and native landscaping.

Land development in unincorporated Madison County, which constitutes 85% of the Upper Silver Creek Watershed Plan project area, is regulated by the Madison County Planning and Development Department. Madison County enforces floodplain development regulations in its Zoning Ordinance, construction and fill activities in its Fill Ordinance, future development in its Land Use Plan, regulations on new housing subdivisions in its Subdivision Ordinance, and stormwater management regulations in its Stormwater Ordinance. Madison County is also a member of the National Flood Insurance Program (NFIP). Madison County's Stormwater Ordinance (amended in 2007) regulates development activities which alter stormwater flows and enables the County to comply with National Pollutant Discharge Elimination System (NPDES) regulations. The ordinance requires several types of development activity proposed in the unincorporated area of the county to obtain a permit, including any land disturbing activity if the activity is within 25 feet of a river, lake, pond, stream, sinkhole, or wetland. Madison County is also currently in the process of adopting a Stormwater Plan, which will guide future stormwater management activities.

Several municipalities in Madison County in the Upper Silver Creek watershed have passed similar ordinances. Alhambra, Edwardsville, Glen Carbon, Hamel, Marine, Troy, and Worden have passed Subdivision Ordinances and Zoning Ordinances. Alhambra, Edwardsville, Hamel, and Troy have also passed Drainage Ordinances. (Other municipalities in Madison County may have passed these ordinances as well; these were the participating jurisdictions in the draft Madison County Multi-Jurisdictional All Hazards Mitigation Plan.)⁵⁰ Many municipalities in the watershed are also members of the NFIP and have passed floodplain ordinances (see Flooding section for more information).

Macoupin County passed a Subdivision Control Ordinance in 2005, which governs review and construction procedures for new subdivisions. The County Soil and Water Conservation District is one of the parties with review of new subdivisions. Macoupin County and its municipalities have no standalone stormwater management ordinance, flood damage prevention ordinance, zoning ordinance, land use plan, or erosion management program/policy as of 2010. The county is a member of the NFIP. Two cities in the county, one of which is the City of Staunton, have passed a Zoning Ordinance (in 2009) which regulates aspects of zoning including land use, building regulations, and procedures for approval of new construction. Staunton also passed a Subdivision Control Ordinance in 2005. ⁵¹

Montgomery County has a Subdivision Ordinance, but no separate Zoning Ordinance or Drainage Ordinance. It does have a Floodplain Zoning Ordinance, adopted in 1999, and it is a member of the NFIP. The county also maintains maps of existing land use and infrastructure.⁵²

Demographics

Population

The 2010 US Census found a population of approximately 26,245 in the Upper Silver Creek watershed, with a population of 103,808 in the entire Silver Creek watershed. Note: the 2014 draft Watershed Resources Inventory used a larger population estimate of 61,994 people. There are approximately 10,490 households in the Upper Silver Creek watershed, and 11,961 parcels (parcel data from Madison County).

Madison County is the most populous of the three project area counties, with more than 267,000 people as of 2012. Macoupin and Montgomery counties have less than a fifth of that population, with approximately 47,000 and 30,000 people respectively, as of 2012. ⁵⁴

Of the municipalities represented within the project area, Edwardsville has the largest population, with 24,293 people as of the 2010 Census. Glen Carbon, Troy, Staunton, and Mount Olive are the next most populous municipalities, respectively. The least populous municipalities in the project area include Williamson, New Douglas, and Alhambra. Troy has the largest number and the largest proportion of its population in the watershed (Table A.18).

Population density varies throughout the watershed. The average population density within the project area is 100 or fewer people per square mile. The lowest population density is 101 to 1,000 people per square mile in several of the municipalities, and the highest population density is 1,001 to 10,000 people in Troy and Staunton (Figure A.25).

Table A.18. Population of the municipalities represented in the project area from the 2010 Census, official 2012 population estimate, and approximate population in each municipality living in the watershed. 55

Municipality	Population (2010 Census)	Population (2012 Estimate)	Approx. Population in the watershed (2010 Census)
Troy	9,888	9,946	11,216
Mount Olive	2,099	2,075	1,505
Marine	960	949	1,120
Hamel	816	815	945
Livingston	858	846	867
Alhambra	681	673	827
Glen Carbon	12,934	12,922	732
Edwardsville	24,293	24,457	515
St. Jacob	1,098	1,127	351
Staunton	5,139	5,143	294
Williamson	230	228	230
Worden	1,044	1,036	175
New Douglas	319	318	55

Population Density

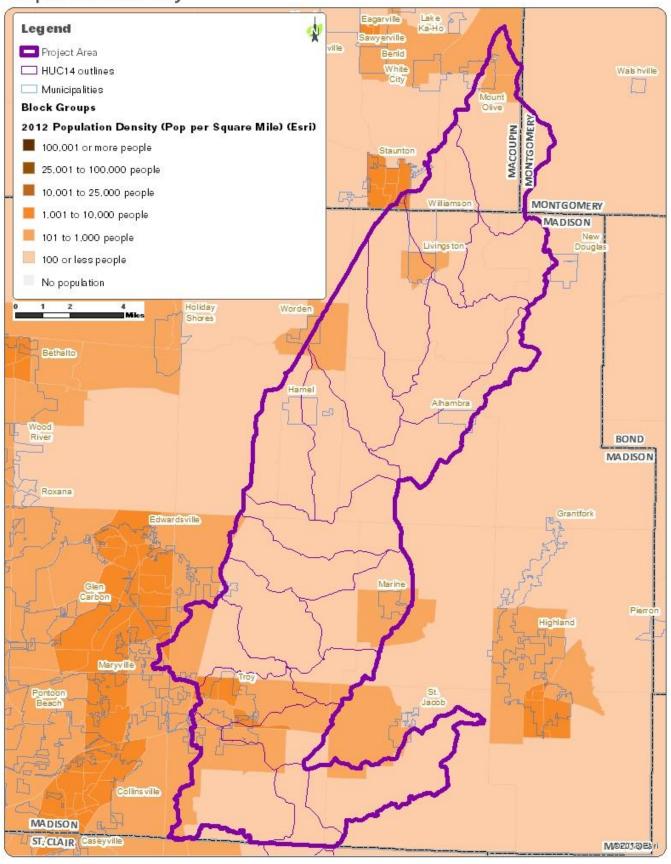


Figure A.25. Population density by Census block in the watershed, according to 2012 estimates. 56

Population change

Recent population growth in the three counties from 2000 to 2010 has varied between 10.9% (Madison County) and 26.8% (Macoupin County). The greatest recent population growth occurred mostly on the east side of the watershed, in tracts including St. Jacob and New Douglas.

All three counties in the project area are expected to increase in population by the year 2030. Madison County is projected to experience the largest actual growth (more than 29,000 people), while Macoupin County is projected to experience the greatest percentage increase in population (26.8%) (Table A.19). A different estimate of Madison County's population growth under a slow-growth scenario by the East-West Gateway Council of Governments puts Madison County's population at 290,143 in 2030, a smaller 8.6% increase from 2013.⁵⁷

Five-year population growth estimates show 0.4% to 1.2% population growth between 2012 and 2017 over much of the project area area (Figure A.26). This growth estimate follows the national average annual growth rate for this time period (0.68%). Pockets of the watershed will experience higher growth of 1.3% to 2.5%, while other areas (for example, Alhambra, Marine, and parts of Troy) are expected not to grow or to lose population.

Table A.19. Population of the counties represented in the project area from the 2000 and 2010 Censuses, with official 2013 population estimates and 2030 population forecasts, and percent change between 2013 and 2030. 58, 59

					Change from	Percent
	2000	2010	2013	2030	2013-2030 (# of	Change from
Total Population	Census	Census	Estimate	Forecast	people)	2013-2030
Madison County	259,391	269,282	267,225	296,342	29,117	10.9%
Macoupin County	49,103	47,765	46,880	59,442	12,562	26.8%
Montgomery County	30,704	30,104	29,654	33,124	3,470	11.7%

Projected Population Growth 2012-2017

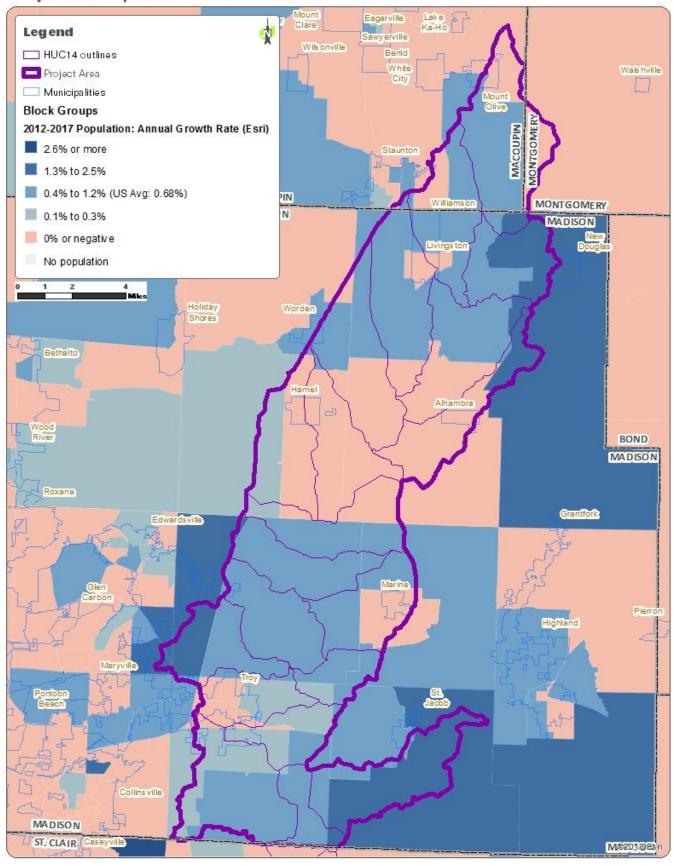


Figure A.26. Projected population growth between 2012 and 2017 (U.S. Census 5-year population estimates). ⁶⁰

Median income

Median income can be an indicator of financial ability to make improvements to property, such as improved septic systems. The median family income in Madison County is \$52,756. In Macoupin and Montgomery counties, the median family income is \$48,788 and \$42,261 respectively (Table A.20). In the watershed, there is a general north-south income gradient when assessed by Census block, with the highest median household income south of Troy in the south of the watershed (Figure A.27).

The municipalities with the highest median family income (upwards of \$70,000) are Troy, St. Jacob, Hamel, and Edwardsville. The municipalities with the lowest proportion of people with income below the poverty level are St. Jacob, Hamel, and Marine, each with 5% or less.

The municipalities with the lowest median family income (less than \$46,000) are Williamson, Alhambra, Livingston, and Mount Olive. Williamson, Alhambra, Livingston, and Worden had the highest percentages of people with income below the poverty level.

Table A.20. Median family income and poverty in the municipalities and counties in the project area. ⁶¹

	Median Family Income (2012 inflation-adjusted	Percentage of people whose income in the past 12 months is below the
Community	dollars)	poverty level
Alhambra	\$39,688	15.2%
Edwardsville	\$73,759	11.6%
Glen Carbon	\$66,296	10.5%
Hamel	\$76,250	5.0%
Livingston	\$42,383	15.1%
Marine	\$54,911	5.0%
Mount Olive	\$45,250	14.7%
New Douglas	\$49,306	17.8%
St. Jacob	\$77,500	4.3%
Staunton	\$45,633	12.6%
Troy	\$90,094	9.5%
Williamson	\$33,750	16.4%
Worden	\$53,125	16.8%
AVERAGE	\$57,534	11.9%
Macoupin County	\$48,788	12.1%
Madison County	\$52,756	13.8%
Montgomery County	\$42,261	14.2%
AVERAGE	\$47,935	13.4%

Household Income

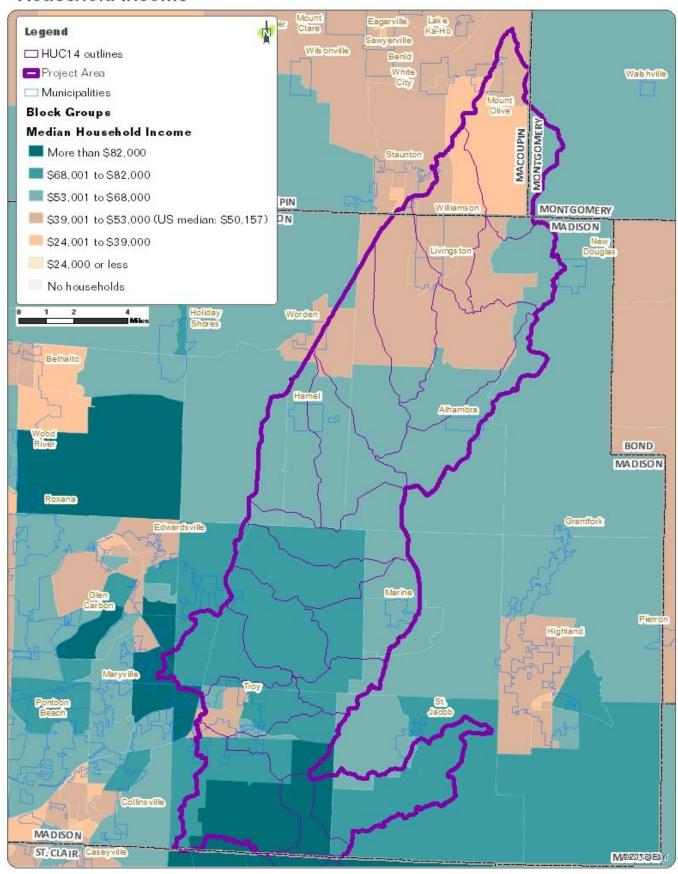


Figure A.27. Median household income by Census block.

Employment

Employment can be an indicator of future growth and development in an area. Madison County experienced a 2.7% increase in the number of jobs between 2001 and 2011 (Table A.21). In 2011, the three industry sectors with the largest number of jobs were government (17,177 jobs), retail trade, (14,993 jobs), and health care/social assistance (14,946 jobs). From 2001 to 2011, jobs in service industries grew 15%. The sectors that added the most new jobs were transportation and warehousing (1,790 new jobs), finance and insurance (1,748 new jobs), and accommodation/food services (1,538 new jobs). The number of government jobs was relatively static, increasing 1%. Jobs in non-service industries shrank 27%, from 30,672 to 22,495 jobs. 62

Macoupin County experienced a 12.7% decrease in the number of jobs between 2001 and 2011. Non-service industry jobs decreased the most, from 4,025 to 3,057 (a -24% decrease), followed by government jobs (a -16% decrease) and service industry jobs (a -9% decrease). The sectors that added the most jobs between 2001 and 2011 were finance and insurance (115 new jobs), real estate/rental and leasing (98 new jobs), and utilities (15 new jobs). ⁶³

Montgomery County also experienced an overall decrease in the number of jobs (-10.7%) between 2001 and 2011. The greatest decrease was in non-service industries, which shrank from 3,452 to 2,792 (a - 19% decrease). Jobs in service industries shrank from 9,464 to 8,703 (a -8% decrease), and government jobs shrank from 2,005 to 1,949 (a -3% decrease). The sectors with the most new jobs were mining (200 new jobs), construction (106 new jobs), and health care/social assistance (100 new jobs).

Table A.21. Percentage of the workforce working in non-services, services, and government sectors in 2000 and 2011, & percentage change in that time. 65, 66, 67

	Madison County		Macoupin County			Montgomery County			
	2001	2011	% Change 2001-2011	2001	2011	% Change 2001-2011	2001	2011	% Change 2001-2011
Percent of Total			2.7%			-12.7%			-10.7%
Non-services related	24.7%	17.6%	-26.7%	~21.7%	~18.9%	-24.0%	22.9%	~20.7%	-19.1%
Farm	1.4%	1.2%	-13.1%	8.2%	7.0%	-25.3%	7.8%	7.1%	-18.4%
Forestry, fishing, & related activities	0.1%	0.1%	19.0%	na	na	na	0.4%	~0.4%	-1.9%
Mining (including fossil fuels)	0.3%	0.4%	30.0%	na	na	na	0.8%	3.5%	73.5%
Construction	6.8%	6.0%	-9.6%	7.3%	6.8%	-19.3%	4.1%	5.4%	17.1%
Manufacturing	16.1%	10.0%	-36.4%	6.1%	5.1%	-28.1%	8.8%	4.4%	-56.1%
Services related	61.6%	68.9%	14.9%	~47.6%	~49.8%	-8.6%	~62.7%	~64.5%	-8.0%
Utilities	0.3%	0.3%	-12.6%	0.3%	0.5%	23.8%	na	na	na
Wholesale trade	2.7%	2.7%	2.8%	5.3%	5.9%	-3.0%	~4.2%	3.9%	-15.9%
Retail trade	12.1%	11.8%	-0.6%	11.8%	11.6%	-14.0%	11.9%	13.1%	-1.8%
Transportation & warehousing	3.9%	5.2%	36.9%	4.0%	3.6%	-20.0%	4.2%	~3.5%	-26.1%
Information	1.0%	0.8%	-24.1%	1.2%	0.9%	-35.3%	1.1%	1.2%	-1.9%
Finance & insurance	4.0%	5.3%	35.3%	4.6%	5.9%	13.6%	4.7%	5.6%	5.9%
Real estate & rental and leasing	2.5%	3.5%	41.1%	2.0%	2.9%	26.1%	2.1%	2.4%	1.2%
Professional & technical services	3.8%	4.9%	32.8%	3.3%	3.0%	-20.9%	3.2%	3.0%	-16.5%
Management of companies & enterprises	0.2%	0.7%	330.6%	~0.1%	~0.0%	-53.9%	0.2%	0.7%	145.9%
Administrative & waste services	3.1%	4.1%	38.9%	~1.6%	~1.7%	-6.4%	2.6%	3.4%	20.5%
Educational services	0.9%	1.2%	31.6%	na	na	na	0.4%	~0.9%	79.5%
Health care and social assistance	11.0%	11.7%	9.6%	na	na	na	11.3%	~13.3%	5.9%
Arts, entertainment, & recreation	2.9%	2.4%	-14.3%	1.4%	1.6%	-1.6%	0.8%	0.9%	-0.6%
Accommodation & food services	7.0%	8.0%	17.8%	5.1%	5.4%	-7.5%	8.9%	6.6%	-33.0%
Other services, except public admin.	6.1%	6.3%	6.4%	7.0%	6.8%	-15.4%	7.1%	5.9%	-24.9%
Government	13.70%	13.5%	0.9%	15.8%	15.2%	-15.9%	13.3%	14.5%	-2.8%

All employment data are reported by place of work. Estimates for data that were not disclosed are indicated with tildes (~).

Home values

Investment and development in the Upper Silver Creek watershed has brought more people to buy homes here to be near their place of work, local schools, and other amenities. Home values are an indication of a location's desirability, the income of community residents, and the tax base local governments have to support themselves and their activities, among other things. Changes in home values over time can show movement from a buyer's to a seller's market, or vice versa.

Estimates mapped by ESRI in 2013 show that median home values in the watershed are generally higher in the southern part of the watershed than in the north (Figure A.28). According to data from housing website Zillow.com, the average median home price in the municipalities in the project area is \$146,000 (Table A.22). All of the municipalities experienced a decrease in home values over the past year, and the prediction for next year is a 0.1% decrease. Overall, the market in the watershed is a buyer's market.

Many homes in the watershed have negative equity – the market value of the property has fallen below the outstanding amount of the mortgage secured on it – but the percentage is similar to the U.S. average of 18.8% (as of March 2014). Approximately 3.3% of homes are delinquent on their mortgages in the three counties, which is much lower than the 7.2% U.S. average (as of March 2014).

Table A.22. Home values, recent and predicted change in home values, and percentages of homes with negative equity and that are delinquent on their mortgages. ⁷⁰

Community	Median home value (as of 5/14)	Change in home values 5/13 to 5/14	Predicted change in home values 5/14 to 5/15	Homes with negative equity	Delinquent on mortgage	
Alhambra	\$ 122,100	-7.1%	-0.6%	19.4%	2.0%	
Edwardsville	\$ 152,000	-5.4%	-0.1%	12.2%	4.3%	
Glen Carbon	\$ 166,300	-4.3%	0.6%	11.5%	4.7%	
Hamel	No data	No data	No data	18.2%	5.0%	
Livingston	No data	No data	No data	16.7%	0.0%	
Marine	\$ 127,000	-4.7%	0.4%	13.4%	2.9%	
Mount Olive	No data	No data	No data	27.7%	5.8%	
New Douglas	No data	No data	No data	19.9%	3.2%	
St. Jacob	\$ 152,500	-6.9%	-0.6%	18.8%	4.9%	
Staunton	No data	No data	No data	22.8%	2.4%	
Troy	\$ 158,700	-4.9%	-0.2%	15.4%	3.5%	
Williamson	No data	No data	No data	No data	No data	
Worden	\$ 143,400	-4.0%	0.0%	11.6%	0%	
AVERAGE	\$ 146,000	-5.3%	-0.1%	17.3%	3.2%	
Macoupin County	No data	No data	No data	20.5%	3.3%	
Madison County	\$ 98,700	-6.2%	-0.7%	18.4%	5.4%	
Montgomery County	No data	No data	No data	21.0%	1.3%	
AVERAGE	n/a	n/a	n/a	18.8%	3.3%	

Home Values

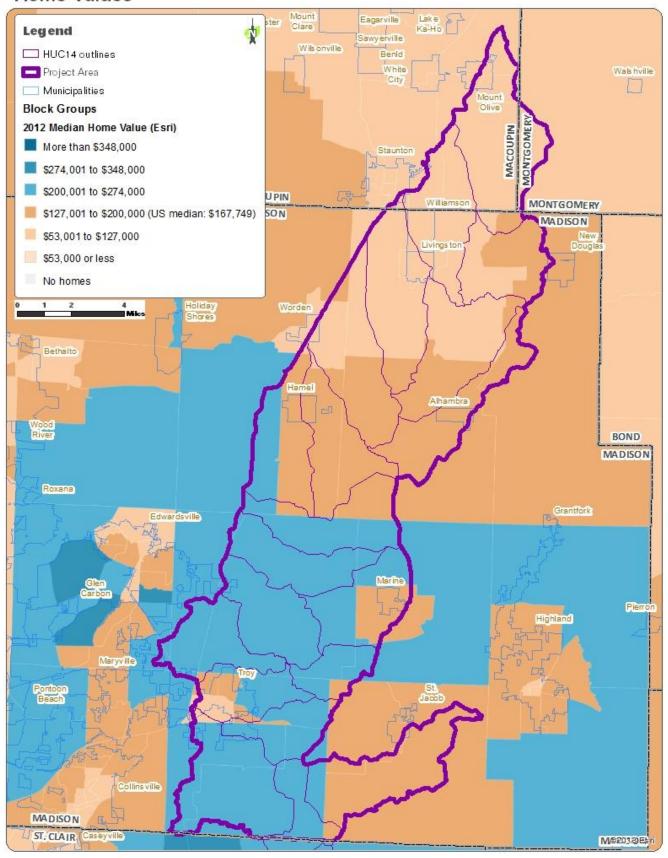


Figure A.28. Median home values from 2012 by Census block. 71

Owner-occupied housing

Homeownership rates can indicate transience or financial stability in a population. The U.S. Census Bureau defines the homeownership rate as the percentage of homes that are occupied by the owner, and presents homeownership data for states and major metropolitan areas. In both St Louis and Illinois, homeownership rates have declined over the past 10 years. This change followed national trends associated with the economic recession and housing market collapse of the mid-2000's and the tendency for the millennial generation to rent homes instead of purchasing.

Owner occupied housing rates are at 76% or more across most of the watershed as of 2012, which is higher than the national average of 57% and the St. Louis Metropolitan Area average of 71.2%. Rates are lower in municipalities, presumably as a result of the increased availability and demand for rental housing available in more urbanized areas (Figure A.29).⁷²

Owner-Occupied Housing

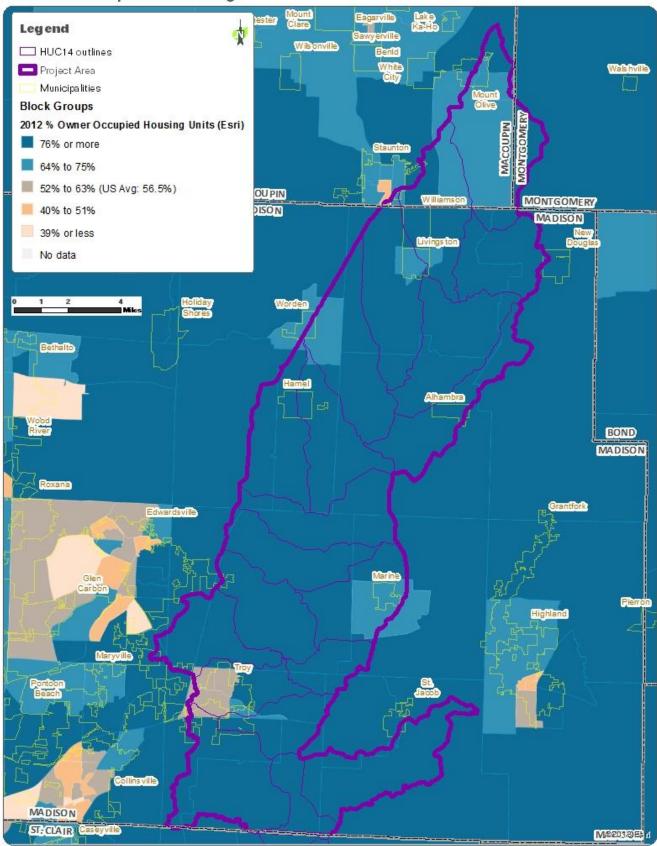


Figure A.29. Percentage of owner-occupied housing in 2012, by Census block. 73

Land Use/Land Cover

2011 land use/land cover

Land use/land cover data for the Upper Silver Creek watershed was collected from the 2011 National Land Cover Database (NLCD). Cultivated crops are the most common land use in the watershed at 70.572 acres or 58% (Table A.23). Other common land uses include hay/pasture (17,404 acres, 14%), deciduous forest (16,470 acres, 14%), developed open space (6,981 acres, 6%), and low intensity developed (6,148 acres, 5%). The urbanized areas are distributed throughout the watershed, but there is more urbanized area in the southwest of the watershed (Figure A.30; codes/descriptions are aggregated for simplicity). There is little or no high intensity developed space, barren land, evergreen forest, mixed forest, or shrub/scrub land use/land cover in the watershed.

The proportions of land use/land cover types are fairly consistent among HUC14 watersheds, ranging between 30% and 75% for agricultural land and 0% and 24% for the four types of developed space. The HUC14 with the most agricultural land is 07140204050401, south of Hamel in the middle of the watershed. The HUC14 with the most developed land is 07140204050603 by a wide margin. Located to include much of Troy, it has 24% low intensity developed space and 5% medium density developed space. See Data Tables section for a detailed breakdown of land use by HUC14.

Most of the watershed's wood wetlands occur in HUCs 07140204050601 and 07140204050901, both of which encompass swaths of the Silver Creek channel and associated low-lying floodplain areas. Deciduous forest is to be found in all of the HUC14s, ranging between 2% and 32% of their area. The highest percentage of deciduous forest is in HUC 0714020450102 in the north of the watershed.

Table A.23. 2011 land use/land cover classifications and acreage. 74

Land Use	Description	Area (acres)	Percent of watershed (%)
	Areas of bedrock, desert pavement, scarps, and other accumulations		
	of earthen material. Generally, vegetation accounts for less than 15%		
Barren Land	of total cover.	23	0%
	Areas used for the production of annual crops, such as corn and		
	soybeans. Crop vegetation accounts for greater than 20% of total		
Cultivated crop	vegetation. Includes all land being actively tilled.	70,572	58%
	Areas dominated by trees generally greater than 5 meters tall, and		
	greater than 20% of total vegetation cover. More than 75% of tree		
Deciduous forest	species shed foliage with seasonal change.	16,470	14%
	Highly developed areas where people reside or work in high		
Developed, High	numbers. E.g. apartment complexes, row houses, commercial		
Intensity	/industrial. Impervious surfaces cover 80-100% area.	155	0%
Developed, Low	Areas with a mixture of constructed materials and vegetation. E.g.		
Intensity	single family houses. Impervious surfaces cover 20-40% area.	6,148	5%
Developed, Medium	Areas with a mixture of constructed materials and vegetation. E.g.		
Intensity	single family houses. Impervious surfaces cover 50-79% area.	1,068	1%

Table A.23 continued.

Land Use	Description	Area (acres)	Percent of watershed (%)
	Areas with a mixture of some constructed materials, but mostly		
	vegetation in the form of lawn grasses. Impervious surfaces cover		
	<20% area. These areas most commonly include large-lot single		
	family housing units, parks, golf courses, and vegetation planted in		
Developed, Open	developed settings for recreation, erosion control, or aesthetic		
Space	purposes.	6,981	6%
Emergent	Areas where perennial herbaceous vegetation accounts for >80% of		
herbaceous	vegetative cover and the soil or substrate is periodically saturated		
wetlands	with or covered with water.	95	0%
	Areas dominated by trees generally greater than 5 meters tall, and		
	>20% of total vegetation cover. More than 75% of the tree species		
Evergreen forest	maintain leaves all year. Canopy is never without green foliage.	18	0%
	Areas of grasses, legumes, or grass-legume mixtures planted for		
	livestock grazing or the production of seed of hay crops, typically on		
	a perennial cycle. Pasture/hay vegetation accounts for >20% of total		
Hay/Pasture	vegetation.	17,404	14%
	Areas dominated by gramanoid or herbaceous vegetation, generally		
	>80% of total vegetation. These areas are not subject to intensive		
Herbaceous	management such as tilling, but can be utilized for grazing.	368	0%
	Areas dominated by trees generally greater than 5 meters tall, and		
	greater than 20% of total vegetation cover. Neither deciduous nor		
Mixed forest	evergreen species are greater than 75% of total tree cover.	0	0%
Open Water	Areas of open water, generally with<25% of vegetation or soil.	466	0%
	Areas dominated by shrubs; less than 5 meters tall with shrub		
Shrub/Scrub	canopy typically greater than 20% of total vegetation.	0	0%
	Areas where forest or shrubland vegetation accounts for >20% of		
	vegetative cover and the soil or substrate is periodically saturated or		
Woody wetlands	covered with water.	1,411	1%
Grand Total		121,179	100%

Land Use/Land Cover

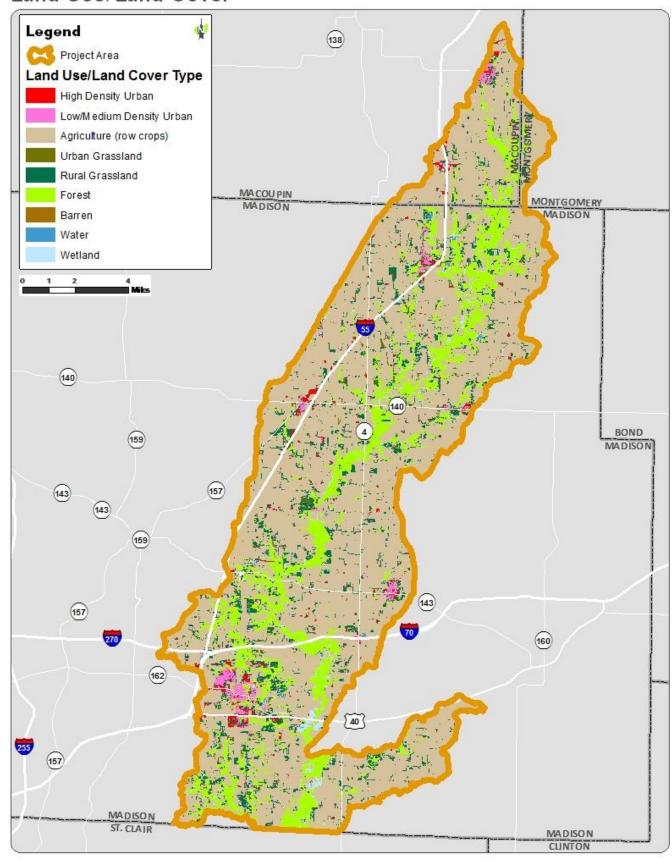


Figure A.30. Land use/land cover categories. 75

Forest

Mixed, deciduous forest in the watershed contains a wide variety of tree species. On the uplands, dominant species include oaks and hickories. In the floodplains, water-tolerant species such as silver maple, cottonwood, sycamore, and ash tend to dominate. ⁷⁶ Forest covers approximately 13.6% of the watershed at present.

The forested corridor along Silver Creek provides habitat for neo-tropical migratory songbirds which fly through and/or nest there after migrating from Central and South America. The songbirds require dense forest interior conditions without holes or gaps, which encourage nest predators such as raccoons, opossums, skunks, and cowbirds. No endangered or threatened species has been documented in the study area, but since this watershed has not been extensively studied or recently inventoried to find them, this is not proof of their absence. The bottomland forest along Silver Creek may support species that rely on this habitat, such as the Indiana Bat.⁷⁷

Illinois RiverWatch volunteers collected data on vegetation at two stream sites in the watershed between 1996 and 2014. This riparian vegetation includes trees such as silver maple, slippery elm, box elder, ash, red oak, and Osage orange. Invasive species including bush honeysuckle (*Lonicera maackii and L. morrowii*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*) were also recorded.⁷⁸

Wetlands

Historically, Illinois lost 90% of its wetlands between the 1780's and 1980's, primarily as a result of farmland being drained for agriculture. The National Wetlands Inventory represents the current extent, approximate location and type of wetlands in the United States, as determined using aerial imagery. According to this Inventory, bottomland forest is the most prevalent wetland type in the project area (Figure A.31). A few pockets of marshland are also found in this area, along with scattered open water wetlands (ponds). Field checks are needed to more accurately assess the extent of wetlands in the watershed and support the general inventory provided by the National Wetlands Inventory. Approximately 1.2% of the watershed currently contains wetlands.

In future, this area may be covered by NWIPlus, an enhanced National Wetlands Inventory database that includes attributes related to ecological functions. These functions include surface water detention, streamflow maintenance, sediment and particulate retention, carbon sequestration, shoreline stabilization, and provision of fish and shellfish habitat.⁸¹

Wetlands mitigation importance values and wetland restoration importance values were created for the watershed by MoRAP. Several layers of data, especially topography, soil type, and land cover, were used to create maps of existing wetlands which it is highly important to protect, and areas which were formerly wetlands which it would be highly beneficial to restore. This work has been done previously for other areas in this region, as seen in the 2013 report, "Ecological Approach to Infrastructure Development: Wetlands Mapping and Analysis for the Mississippi and Mississippi River Floodplains". 82

Wetlands

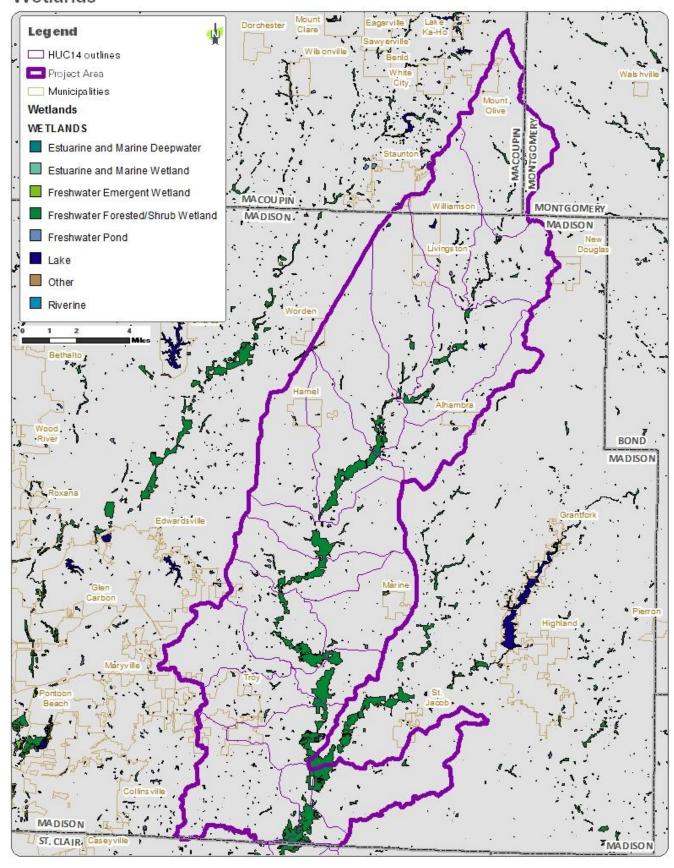


Figure A.31. Wetlands in the watershed as determined by the National Wetlands Inventory. 83

Ecological Significance

The Missouri Resource Assessment Partnership (MoRAP) and the East-West Gateway Council of Governments (EWG) created an ecological significance GIS data layer for EWG's eight-county planning region in 2010. The attribute variables important to ecological significance included the results of existing aquatic conservation assessments, vegetation type, vegetation patch size, natural diversity, occurrence of rare species, and land ownership (public/private). Eight tiers of importance were identified from high to low ecological significance. Areas of high ecological significance include the Silver Creek corridor and some of its major tributaries, and the wetland bottoms area where East Fork Silver Creek enters Silver Creek (Figure A.32).

Ecological Significance (natural and semi-natural vegetation) Mount Eagarville Lake Legend Lake Fork Ка-Н ester **Ecological Significance** Sawyerville High Whit Wilsonville Grove Branch Branch City Walshville Staunton Williamson Low Livingston Upper Silver Creek Watershed ouglas Municipalities Streams 55 Data Source: Developed by The Missouri Resource Assessment Partnership for the East-West Gateway Council of Governments (EWG) in support of the Ecological Approach to Infrastructure Development initiative. Alhambra Heights Wood River AADISON COUNT **BOND COUNTY** Grantfork Edwardsville Marine. Pierron Glen Highland Maryville Ponto Beac MADISON COUNTY MADISON COUNTY ST. CLAIR COUNTY City CLINTON COUNTY O'Fallon

Figure A.32. Ecological significance attributes (out of eight tiers of importance) calculated by the MoRAP and EWG.

Threatened and endangered species

No endangered or threatened species has been documented in the study area, but since this watershed has not been extensively studied or recently inventoried to find them, this is not proof of their absence. The bottomland forest along Silver Creek may support species that rely on this habitat. Eight animal and plant species listed as threatened or endangered may be present in the Upper Silver Creek watershed (Table A.24). The most likely species present are the Indiana bat, based on its habitat of stream corridors with well-developed riparian woods, and upland forests), and the leafy prairie clover, which grows in prairie remnants on thin soil over limestone.

Table A.24. Threatened and endangered species listed by the U.S. Fish and Wildlife Service as being present in one or more of the counties in the Upper Silver Creek watershed. ⁸⁶

	Species	Status	Range	Habitat
Mammal	Indiana bat (Myotis sodalis)	Endangered	Potential Habitat Statewide; Known Occurences in 27 counties in Illinois, including Madison and Macoupin counties. Neither county has hibernacula.	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Bird	Least tern (Sterna antillarum)	Endangered	10 counties in Illinois including Madison County.	Bare alluvial and dredged spoil islands
Reptile	Eastern Massasauga (Sistrurus catenatus)	Candidate*	10 counties in Illinois including Madison County.	Shrub wetlands
Fish	Pallid sturgeon (Scaphirynchus albus)	Endangered	7 counties in Illinois including Madison County.	Large rivers
Mussel	Spectaclecase mussel (Scaphirynchus albus)	Endangered	7 counties in Illinois including Madison County.	Large rivers
Plant	Decurrent false aster (Boltonia decurrens)	Threatened	20 counties in Illinois including Madison County.	Disturbed alluvial soils
Plant	Eastern prairie fringed orchid (Platanthera leucophaea)	Threatened	82 counties in Illinois including Madison, Macoupin, and Montgomery counties.	Mesic to wet prairies
Plant	Leafy prairie clover (Dalea foliosa)	Endangered	9 counties in Illinois including Madison County.	Prairie remnants on thin soil over limestone

^{* &}quot;Candidate" means the species is a candidate for listing as endangered or threatened.

Fish

The Illinois Natural History Survey (INHS) keeps records of fish sampling in Illinois. Samples were taken in the Upper Silver Creek watershed at three locations a total of four times in 1963, 1966, and 2000. Sixteen species of fish were found, and 195 individuals collected. ⁸⁷ Six of the 16 species are tolerant of various environmental perturbations, three are moderately tolerant, and two are moderately intolerant (the other five were not rated by U.S. EPA). ⁸⁸ These small, separate sampling events therefore indicate that there is moderate pollution/environmental disturbance at the sampling locations on or tributary to Silver Creek.

In the Intensive River Basin Survey of 2007 at the USGS gauge on Silver Creek, Illinois EPA found a fish IBI score of 45, indicating no impairment (a score above 41 is "fully supporting" of aquatic life). The impairment was determined through the low macroinvertebrate IBI score and water quality data.

Crustaceans

The INHS Crustacean Collection database keeps records of crustaceans sampled in Illinois. Crustaceans were sampled at seven locations in Silver Creek (not necessarily Upper Silver Creek), Mill Creek, or Lake Fork over four days in 1975 and 1977. Four species of crustaceans were found, and 40 individuals collected.⁸⁹

Mussels

The INHS Mussel Collection database keeps records of mussels sampled in Illinois. Mussels were sampled once per year in Silver Creek (not necessarily Upper Silver Creek) in 1999, 2004, 2007, and 2010. Eight species were found, and more than 53 individuals collected. Illinois RiverWatch volunteers found no mussels at the two sites they monitored in the watershed between 1996 and 2014, except for one fingernail clam at the Wendell Branch site in 1999.

Livestock and domestic animals

Animal (livestock) data is available from the USDA 2012 Agricultural Census database at the county level. 92 Additionally, cattle, horses, and sheep have been noted by watershed stakeholders, including two stables and a mustang ranch (Legendary Mustang Sanctuary). The watershed has no Concentrated Animal Feeding Operations (CAFOs) according to the IEPA data layer in the Resource Management Mapping Service (RMMS). 93

Agricultural land use/land cover

Illinois, and the Upper Silver Creek watershed, lies at the heart of the "Corn Belt". The area's gentle topography; moderate, wet climate; and location adjacent to the Mississippi River support agricultural success. Furthermore, the thick layer of loess on uplands in the watershed provides abundant farmland. Besides mineral content, much of the soils' richness comes from layers of organic matter from the area's historic vegetation, forest and tallgrass prairie. As a result of intensive row crop agriculture on upland fields, most of the original top soil has been lost to erosion. It is common in many crop fields to find that 50-90% of the original top soil layer is gone, and farmers are increasingly farming the heavier clay subsoils. 94 The resulting delivery of sediment to downstream water bodies is an ongoing water quality

problem. Some farmers in the watershed have enrolled in land conservation programs such as the Conservation Reserve Program (CRP) to protect highly erodible soils.⁹⁵

The total watershed acreage of land in agricultural use is 87,976 acres (72%), of which 58% is used for cultivated crops and 14% is used for hay/pasture (Table A.23). Corn, soybeans, and wheat are grown extensively in the watershed. Sorghum, horseradish, sweet corn, tomatoes, onions, potatoes, berries, and fruits are also grown. The average farm size in the three counties is 340 acres, while the median size is 97 acres, indicating that there are a few very large farms. Madison County farms are typically smaller than farms in the other two counties (Table A.25).

Table A.25. Data about agriculture in Macoupin, Madison, and Montgomery counties. 97

	Macoupin	Madison	Montgomery
Farms	1,190	1,110	1,021
Land in farms (acres)	438,592	307,135	382,388
Average size of farms (acres)	369	277	375
Median size of farms (acres)	115	66	110
Total cropland (acres)	371,038	276,513	346,716
Irrigated land (acres)	30	2,364	(D)*
Avg market value of ag products sold per farm (dollars)	\$ 186,369	\$ 127,692	\$ 22,582
Average net farm cash income (dollars)	\$ 44,417	\$ 1,474	\$ 4,706
Farms harvesting corn for grain	601	491	543
Acres farmed for corn for grain	220,412	116,881	180,222
Farms with hired farm labor	312	286	283
Number of hired farm labor workers	886	1,328	729
Farms enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement			
Programs	495	179	430
Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement			
Programs (acres)	16,995	3,785	12,425

^{* (}D): figure is withheld to avoid disclosing data for individual farms.

The pressures of urbanization have led to encroachment on/conversion of farmland in Illinois over time. There are fewer farms and fewer acres in agricultural production in the state than at any time since the 1982 USDA's Agricultural Census. Between 1997 and 2003, 50,000 acres was converted to urban use in the Metro Area of St. Louis, which includes Madison County. The population, while relatively stagnant in overall size, shifted eastward onto larger lots and "farmettes", but often did not take up farming. The Upper Silver Creek watershed appears to have a lower proportion of owner-farmers than southwestern Illinois as a whole, as much of the land is rented out to be farmed (based on anecdotal information). The average age of farmers in the three counties is 55 years.

Corn and soybeans are the major crops grown in the watershed (or were in 2011), followed by double cropped winter wheat and soybeans and grassland/pasture (Figure A.33). The USDA-NASS Cropland Data Layer also shows large areas of developed land and deciduous forest in the watershed.

Cropland

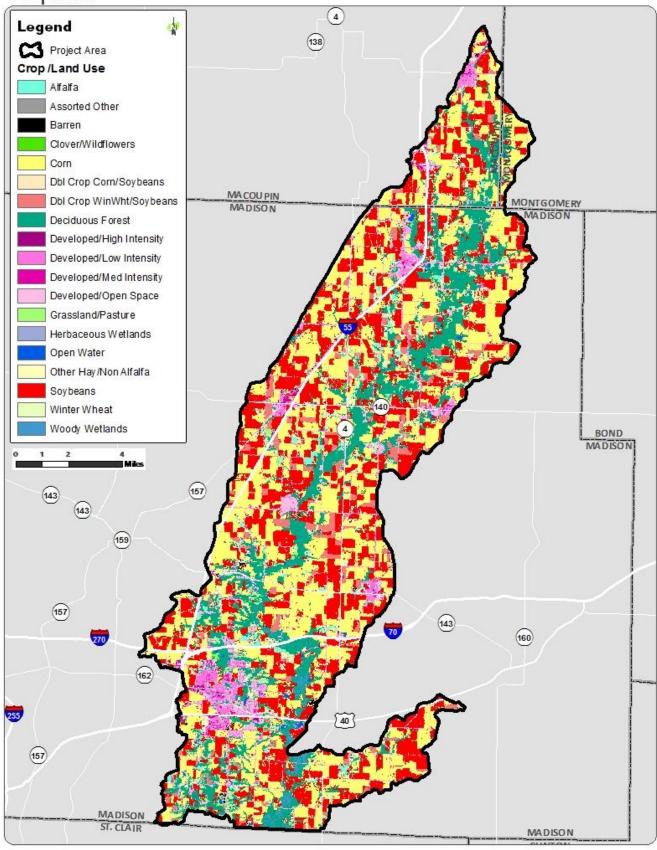


Figure A.33. Cropland types and land use from the 2011 USDA-NASS Cropland Data Layer. 99

Open space

There is no federally- or IDNR-owned open space in the watershed. However, there are 26 areas of open space covering 1,289 acres (1% of the watershed). These open spaces include municipal parks, bike trails, campgrounds, and athletic fields (Figure A.34). There is one golf course in the watershed. The watershed's one campground is Bur Oaks Campground, located southwest of Alhambra. The 35-acre private campground features RV sites accommodating 76 visitors, and two lakes used for swimming. The tributary that passes through the campsite is often 50 feet wide and floods about twice a year. The space of the same statement of the same

Subdivisions

Madison County is currently working on assembling data on all subdivisions in the unincorporated area, with a particular focus on those subdivided in the last 10 years. The total "developed" area in the unincorporated county is 6,513 acres (650 lots), which includes major and minor subdivisions, private access subdivisions, single lot subdivisions, and single lot additions. Plat years are recorded for some, but not all, major and minor subdivisions. There are many more subdivisions in the south than in the north, particularly around and to the south of Troy (Figures A.35 and A.36).

Transportation infrastructure

The watershed contains several important components of Illinois' transportation network, including Interstates 55 and 70, and several state routes (Figure A.34). State Route 4 runs north-south through much of the watershed. A railroad runs northeast to southwest through Livingston in the north of the watershed, and there is a small airport, the St. Louis Metro East/Shafer Field Airport, near St. Jacob. (Note about the map: Railroads and open spaces identified by the East-West Gateway Council of Governments are only available for Madison County. Some railroads are not currently in use.)

Cultural/historic resources

Cahokia, a pre-Columbian Native American city, covered about 6 square miles in its heyday (1200's CE) and was the largest and most influential urban settlement in Mississippian culture. Many earthen mounds were built by those peoples in and around Cahokia, including some in the Upper Silver Creek watershed. They were identified by HeartLands Conservancy in "The Mounds – America's First Cities: A Feasibility Study" in 2014, which mapped over 550 mound sites in the St. Louis region. Four mounds sites were identified by this study in the watershed (MS228, MS152, MS187, and MS29). All are in "unknown" condition (Figure A.37). The Bur Oaks Camprgound has also attracted student groups from SIUE to look for arrowheads in the streambed, based on previous finds there. 104

Route 66, also known as the Mother Road, was one of the original highways in the U.S. highway system. First established in 1926, the highway became one of the most famous roads in America, and was a major route for those migrating west during the Dust Bowl of the 1930's. Today, much of the road has been designated as a National Scenic Byway and given the name "Historic Route 66". The road ran through the watershed, passing through Mount Olive, Staunton, Hamel (as US 157), Livingston, Troy (as US 40), Marine, and St. Jacob (as US 40). (The route changed considerably over the years, including and excluding these places at different times.) These municipalities still make the most of this history, welcoming motorists through the year and in mid-June for the Illinois Route 66 Mother Road Tour. Historic Route 66 also passes through Edwardsville, outside of the watershed area; Edwardsville will mark this heritage with "The Edwardsville Route 66 Conference" in October 2015. 105

Transportation Infrastructure & Open Space Legend (138) Open Space Interstates U.S. Highways MACOUPIN State Routes Major Roads MA COU PIN MONTGOMERY MADISON Railroads MADISON Project Area 140) (140) BOND MADISON (143) 270 160 BOND CLINTON MADISON MADISON ST. CLAIR CLINTON

Figure A.34. Transportation infrastructure and open space.

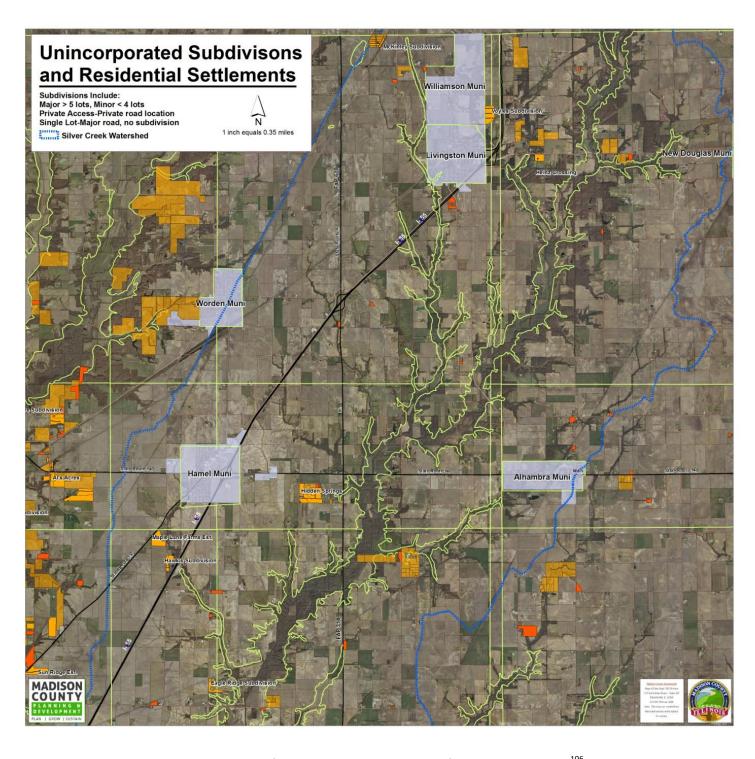


Figure A.35. Subdivisions in the north of the watershed. Maps and data from Madison County. 106

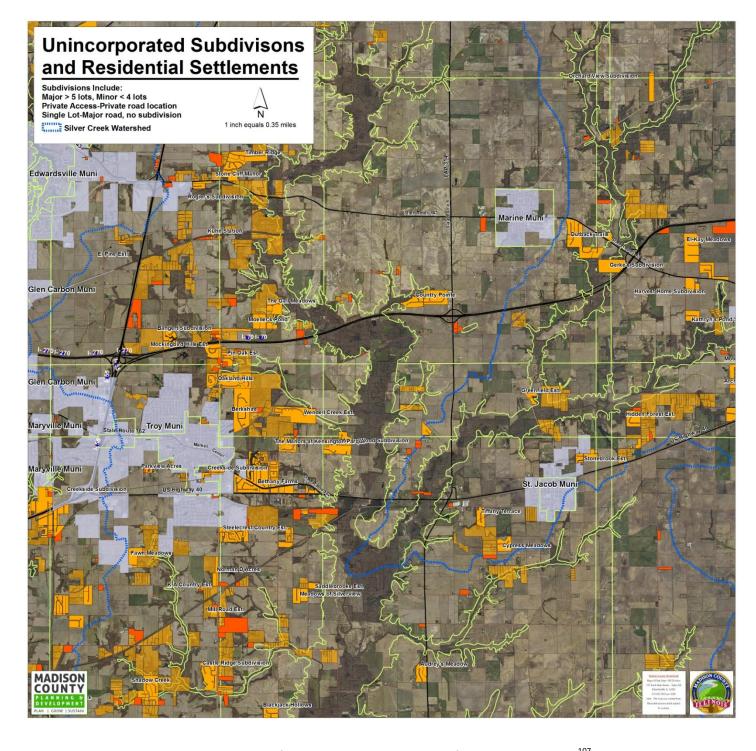


Figure A.36. Subdivisions in the south of the watershed. Maps and data from Madison County. 107

Mound sites

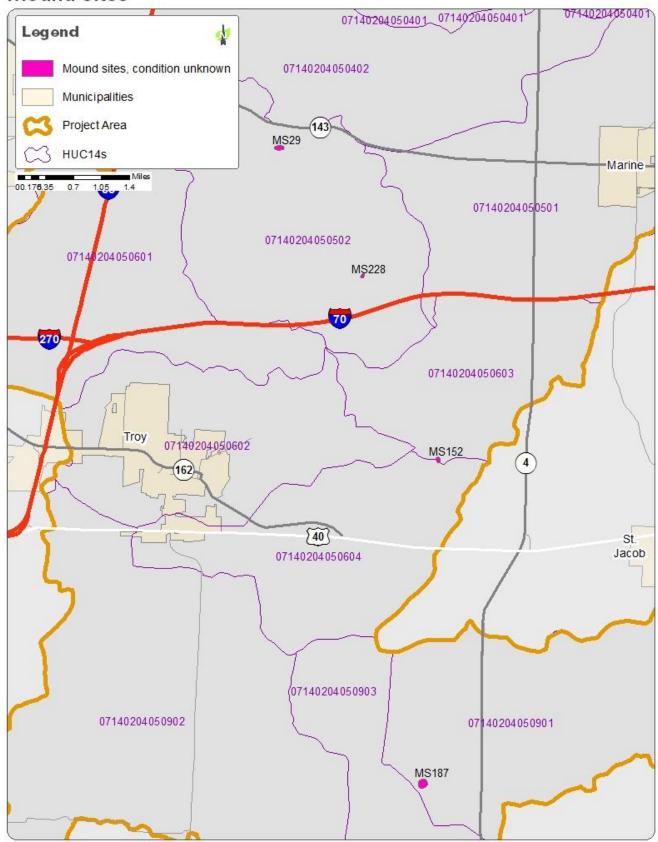


Figure A.37 Location of four pre-Colombian mound sites.

Future land use/land cover predictions

Changes to land use/land cover in the watershed were projected from municipal Comprehensive Plans, where available. Using these Plans, percentages of the different land uses under a future build-out scenario were estimated for the 1.5 mile zone outside each municipality. A 1.5 mile buffer around the municipalities was created in ArcGIS, a Geographic Information System (GIS) software program, and the new land use/land cover percentages was applied to the buffer. The remaining land outside the 1.5 mile zone was considered to retain its current land use/land cover designations. The resulting land use/land cover predictions represent a full build-out scenario for the municipalities in the watershed, while retaining a conservative estimate of zero land use/land cover change in the unincorporated area.

The largest predicted change in land use/land cover pertains to agricultural land, with a 32,726 acre or 46% decrease in cultivated crops and a 6,776 acre or 39% decrease in hay/pasture across the watershed. This land is largely expected to be converted to low intensity and medium intensity developed land uses (Table A.26). Deciduous forest is expected to shrink by 41%. In total, approximately 46,295 acres of existing open space within agricultural lands, wooded/herbaceous wetland, and forest is expected to be lost to development. Much of the new development will likely occur in the 1.5 mile zones around municipalities in the watershed. The HUC14s with the largest municipal areas will likely see the most growth and resulting loss of agricultural land. For example, the HUC14 containing Troy, 07140204050603, is predicted to lose 698 acres of cultivated cropland, a 58% change. See Data Tables section for a detailed breakdown of future land use/land cover by HUC14.

Table A.26. Existing and predicted future land use/land cover.

Land Use/Land Cover Description	Land Use Code	Current Area (acres)	Current Area (%)	Predicted Area (acres)*	Predicted Area (%)	Change (acres)	Percent Change
Barren Land	31	22.7	0%	11.9	0%	-10.8	-48%
Cultivated crop	82	70,571.9	58%	37,846.2	31%	-32,725.7	-46%
Deciduous forest	41	16,470.1	14%	9,767.7	8%	-6,702.4	-41%
Developed, High Intensity	24	154.6	0%	667.6	1%	513.0	332%
Developed, Low Intensity	22	6,148.3	5%	37,485.6	31%	31,337.3	510%
Developed, Medium Intensity	23	1,067.5	1%	18,679.9	15%	17,612.4	1,650%
Developed, Open Space	21	6,981.4	6%	3,938.5	3%	-3,042.9	-44%
Emergent herbaceous							
wetlands	95	94.7	0%	58.2	0%	-36.5	-39%
Evergreen forest	42	17.6	0%	5.5	0%	-12.1	-69%
Hay/Pasture	81	17,404.5	14%	10,628.5	9%	-6,776.0	-39%
Herbaceous	71	367.7	0%	203.2	0%	-164.5	-45%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	466.4	0%	517.4	0%	51.0	11%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	1,411.2	1%	1,368.7	1%	-42.5	-3%

^{*} Predicted land use/land cover is based on zoning identified in the Comprehensive Plans of municipalities in the watershed for the 1.5 mile zone outside their current boundaries.

Impervious cover

Impervious cover is the surfaces of an urban landscape that prevent infiltration of precipitation and runoff into the ground. Imperviousness is a useful indicator of the impacts of urban land use/land cover on water quality, hydrology, and flooding. Runoff over impervious surfaces warms the water and collects pollutants causing receiving stream to experience a shift in plant, macroinvertebrate, and fish communities. Sensitive species can no longer thrive, and pollution-tolerant species begin to dominate. Higher impervious cover also translates to greater runoff volumes, resulting in changes to stream hydrology.

The National Land Cover Database (NLCD) Percent Developed Impervious Surface file provides nationally consistent estimates of the amount of man-made impervious surfaces present over a given area. The values are derived from Landsat satellite imagery, using classification and regression tree analysis. Values range from 0 to 100 percent, indicating the degree to which the area is covered by impervious features. In the Upper Silver Creek watershed, the mean imperviousness is 3.0% with a standard deviation of 9.9% (Table A.27). Most of the watershed is not highly impervious. However, selected areas have a lot of impervious cover, up to 100% (Figure A.38). These areas correlate with developed land use/land cover as seen in Figure A.30.

Table A.27. Existing impervious cover by HUC14, as assessed from the NLCD Percent Developed Impervious Surface dataset.

HUC14	Existing Impervious %
07140204050101	2.2%
07140204050101	0.9%
	5.0,1
07140204050201	4.3%
07140204050202	0.8%
07140204050203	2.8%
07140204050301	2.2%
07140204050302	2.2%
07140204050303	2.7%
07140204050304	3.3%
07140204050401	1.6%
07140204050402	1.2%
07140204050501	2.3%
07140204050502	3.6%
07140204050601	1.4%
07140204050602	4.9%
07140204050603	13.1%
07140204050604	6.9%
07140204050901	1.0%
07140204050902	1.1%
07140204050903	2.6%
AVERAGE	3.0%

Impervious Cover

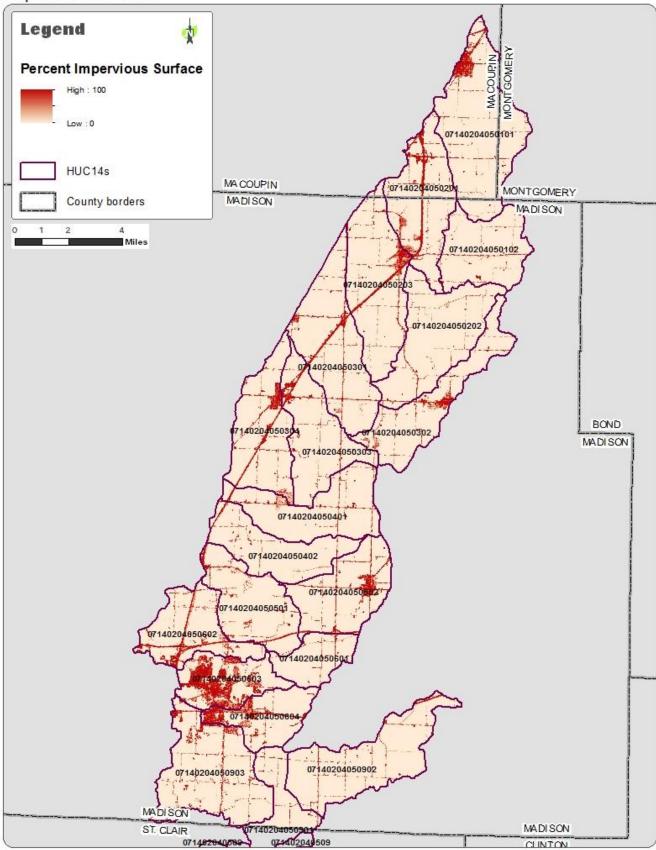


Figure A.38. Impervious cover in the watershed.

Future impervious cover

As with predicted future land use, no digitized maps of future zoning around municipalities in the watershed were available to shape assessments of future impervious cover in the watershed. Educated assumptions were made about future changes in impervious cover based on the future land use estimates, which were translated to imperviousness percentages using NLCD definitions for developed land uses (of which definitions impervious cover percentages are a component) and imperviousness percentages derived from land use/land cover in a Maryland EPA study. ¹⁰⁸

Based on the impervious cover coefficients assigned to land use/land cover described above, the future land use scenario for the watershed will increase impervious cover in the watershed from 3.0% to 24.0% in a future full-buildout scenario (Table A.28). The highest future impervious cover percentage is 43.5% in HUC 07140204050602. These figures represent a significant increase in imperviousness. As a comparison, USGS data indicates that impervious cover increased 2.8% in the watershed between 2006 and 2011. ¹⁰⁹ If we assume that an annual increase of 2.8% remains constant, this assessment's future impervious cover of 24.0% will be reached in 76 years, representing a long period of slow increases in developed land and impervious surfaces.

Table A.28. Current and future imperviousness by HUC14, with Impervious Classification categories from the Center for Watershed Protection's Impervious Cover Model.

	Existing	Existing (2012) Impervious	Predicted	Predicted Impervious
HUC14	Impervious %	Classification	Impervious %	Classification
07140204050101	2.2%	Sensitive	20.2%	Impacted
07140204050102	0.9%	Sensitive	27.3%	Non-supporting
07140204050201	4.3%	Sensitive	36.7%	Non-supporting
07140204050202	0.8%	Sensitive	22.1%	Impacted
07140204050203	2.8%	Sensitive	27.9%	Non-supporting
07140204050301	2.2%	Sensitive	27.7%	Non-supporting
07140204050302	2.2%	Sensitive	25.7%	Non-supporting
07140204050303	2.7%	Sensitive	24.3%	Impacted
07140204050304	3.3%	Sensitive	27.7%	Non-supporting
07140204050401	1.6%	Sensitive	9.1%	Sensitive
07140204050402	1.2%	Sensitive	19.4%	Impacted
07140204050501	2.3%	Sensitive	23.5%	Impacted
07140204050502	3.6%	Sensitive	33.2%	Non-supporting
07140204050601	1.4%	Sensitive	9.7%	Impacted
07140204050602	4.9%	Sensitive	43.5%	Non-supporting
07140204050603	13.1%	Impacted	33.9%	Non-supporting
07140204050604	6.9%	Sensitive	28.8%	Non-supporting
07140204050901	1.0%	Sensitive	8.7%	Sensitive
07140204050902	1.1%	Sensitive	23.0%	Impacted
07140204050903	2.6%	Sensitive	24.7%	Impacted
AVERAGE	3.0%	Sensitive	24.8%	Impacted

Table A.29. Impervious category & corresponding stream conditions per the Impervious Cover Model from the Center for Watershed Protection. ¹¹⁰

Impervious Cover	
Management Category	% Impervious
Sensitive	<10%
Impacted	> 10% but <25%
Non-supporting	>25%

Based on a review of hundreds of studies, scientists at the Center for Watershed Protection (CWP) in Maryland developed an "Impervious Cover Model". This model classifies the relationship between percentage of impervious cover in a watershed and stream quality. Streams are grouped into one of three categories: sensitive, impacted, and non-supporting (Table A.29). Streams in non-supporting subwatersheds generally have greater than 25% impervious cover, highly degraded channels, degraded habitat, poor water quality, and poor-quality biological communities. Sensitive subwatersheds have less than 10% impervious cover, stable channels, good habitat, good water quality, and diverse biological communities.¹¹¹

Out of 19 "sensitive" subwatersheds (less than 10% impervious cover), two are projected to remain sensitive, eight will become "impacted", and nine will become "non-supporting". The HUC14 subwatershed with the highest current impervious cover, which includes much of Troy (HUC 07140204050603), will change from "impacted" to "non-supporting" (Table A.28).

Watershed Drainage

Stream delineation

The stream reaches used in assessing stream conditions are from the National Hydrography Dataset (NHD). A reach is a continuous piece of surface water with similar hydrologic characteristics. The NHD catalogs stream reaches, giving each reach a unique 14-digit Reach Code. The first 8 digits are the same as the HUC8 code for the Lower Kaskaskia watershed (07140204). The next six digits are randomly assigned, sequential numbers that are unique within the HUC8 watershed.

There are 708 NHD stream reaches in the Upper Silver Creek watershed, comprising 481.7 miles of perennial and intermittent streams. The average length of an NHD stream reach is 0.4 miles, while the range of stream lengths is 0.0052 miles (28 feet) to 2.7 miles. The segments are all listed as perennial or intermittent streams/rivers, with the exception of certain "artificial path" or "connector" segments, which represent non-specific connections between non-adjacent segments. A full table of NHD stream reaches in the Upper Silver Creek watershed can be found in the Data Tables section.

In this assessment/project, we used the NHD stream reaches as our stream units. We did not subdivide the reaches further, as we had no way to assess homogenous stream conditions on a smaller scale than the NHD within the bounds of the project.

There was little existing information about the condition of the streams in the project area. To gather information about the stream reaches, geo-referenced video footage was taken on low level helicopter flights over the larger streams in the watershed. Fostaire Helicopter was selected to gather the flight data, using Red Hen software to collect and store the video in a GIS database. The video was collected during the winter (February 2014) when leaf cover was absent and vegetation was dormant in order to increase the visibility of the streams flown. A total of 275.9 miles or 57.2% of the total stream miles in the watershed were flown and videotaped.

The video images were then viewed to assess three different parameters for each stream. These three parameters were streambank erosion, degree of channelization and condition of the riparian area.

Streambank erosion

As the video from the aerial survey was reviewed, areas of eroding streambank were identified and catalogued in a feature table in a GIS database. The feature table includes the degree of erosion based on Illinois EPA (IEPA) guidelines (Table A.30), the estimated length, and the location of each stream sections determined to be eroding at a moderate or severe rate. Lengths with slight bank erosion were then determined by subtracting the length of severe and moderate erosion sections from the entire stream segment length.

The slight, moderate, and severe erosion categories were based on IEPA's guidelines for lateral recession from the IEPA Load Reduction Worksheet (Table 28). The very severe erosion category was not used in this assessment.

Table A.30. Lateral recession category guidelines used in classifying streambank erosion in the assessment of the video footage of the aerial assessment. 113

Lateral Recession Rate* (ft/yr)	Category	Description
0.01 – 0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang.
0.06 - 0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang.
0.3 – 0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross-section becomes more U-shaped as opposed to V-shaped.
0.5+	Very Severe*	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and change in cultural features as above. Massive slips or washouts common. Channel cross-section is U-shaped and streamcourse or gully may be meandering.

^{*} Lateral Recession Rate is a rate quantifying how much the streambank is estimated to erode annually.

In total, 1,456,952 ft (276 miles) of streams were successfully assessed for streambank erosion using geo-referenced video footage. Of the assessed length, 65% had none or low/slight erosion, 18% had moderate erosion, and 17% had high/severe erosion (Table A.31). A full breakdown of streambank erosion conditions by reach code can be found in the Data Tables section.

Lengths of moderate and severe streambank erosion were identified throughout the watershed in tributaries and on the main branches (Figure A.39). Many headwater streams show up as having "none or low" erosion, but this is because they were left unmarked in several instances where visibility was poor and no erosion category could be assigned. Headwater streams often have a steeper gradient and may in fact have a higher degree of bank erosion due to higher velocities, even though flow is low.

Illinois RiverWatch volunteers assessed stream width at two sites in the watershed between 1996 and 2014. At both sites, stream width varied greatly over time, suggesting the occurrence of streambank erosion and/or measurement differences. At the Silver Creek site near the USGS gauge ("Knights Creek", 38.7162, -89.8181), the stream was recorded as 7.1 ft wide in 2000, and 7.9 ft wide in 2014, but measurements of 3.2 ft and 17 ft occurred in the intervening years. At the Wendell Branch site (38.7578, -89.8181), stream width ranged between 18 and 21.6 ft. Neither site showed a clear and definitive increase or decrease in stream width over time.¹¹⁴

Table A.31. Streambank erosion along assessed stream reaches in the watershed (total stream length assessed and average streambank erosion conditions).

	Stream Length	None or Low	Erosion	Moderate	Erosion	High	Erosion
	Assessed (ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
TOTAL	145,6952.1	908,914.2		283,512.7		264,525.2	
AVERAGE			65%		18%		17%

^{**} The very severe erosion category was not used in this assessment.

Streambank Erosion

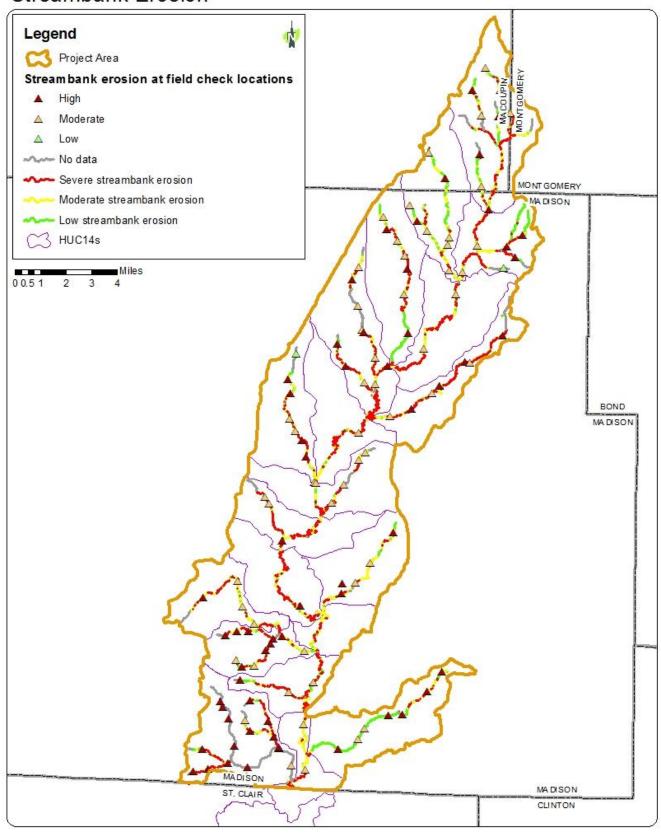


Figure A.39. Streambank erosion conditions assessed from video footage of an aerial survey of the watershed (shown as lengths of stream reach in red, yellow, or green) and assessed at 117 field check locations (shown as red, yellow, or green triangles).

Degree of channelization

Changes in stream channelization were identified from the video and geo-referenced in a feature table. The degree of channelization between geo-referenced points was then marked the same for the sections between marked locations. Lengths of high, moderate and low channelization were then determined by measurement between marked boundaries, using criteria based on stream straightness and evidence of man-made modifications (Table A.32).

In total, 759,477.0 ft (143.84 miles) of streams were successfully assessed for streambank erosion using geo-referenced video footage. Of the assessed length, 68% had none or low channelization, 16% had moderate channelization, and 15% had high channelization (Table A.33). A full breakdown of degree of channelization by reach code can be found in the Data Tables section.

Lengths of moderate and high channelization were identified throughout the watershed (Figure A.40). The headwaters often showed high channelization, likely because of their beginnings in farm fields as drainage ditches, where stream size is much smaller and channelization less expensive. Moderately and highly channelized streams appear to be interspersed elsewhere with lengths of low channelization.

Table A.32. Criteria used to assess degree of channelization. 115

Condition	Description
Low	Natural meandering stream with no obvious evidence of modification
Moderate	Not "straight" but evidence of modification to planform by human activity
High	Straight or nearly straight channelized stream segment

Table A.32. Degree of channelization along assessed stream reaches in the watershed (total stream length assessed and average channelization conditions).

	Stream Length None or Low Channel		annelization	Moderate Ch	annelization	High Channelization	
	Assessed (ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
TOTAL	759,477.0	511,793.0		127,952.0		119,732.0	
AVERAGE			68%		16%		15%

Channelization

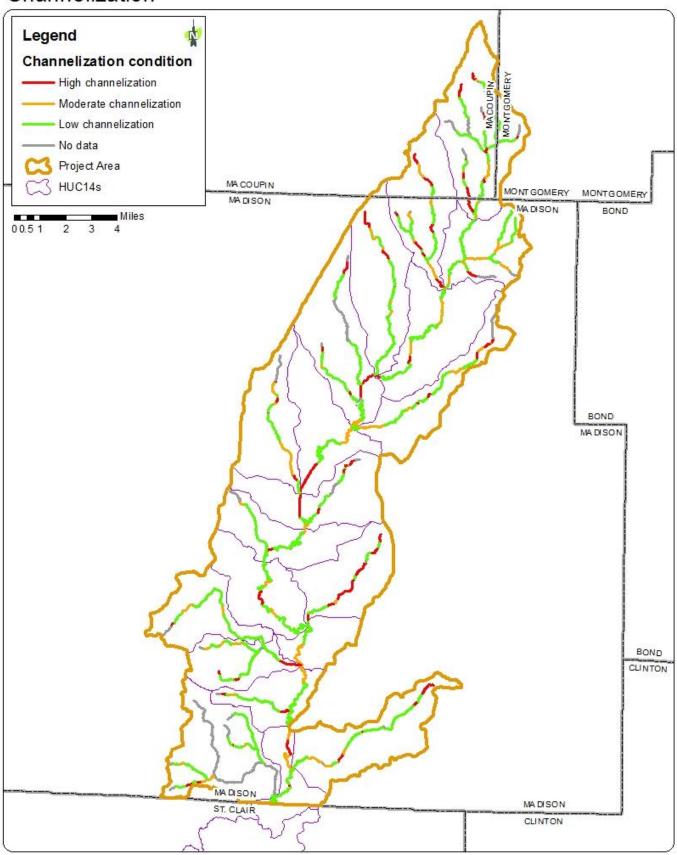


Figure A.40. Channelization condition assessed from video footage of an aerial survey of the watershed.

Riparian condition

Riparian condition was assessed from the video review by geo-referencing in a feature table each location where type and extent of woody cover changed. The riparian area between geo-referenced points was then considered the same for the area between marked locations. Lengths of good, fair and poor riparian area were then determined by measurement between marked boundaries. The criteria used to assess riparian condition are based on width of vegetative cover on both sides of the waterway, extent of vegetative cover, and type of vegetation (woody plants or grass) (Table A.34).

In total, 739,602 ft (140 miles) of streams were successfully assessed for riparian condition using georeferenced video footage. Of the assessed length, 50% had good riparian condition, 42% had fair riparian condition, and 9% had poor riparian condition (Table A.35). A full breakdown of riparian condition by reach code can be found in the Data Tables section.

The stream lengths with good and fair riparian conditions are spread throughout the watershed (Figure A.41). Lengths of poor riparian condition are largely concentrated in three tributaries on the east side of the watershed (located in HUCs 07140204050302, 07140204050401, and 07140204050502). These subwatersheds are largely agricultural, but two municipalities are also present (Alhambra and Marine). Vegetative and tree cover is poor wherever farm fields or urban development extend out to or close to the streambank.

Table A.34. Criteria used to assess riparian condition. ¹¹⁶

Condition	Description
Good	Wide (minimum of two stream widths) vegetative cover w/ woody plants on both banks.
Fair	Narrow (less than two stream widths) vegetative cover of woody plants or grass cover on both banks
Poor	No woody vegetation with narrow (less than 10 ft.) grass or herbaceous cover on one or both banks.

Table A.35. Riparian condition along assessed stream reaches in the watershed (total stream length assessed and average riparian conditions).

	Stream Length	Good Condition		Fair Condition		Poor Condition	
	Assessed (ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
TOTAL	739,602	375,036		306,648		57,918	
AVERAGE			50%		42%		9%

Riparian Condition

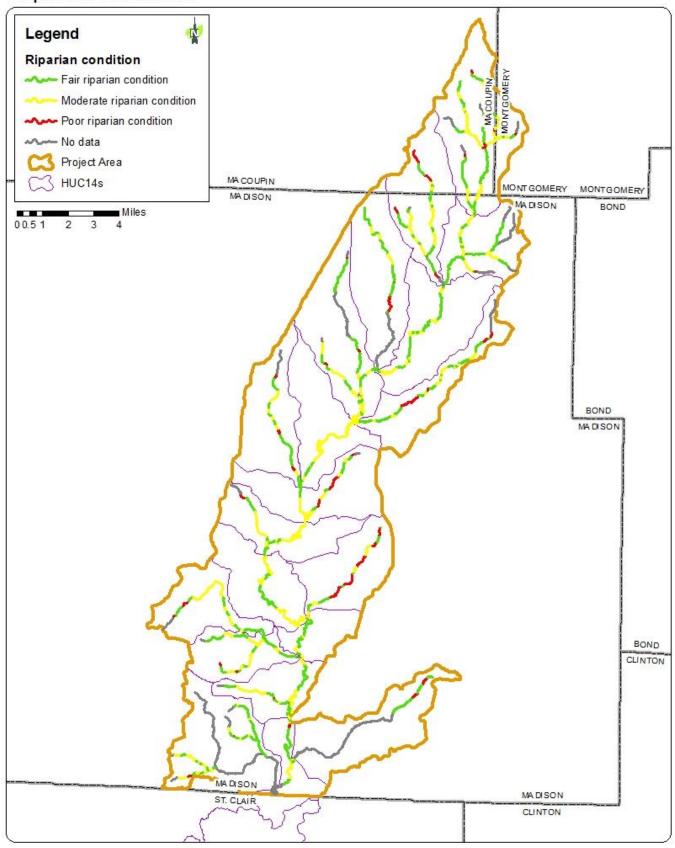


Figure A.41. Riparian condition assessed from video footage of an aerial survey of the watershed.

Visibility and data collection

Limitations on visibility affected the collection of streambank erosion, channelization, and riparian condition data from the flight video. The video imaging seemed to work best on larger streams and streams with poor woody riparian areas. Those streams where the tree canopy completely covered the stream offered limited visibility of the stream condition, even with no leaf cover. In some instances no data was collected from the video imaging due to the inability to see the streambanks, and in others, data collection was incomplete or questionable due to poor visibility.

Streambed erosion

In order to calculate streambed erosion and sediment loading, "eroding" bank heights needed to be determined throughout the watershed. To make these determinations, field checks were completed at 117 locations in the watershed on 50-500 ft per site, constituting an assessment of approximately 16,675 feet or 3.2 miles. These locations were primarily a hundred feet or more upstream of road crossings to circumvent the impacts of bridges and culverts on local erosion conditions. At these points three conditions were assessed: 1) eroding bank height (height of active erosion as caused by streamflow), 2) degree of streambed erosion and 3) field assessment of lateral recession.

At each field check location, a streambed erosion category of low, moderate, or high erosion was assigned, using categories detailed in Table A.36. In total, 16,675 ft (3.2 miles) of streams were successfully assessed for degree of streambed erosion during field checks. Of the assessed length, 53% had low streambed erosion, 30% had moderate streambed erosion, and 17% had high streambed erosion (Table A.37). A full breakdown of riparian condition by reach code can be found in the Data Tables section.

Table A.36. Criteria used to assess degree of streambed erosion. 117

Degree of streambed erosion	Description
Low	Bedload material found deposited in stream cross-over points with evidence of
	frequent out-of bank flow in the adjacent floodplain. Absence of residual bed
	material exposed anywhere except in bottom of pools.
Moderate	Bedload material not found consistently in stream cross over locations with some evidence of residual material exposed or very near the surface in cross over
	, ,
	locations. Evidence of out of bank flow very hard to identify (few or no trash lines
	over top of bank).
High	Little or no bedload found in stream cross over locations. Large areas of residual
	material exposed in the streambed. Trash lines primarily confined to upper
	portion of the bank with no evidence of out of bank flow except on rare
	occasions of very large storm events.

Table A.37. Degree of streambed erosion along assessed stream reaches in the watershed (total stream length assessed and average streambed erosion conditions).

	Stream Length	Low Streaml	bed Erosion	Moderate Streambed Erosion		High Streambed Erosion	
	Assessed (ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
TOTAL	16,675	8,175		4,950		3,550	
AVERAGE			53%		30%		17%

Streambed erosion was generally lower in the northern part of the watershed and at the headwaters of several streams (Figure A.42). Thirteen of the 20 HUC14s returned only low or moderate streambed erosion, while two of the southernmost HUC14s (07140204050902 and 07140204050903) have the most locations with high streambed erosion.

Illinois RiverWatch volunteers documented streambed composition 22 times at two sites in the watershed between 1996 and 2014. The presence of bedrock, boulders, clay, cobble, gravel, sand, and silt in the streambed were estimated in percent ranges. At the Silver Creek site near the Troy USGS gauge ("Knights Creek", 38.7162, -89.8181), the substrate was often mixed, with the silt as the highest percentage component. At the Wendell Branch site (38.7578, -89.8181), bedrock was consistently reported as the dominant substrate component, comprising over 50% of the substrate. 118

Ephemeral/gully erosion

The Illinois Department of Agriculture's periodic Soil Conservation Transect Survey gathers information about conservation tillage practices in the state. Its measure of ephemeral erosion indicates the extent of gully erosion by county, as surveyors identify fields in which ephemeral or gully erosion has occurred or is likely to occur in areas of concentrated surface water flow. According to the 2013 transect survey, Madison and Montgomery counties have a relatively high rate of ephemeral erosion (47% and 40%, respectively) compared to the overall state average (19.6%) (Table A.38). Macoupin County had a significantly lower ephemeral/gully erosion rate (4%).

Table A.38. Percent and number of fields with indicated ephemeral/gully erosion by county in 2013. 121

County	Yes		No		Total
	Percent	Number	Percent	Number	
Macoupin	4%	18	96%	481	499
Madison	47%	174	53%	196	370
Montgomery	40%	189	60%	278	467
Illinois Total	20%		80%		

Streambed Erosion

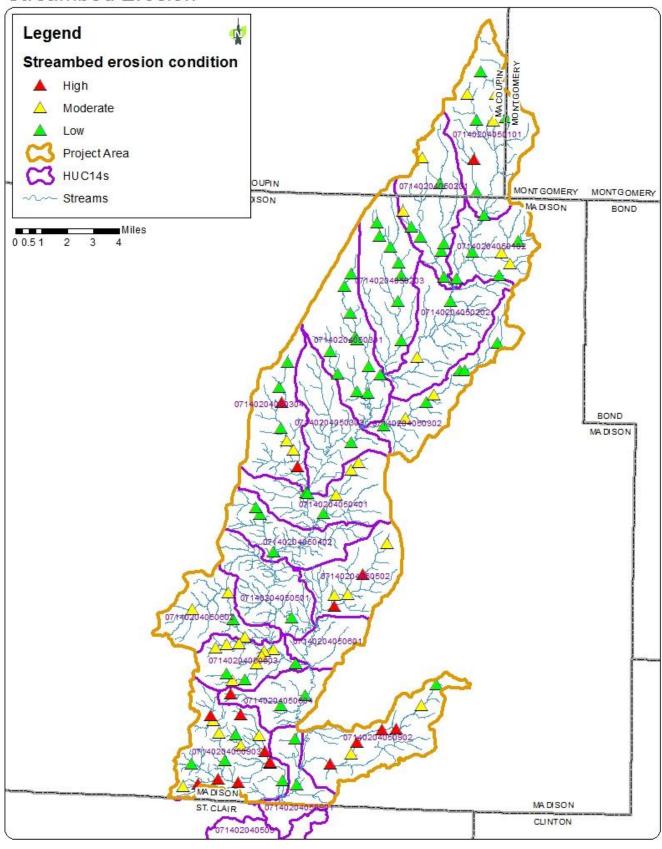


Figure A.42. Streambed erosion conditions noted in 117 field check locations.

Debris blockages (logjams)

Logjams alter stream hydrology, increasing the scouring effect of flow on the streambank and streambed as water is channeled around the blockage. If the logjam spans the channel, the stream is more likely to overtop and flood nearby land during times of high flow.

Logjams were identified in both the video footage of the aerial survey along streams in the watershed (see Watershed Drainage section for methods) and in a ground assessment by a Madison County Stream Cleanup team (Table A.39). The Stream Cleanup team operated between 2008 and 2009 and removed debris from selected streams in the county about which they received complaints. When a logjam was identified in the field, a data point was entered using a handheld GPS unit and later processed by the county's IT department. Logjams were identified at five distinct locations in the Upper Silver Creek watershed by the Stream Cleanup team (Figure A.43). Two or more instances were identified in close proximity to each other at each location.

Table A.39. Logjams identified in the Upper Silver Creek in video footage from the aerial survey (2/2014) and by the Madison County Stream Cleanup team (6/2008 – 5/2009).

	Iii-datfid-iil	Logjams identified by Stream
HUC14	Logjams identified in aerial survey (number)	Cleanup team (number of distinct locations)
07140204050101	28	distinct locations;
07140204050102	18	
07140204050201	9	
07140204050201	14	
07140204050203	14	
07140204050301	22	
07140204050301	38	
07140204050303	10	
07140204050304	14	
07140204050401	7	
07140204050401	19	
07140204050501	6	1
07140204050501	6	1
07140204050601	4	
07140204050601	16	
07140204030602	5	1
		_
07140204050604	4	1
07140204050901	3	1
07140204050902	23	
07140204050903	13	1
TOTAL	273	5

Logjams

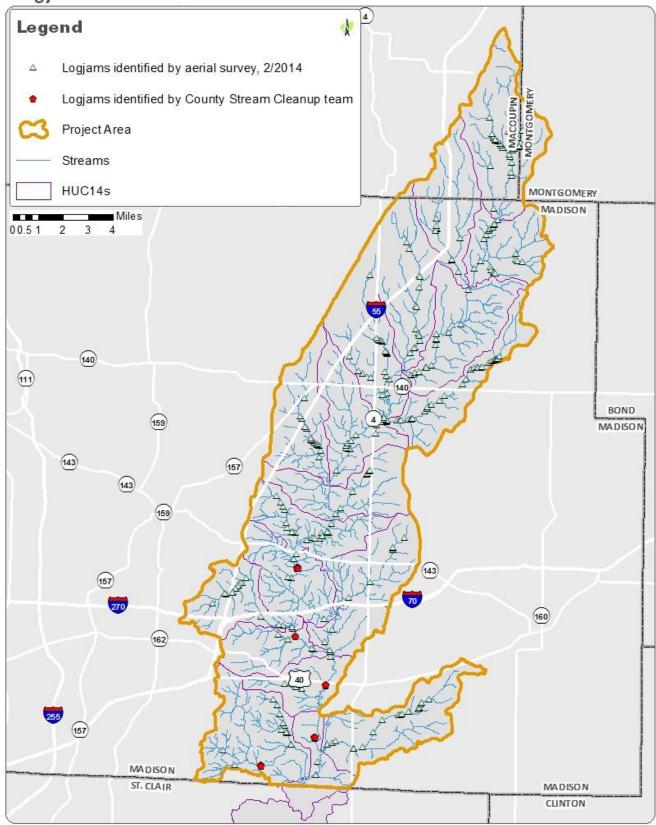


Figure A.43. Logjams in the Upper Silver Creek watershed as identified from video footage taken for the aerial survey (2/2014) and by the Madison County Stream Cleanup team (6/2008 - 5/2009).

Detention and retention basins

HeartLands staff looked at aerial photographs of the watershed, along with USGS topographic maps, an elevation dataset, and the National Hydrography Dataset, to identify detention and retention basins. A point was created for each basin located in or very close to a group of 5 or more buildings. This was in order to avoid classifying natural ponds as detention basins; with significant developed area near the basin, there was a higher likelihood that the basin had been engineered or altered by man in some way. It should be noted that detention and retention basins on agricultural land are very common, but they were not included in this inventory, partly because the Agricultural Conservation Planning Framework (ACPF) used to identify BMPs also identifies likely detention locations.

The data gathered includes whether the detention basin is in a subdivision, along with the year the subdivision was first developed and the year of latest development (from plat information from Madison County). Also noted was the presence of standing water, the number of visible inlets/outlets, whether the basin was "on-line" (on a stream or at the start of a stream) or "off-line" (outside the waterway), the type of side slope vegetation, whether the basin was already in the National Hydrography Dataset, and the accessibility of the basin from nearby roads or public land.

Sixty-seven (67) detention or retention basins were identified in the watershed, with the majority occurring in the lower portion of the watershed (Table A.40, Figure A.44). Most of the basins identified are off-line (70%), and most have water in them (82%). (Note: it was much easier to identify basins containing water than dry basins, so wet basins may be overrepresented.) Twenty-four percent (24%) of the basins were already in the National Hydrography Dataset as "Lake/Pond, perennial". Turf is the most common vegetation on the side slopes of the basins, present in 87% of the basins identified. Trees are present on 19% of the basins' side slopes, and rock is present on 49% of the side slopes.

Table A.40. Number of detention and retention basins identified in each HUC14, and the number and condition of basins visited. HUC14s not listed had zero basins identified.

	# of basins	# basins	Condition of
HUC14	identified	visited	basins visited
07140204050201	1		
07140204050302	1	1	GOOD
07140204050303	1	1	AVERAGE
07140204050402	3		
07140204050501	9	1	POOR
07140204050502	2	1	GOOD
07140204050602	10	1	GOOD
07140204050603	19	2	GOOD
07140204050604	9	1	POOR
07140204050903	12	2	AVERAGE
			5 GOOD,
			3 AVERAGE,
Total	67	10	2 POOR

Detention basins

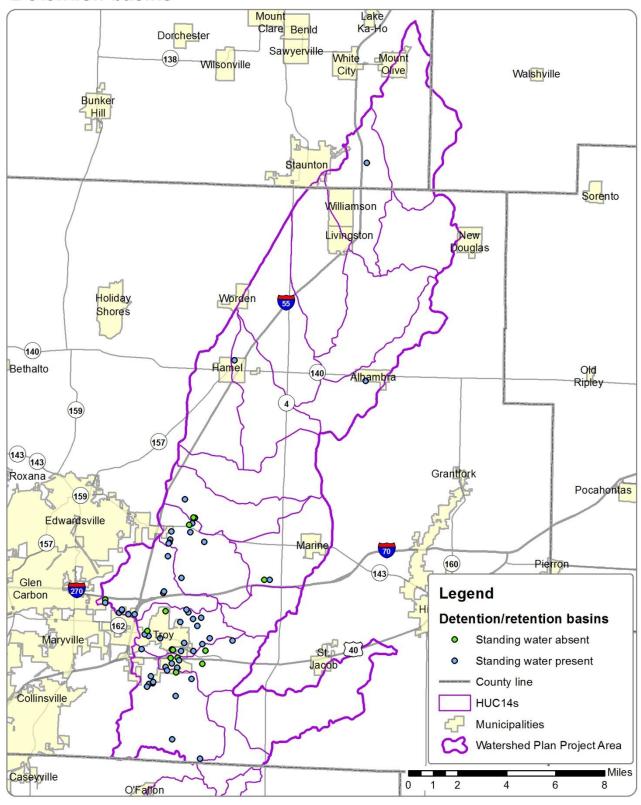


Figure A.44. Location of detention and retention basins identified by assessment of aerial photographs.

Site visits were made in April 2015 to 10 of the 44 accessible sites identified, in order to determine their condition. The sites were selected by geographic location (distributed somewhat evenly throughout the watershed) and by prioritizing basins about which the Madison County Stormwater Coordinator received complaints. On the site visits, location, type, and condition of the basins were confirmed. Basins visited ranged in size between 0.44 acre and 4.78 acres, with an average area of 1.4 acres. Eight were wet retention basins and two were dry detention basins. Eight had turf side slopes. None had native grasses in or immediately around the basin, although a few native trees were present at the water's edge in some cases.

Table A.41 shows a summary of the issues identified on the site visits (full results shown in the Data Tables section). Common maintenance and design issues identified included algae, sediment, bank erosion, and trash. Three of the basins had already been treated with copper sulfate or similar algasecides to kill algae (as evidenced by a blue tinge to the water). These chemicals can have harmful short- and long-term effects on fish and other aquatic life if incorrectly applied.

Table A.41. Summary of location, type, and condition of detention and retention basins inspected on site visits to 10 basins.

Issue	# sites
Algae (submerged or on surface)	5
Sediment (reduced basin capacity)	4
Bank erosion	3
Trash	3
Blocked culvert under road leading to basin; road floods	1
Murky, milky water appearance	1
Outlet pipe leads towards power station - potentially unsafe	1
Scouring of outlet channel	1
Submerged inlet pipe	1

Flooding

Flood types and contributing factors

A flood is defined by FEMA as a general or temporary condition where two or more acres of normally dry land or two or more properties are inundated by:

- overflow of inland or tidal waters;
- unusual and rapid accumulation or runoff of surface waters from any source;
- mudflows; or
- a sudden collapse or subsidence of shoreline land.

A combination of topography, ground cover, precipitation and weather patterns, recent soil moisture, and the presence of streams and other waterbodies determine the severity of floods in a given location. Floods can cause utility damage and outages, infrastructure damage (both to transportation and communication systems), structural damage to buildings, crop loss, decreased land values and impediments to travel and emergency access.

Two main types of flooding affect the Upper Silver Creek watershed: flash flooding and general flooding. A **flash flood** is a rapid rise of water along a stream or low-lying area, usually produced when heavy localized precipitation falls over an area in a short amount of time. Flash floods are considered the most dangerous type of flood event because there is often little or no warning time, and because of their capacity for damage, including the capability to induce mudslides. Vulnerability to flash flooding changes most often with a change in land use, as, for example, agricultural land and open space is converted for residential and industrial uses, increasing the area of impervious surfaces (eg, roofs, parking lots, roads, and sidewalks). As impervious surface area increases, the risk of flash flooding increases, as rain and snowmelt can no longer infiltrate the ground slowly and flows quickly downstream.

General flooding can be broken down into two categories: riverine flooding and shallow or overland flooding. A **riverine flood** is the gradual rise of water in a river, stream, lake, or other waterway that results in the waterway overflowing its banks. This type of flooding generally occurs when storm systems remain in the area for extended periods of time, when winter or spring rains combine with melting snow to create higher flows, or when obstructions such as logjams block normal water flow. A shallow or **overland flood** is the pooling of water outside of a defined river or stream, for example, in sheet flow or ponding. An overland flood generally occurs when rainfall collects on saturated or frozen ground. When surface runoff cannot find a channel, it may flow out over a large area at a somewhat uniform depth in sheet flow, or collect in depressions and low-lying areas, creating a ponding effect. Vulnerability to riverine flooding in the National Flood Insurance Program (NFIP) member communities is low as long as existing floodplain ordinances are enforced. Floodplain ordinances are the major mechanism for ensuring that new structures either are not built in flood-prone areas or are elevated or protected from floodwaters to severely limit their potential flood damage.

The general definition of a **floodplain** is any land area susceptible to being inundated or flooded by water from any source (such as a river or stream). This general definition differs slightly from the regulatory definition of a floodplain, which may be found in the Madison County Hazard Mitigation Plan and under the NFIP along with further definitions of base floods, base floodplains, floodway, flood fringe, Special Flood Hazard Area, Flood Insurance Rate Maps, and flood zones. ¹²⁴

Extent of the floodplain

In the Upper Silver Creek project area within Madison County, 10.8% of the land, or 12,982 acres, is designated as floodplain (Figure A.45). ¹²⁵ Another estimate found in the Madison County Hazard Mitigation Plan is 70,282 acres or 13.8% of the county's area. ¹²⁶

In Montgomery County, floodplains cover much less ground. Less than 3% of the area in Montgomery County is designated as being within the regulatory floodplain and susceptible to river floods. A large portion of this flood-prone area is in the unincorporated portion of the County, although several communities also are vulnerable to flooding. As a result of the limited riverine floodplain area and flat topography, a majority of the flooding experienced within the County is related to flash flood events. The 2007 Illinois Natural Hazard Mitigation Plan prepared by the Illinois Emergency Management Agency classifies Montgomery County's hazard rating for floods as "elevated." This information was not available in Macoupin County's Multi-Hazard Mitigation Plan.

Development in the floodplain

In the Upper Silver Creek watershed, 113 structures are wholly or partly located in the 100-year floodplain within municipalities. Glen Carbon and Worden have no structures in the floodplain (Table A.42). Seven of the communities in the watershed are not fully covered by a Flood Insurance Rate Map (FIRM), so the number of structures at risk of flooding within floodplains in these communities is unknown. Digitized structure data were not available for Macoupin or Montgomery counties. The estimated total building exposure to floods in Montgomery County is \$3,200,553, with the majority of the exposure (\$2,447,153) listed as residential exposure. 129

Table A.42. Number of structures partially or wholly within floodplain (Zones A, AE, AO, and AH) in municipalities in the Upper Silver Creek watershed, in Madison County. ¹³⁰ Some municipalities have limited floodplain information because all or part of their area is covered with a map panel marked Zone ANI (no flood information). Partly covered: Zone ANI covers up to 60% of the area of a municipality. Mostly covered: Zone ANI covers 60 to 95% of the municipality. Entirely covered: Zone ANI covers 95 to 100% of the municipality. ¹³¹

Municipality	Number of structures	Gap in map coverage?
	wholly/partly in the SHFA	
Alhambra	0	Yes; municipality mostly covered by Zone ANI
Edwardsville	104	No
Glen Carbon	0	No
Hamel	0	Yes; municipality mostly covered by Zone ANI
Livingston	9	No
Marine	0	Yes; municipality mostly covered by Zone ANI
New Douglas	0	Yes; municipality entirely covered by Zone ANI
St. Jacob	0	Yes; municipality mostly covered by Zone ANI
Troy	0	Yes; municipality partly covered by Zone ANI
Williamson	0	Yes; municipality entirely covered by Zone ANI
Worden	0	No

Floodplain

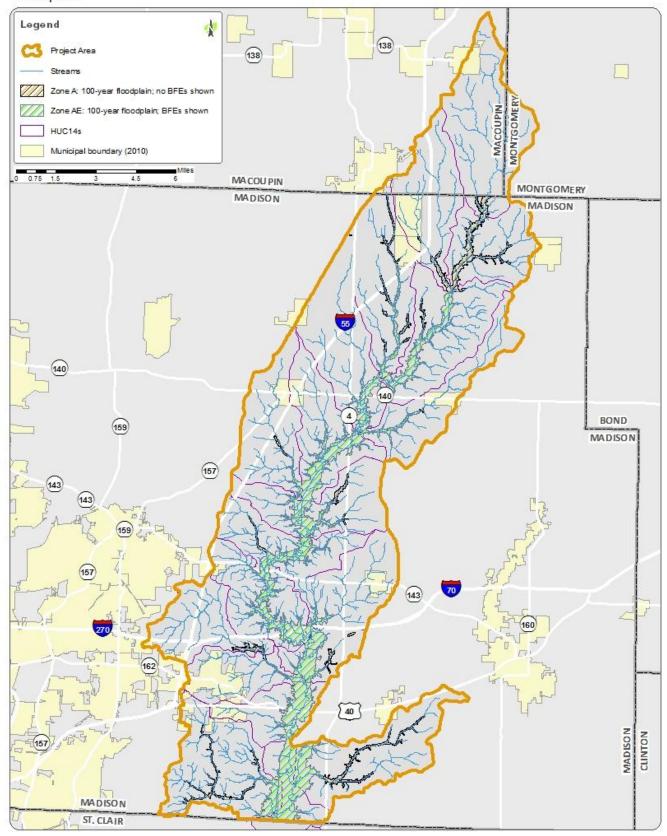


Figure A.45. FEMA-designated floodplain in Madison County in the Upper Silver Creek watershed. BFE is an abbreviation for Base Flood Elevation, the height reached by floodwaters in a 100-year flood.

Repetitive loss structures in the watershed

A repetitive loss structure is defined by FEMA as a structure covered by flood insurance issued under the NFIP which has suffered flood loss damage on two occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage is 25% of the market value of the structure at the time of each flood loss.

No municipalities within the Upper Silver Creek watershed contain repetitive loss structures. ^{132, 133, 134} However, the unincorporated area of Madison County contains 10 repetitive loss properties which have made 27 claim payments resulting in a total of \$487,050 in claim payments. The exact location of these properties is kept private by FEMA, so it is unknown how many of these structures are in the watershed. Montgomery County has no repetitive loss structures as of July 2010. ¹³⁵

Critical facilities in the floodplain

Some structures require particular protection from floods to protect vulnerable populations and public health at large. FEMA recognizes these critical facilities under two categories:

- 1. At-risk essential facilities: Facilities that are vital to flood response activities or critical to the health and safety of the public before, during, and after a flood, such as a hospital, emergency operations center, electric substation, police station, fire station, nursing home, school, vehicle and equipment storage facility, or shelter.
- At-risk critical facilities: Facilities that, if flooded, would make the flood's impacts much worse, such as a hazardous materials facility, power generation facility, water utility, or wastewater treatment plant.

Madison County also has the most critical facilities located in the 100-year floodplain of any county in Illinois (31), including schools, police stations, wastewater treatment facilities, and communications facilities.¹³⁶

In Macoupin County, there are 79 "essential facilities", a subset of critical facilities including schools, medical care facilities, fire stations, police stations, and Emergency Operations Centers. It is unknown how many of these facilities are in the floodplain. An accurate count of the number of buildings and critical facilities within the floodplain in Montgomery County could not be calculated for its most recent Hazard Mitigation Plan. 138

Infrastructure in the floodplain

Roads, bridges, and buried power and communication lines are located within or adjacent to floodplains throughout the watershed. Additionally, almost all of the watershed is vulnerable to flash flooding. As a result, a majority of the buildings, infrastructure and critical facilities (including wastewater treatment plants, hospitals, schools, fire stations, and police stations) that may be impacted by flooding are located outside of the base floodplain and are not easily identifiable. Stakeholder outreach conducted for this Plan helped to highlight several other instances of flooding outside of floodplains, some of it threatening critical facilities including sewage treatment plants (see Flooding Locations section).

Locations affected by floods

Flooding locations identified at stakeholder meetings

At stakeholder meetings to introduce the Upper Silver Creek Watershed Plan, attendees were invited to provide input on where they knew of floods occurring. They looked at maps showing major roads, municipalities, parcels, structures, and the FEMA-designated floodplains, and drew or described locations of flooding of which they were aware. Later, these locations were digitized, along with other descriptive information from the attendees such as flood frequency and cause of inundation. Several flooding locations were outside of the 100-year floodplain in subdivisions, on farm fields, and on major and minor roads (Figure A.46).

Flooding locations identified in the Community Flood Survey

The Madison County Community Flood
Survey was created by HeartLands
Conservancy and Madison County in the
summer of 2014 and distributed to
homeowners and business owners in the
Upper Silver Creek Watershed to gather
information about the location, extent,
impacts, and causes of flooding in the
watershed. A total of 477 surveys were
completed from within the study area out of
2,000 mailed out, giving a response rate of 24%.

Some of these were collected via an online survey. 139

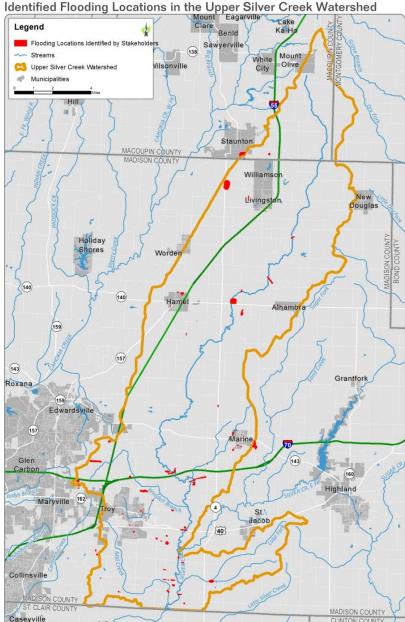


Figure A.46. Flooding locations identified at stakeholder meetings.

The results of the Community Flood Survey are shown in the Flood Survey Report in Appendix B. Since they pertain to this Inventory, some results are also included here. Over a quarter of respondents (25.8%) replied that they had experienced flooding in the last 10 years (Table A.43). HUC 07140204050603 (Troy and NW St. Jacob area) had the largest number of respondents with flooding in the last 10 years with 34 responses. HUCs 07140204050601 (Southern Marine and NW St. Jacob Area), 07140204050202 (northeastern Alhambra and southwestern New Douglas areas), and 07140204050101

(Mt. Olive/Walshville area) had the highest percentages of respondents who experienced flooding events in the last 10 years. The lowest percentage of respondents that had been flooded was for the watershed containing Williamson (HUC 07140204050201) (Figure A.47).

An assessment was made of flooding "hotspot" locations in the watershed based on four (4) attributes: 1) percentage of respondents who said they had been flooded, 2) flood frequency, 3) percentage who said that neighbors had been flooded, and 4) monetary loss as a result of flooding. (Note: the estimate of monetary loss due to flooding in the last 10 years across the whole watershed, \$42.9 million, was calculated using a population estimate that was too high. The population estimate of 61,994 people was based on preliminary calculations made for the 2014 draft of the Watershed Resources Inventory (WRI). This final version of the WRI uses a lower population of 26,245 from U.S. Census Bureau data. The total estimated monetary loss from flooding in the watershed over 10 years, using the lowest estimated costs from respondents, is \$18,157,798.)

The top three (3) flooding hotspots based on the survey results are HUCs 07140204050401, 07140204050304, and 07140204050101 (Table A.44; Figure A.48). However, these watersheds also had a small number of respondents (6, 17, and 2, respectively) and fewer respondents who said they had been flooded (1, 7, and 1, respectively).

Table A.43. Responses to the flood survey question, "Have you experienced flooding in the last 10 years?"

Have you experienced flooding in the last 10 years?	Number of responses	%
Yes	120	25.8%
No	345	74.2%
No Answer	12	2.5%

Table A.44. Flooding "hotspot" rankings of the HUC14s based on percent of respondents flooded, frequency of flooding, percent of respondents whose neighbors flooded, and monetary loss due to flooding, from the Madison County Community Flood Survey.

	Percent of respondents flooded in last	Frequency of flooding (times per	Percent of those flooded who said one or more neighbors also	Monetary loss due to	
HUC14	10 years	year)	flooded	flooding	Ranking
07140204050401	0.17	7	1.00	\$ 300,001	1
0140204050304	0.41	2.642857143	0.60	\$ 101,667	2
07140204050101	0.50	0.7	1.00		3
07140204050202	0.50	2.333333333	0.67	\$ 38,750	4
07140204050601	0.60	2.75	0.50	\$ 2,500	5
07140204050901	0.20	7	0.50		6
07140204050502	0.45	1.111538462	0.64	\$ 2,500	7
07140204050501	0.30	2.405	0.64	\$ 5,000	8
07140204050303	0.33	3	0.50	\$ 2,500	8
07140204050203	0.22	0.825	0.50	\$ 38,750	9
07140204050302	0.29	1.2125	0.50	\$ 7,500	10
07140204050603	0.23	1.59137931	0.50	\$ 5,834	10
07140204050602	0.16	1.95	0.67	\$ 2,500	10
07140204050102	0.22	3.85	0.25	\$ 2,500	11
07140204050301	0.21	2.333333333	0.25	\$ 2,500	11
07140204050402	0.21	2.783333333	0.33	\$ 2,500	11
07140204050604	0.20	2.575	0.46	\$ 5,000	11
07140204050903	0.17	2.6	0.35	\$ 15,625	11
07140204050902	0.29	3.44	0.38		11
07140204050201	0.14	1.5	0.33		12

Percent of respondents flooded Mount Benid Lake MONTGOMERY Clare Ka-Ho MACOUPIN Legend 138 chester White Sawyerville Watershed Plan Project Area Wilsonville City (138) Mount Walshville Municipal boundary (2010) **HUC14** boundaries 07140204050101 2 respondents; Percent respondents flooded in past 10 years 1 flooded 0 - 15% 15 - 30% Staunton MACOUPIN 500 MONTGOMERY MONTGOMERY 45 - 60% MADISON 7 respondents; MADISON BOND 1 flooded Miles Williamson 0 0.75 1.5 4.5 07140204050102 Livingston 9 respondents; New 2 flooded Douglas 07140204050203 9 respondents Worden 07140204050202 2 flooded Holiday 6 respondents 07140204050301 Shores 3 flooded 14 respondents; 3 flooded (140) Bethalto Hamel 40204050304 respondents; Alhambra (4 07/140204050302 BOND 14 respondents; Wood (159) 07140204050303 MADISON 4 flooded River 15 respondents 5 flooded (157) (143) (143) 07140204050401 Grantfork Roxana 6 respondents; 1_flooded 07140204050402 Edwardsville 14 respondents; 3 flooded Marine (157) 143 07140204050501 Pierron 714020405060233 respondents; 70 Glen 🖟 19 respondents; 10 flooded 07140204050 3 flooded Carbon responde Highland 07140204050603 151 respondents: 34 flooded Maryville St. 07140204050604 40 Jacob Pontoon 69 respondents; Beach 14 flooded

Figure A.47. Number and percent of respondents who experienced flooding in the last 10 years, by HUC14.

07140204050901 5 respondents;

1 flooded

07140204050903

59 respondents; 10 flooded

157)/

Caseyville

Collinsville

MADISON

ST. CLAIR

07140204050902

17 respondents;

MADISON

Flood damage hotspots

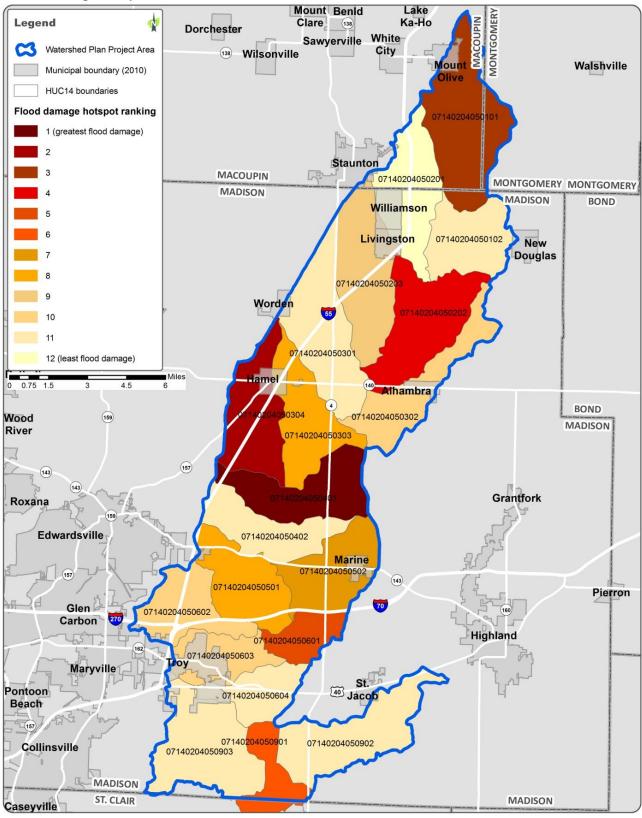


Figure A.48. Flood damage "hotspots", by HUC14, based on percent of respondents flooded, frequency of flooding, percent of respondents whose neighbors flooded, and monetary loss due to flooding.

Flooding outside of floodplains

FEMA-designated floodplains cover close to 11% of the total acreage in the Upper Silver Creek watershed within Madison County. A similar proportion of survey responses, 13%, came from parcels wholly or partly within these floodplains. However, only 3% of survey respondents (13 people) responded that they lived in a FEMA-designated floodplain. Forty (40) respondents, or 10% of those who answered the survey question, unknowingly own property that is wholly or partly in a floodplain (Table A.45).

Respondents reported a total of approximately 146 events per year taking place outside of FEMA-designated floodplains over the last 10 years. Within floodplains, approximately 88 parcels per year were flooded. 140

Table A.45. Frequency and location of flooding in and outside of floodplains, according to the mapped locations of responses.

Flood frequency	Average frequency, in times per year	Number of parcels in floodplain	Number of times per year parcels WITHIN floodplains are flooded	Number of parcels outside floodplain	Number of times per year parcels OUTSIDE floodplains are flooded
Only once or twice in 10 years.	0.15	0	0	22	3.3
Three to four times in 10 years.	0.35	1	0.35	11	3.85
Five to nine times in 10 years.	0.7	2	1.4	7	4.9
Once or twice a year.	1.5	6	9	20	30
Three to five times a year.	4	12	48	19	76
Six or more times a year.	7	4	28	4	28
Total		59	86.75	83	146.05

History of flooding in the watershed

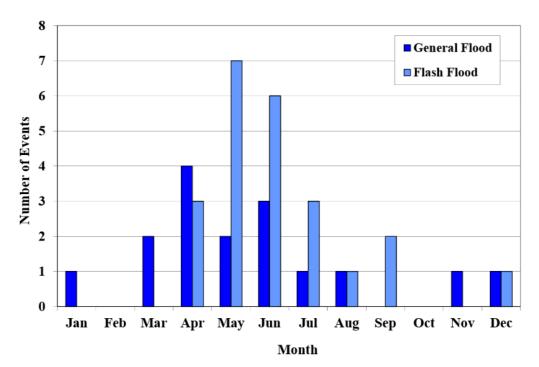
All three counties in the project area have records of general flooding and flash flooding events, as identified in their County Hazard Mitigation Plans. Macoupin County experienced 17 flood events between 1994 and 2013, and Montgomery County experienced at least 10 flood events between 1994 and 2008. Madison County experienced at least 23 flood events between 1993 and 2012, including historic Mississippi River floods such as the record-breaking flood of 1993 (Table A.46). All of the general flood events in Madison County, with one exception, were considered countywide events. No specific jurisdictions in Madison County experienced flash floods only in one municipality.

The spring and early summer have the greatest flood risk in the Upper Silver Creek. The most likely month for flash floods to occur in Madison County is April (56% of the events), and in Montgomery County, May (40%) (Figure A.49). The most likely month for general flooding in Madison County is May. NCDC data shows that none of the floods in Macoupin County were listed as affecting Staunton or Mount Olive specifically. However, five are listed as "countywide", meaning floods were recorded at several locations in the county. In Madison County, one flash flood occurred in the east of the county, and one in the north; either could be in the Upper Silver Creek watershed. In Montgomery County, seven of the ten flood events between 1994 and 2008 are listed as "countywide", with none listed for the southwest of the county.

Table A.46. Occurrences of floods and most likely months for flooding to occur in the three counties in the project area. ^{141, 142, 143}

	Macoupin County	Madison County	Montgomery County
Number of General Floods Reported	1 (1994-2013)	16 (1973-2012)	(unknown)
Number of Flash Floods Reported	16 (1994-2013)	23 (1993-2012)	10 (1994-2008)
Total Number of Floods Reported	17 (1994-2013)	≥ 23 (1993-2012)	≥ 10 (1994-2008)

Figure A.49. Reported flood events in Madison County by month. Note: Multi-month events are shown only in the month they began.



Impacts of floods

Injury and death

On average, four deaths per year result from flooding in Illinois. Fortunately, the historic number of injuries and deaths from flooding in Madison County has been very low. No injuries or deaths were reported as a result of any of the 16 recorded general or flash flood events between 1973 and 2012. However, a majority of the recorded flood events in the county are a result of flash flooding. Since there is often very little warning for flash flooding, the risk to public health and safety from flash flooding is "elevated to medium." 144

The major cause of death during floods is drowning, with nearly half of all flash flood deaths occurring in vehicles as they are swept downstream. Host of these deaths take place when people drive into flooded roadways. It only takes two feet of water to carry away most vehicles. Damage to roadways, bridges and other transportation structures can also affect mobility and the ability for injured or ill people to evacuate flooded areas.

Floodwaters containing biological and chemical contaminants also pose risks to public health. During floods, the risk of untreated sewage mixing with stormwater is increased, and floodwaters transport the biological contaminants into buildings and onto streets, and can serve as breeding grounds for bacteria and other disease-causing agents if left untreated. Chemical contaminants such as gasoline and oil can also enter floodwaters if underground storage tanks or pipelines crack and begin leaking during a flood event. Floodwaters may also contain significant concentrations of agricultural chemicals applied to farm fields, depending on the time of year. 146

Once floodwaters have receded, mold and mildew can pose a health hazard in basements and buildings that are not thoroughly cleaned, especially affecting small children, the elderly and those with specific allergies. ¹⁴⁷

Financial impacts

Flooding is the single most financially damaging natural hazard in Illinois, with an estimated \$257 million per year in property damage losses across the state since 1983. Structural damage to property can include warping of or cracks forming in a building's foundation, flooring, drywall and wood framing. Buildings' contents can also be seriously damaged. Losses in agricultural, industrial, and commercial productivity, as well as tourism, also impact the local economy in flooded areas.

Over a 35-year period (1978-2013), the National Flood Insurance Program paid out more than \$3 million to Madison County policyholders, over \$64,000 to Macoupin County policyholders, and over \$68,000 to Montgomery County policyholders. Across the three counties, this works out to more than \$89,000 per year per county paid in claims for flood damage. ¹⁴⁸ See Table A.49 for a detailed breakdown of claims, policies, and losses in the municipalities in the Upper Silver Creek watershed and in the unincorporated area of the county as a whole.

Six of the 16 general flood events in Madison County between 1973 and 2012 caused \$12,500,000 in crop damage and \$36,995,996 in property damage (figure includes \$20 million for the April 1994 and May 1995 general flood events representing losses sustained in multiple counties; a breakdown by

county was unavailable). Four of these six events were part of federally-declared disasters. Damage information was either unavailable or not recorded for the remaining 10 reported occurrences. ¹⁴⁹

Six of the 23 flash flood events in Madison County between 1993 and 2012 caused \$95,000 in crop damage and \$7,279,150 in property damage (which figure includes \$1,456,500 in verified infrastructure damage sustained by Edwardsville and the County as a result of two separate flash flood events outside of the Upper Silver Creek watershed). Damage information was either unavailable or none was recorded for the remaining 17 reported occurrences. ¹⁵⁰ In Montgomery County, damages were only recorded for four of the 10 reported flash flooding events between 1994 and 2008: a 1994 event causing \$50 million in property damage across eight counties (a breakdown by county was not available); a 1995 event causing approximately \$800 in property damage; a 2008 event causing approximately \$1,000 in property damage; and another 2008 event causing approximately \$1 million in property damage within the county, which was included a presidential disaster declaration and was the most severe flash flooding event to occur in terms of property damage in recent memory. Damage information was either unavailable or not recorded for the rest of the reported occurrences. ¹⁵¹

The Madison County Community Flood Survey asked questions about flooding frequency and cost of flood damages in the Upper Silver Creek watershed. Preliminary results as of September 29, 2014 show that more than a quarter of respondents said their home, business, or property had been flooded in the last 10 years. Of these, 30% had been flooded three to five times per year and 23% experienced damage to the primary home or business building(s) at the address given. Of those who suffered a monetary loss due to flooding over the last 10 years, 38% paid out less than \$5,000, 13% paid \$5-20,000, and 9% paid more than \$20,000.

Other impacts

The most commonly reported impact of flooding from the Madison County Community Flood Survey was stress. Loss of access to the property was the next most common impact, with respondents commenting under "Other" that floods had restricted access on their own land (e.g., their driveway flooded) or blocked an entrance road to their subdivision. Several responses noted costs associated with repairing flood damage or replacing lost items (a combined 17%). Respondents also identified other specific effects including increases in homeowners' insurance rates, the presence of mosquitoes in floodwater, and delays and difficulties with yard maintenance.¹⁵²

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) was created by Congress in 1968 through the National Flood Insurance Act. Communities participating in the NFIP agree to adopt a floodplain management ordinance to reduce flood risks to new construction in Special Flood Hazard Areas (SFHAs), which are subject to inundation by the base flood (also known as the 1 percent chance flood, 100-year flood, or regulatory flood), as designated on Flood Insurance Rate Maps (FIRMs). In return, the NFIP makes flood insurance available within the community as a financial protection against flood losses. Four percent of U.S. households in 22,000 communities participated in the NFIP as of 2010. The NFIP is managed within the Federal Emergency Management Agency (FEMA)'s Mitigation Division. Illinois is in Region V.

Communities enrolled in the NFIP and their policies

In Madison County, five communities in the Upper Silver Creek watershed are enrolled in the NFIP, as well as the County itself (representing the unincorporated areas). Staunton and Macoupin County are NFIP members in the Macoupin County portion of the watershed. Montgomery County is also a member. The date of the entry of these communities into the NFIP and their effective FIRM dates (typically between 1978 and 1984) are listed in Table A.48. The FIRMs can be found on FEMA's Map Service Center website. Since the 1980's, some updated, preliminary FIRMs have been created for the region, which are available on the Illinois Water Survey website.

The county has 1,957 policies currently in force, with a total coverage amount of over \$395 million (Table A.49). Between 1978 and May 2014, the average claim amount FEMA paid out to individuals in NFIP communities in the watershed was \$14,042 (for 203 paid claims). Of the communities examined, Madison County has the most policies, insurance in force, and claim dollars paid, followed by Montgomery County. The communities of Glen Carbon and Edwardsville have the most policies and insurance in force in the project area.

The average premium among all the NFIP communities with policies in the watershed is \$693 per year. The "average premium" column in Table A.49 does not closely reflect flood risk in each community; a smaller average premium might cover many inexpensive policies with contents-only coverage, while a larger average premium might reflect larger coverage amounts required on commercial properties. The column is provided solely to indicate a range of premiums paid by policyholders in the watershed.

Sixty-six respondents to the Madison County Community Flood Survey (14% of respondents) said that they have flood insurance. Of these respondents, three (11%) made a claim in the watershed in the last 10 years (Table A.49). Fifty-four (54), or 82%, of the survey respondents have flood insurance on structures that are not in a floodplain.

Table A.47. Communities in the Upper Silver Creek watershed enrolled in the NFIP, and the effective dates of their FIRMs. ^{157, 158} NSFA: No Special Flood Hazard Area – All Zone C. M: No elevation determined – All Zone A, C, and X. Program Enrollment Date: Date of entry into the Regular Program. E: Indicates date of entry in Emergency Program (initial phase of NFIP enrollment with limited coverage at less than actuarial rates; communities convert to the Regular Program upon issuance of a FIRM). CRS: Enrolled In Community Rating System (CRS). ¹⁵⁹

Communities enrolled in	Initial FIRM	Current Effective	Program
the NFIP	identified	Map Date	Enrollment Date
Edwardsville	01/18/84	01/18/84	01/18/84
Glen Carbon (NSFHA)			07/18/83
Livingston	02/27/84	02/27/84(M)	02/27/84
Macoupin County		01/06/78	09/18/96(E)
(unincorporated area)			
Madison County	04/15/82	04/15/82	04/15/82
(unincorporated area)			
Montgomery County		01/09/81	02/03/00(E)
(unincorporated area)			
Staunton	07/17/81	07/17/81(M)	12/21/84
Worden (NSFHA)			06/08/84

Table A.48. Number of respondents with flood insurance whose parcels are in a floodplain and who have made a claim.

		Parcel is	in floodplain	floodplain		
Have flood insurance	Have made a claim	Yes	No	Total		
	Yes	0	3	3		
Yes	No	10	51	61		
	Yes	1	1	2		
	No	48	332	380		
No	(Blank - no answer)	0	4	4		
	No	0	16	16		
(Blank - no answer)	(Blank - no answer)		4	4		
Total		59	411	470		

^{*}Those who responded that they did not have flood insurance and then left the claims question blank are assumed not to have made a claim.

^{*}Two people said they did not have flood insurance but did make a claim – these respondents may be confused about the claim made; it may have been to their home insurance company instead of a flood insurance company.

Table A.49. NFIP policy coverage and loss statistics for municipalities enrolled in the NFIP in the Upper Silver Creek watershed, and unincorporated Madison County, between 01/01/1978 and 05/31/2014. Policies In Force: Policies in force on the "as of" date of the report. Insurance In Force: The coverage amount for policies in force. Written Premium In Force: Total premiums paid for policies in force, per year. Average premium: Premiums in force divided by number of policies. Total losses: All losses (claims) submitted regardless of the status. Closed losses: Losses that have been paid. Open losses: Losses that have been paid in full. CWOP losses: Losses that have been closed without payment. Total Payments: Total amount paid on losses.

Community name	Policies In Force	Insurance In Force	Written Pre In Ford			rage nium	Total losses	Closed losses	Open losses	CWOP losses	Tota	al payments
EDWARDSVILLE, CITY OF	13	\$ 2,692,000	\$	10,214	\$	786	5	2	0	3	\$	38,360
GLEN CARBON, VILLAGE OF	12	\$ 3,185,000	\$	4,682	\$	390						
LIVINGSTON, VILLAGE OF	1	\$ 148,000	\$	1,376	\$ 1,	,376	3	2	0	1	\$	23,587
MACOUPIN COUNTY *	7	\$ 299,000	\$	3,180	\$	454						
MADISON COUNTY *	688	\$ 156,729,500	\$ 5	39,870	\$	785	227	169	0	58	\$	1,613,833
MONTGOMERY COUNTY *	76	\$ 10,003,600	\$ 3	33,166	\$	436	35	25	0	10	\$	547,130
STAUNTON, CITY OF	9	\$ 1,207,500	\$	5,615	\$	624	5	5	0	0	\$	39,010

^{*}Unincorporated area.

Communities not enrolled in the NFIP

Eight incorporated communities in the watershed are not enrolled in the NFIP (Table A.50). ^{162, 163} When the NFIP began, separate areas of government jurisdiction were shown on separate FIRMs. This is the case for several communities whose FIRMs were created in the 1980's. Some communities were not mapped, including those in Table A.50, and as a result, they do not currently face any sanctions for being flood-prone while not enrolled (such as no flood insurance, no federal mortgage insurance, and no federal grants or loans for development). ¹⁶⁴ They may join the NFIP at any time, whether or not they have a FHBM or a FIRM.

Since the 1990's, FEMA has mapped all areas of a county on the same map to eliminate gaps and outdated information as municipalities grow and communities incorporate. ¹⁶⁵ When the next FIRMs are created, current "holes in the map" will be eliminated and the entire county will be covered.

Impacts of recent federal flood insurance reform

The Biggert-Waters Flood Insurance Reform Act (Biggert-Waters, H.R.1309), passed in June 2012, is a landmark bill that aims to improve the NFIP's financial solvency, ensure flood insurance reflects real flood risks, and encourage floodproofing and mitigation activities. Biggert-Waters extended the NFIP for five years (until 2017) and made a number of changes related to flood insurance, flood risk mapping, and flood mitigation programs. For a fuller description of Biggert-Waters' reforms, see the H.R. 4348 Conference Report Summary. ¹⁶⁶

The Homeowner Flood Insurance Affordability Act of 2014 (HFIAA, H.R. 3370) was signed by President Obama on Friday 21st March, 2014. ¹⁶⁷ The HFIAA made changes to several provisions of Biggert-Waters and also created new policies for the NFIP.

The greatest changes to the NFIP under these pieces of legislation affect subsidized flood insurance policies. In Madison County, most subsidized policies cover structures built before the communities' first Flood Insurance Rate Maps (FIRMs) were released (usually between 1978 and 1984). ^{168, 169} Subsidies for non-primary residences (including businesses and second homes) began to be phased out from October 2013 as the policies came up for renewal. The remaining subsidized structures, all primary residences, were allowed to keep their lower rates until a "trigger event" occurs, such as substantial damage or the sale of the property.

Table A.50. Incorporated communities in the Upper Silver Creek watershed not enrolled in the NFIP. All communities are unmapped by an effective FIRM. The panel number for the unmapped communities is given. ¹⁷⁰

Community	FIRM Panel Number
Alhambra	17X013
Hamel	17X144
Marine	17X205
Mount Olive	(unlisted)
New Douglas	17X233
St. Jacob	17X298
Troy	17X345
Williamson	17X371

Since the HFIAA was so recently passed and the rate-setting for it has not yet been completed, it is impossible to determine its final effects on property owners in the Upper Silver Creek watershed. However, it may be possible to make some generalized conclusions based on the trends in the two Acts and the number of NFIP policies affected in the County. For example, the rate increases under Biggert-Waters that were not repealed by the HFIAA may stunt the growth of local housing markets and economies over the medium term. New structures may cost more to build as developers must elevate them in order to make manageable flood insurance rates available, and certain older properties will prove more difficult to maintain or sell as premiums rise. However, these effects will likely not be highly pronounced in the Upper Silver Creek watershed, as not many subsidized policies are located there (they are more commonly clustered along the Mississippi River and in the American Bottoms). Furthermore, as premiums increase to actuarially-based levels, development and habitation will be redirected away from floodprone areas while flood mitigation activities are incentivized there, reducing flood risk to life and property.

See the recent HeartLands Conservancy report "Impacts of Federal Flood Insurance Reform Legislation on Madison County, Illinois" for more information on potential impacts on Madison County. 171

Future development and flood ordinances

The 2008 Hazard Mitigation Plan for Madison County predicted little flood risk in current development trends in Madison County, as most residential growth was occurring in regions not prone to bottomland flooding, and development planned on the fringe of major drainage features would be discouraged by floodplain regulations. ¹⁷² Similarly, in Macoupin County, no construction was planned within the 100-year floodplain as of 2010, and the Macoupin County planning commission reviews all new subdivision development for compliance with its Subdivision Control Ordinance, which contains certain flood management provisions. ¹⁷³ Montgomery County's floodplain ordinance also provides protection to any new building, infrastructure or critical facility built in a flood-prone area. ¹⁷⁴ However, all three counties remain vulnerable to flash flooding depending on the amount of precipitation received, topography, land use, and other factors.

Prioritizing floods among other natural hazards

Some jurisdictions have tried to rank the various natural hazards with which they are faced, in order to more effectively direct their hazard mitigation efforts.

In Macoupin County's Multi-Hazard Mitigation Plan, Hazard Rankings are calculated for nine hazards: flooding, tornado, transportation hazardous material release, thunderstorms/high winds/hail/lightning, winter storms, subsidence, earthquake, fire/explosion, and dam/levee failure. For each community and each hazard, a probability value and a magnitude/severity value was assigned, resulting in a Risk Priority Index (RPI) value. These values were ranked for each community. Flooding was ranked as the #5 hazard in Staunton and at #8 in Mount Olive among the nine hazards. No such hazard ranking assessment has been done in Montgomery County's Multi-Jurisdictional Natural Hazards Mitigation Plan or Madison County's most recent Draft Multi-Jurisdictional All Hazards Mitigation Plan.

Water Quality

Impaired waters

Under Section 305(b) of the Clean Water Act, Illinois EPA (IEPA) must submit to the USEPA a biennial report of the quality of the state's surface and groundwater resources. The report, called the Illinois Integrated Water Quality Report and Section 303(d) List, must describe how Illinois waters meet or fail to meet water quality standards appropriate for certain "Designated Uses" assigned to them. There are seven Designated Uses in Illinois, of which five have been assigned to streams in the Upper Silver Creek watershed: Aquatic Life, Fish Consumption, Primary Contact, Secondary Contact, and Aesthetic Quality. When a Designated Use cannot be met, a waterbody is determined to be impaired, and IEPA must list the potential causes and sources for impairment in the 303(d) impaired waters list.

The Silver Creek watershed at the HUC10 level (HUC 0714020405) has four impairments as of the 2014 Illinois Integrated Water Quality Report (Table A.51). They occur at two distinct stretches of impaired waters in the Upper Silver Creek watershed – the main channel itself, and a small segment of a stream named Troy Creek that flows into Wendell Branch (Figure A.50). Both waterways were listed as impaired for Aquatic life, a "designated use" of a waterway that represents its ability to support fish and aquatic macroinvertebrates.

The Aquatic Life designated use is met when certain levels of water quality are achieved, as first determined by biological indices: the Macroinvertebrate Index of Biotic Integrity (mIBI) or Macroinvertebrate Biotic Index (MBI), and the Fish Index of Biotic Integrity (fIBI). If scores for these indexes are unavailable, water chemistry data from a three-year dataset typically available from an Ambient Water Quality Monitoring Network station is used. Habitat data from assessments such as an Intensive Basin Survey may also be required. Designated Uses other than Aquatic Life were not assessed for any stream in the watershed. IEPA has not yet completed any Total Maximum Daily Load (TMDL) reports for streams in the Upper Silver Creek watershed.

The 2014 303(d) listing for Silver Creek (IL_OD-06) was based on data collected in 2007 at the Troy USGS gauge site (Illinois EPA station OD-09) in 2007 as part of the Intensive River Basin Survey program and the Ambient Water Quality Monitoring Program. The Intensive Basin Survey program assesses sites on a five-year rotation; the Ambient Water Quality Monitoring Program collects data on a six week rotation. The assessments found a fish IBI score of 45 (fully supporting) and a macroinvertebrate score of 33.9 (moderate impairment), along with water quality data. The impaired 51 mile segment of Silver Creek was determined as "Not Supporting" for Aquatic Life, and the causes of impairment in this segment are Dissolved Oxygen, Manganese, Total Phosphorus (P), and Sedimentation/Siltation. The three sources of impairment are identified as Animal Feeding Operations (NPS), Municipal Point Source Discharges, and Crop Production (Crop Land or Dry Land) (Table A.51).

Troy Creek (Assessment ID IL_ODMA-TRC3) is also listed as impaired for Aquatic Life, with Phosphorus (Total) as the impairment. Two sources are listed: Municipal Point Source Discharges and Urban Runoff/Storm Sewers. For Troy Creek, the assessment data is from a 2002 Facility Related Stream Survey. A single macroinvertebrate sample was taken at station ODMA-TR-C3, yielding an MBI score of 6.0 (moderate impairment). A single water sample was also taken, which showed exceedances of the criteria formerly used to list total nitrogen and total phosphorus. Illinois RiverWatch MBI scores were not used in these determinations.

Table A.51. Illinois EPA Designated Uses and impairments for stream reaches in the Upper Silver Creek watershed. ¹⁷⁸ Note: There is no record of reaches named "Marine Creek" or "Marine Effluent Creek" in the NHD in Illinois, but since these reaches fall within HUC 0714020405 and there is only one municipality named Marine in the state, it is assumed these reaches are in the Upper Silver Creek watershed.

Name and	Size	Designated	Use			
Assessment ID	(miles)	Use	Attainment	Impaired?	Cause of Impairment	Source of Impairment
Fork Creek:		, ,				
IL_ODKA	4.12	(any)	Not assessed	-	-	-
Lake Fork: IL_ODK	8.16	(any)	Not assessed	-	-	-
Marine Creek:						
IL_ODP	5.7	Aquatic Life	Supporting	No	None	None
Marine Effluent						
Creek:						
IL_ODPA_MA-C2	1.1	Aquatic Life	Supporting	No	None	None
Marine Effluent						
Creek:						
IL_ODPA_MA-C3	1.05	Aquatic Life	Supporting	No	None	None
Mill Creek: IL_ODJ	8.87	(any)	Not assessed	-	-	-
						Animal Feeding
					Dissolved Oxygen,	Operations (NPS),
					Manganese,	Municipal Point Source
					Phosphorus (Total),	Discharges, Crop
						Discharges, Crop
Silver Creek: IL OD-			Not		Sedimentation/	• •
Silver Creek: IL_OD- 06	50.74	Aquatic Life	Not supporting	Yes		Production (Crop Land or Dry Land)
06	50.74	Aquatic Life		Yes	Sedimentation/	Production (Crop Land
06 Silver Creek Ditch:		·	supporting		Sedimentation/ Siltation	Production (Crop Land or Dry Land)
06 Silver Creek Ditch: IL_ODF-OF-C1	50.74 7.72	Aquatic Life Aquatic Life		Yes	Sedimentation/	Production (Crop Land
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek:	7.72	Aquatic Life	supporting Supporting	No	Sedimentation/ Siltation	Production (Crop Land or Dry Land)
06 Silver Creek Ditch: IL_ODF-OF-C1		·	supporting		Sedimentation/ Siltation	Production (Crop Land or Dry Land)
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek:	7.72	Aquatic Life	supporting Supporting	No	Sedimentation/ Siltation	Production (Crop Land or Dry Land)
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek:	7.72	Aquatic Life	supporting Supporting	No	Sedimentation/ Siltation	Production (Crop Land or Dry Land) None None
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek: IL_ODMA-TR-C2	7.72	Aquatic Life	supporting Supporting	No	Sedimentation/ Siltation	Production (Crop Land or Dry Land) None None Municipal Point Source
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek: IL_ODMA-TR-C2 Troy Creek:	7.72	Aquatic Life	Supporting Supporting Supporting	No	Sedimentation/ Siltation	Production (Crop Land or Dry Land) None None
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek: IL_ODMA-TR-C2 Troy Creek: IL_ODMA-TR-C3	7.72 2.95	Aquatic Life Aquatic Life	Supporting Supporting Supporting Not	No No	Sedimentation/ Siltation None None	Production (Crop Land or Dry Land) None None Municipal Point Source Discharges, Urban
O6 Silver Creek Ditch: IL_ODF-OF-C1 Troy Creek: IL_ODMA-TR-C2 Troy Creek:	7.72 2.95	Aquatic Life Aquatic Life	Supporting Supporting Supporting Not	No No	Sedimentation/ Siltation None None	Production (Crop Land or Dry Land) None None Municipal Point Source Discharges, Urban

Causes of impairments in the Silver Creek watershed have changed over time. In 2004, there were eight causes, including five not currently present (Table A.52). Since then, pH, Total Nitrogen (N), Total Suspended Solids, Total Fecal Coliform, and Atrazine have disappeared from the list, Dissolved Oxygen has disappeared and then reappeared on the list, and Manganese has joined the list. Total Phosphorus and Sedimentation/Siltation have been constant impairments over the last 10 years.

Little Silver Creek (also in the East Fork Silver Creek watershed that feeds into Silver Creek) was on the 2014 303(d) list as well, with low DO, Phosphorus (Total), and Sedimentation/Siltation listed as the causes of impairment.

Table A.52. Impairments for the Silver Creek watershed (HUC 0714020405) between 2004 and 2014.¹⁷⁹ **DO**: dissolved oxygen. **P**: phosphorus. **N**: nitrogen. **TSS**: Total Suspended Solids. **Mn**: manganese.

	Impairment									
Year	рН	DO	Total P	Total N	Sedimentation/ Siltation	TSS	Mn	Total Fecal Coliform	Atrazine	
2014		х	х		х		х			
2012		х	х		х		х			
2010			х		х		х			
2008	х		х		х	х				
2006	х	х	х	х	х	х				
2004	х	х	х	х	х	х		x	х	

Highland Silver Lake, a lake in the East Fork Silver Creek (HUC 0714020404) watershed whose waters flow into the Upper Silver Creek watershed at HUC 07140204050901, is also impaired. Highland Silver Lake was on the 2014 303(d) list for pH and mercury. Highland Silver Lake is a 550-acre impoundment constructed in 1962 which provides drinking water to Highland, St. Jacob, Grantfork, and Pierron. Point sources and water withdrawals may affect water quantity and quality in Highland Silver Lake. Odor and taste issues have been reported in Highland drinking water, which is supplied from the lake, as a result of algal blooms. Two NPDES-permitted dischargers are located within the Highland Silver Lake watershed. There is also one landfill (Bertha Davis, ID 50200001) and three locations where there are one or more oil wells. A watershed plan was completed for the Highland Silver Lake watershed in July 2011. In 2005, three TMDLs were approved for Highland-Silver Lake, for phosphorus, aldrin, and chlordane. It was suspected that both aldrin and chlordane are widespread throughout the watershed, due to historical application of these pesticides to cropland and their use in controlling termites.

The next determination of impairments for the Upper Silver Creek watershed for the 2016 303(d) list will be based on data from station OD-09 in the Intensive River Basin Survey of 2012. This data shows a fish IBI score of 29 (moderate impairment) and a macroinvertebrate IBI score of 36.7 (moderate impairment). There will be no new data for Troy Creek (IL_ODMA-TR-C3), and there are no plans to resample that segment; the existing assessment will remain in effect until new data are available to update it. The 2016 Integrated Report and 303(d) list will be made available for public review sometime in June or July of 2015.

Impaired Waters

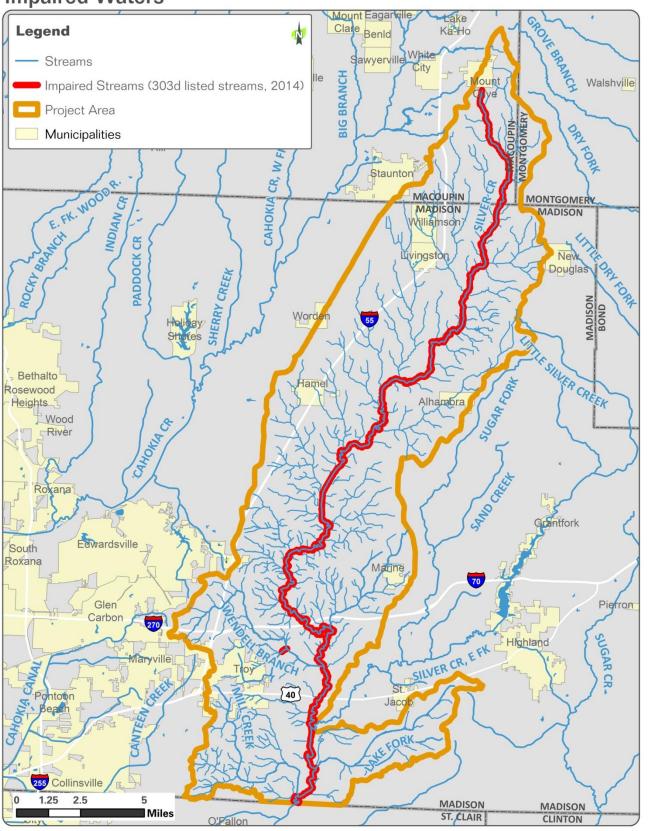


Figure A.50. Impaired waters in the Upper Silver Creek watershed, 2014.

Water quality indicators & research

Water quality in the Upper Silver Creek Watershed is impacted primarily by two land uses -1) agriculture and 2) urban development. Agriculture, or more specifically, row crop farming, covers most of the land surface in the watershed. The National Land Cover Database indicates that 58% of the Upper Silver Creek watershed is covered by harvested row crops, consisting almost entirely of corn, soybeans, and wheat. Urban development occupies on average only 12% of the Upper Silver Creek watershed, but it is concentrated in certain subwatersheds such as HUC 07140204050603, at 46% urban land, which includes the City of Troy. Urbanization is expected to increase by 11% in Madison County during the next 15 years due to its location in the Metro East area of the Saint Louis metropolitan region.

Sources of data

Water quality monitoring in the Upper Silver Creek watershed was carried out at various times from 1972 to 2013 by the U.S. Geological Survey -Illinois Water Science Center (USGS-IWSC) and Illinois EPA (IEPA). Both agencies collected their data adjacent to the USGS gage 05594450 located on the main stem of Silver Creek near Route 40 east of Troy, Illinois (Figure A.51, 38 42" 59.1" N, 89 42' 59.3" W or 38.7167145, 89.829263). The drainage area for this monitoring site is 98,560 acres which covers 82% of the project area. Therefore, the data from this site provides a good overview of the overall status of water quality in the Upper Silver Creek watershed. In general, USGS-IWSC monitoring was conducted from the late 1970s unit 1997. After a gap of several years in monitoring, IEPA began monitoring at the same site from 2003 to 2005 and again from 2009 to 2011. Most of the same parameters were monitored by both agencies. Figure A.52 shows a timeline for when the various water quality parameters were measured at this location. In addition to the timeline shown in Figure A.52, daily mean discharge data for the USGS Gage 05594450 was obtained for the time period from 1966 to 2014 (Figure A.53).

A second data source is research conducted by a Southern Illinois University Master of Science student between 2008 and 2009 that was subsequently published in a peer-reviewed journal article in 2011. ^{185,} This data was gathered from 43 catchment areas within the Lower Kaskaskia River basin, including 16 catchment areas located within the Upper Silver Creek watershed.

A third data source is the data gathered by Illinois RiverWatch volunteers at two sites in the watershed between 1996 and 2014 (Table A.53). RiverWatch volunteers are trained and tested in gathering data on various metrics of water quality through the RiverWatch program. The local chapter of this program is hosted at the National Great Rivers Research and Education Center (NGRREC) in East Alton. Data collected by RiverWatch volunteers in the watershed includes stream width, average stream velocity and discharge, water appearance, air and water temperature, turbidity, % algal coverage, channelization, and the presence of macroinvertebrates. 187

Table A.53. Location, date, and numbers of volunteers at RiverWatch sampling sites in the watershed.

Stream	# times		# volunteers who	RiverWatcher network
sampled	sampled	Years sampled	monitored there	group
Wendell Branch	9	1996-1997, 1999-2003, 2013-2014	18	
Knights Creek*	13	2000-2003, 2006-2014	>24	Triad High School

^{*}not an official name in the GNIS

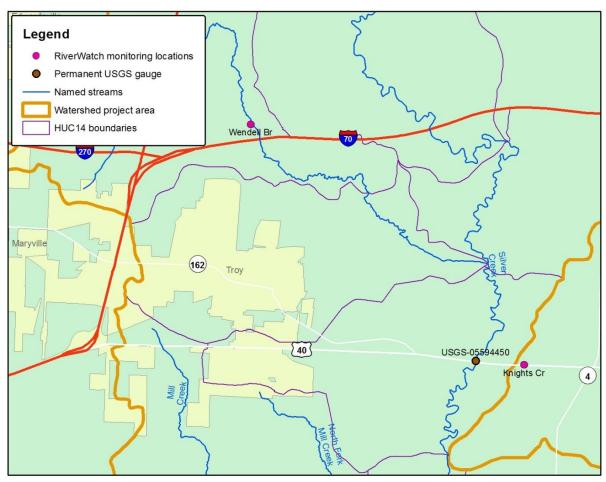


Figure A.51. Location of USGS gage 05594450 within HUC 07140204050604 in the watershed, and locations sampled by Illinois RiverWatch volunteers between 1996 and 2014.

Stream flow

The mean daily discharge measured at the USGS gage 05594450 starting in 1966 ranged from 0 to 7740 cfs, but half the discharge rates were 17 cfs or less, and 97% were less than 1000 cfs (Figure A.53). Most surface runoff, streambank erosion, and sediment transport occurs during extreme runoff events, due primarily to the large volume of water flowing through the river channel. The number of those events is inconsistent from year to year and difficult to predict, but since the year 1966, the highest peak streamflow each year has ranged from 546 to 10,600 cfs (Figure A.54). Not only are individual extreme runoff events variable and difficult to predict, but the annual mean discharge also varies widely from year to year due to annual variations in climate (Figure A.55).

RiverWatch volunteers measured an average stream discharge of 3.8 cfs and a peak discharge of 15.6 cfs at the Silver Creek site ("Knights Creek", 38.7162, -89.8181). At the Wendell Branch site (38.7578, -89.8181), the average was 4.5 cfs and the peak was recorded as 67.6 cfs. 188 Stream velocity was also recorded at these sites. At the Silver Creek site, the average velocity was 0.39 ft/s, and the peak velocity was 0.57 ft/s. at the Wendell Branch site, the average velocity was 0.40 ft/s, and the peak velocity was 10.3 ft/s. 189

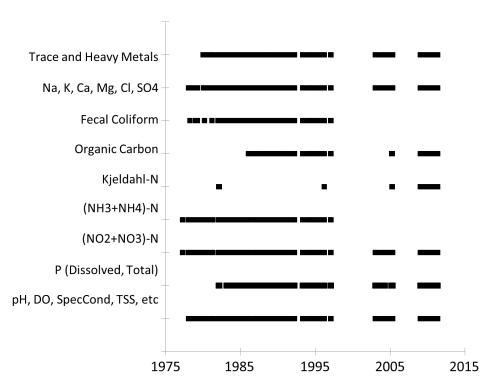


Figure A.52. Timeline showing when various water quality parameters were measured at the Silver Creek USGS gage 05594450.

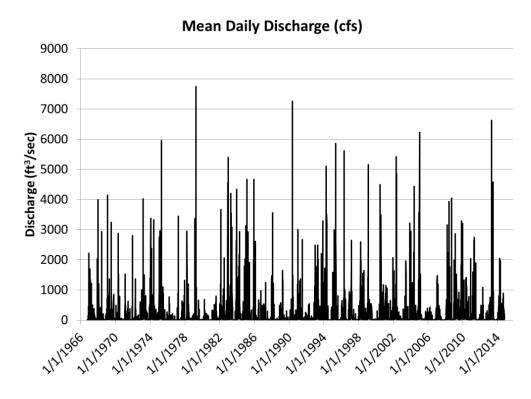


Figure A.53. Mean daily discharge measured at USGS gage 05594450 in the Upper Silver Creek watershed between 1966 and 2014.

Annual Peak Streamflow (cfs) 12,000 10,000 8,000 Discharge (ft³/sec) 6,000 4,000 2,000 111/2006 1/1/2002 1/1/1990 1/1/2010 111274 11/1918 1111982 1111986 1111994 1111998 77/1970

Figure A.54. Annual Peak streamflows measured at USGS gage 05594450 in the Upper Silver Creek watershed between 1966 and 2013.

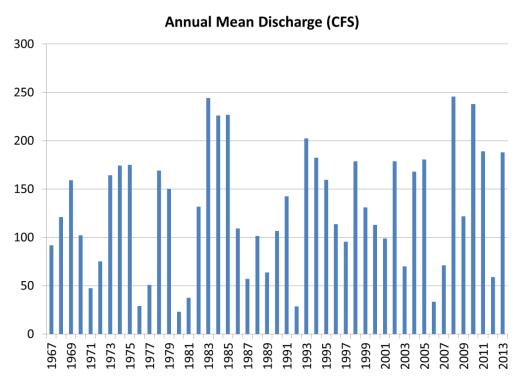


Figure A.55. Annual mean discharge for the Upper Silver Creek watershed measured at USGS gage 05594450 between 1967 to 2013.

Sediment loads

Total suspended solids (TSS) were measured in discrete samples collected from the Silver Creek at the USGS gage 05594450 from 1978 to 1991 by the USGS-IWSC and then by IEPA from 2003 to 2005 and 2009-2011. Both agencies collected 8 to 12 samples per year on monthly basis for a total of 220 samples. Total suspended solids (TSS) for individual events ranged from <5 mg/L to >2300 mg/L (Figure A.56-B). There was no clear relationship between TSS and discharge for the dates when samples were collected (Figure A.57), indicating that there are multiple factors affecting the suspended sediment concentration besides stream discharge. For instance, antecedent soil moisture due to rainfall and surface vegetative cover has major impacts on sediment losses from agricultural fields.

TSS values (Figure A.56-B)) were multiplied by the daily mean discharge for the corresponding date (Figure A.56-A), and also a unit adjustment factor, to determine the total suspended sediment load for those individual days (Figure A.56-C). It needs to be clearly noted that the sediment loads shown in Figure A.56-C represent a relatively few number of days throughout the period from 1978 to 2011. More specifically, there were 220 days with TSS data out of a time period that spanned 12,327 days. With that in mind, the results indicate that only a relatively small number of events result in large movements of sediments through the Silver Creek watershed. Stream discharge (Figure A.56-A), more than TSS, is the primary factor determining the amount of sediment transported. Of particular note is the extremely high sediment load of 8,794 ton/day measured on 4/12/1979 when the discharge rate was 7740 cfs. The second highest sediment load of 2,456 ton/day occurred seven weeks earlier on 2/23/1979 when the discharge was 2000 cfs. Examination of the hydrograph for Silver Creek (Figure A.53) for the period from 1966 to 2014 shows over 18 events where discharge exceeded 4,000 cfs, suggesting there were multiple times when large sediment loads were transported out of the Upper Silver Creek watershed, but without corresponding suspended sediment concentrations, it is impossible to calculate the exact suspended sediment load. The measured discharge and suspended sediment loads are consistent with the streambank assessment conducted for the project.

More recent suspended sediment loads for the Silver Creek watershed were reported in the 2011 Southern Illinois University-Carbondale study of land cover effects on water quality. ¹⁹⁰ Average values ranging from 14.2 to 17.4 mg/L for baseflow, and from 163 to 227 mg/L for storm flow, were reported. These values are well below the peak values observed at the USGS gage site (Figure A.56) because the sampling methods used did not capture extreme storm events.

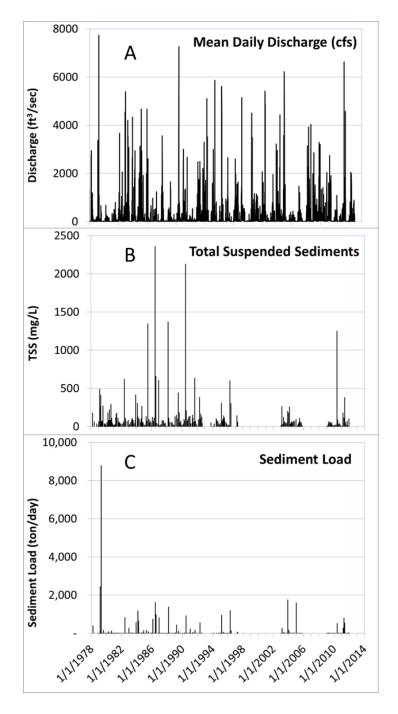


Figure A.56. (A) Mean daily discharge, (B) Total suspended sediments (TSS) in discrete water samples, and (C) suspended sediment load calculated from corresponding Discharge and TSS loads, for 223 individual days measured at USGS gage 05594450 between 1978 to 1996.

Relationship between Discharge and Suspended Sediments

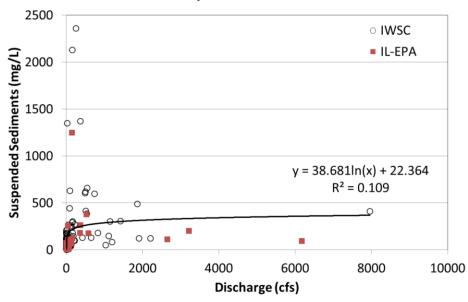
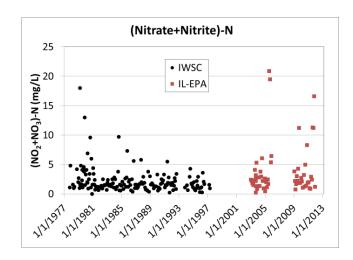


Figure A.57. Relationship between discharge and suspended sediments in discrete samples collected from Silver Creek at the USGS Gage 05594450 from 1978 to 2011 by the Illinois Water Survey and IEPA.

Nitrogen

Nitrate: More than 65% of the nitrate-nitrogen ((NO2+NO3)-N, referring to both nitrite and nitrate, among which nitrite concentrations are typically negligible compared to nitrate) concentrations measured at the USGS gage site from 1982 to 1997, were below 2 mg/L. During peak discharge periods, values reached concentrations as high as 20.9 mg/L (Figure A.58 and Table A.54). The average nitrate concentration for the Upper Silver Creek from 1977 to 2011 was 2.7 mg/L (Table A.54), which is less than the statewide average of 3.89 mg/L from 1980 to 1996 reported in a 1999 IEPA study. ¹⁹¹ More recently, base flow concentrations of NO₃-N were typically below 1 mg/L and storm flow concentrations were below 2 mg/L when measured at the subcatchment level in the in the Silver Creek watershed from January 2008 to August 2009 (Table A.55). The nitrate concentrations in the Silver Creek watershed tend to be lower than concentrations of 2 to 4 mg/L observed in the main channel of the Mississippi River between 1994 and 2004 near its confluence with the Kaskaskia River. ¹⁹² High levels of nitrate can indicate significant installation of tile drainage; these moderate levels may indicate that the watershed is not overly tiled. The presence of tile drains is difficult to measure.



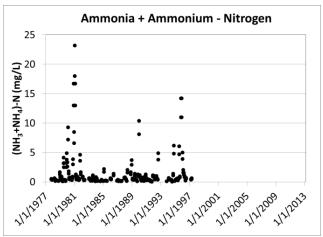


Figure A.58. Nitrate + nitrate nitrogen concentrations in Silver Creek water measured at USGS gage site 05594450 from 1982 to 1997.

Table A.54. Statistical summary of nutrients and nutrient-related parameters measured in samples collected from Silver Creek adjacent to the USGS gage 05594450 between 1972 and 2011 by the Illinois Water Science Center and IEPA.

Characteristic	Units	n	Min	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl	Max	Mean
							1 0			
Nutrients										
(NH3+NH4)-N	mg/L	168	0.02	0.10	0.16	0.38	0.70	2.90	18.00	1.14
(NO2+NO3)-N	mg/L	225	0	0.80	1.13	1.70	2.80	5.29	20.90	2.70
Organic N	mg/L	2	0.95	0.95	0.95	1.03	1.10	1.10	1.10	1.03
Kjeldahl N	mg/L	32	0.43	0.49	0.57	0.89	1.13	1.53	1.87	0.91
Total N	mg/L	4	2.10	2.10	2.30	2.80	3.20	3.30	3.30	2.80
P, Dissolved	mg/L	157	0.07	0.15	0.23	0.38	0.79	1.9	5.3	0.73
P, Total	mg/L	157	0.14	0.31	0.46	0.64	1.3	2.2	5.4	1.0
Organic Carbon	mg/L	113	3.5	5.29	7.1	8.8	11.4	18.0	51.3	10.6
Fecal Coliforms	cfu/100mL	121	30	100	270	630	2100	5600	106000	3190

Table A.55. Statistical summary of standard water quality parameters measured in samples collected from Silver Creek adjacent to the USGS gage 05594450 between 1972 and 2011 by the Illinois Water Science Center and IEPA.

Characteristic	Units	n	Min	10th	25th	Median	75th	90th	Max	Mean
				Pctl	Pctl		Pctl	Pctl		
Standard parameters										
Temperature (Water)	С	312	-0.14	0.6	6.5	13.5	21.5	24	29	13.5
pH		224	6.5	7	7.2	7.5	7.7	8	9	7.5
Specific Conductance	μS/cm	214	94	290	509	682	893	1270	2060	745
Chemical Oxygen Demand	mg/L	143	0	18	23	29	38	53	260	35
Dissolved Oxygen	mg/L	205	2	4.1	5.19	7.5	10.4	12.2	14.51	7.7
Alkalinity	mg/L	226	1	51	116	181	238	288	458	176
Total Dissolved Solids	mg/L	121	98	161	284	399	520	785	1460	432
Total Suspended Solids	mg/L	220	2	16	33	60	110	262	2360	132
Total Volatile Solids	mg/L	2	6	6	6	7	8	8	8	7
Suspended Sediment Concentration	mg/L	4	26	26	48	125.5	227	273	273	138
Suspended Sediment Concentration	tons/day	4	0.02	0.02	0.2	41.7	124	165	165	62
Fixes Suspended Sediments	mg/L	164	1	10	28	56	95	265	2120	128
Total Hardness (as CaCO3)	mg/L	120	66.4	110	180	270	345	410	490	264
Turbidity	NTU	169	1.9	4.2	9.4	22	60.1	180	1300	74
VSS	mg/L	217	0	4	6	10	18	32	240	17

Ammonium: Ammonium-nitrogen ((NH₃+NH₄)-N), which includes both ammonia (NH₃) and ammonium (NH₄) forms but is mostly the latter, was measured at the USGS gage 05594450. Between 1977 and 1997, ammonium-nitrogen ranged from 0.02 to 18 mg/L with a median value of 0.38 mg/L and an average of 1.14 mg/L (Figure A.58 and Table A.54). The average is slightly higher than the statewide average of 0.32 mg/L for Illinois from 1980 to 1996. A 2009 IEPA study identified the Upper Silver Creek watershed as one where ammonia-N tended to be elevated compared to the rest of the state. There was no available ammonium data for the period after 1997 for the USGS Gage 05594450 site, but the 2011 SIU-Carbondale study reported ammonium concentrations in multiple subcatchment areas in the Upper Silver Creek watershed (Table A.56). Their average values ranged from 0.24 mg/L for base flow in an agricultural catchment area to 0.43 mg/L for storm flow in an urban catchment area, so it's possible that ammonium levels in the Upper Silver Creek Watershed have declined since the period from 1977 to 1997.

Total / Kjeldahl / Organic N: On a few occasions during the period from 1977 to 2011, other forms of nitrogen were measured at the USGS gage, including organic N, Kjeldahl N, and Total N (Table A.54). Nitrogen in these forms consistently followed the trend of Total-N > Kjeldahl-N > organic-N. Kjeldahl N was measured in 32 samples by both the USGS-IWSC and IEPA, although the latter agency analyzed most of those samples. The amounts of nitrogen in these forms exceeded the concentrations reported for nitrate and ammonium. Without additional data for these forms of nitrogen, it is impossible to discern trends over time. However, when all the forms of nitrogen are considered together, nitrogen is not a significant problem in the watershed. Total N was listed as an impairment on the 2004 and 2006 303(d) list, but since then has not been considered an impairment.

Phosphorus

Both total and dissolved phosphorus were measured at USGS gage 05594450 from 1982 to 2011. Dissolved P is primarily orthophosphate (soluble reactive phosphorus) and is the form that is biologically active. Dissolved P tended to be high in the main stem of Silver Creek (Figure A.59) as well as in subcatchment waters during both base flow and storm flow (A.55). More than 99% of the orthophosphate concentrations measured at the USGS gage site from 1982 to 2011 and by the SIU-Carbondale study from 2008 to 2009 exceeded the Illinois statewide average for soluble phosphorus of 0.25 mg/L. In fact, that study reported that all of its measurements for orthophosphate during storm flow exceeded the statewide 95th percentile concentration of 1.07 mg/L. ¹⁹⁵ Total phosphorus concentrations varied widely, as did dissolved P, but on average, total P values were 0.25 to 0.3 mg/L higher than the dissolved concentrations (Figure A.59). Nearby, on the main channel of the Mississippi River near its confluence with the Kaskaskia River, soluble reactive phosphorus concentrations from 1994 to 2004 were typically below 0.1 mg/L. Clearly, surface water in the Silver Creek watershed has a long history of excessive phosphorus and this is consistent with its inclusion on the 303(d) list of impaired waters.

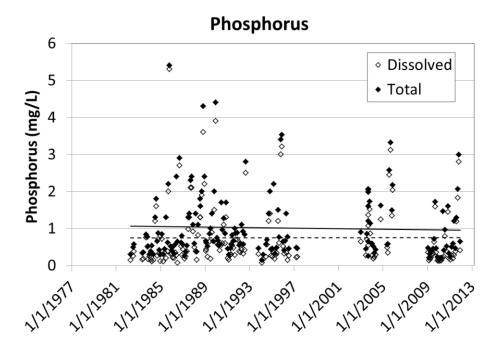


Figure A.59. Dissolved and Total phosphorus concentrations in water samples collected from Silver Creek adjacent to the USGS gage 05594450 by the IWSC and IEPA.

Table A.56. A comparison of water quality in various subcatchments of the Silver Creek Watershed. Water quality is categorized into Agricultural, Village, and Urban land uses. The number of subcatchments in each category is listed in parentheses. Data is from the SIU-Carbondale study published in 2011. 196

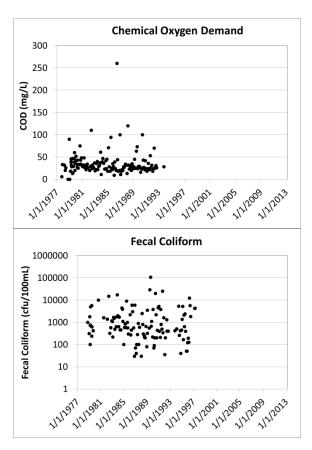
Water quality parameter	Agriculture (21)	Village (12)	Urban (10)	p value*	
Turbidity (NTU)	19.5	12.2	10.8	<0.0001	
TSS (mg/L)	17.4	14.2	14.3	0.0028	
Fecal coliform (CFU)	736	944	1,594	0.1892	
Escherichia coli (MPN)	497	471	571	0.0585	
NH4-N (mg/L)	0.24	0.41	0.32	0.0020	
NO3-N (mg/L)	0.47	0.48	0.66	0.0015	
Ortho-P (mg/L)	0.48	0.76	1.88	<0.0001	
		<u>Storm</u>	flow		
Turbidity (NTU)	190	219	109	0.0002	
TSS (mg/l)	163	227	168	0.2347	
Fecal coliform (CFU)	1,900	1,630	1,683	0.7693	
E. coli (MPN)	4,580	3,366	1,911	0.5815	
NH ₄ -N (mg/L)	0.39	0.38	0.43	0.4801	
NO ₃ -N (mg/L)	0.40	0.41	0.46	0.4028	
Ortho-P (mg/L)	1.17	1.20	1.13	0.7029	

^{*}p values less than 0.05 indicate that the difference among the three land uses can be considered significantly different.

Biological indicators of water quality

Chemical Oxygen Demand (COD) was measured from 1977 to 1993 and there was no significant trend over time (Figure A.60). Most values were below 50 mg/L, but some values ranged from 50 to 125 mg/L (Table A.56). A single extremely high value of 260 mg/L was observed on a single day in 1986 that corresponded to a major hydrological event. COD is typically below 20 mg/L in unpolluted waters, so the values measured in Silver Creek indicate there is a significant organic carbon load in the stream for much of the time.

Dissolved oxygen (DO) was measured from 10/12/1978 to 12/15/2011 during three distinct periods. DO values less than 2 mg/L indicate hypoxic conditions, but no samples in the Silver Creek watershed had DO values below 2 mg/L (the minimum values was 2 mg/L). There was no significant trend over time, except for seasonal trends with DO values generally higher in the cooler winter months and lower during the hot summer months (Figure A.60). This is because warmer water can hold less DO. When shade trees are cut down next to streams, this has the same effect – the water becomes warmer and DO levels decrease. The median DO in the stream between 1972 and 2011 is 7.5 mg/L. It is unclear why DO was included on the list of impairments for the Silver Creek watershed, especially since the later IEPA measurement were never below 4 mg/L.



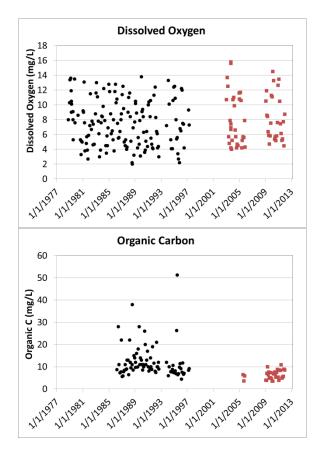


Figure A.60. Some water quality parameters relating to biological activity in water samples collected by the IWSC and IEPA at the Silver Creek USGS Gage 05594450 from 1977 to 2011.

Fecal coliforms were measured from 10/12/1978 to 4/22/1997 as the number of colony forming units per 100mL (cfu/100mL). Reported values ranged from 30 to 106,000 cfu/100mL. Before switching to other indicators of fecal contamination, the EPA used a threshold of 200 cfu/100mL to indicate unacceptable water quality for fishing and swimming. During the period from 1978 to 1997 when fecal coliforms were monitored, over 80% of the samples had concentrations above the minimum acceptable threshold (Figure A.60). Bacterial contamination have not been reported since 1997. Fecal coliforms were listed as an impairment on the 2004 303(d) list, but has not been re-listed since then.

Organic carbon is both an important indicator of biological activity as well as a substrate for microbial activity. Measurements by the USGS-IWSC from 1986 to 1997 varied widely but tended to be less than 15 mg/L (Figure A.60). Nearly all of the samples collected by IEPA from 2005 to 2011 were less than 10 mg/L. It is unclear whether the difference is due to actual changes in the organic carbon concentration in Silver Creek, or rather, due to the use of different laboratory methods. In general, the organic carbon values are typical of rivers in the Midwest.

Aquatic macroinvertebrate communities are also indicators of water quality. Macroinvertebrates are organisms without a backbone that are visible to the naked eye. Those that live in streams include the immature and adult stages of many flies, beetles, stoneflies, caddisflies, mayflies, dragonflies, aquatic worms, snails, and leeches. In the Intensive River Basin Survey of 2007 at the Silver Creek site, Illinois EPA found an MBI score of 33.9, indicating moderate impairment. Illinois RiverWatch volunteers conducted surveys of macroinvertebrates 22 times at two sites in the watershed between 1996 and 2014. The volunteer groups counted the number of individuals of different types of macroinvertebrate in the riffles of the stream sites, and calculated several metrics to describe the communities found. These are:

- Taxa richness Taxa richness measures the abundance of a variety of different organisms as
 determined by the total number of taxa represented in a sample. Generally, taxa richness
 increases as water quality, habitat diversity, and habitat suitability increase. Low taxa richness
 generally indicates low water quality.
- EPT taxa richness Ephemeroptera, Plecoptera, and Trichoptera (EPT) are the three most pollution-sensitive insect orders. The abundance of these orders in a population is an indicator of water quality. The lower the EPT taxa richness, the lower the number of EPT insects sampled, and the worse the water quality.
- MBI Macroinvertebrate Biotic Index, a measure of water quality based on taxa richness, EPT taxa richness, and number of organisms sampled, as calculated through Illinois RiverWatch criteria.¹⁹⁷
- Dominance score (3 taxa) Percentage of the sample that is comprised of the 3 most abundant taxa identified. Calculated for 1993-2000 data only. This measure is useful because as habitat or water quality become more limited or impaired, more tolerant or opportunistic species replace sensitive or specialized species. As diversity declines, a few taxa will begin to dominate the population.
- Biological score Percentile score of how that site ranked compared to a statewide selection of
 random samples for a range of habitat metrics. If the biological score is 78, that site ranked
 better than 78% of RiverWatch stream sites for macroinvertebrate community. Calculated as
 the weighted average of the percentile scores for MBI, EPT taxa richness, total taxa richness,
 percent dominance, and percent worms, where the first two are rated double. It has been
 normalized by the mean and standard deviation of the randomly selected sites. This score is
 commonly used by RiverWatch and follows IDNR guidelines. Calculated for 1993-2000 data only.

 Habitat score – Percentile score of how that site ranked compared to a statewide selection of random samples for a range of biological metrics. If the biological score is 85, that site ranked better than 85% of RiverWatch stream sites for habitat. The habitat score is based on several physical characteristics of the stream and its habitat, including surrounding land uses, channel disturbances, stream substrate, water odor, water color, and canopy cover. It has been normalized by the mean and standard deviation of the randomly selected sites. Calculated for 1993-2000 data only.

The metrics from the RiverWatch data indicate that the macroinvertebrate species richness and habitat, and associated water quality, at the three sites sampled is typically poor to fair (Table A.57). Taxa richness at the sites was typically poor, while EPT taxa richness ranged between very poor and fair over time. The dominance scores at Knights Creek and Wendell Branch showed that the 3 most abundant taxa comprised approximately 80% of the total macroinvertebrate populations, indicating poor diversity.

The average MBI scores indicated fair water quality, but those scores increased to high, "very poor" water quality ratings from time to time over the monitoring period. The biological scores showed the two sites have biological richness and diversity below the Illinois average of RiverWatch sites. The Knights Creek site was below the Illinois average for habitat scores, too, but the Wendell Branch site averaged the 85th percentile for Illinois in habitat.

Table A.56. Metrics based on macroinvertebrate populations sampled in the Upper Silver Creek watershed.

		# ORGANISMS		EPT TAXA		DOMINAN	BIOLOGICAL	HABITAT
STREAM NAME	FIELD DATE	SAMPLED	TAXA RICHNESS	RICHNESS	MBI	CE SCORE	SCORE	SCORE
Knights Cr	2000-05-23	100	7	2	5.79	84.0%	45.3	4.1
Knights Cr	2001-05-29	96	14	2	6.18	67.7%	48.0	55.5
Knights Cr	2002-05-20	50	5	1	5.91	92.0%	23.1	67.5
Knights Cr	2003-05-15	76	10	1	7.68	75.0%	19.6	27.7
Knights Cr	2006-05-17	260	13	3	6.33			
Knights Cr	2007-05-16	0						
Knights Cr	2008-05-01	35	8	1	6.43			
Knights Cr	2009-05-12	167	9	3	6.03			
Knights Cr	2010-05-11	224	6	1	5.95			
Knights Cr	2011-05-04	159	10	3	6.38			
Knights Cr	2012-05-02	126	10	2	5.63			
Knights Cr	2013-05-06	82	5	0	6.23			
Knights Cr	2014-05-07	86	8	1	5.69			
Average		112.4	8.8	1.7	6.2	80%	34.0	38.7
Description of average			Poor/Fair	Very Poor/Poor	Fair water quality			
Range			5 to 14	0 - 3	5.63 - 7.68			
Description of range			Very Poor - Excellent	Very Poor - Fair	Fair - very poor water quality			
Wendell Br	1996-07-03	39	6	1	5.85	92.3%	23.5	55.5
Wendell Br	1997-06-30	74	12	3	6.32	63.5%	67.7	83.5
Wendell Br	1999-06-30	97.00	7	3	5.65	88.7%	56.4	67.5
Wendell Br	2000-06-11	146	5	2	5.91	97.9%	38.8	97.2
Wendell Br	2001-05-12	373	9	3	6.09	96.8%	35.2	97.2
Wendell Br	2002-06-04	75	8	2	5.99	80.0%	40.7	97.2
Wendell Br	2003-05-25	72	11	2	6.88	65.3%	27.6	97.2
Wendell Br	2013-07-11	14	3	0	6.14			
Wendell Br	2014-05-19	19	10	2	7.47			
Average		101.0	7.9	2.0	6.3	83%	41.4	85.0
Description of average			Poor	Poor	Fair water quality			
Range			3 to 12	0 - 3	5.85 - 7.47			
Description of range			Very Poor to Good	Very Poor - Fair	Fair - very poor water quality			

Earth and trace Metals

Water quality monitoring by the USGS-IWSC and IEPA at the USGS gage 05594450 included a large number of common earth metals (Table A.58) as well as trace and heavy metals (Table A.59). In most cases, both dissolved and total forms were reported. Earth metals are typically found in high concentrations throughout the environment because they are common ingredients in soils and plants. Trace and heavy metals are also relatively ubiquitous in the natural environment, but they tend not to be found in high concentrations. High concentrations of trace and heavy metals usually indicate some type of industrial contamination. This large Silver Creek dataset showed that these naturally occurring elements were all within normal ranges found in natural environments.

Manganese, which is listed as one of the impairments for Silver Creek, is a mineral that naturally occurs in rocks and soil. In trace amounts, it is essential to the health of plants and animals. It has similar properties to iron, and is used in compounds for uses including metal alloys, antiseptic creams, preservatives, batteries, fireworks, fertilizers, and animal feed. Manganese was listed as an impairment in 2010, 2012, and 2014. Measurements taken prior to 1997 are higher than those taken more recently, perhaps as a result of more accurate measurement procedures. The method detection level prior to 1997 was >1 μ g/L, and for the 2009 to 2011 data it was 0.05 μ g/L.

Sources of manganese include atmospheric deposition (particles in the air from industry and coalburning power plants), groundwater as it flows through rocks and soils with high natural manganese, - discharges from industrial operations (including the production of metal alloys, antiseptic creams, preservatives, batteries, fireworks, fertilizers, and animal feed), and runoff from fertilizer on cropland. When water contains too much manganese, it leaves stains on everything with which it comes in contact, including pipelines, faucets, and fabrics. At concentrations exceeding 0.15 ppm, manganese imparts an undesirable taste to beverages and stains plumbing fixtures. The value recommended by the FAO is 0.1 ppm. The US EPA Secondary Maximum Contaminant Level (MCL), a recommended concentration set of drinking water for aesthetic reasons (ie to avoid staining to pipes) is 0.05mg/L (0.05 ppm). The median manganese concentration in Silver Creek between 1977 and 2011 is 0.29 ppm (290 ug/L) dissolved manganese, while the maximum observed manganese was 3.2 ppm (3200 ug/L) dissolved manganese – well above the EPA and FAO recommended levels for drinking water (Figure A.61). However, surface water samples typically range from 1 to 200 μ g/L.

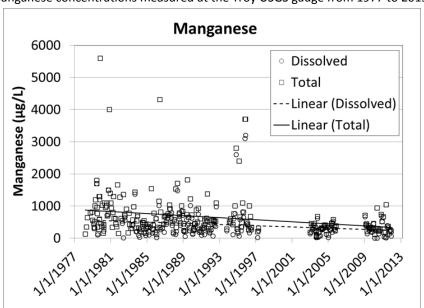


Figure A.61. Manganese concentrations measured at the Troy USGS gauge from 1977 to 2013.

Table A.58. Statistical summary of earth metal concentrations monitored in Silver Creek adjacent to the USGS Gage 05594450 between 1977 and 2011 by the Illinois Water Science Center and IEPA.

Characteristic	Units	n	Min	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl	Max	Mean
				1 011	1 011		1 00	1 011		
Earth Metals										
Aluminum, Dissolved	μg/L	159	1.39	18	25	25	83	208	870	77
Aluminum, Total	μg/L	161	25	300	670	1500	2800	7500	54000	3511
Iron, Dissolved	μg/L	102	3.53	21	60	86.2	150	180	870	113
Iron, Total	μg/L	226	270	630	1070	1910	3400	8310	68000	4220
Mn, Dissolved	μg/L	169	2.59	78	190	290	511	740	3200	417
Mn, Total	μg/L	227	100	210	310	480	780	1280	5600	674
K, Dissolved	mg/L	169	0.63	3.5	4.5	6.1	8.5	12	27	7.1
K, Total	mg/L	198	1.6	4.2	5.2	7	10	12	26	7.9
Na, Dissolved	mg/L	169	2.5	10	22	38	60	130	226	51.4
Na, Total	mg/L	199	3.3	12	24	40	65.2	135	222	55.7
Calcium, Dissolved	mg/L	169	9.4	24	40.6	63	75.2	89	122	58.8
Calcium, Total	mg/L	199	12	30	47	66	79.2	95.2	123	64.1
Chloride, Dissolved	mg/L	169	6.2	16.1	26	43.1	89	220	281	72.1
Chloride, Total	mg/L	55	6.5	24.6	46.9	68.3	108	220	348	96.4
Fluoride, Dissolved	mg/L	2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Fluoride, Total	mg/L	4	0.4	0.4	0.45	0.55	0.7	0.79	0.79	0.57
Oil+grea, Total	mg/L	98	0	0	0	1	2	7	80	3.7
Phenols, Total	μg/L	12	1.66	1.83	2	2.58	3.35	4.07	4.57	2.75
Sulfate, Dissolved	mg/L	171	12	39	64	99	133	165	335	102
Sulfate, Total	mg/L	54	9.76	19	37.1	50.5	72.6	101	138	57

Table A.59. Statistical summary of trace and heavy metal concentrations monitored in Silver Creek adjacent to the USGS Gage 05594450 between 1977 and 2011 by the Illinois Water Science Center and IEPA.

Characteristic	Units	n	Min	10th Pctl	25th Pctl	Median	75th Pctl	90th Pctl	Max	Mean
Trace and Heavy Metals										
Arsenic, Dissolved	μg/L	22	1.14	1.37	1.65	2.41	3.02	3.75	4.85	2.45
Arsenic, Total	μg/L	31	0.47	1.82	2.23	3	4.68	5.39	12	3.7
Barium, Dissolved	μg/L	166	2.5	50	62	80.5	97	120	149	80.9
Barium, Total	μg/L	199	50	50	93.6	100	120	200	900	123.5
Beryllium, Dissolved	μg/L	163	0.04	0.1	0.5	0.5	0.5	0.5	5	0.47
Beryllium, Total	μg/L	51	0.04	0.04	0.04	0.5	0.5	0.5	0.69	0.35
Boron, Dissolved	μg/L	148	19.2	40	56	80	130.5	230	460	114
Boron, Total	μg/L	185	0	47.8	60	100	160	290	510	132
Cadmium, Dissolved	μg/L	10	0.2	0.23	0.28	0.71	2.9	4	5	1.46
Cadmium, Total	μg/L	32	0	0	0	0.45	4.14	5	5	1.6
Chromium, Dissolved	μg/L	24	0.44	0.58	0.82	1.14	5	5	5	2.66
Chromium, Total	μg/L	81	0	0	1.6	6	11	20	100	10.1
Cobalt, Dissolved	μg/L	21	0.23	0.29	0.54	0.97	5	7.5	10	2.63
Cobalt, Total	μg/L	48	0.36	0.64	0.94	5	10	20	40	6.26
Copper, Dissolved	μg/L	31	0.94	2.3	3.23	5	7.2	11	13	5.57
Copper, Total	μg/L	85	0	0	5	5.2	10	30	80	10.6
Lead, Dissolved	μg/L	22	0.26	0.45	0.67	1.21	2.34	3.81	4.1	1.60
Lead, Total	μg/L	56	0	0	0	1.79	5.72	11.8	400	17.7
Manganese, Dissolved	ugL	169	2.59	78	190	290	511	740	3200	416.6
Manganese, Total	ugL	227	100	210	310	480	780	1280	5600	673.57
Nickel, Dissolved	μg/L	28	1.02	1.18	2	2.81	3.69	6.7	100	6.4
Nickel, Total	μg/L	45	0	0	0	3.43	6.9	9	100	6.8
Strontium, Dissolved	μg/L	167	20	66	110	170	207	229	290	159
Strontium, Total	μg/L	199	35	92	140	180	212	240	290	175
Vanadium, Dissolved	μg/L	40	0.37	1.53	2.71	5	7	10	14	5.3
Vanadium, Total	μg/L	74	0.68	4.4	8.3	10	20	50	130	19.3
Zinc, Dissolved	μg/L	44	0.86	2.16	4.7	6.75	26.2	110	240	30.4
Zinc, Total	μg/L	91	0	4.34	10	30	100	130	420	61.3

Water appearance

Water appearance documented by the Illinois RiverWatch volunteers at the two sites in the watershed between 1996 and 2014 was described as clear, dark brown, milky, or foamy (Table A.60). The Wendell Branch site (38.7578, -89.8181) had the greatest proportion of assessments with non-clear water appearance – 7 out of 9, or 88% of visits showed non-clear water such as milky or foamy. At the Silver Creek site near the USGS gauge ("Knights Creek"), the water appeared clear 8 out of 13 times (on 62% of visits). The volunteers also collected qualitative data on the worst weather in the last 24 and 48 hours. When the worst weather in the last 48 hours included rain, 57% of the water appearance descriptions were not "clear". However, clear or overcast weather did not guarantee clear water; 4 out of 8 (50%) of the monitoring events with no rain in the last 48 hours had a milky appearance (both at the Wendell Branch site). The data show no clear trend of improvement or deterioration of water appearance over time.

Table A.60. Water appearance at the three RiverWatch monitoring sites, compared with worst weather in the last 48 hours at those sites, based on 23 monitoring events. ¹⁹⁹

			Frequency								
		Worst weather in last 48 hours									
Water appearance	CLEAR/SUNNY	R/SUNNY OVERCAST RAIN SHOWERS STORM Tota									
CLEAR	1	3	1	4	1	10					
DARK BROWN				1		1					
FOAMY			1			1					
MILKY	2	2	1	1	2	8					
OTHER			1		1	2					
Total	3	5	4	6	4	22					

Turbidity

Of the 22 monitoring occasions where turbidity was reported by RiverWatch volunteers, 5 marked "clear", 11 marked "slight", 5 marked "medium", and 1 marked "heavy". The medium and heavy turbidity determinations all occurred within 48 hours of a rain event. The data show no clear trend of improvement or deterioration in turbidity over time. ²⁰⁰

Agriculture and water quality

Grain agriculture requires the use of nitrogen and phosphorus fertilizers. This results in the annual addition of soluble nutrients to the watershed. A 2010 study published in the Journal of Environmental Quality reported that 75% of the nitrogen inputs into Madison County were a result of fertilizer applications, with another 9.3% from manure, 6.7% from the atmosphere, and 8.6% from human activities (sewage). Similarly, a 2011 study in the Journal of Environmental Quality reported that 73% of phosphorus inputs into Madison County came from fertilizer, 21.2% from manure, and 5.6% from sewage. The tillage practices associated with grain production result in annual disturbance of the soil surface making it more susceptible to sheet and rill erosion during precipitation events. The 2012 Illinois Department of Agriculture Soil Conservation Transect Survey reported that 75% of corn and 37% of soybeans in Madison County are produced using conventional tillage practices that result in significant soil disturbance. These values are much higher than the state averages of 49.1% for corn and 21.5% for soybean. Inversely, the amount of no till crop production is 1% for corn and 7% for soybean, which is

much lower than the state averages of 10.8% for corn and 38.6% for soybean. It is apparent that row crop agriculture in Madison County has the greatest impact on surface water quality.

Urbanization and water quality

The greatest detriment to water quality from urbanization is an increase in the amount of impervious surfaces such as asphalt. Impervious surfaces prevent the natural process of rain infiltration into the soil. Instead, rainfall is rapidly directed into stormwater sewer systems that deliver the water directly to streams. The rapid increase in runoff volume induces severe streambank and streambed erosion in the ephemeral streams that initially receive the water. Another impact of urbanization on water quality is the use of fertilizers by homeowners. Urban landowners are more likely to apply excessive amounts of nitrogen and phosphorus fertilizers on a unit of land. Although each homeowner controls a small amount of land, the cumulative effect of residential landscape fertilization can be significant in densely populated areas. Surface runoff from urban landscapes reaches streams more quickly than from agricultural or natural landscapes due to the prevalence of impervious surfaces. The 2011 SIU-Carbondale study showed that during periods of base flow, both nitrate and orthophosphate concentrations in urban watersheds were higher than in agricultural subwatersheds of the Silver Creek watershed. Sewer and septic systems in urban-dominated watersheds likely contribute significant amounts of nitrate and phosphate to stream base flows.

Private sewage systems

Given that so much of the Upper Silver Creek watershed is rural, many houses are a considerable distance from municipal sewer lines. Private sewage systems, commonly septic tanks, are the predominant type of sewage system throughout the watershed (Figure A.62). In the Madison County portion of the Upper Silver Creek watershed, there are approximately 3,579 private sewage systems, of which most are private individual systems, 120 are private central sewage systems shared between two or more households, and 110 are public sewage systems (with no data on numbers of households served). The private sewage systems are located throughout the watershed, with greater concentrations in subdivisions outside of municipal limits. Private sewage systems can release nutrients and bacteria to waterways if not properly maintained. USEPA reports that state agencies found that failing septic systems are the third most common source of groundwater contamination, and that approximately 10% of all septic systems nationally are failing.²⁰⁵

Private Sewage Systems

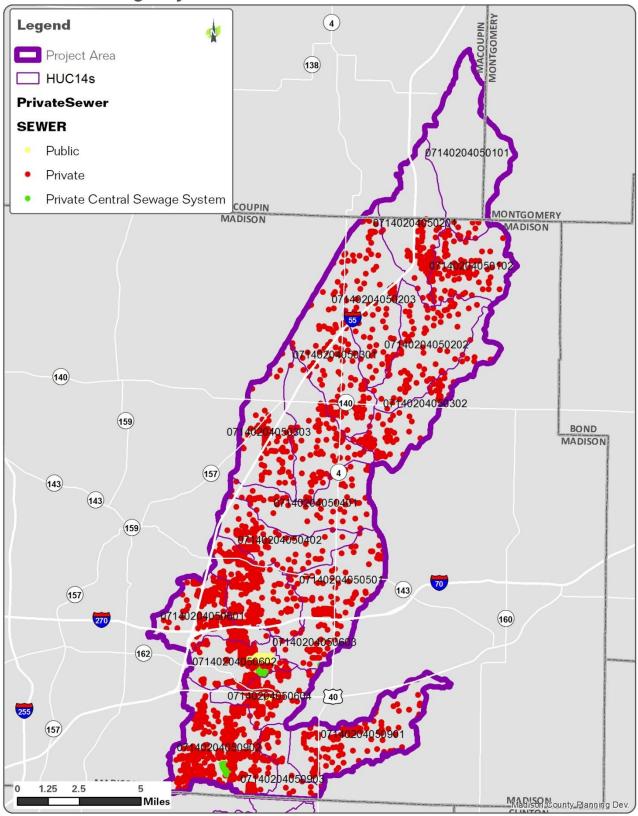


Figure A.62. Private sewage systems in Madison County. Data layer created in 2014 using permits and other information available to Madison County. 206

NPDES permitted discharges

There are 10 facilities with National Pollution Discharge Elimination System (NPDES) permits to discharge into the Upper Silver Creek watershed (Table A.61). Six of them are water or sewage treatment plants. Several other facilities in the watershed have been issued NPDES permits in the past which have now expired. None of the facilities have exceeded the capacity for which they were designed. The permit limits can be downloaded from the Discharge Monitoring Report (DMR) Pollutant Loading Tool. ²⁰⁷

Several pollutants are required to be monitored at these facilities, including residual chlorine, biological oxygen demand, fecal coliform, ammonia nitrogen, suspended solids, pH, dissolved oxygen, and total flow. Suspended solids monitored at the facilities are shown in Table A.62. Five out of the 10 permitted facilities monitored total suspended solids, and the average total of the total suspended solids from these five facilities was 55.77 lb/d. Translated into a yearly value, that's 10.18 t/year. As a proportion of total sediment load estimated by STEPL for the entire watershed, these NPDES permitted facilities contribute 0.017% of the watershed's sediment load (10.18 out of 60,230 t/year).

The Troy Sewage Treatment Plant (STP) was the only facility to track manganese, nitrogen, nitrate, and phosphorus discharge from 2007 to 2014, with some gaps (Table A.63). These pollutants are not subject to limits in the permit. On average, between 2012 and 2014, Troy STP discharged 104,355 lbs/year of nitrogen and 41,304 lbs/year of phosphorus. In 2013, a high loading year, the plant discharged more than twice as much nitrogen and phosphorus. As a proportion of total nitrogen load estimated by STEPL for the entire watershed, Troy STP contributed 9% of the watershed's nitrogen load (104,355 lbs/year out of 1,178,496 lbs/year) and 15% of the watershed's phosphorus load (41,304 lbs/year out of 264,952 lbs/year).

Table A.61. NPDES permitted discharges to the Upper Silver Creek watershed.²⁰⁸ WTP: Water Treatment Plant. STP: Sewage Treatment Plant. Data from U.S. EPA's Integrated Compliance Information System (ICIS) and Permit Compliance System (PCS) databases, which include NPDES data. The PCS/ICIS database provides information on companies which have been permitted to discharge waste water into rivers.²⁰⁹

				Residents	Design	Average
		Permit		served	Flow	Daily Flow
HUC 12	Site name	number	Permit expiry date		(MGD)	(MGD)
071402040501	City of Mount Olive	ILG870626	OCT-30-2016			
071402040502	Alhambra STP, Village of	ILG580004	JUN-30-2018	603		0.011
071402040502	Alhambra WTP	ILG640029	APR-30-2017		0.22	0.072
071402040502	Livingston STP	ILG580115	JUN-30-2018		0.66	0.14
071402040503	Hamel STP	ILG580011	JUN-30-2018		0.26	0.105
071402040506	B-Line Systems, INC.	ILP000151				
071402040506	Jarvis Township Road District	ILG870746	OCT-30-2016	917		
	Manors at Kensington					
071402040506	Parque	IL0074993	AUG-31-2018		0.059	0.023
071402040506	Triad High School Dist 2 STP	ILG551025	JUN-30-2018		0.048	0.019
			DEC-31-2016 &			
071402040506	Troy STP, City of	IL0031488	DEC-31-2015	6,086	3.902	1.35

Table A.62. Total Suspended Solids as averages from measurements from the PCS/ICIS.

HUC12	Name of facility	Permit #	Average total suspended solids discharge (lb/d)	Dates of data used
071402040501	City of Mount Olive	ILG870626		March 4, 2014 - January 31, 2015
071402040502	Alhambra STP, Village of	ILG580004	3.8	July 29, 2014 - January 31, 2015
071402040502	Alhambra WTP	ILG640029		
071402040502	Livingston STP	ILG580115	41.1	
071402040503	Hamel STP	ILG580011	10.4	Feb 14, 2014 - January 31, 2015
071402040506	B-Line Systems, INC.	ILP000151		March 28, 2013 - January 31, 2015
071402040506	Jarvis Township Road District	ILG870746		Feb 24, 2014 - January 31, 2015
071402040506	Manors at Kensington Parque	IL0074993	0.36	Sept 12, 2013 - January 31, 2015
071402040506	Triad High School Dist 2 STP	ILG551025	0.11	April 11, 2014 - January 31, 2015
071402040506	Troy STP, City of	IL0031488		Jan 1, 2011 - January 31, 2015
TOTAL			55.77	

Table A.63. Pollutant loads of nitrogen, nitrate, phosphorus, and zinc from Troy Sewage Treatment Plant from 2007 to October 2014. Note that some pollutant measurements might overlap with other pollutant measurements. Consequently, the amounts of all the pollutants in this table should not be summed, as this would result in an overestimation of the total amount of pollution discharged. For other pollutants monitored, see the DMR.

			To	otal Disc	harged (lbs/year)			Average
Chemical Name	2007	2008	2009	2010	2011	2012	2013	2014	(lbs/year)
Manganese & manganese compounds	-	-	11.8	23.5	-	-	1	-	18
Nitrate compounds	-	-	-	-	-	54,389	251,536	42,369	116,098
Nitrogen	-	-	-	-	-	10,891	254,199	47,977	104,355
Phosphorus	-	-	-	-	-	102,602	12,428	8,882	41,304

Alhambra STP, Livingston STP, and Troy STP were assessed in the 2008 Clean Watershed Needs Survey. The survey identified no changes needed at the Livingston and Troy STPs, but \$874,797 of needs at Alhambra STP (in 2008 dollars). Troy STP has advanced treatment methods for BOD Removal, Ammonia Organic Removal, and Nutrient Removal, while the other two STPs do not have any. In the past five years, four of the ten facilities have had known pollutant exceedences.

Outfalls

"Outfall" means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States, according to the federal definition. Outfalls do not include open conveyances connecting two municipal storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States. ²¹³

NPDES outfall locations are available to download from Illinois' Resource Management Mapping Service (RMMS). There are 13 within the watershed (Table A.64). (Madison County also created a georeferenced outfalls file covering the county some years ago, but it is not clear that the makers of this file used the federal definition of outfalls, and the file is not accompanied by metadata that could explain its attributes.)

Four of the outfalls are within municipal boundaries; three associated with Troy sewage and water treatment, and the Alhambra Water Treatment Plant (Figure A.63).

Table A.64. NPDES outfalls in the watershed. STP = Sewage Treatment Plant. WTP = Water Treatment Plant. 214

HUC14	Facility name	NPID	Description
07140204050201	SUPER 8 MOTEL STP-STAUNTON	IL0066788	STP OUTFALL
07140204050201	LIVINGSTON STP	ILG580115	STP OUTFALL
07140204050302	ALHAMBRA WTP	IL0052299	
07140204050302	ALHAMBRA STP	ILG580004	STP OUTFALL
07140204050304	HAMEL STP	ILG580011	STP OUTFALL
07140204050502	MARINE STP	ILG580228	STP OUTFALL
07140204050502	HOPKINS PARK STP	ILG580217	STP OUTFALL
07140204050601	METRO-EAST AIRPARK STP	IL0075094	STP OUTFALL
07140204050603	TROY STP	IL0031488	EXCESS FLOW(OVER 3.902 MGD)
07140204050603	TROY WTP	IL0060062	TREATED IRON FILTER BACKWASH
07140204050603	MANORS AT KENSINGTON PARQUE	IL0074993	STP OUTFALL
07140204050603	TROY STP	IL0031488	STP OUTFALL
07140204050604	TRIAD COMMUNITY UNIT DIST #2	ILG551025	STP OUTFALL

NPDES outfalls

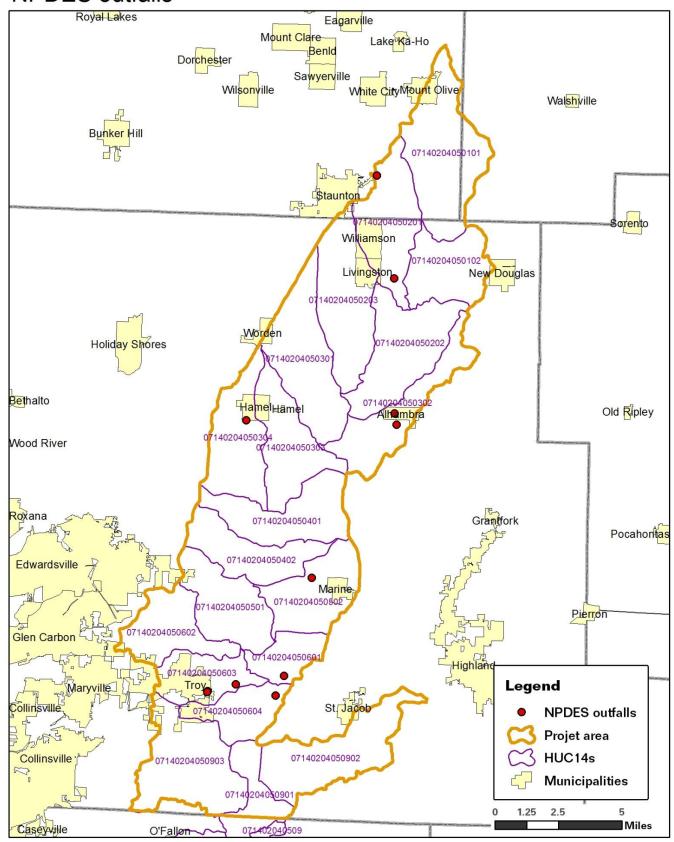


Figure A.63. NPDES outfall locations in the watershed. Only ten locations are visible because some locations are very close together and overlap when viewed with a small scale.

Pollutant loading analysis

Estimating pollutant loads by source

Nutrient (total nitrogen and total phosphorus) and sediment loads (sheet and rill erosion) for the Upper Silver Creek watershed were calculated using the Spreadsheet Tool for Estimating Pollutant Load (STEPL), a tool developed by the U.S. Environmental Protection Agency (EPA). STEPL employs simple algorithms to calculate nitrogen, phosphorus, and sediment loads from different land uses.

Inputs required by the model include land uses, animal operations, precipitation, soil types and Universal Soil Loss Equation (USLE) parameters, septic systems, and direct discharges. Land use data was identified from the most recent National Land Cover Database (NLCD 2011). Animal (livestock) data was obtained from the USDA 2012 Agricultural Census database at the county level. Runoff volumes were based on long-term precipitation records from the Southern Illinois University weather station at Belleville. The annual sediment load (sheet and rill erosion only) is calculated based on the Universal Soil Loss Equation (USLE) and the sediment delivery ratio. USLE parameters were from the Madison County Soil Survey. Data related to septic systems was obtained from the U.S. Census Bureau and the USEPS. The remaining user input parameters were obtained from the online STEPL Input Data Server. ²¹⁷

Sediment loads due to streambank erosion were calculated using the NRCS Streambank Erosion Estimator (Direct Volume Method) with one additional factor added to distinguish between stable and actively eroding segments. The helicopter survey of Silver Creek streams classified lateral recession rates of eroding segments as slight, moderate, or severe, but it was impossible to examine the entire stream length of every tributary to confirm whether or not erosion was active. At any given time, not all stream segments are actively eroding. In an lowa watershed of similar size and geomorphology to the Upper Silver Creek watershed, 40% of the assessed streambanks were actively eroding when assessed in 2010. ²¹⁸ Therefore, it was assumed that for the Upper Silver Creek watershed, 40% of the total stream length was actively eroding and contributing sediments to the total suspended solids load. To determine the nitrogen and phosphorus load associated with streambank erosion, sediment loads were multiplied by the percent nitrogen or phosphorus in the sediments. Nitrogen and phosphorus concentrations were estimated by using the average organic matter content of the predominant soil types in the Upper Silver Creek watershed. ²¹⁹ The scientifically accepted conversion factor for organic matter to total nutrient concentration is 5% for nitrogen and 0.5% for phosphorus.

Table A.65. Estimated current annual pollutant load by source at the watershed scale.

Sources	N Load		P Loa	d	Sediment Load		
	(lb/yr)	(%)	(lb/yr)	(%)	(t/yr)	(%)	
Cropland	927,787	78.7	231,153	87.2	19,442	32.3	
Pastureland	103,687	8.8	8,588	3.2	818	1.4	
Forest	3,859	0.3	1,909	0.7	57	0.1	
Urban	87,519	7.4	13,813	5.2	2,041	3.4	
Feedlots	10,737	0.9	2,147	0.8	-	-	
Septic	9,774	0.8	3,828	1.4	-	-	
Streambank	35,134	3.0	3,513	1.3	37,871	62.9	
Total	1,178,496	100.0	264,952	100.0	60,230	100.0	

The STEPL model calculated nutrient loads for each of the primary land uses as used in the NLCD (Table A.65). Cropland was by far the greatest source of nutrients and sediments in the Upper Silver Creek watershed. Cultivated cropland accounts for 58% of the total land surface in the watershed, but contributes 78.7% of the nitrogen load, 87% of the phosphorus load, and 32% of the sediment load. Hay and pastureland cover 14% of the land surface in the watershed, but contribute much smaller amounts of nutrients and sediments due to protection of the soil surface by a permanent vegetative cover. Forest also covers 14% of the watershed, but contributes less than 1% of the nutrient and sediment loads. Developed urban areas cover 12% of the watershed and contribute 7.4% of the nitrogen load, 5.2% of the phosphorus load, and 3.4% of the sediment load. Although these amounts are relatively small compared to the agricultural sources, a trend towards increasing urbanization indicates that urban sources of pollutants will account for a greater portion of pollutant loads in the future. Streambank erosion is the single largest contributor of sediments in the watershed based on the observations and calculations conducted for this report, which produced the estimate that 35% of the stream reaches in the Upper Silver Creek watershed exhibited moderate to severe streambank erosion.

Estimated pollutant loads by subwatershed

Additional insight into the impact of land use on pollutant loads can be discerned by examining pollutant loads and land use/land cover by HUC14 subwatershed (Table A.66).

Table A.66. Annual pollutant loads by subwatershed, and area of cropland in acres.

HUC14	Cropland	N Load	P Load	Sediment Load
	(acres)	(lb/year)	(lb/year)	(ton/year)
07140204050101	5,764	123,277	28,244	3,819
07140204050102	2,474	55,826	12,534	2,196
07140204050201	3,490	80,642	18,002	1,976
07140204050202	4,238	92,231	20,882	4,490
07140204050203	4,323	102,649	22,073	3,401
07140204050301	5,169	90,296	20,595	3,776
07140204050302	3,872	67,381	15,392	3,048
07140204050303	3,493	63,383	14,127	2,863
07140204050304	4,565	77,084	17,854	2,843
07140204050401	4,735	56,807	13,487	3,279
07140204050402	3,134	42,151	9,349	3,910
07140204050501	2,328	37,256	7,811	3,507
07140204050502	4,285	53,011	12,471	2,388
07140204050601	1,743	21,477	5,117	1,350
07140204050602	2,442	35,866	7,963	2,207
07140204050603	1,203	25,845	5,199	1,931
07140204050604	1,698	25,954	5,710	2,403
07140204050901	1,820	24,189	5,609	2,129
07140204050902	5,650	70,437	16,720	3,699
07140204050903	4,089	32,733	5,814	5,015
TOTAL	70,516	1,178,496	264,952	60,230

The relationship between nutrient loads and crop acreage is very strong, as is the relationship between sediment load and cropland. The correlation between total nutrient and sediment loads and all other land uses was weak or nonexistent, and are not shown in Table A.66. This does not indicate that other nutrient and sediment sources are unimportant, but rather that the amounts contributed by non-crop land sources are relatively small compared to cropland.

The HUC14 with the greatest nitrogen loading is 07140204050101, with 121,231 lb/year. The same HUC14 also has the most phosphorus loading (28,039 lb/year), and the most sediment loading (1,749 tons/year). It is important to note that 07140204050101 is also the largest subwatershed in the project area. Even when adjusted for area, it produces the most nitrogen per acre, with 12.6 lb/acre/year. The northernmost HUC14s generally produce more nitrogen per acre than the southern subwatersheds (Figure A.64).

The pattern is the same for phosphorus loading (Figure A.65), with HUC14 07140204050101 producing the most phosphorus in total and per acre, and the northernmost subwatersheds produce more phosphorus than the southern subwatersheds. The amount of phosphorus loading is much smaller than the nitrogen loading in terms of pounds.

Areas of high sediment loading are distributed somewhat evenly throughout the watershed, with the highest loading in HUC 07140204050304, and the lowest loading in 07140204050102 and the watersheds around Troy (Figure A.66).

Nitrogen loads (by HUC14)

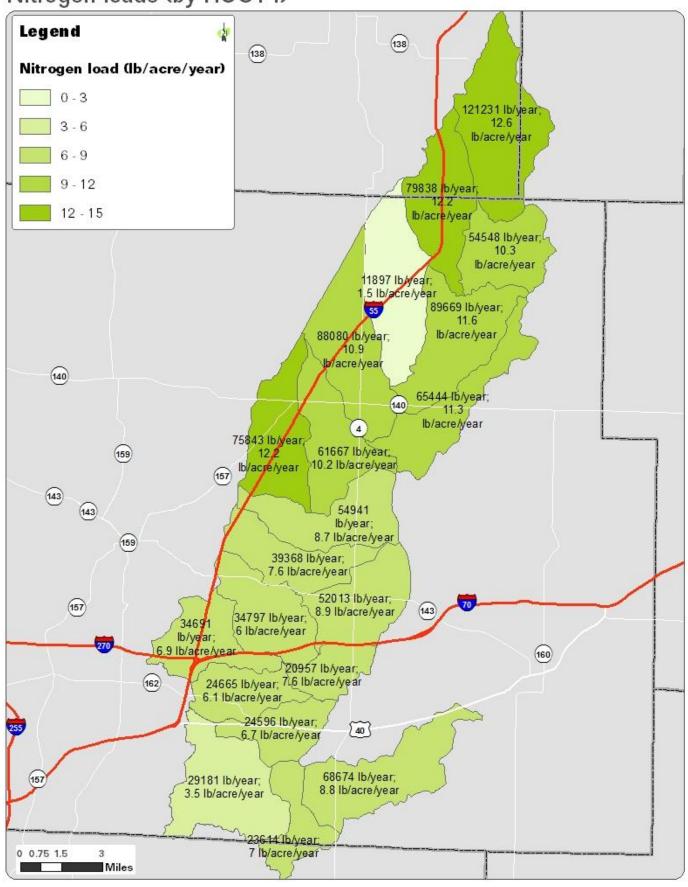


Figure A.64. Nitrogen loads to the HUC14s in the Upper Silver Creek watershed, as modeled using STEPL.

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Phosphorus loads (by HUC14)

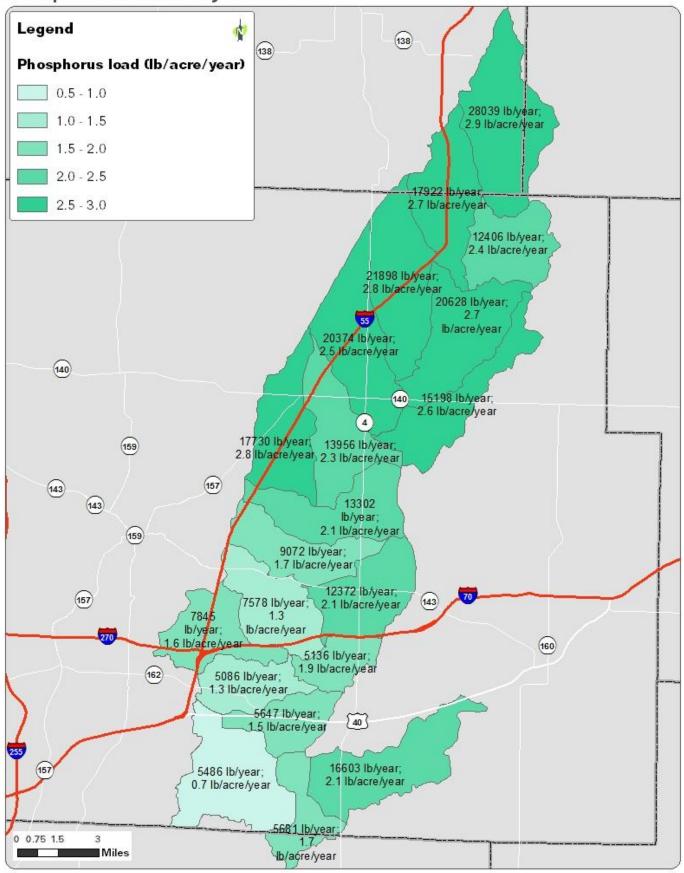


Figure A.65. Phosphorus loads to the HUC14s in the Upper Silver Creek watershed, as modeled using STEPL.

Sediment loads (by HUC14)

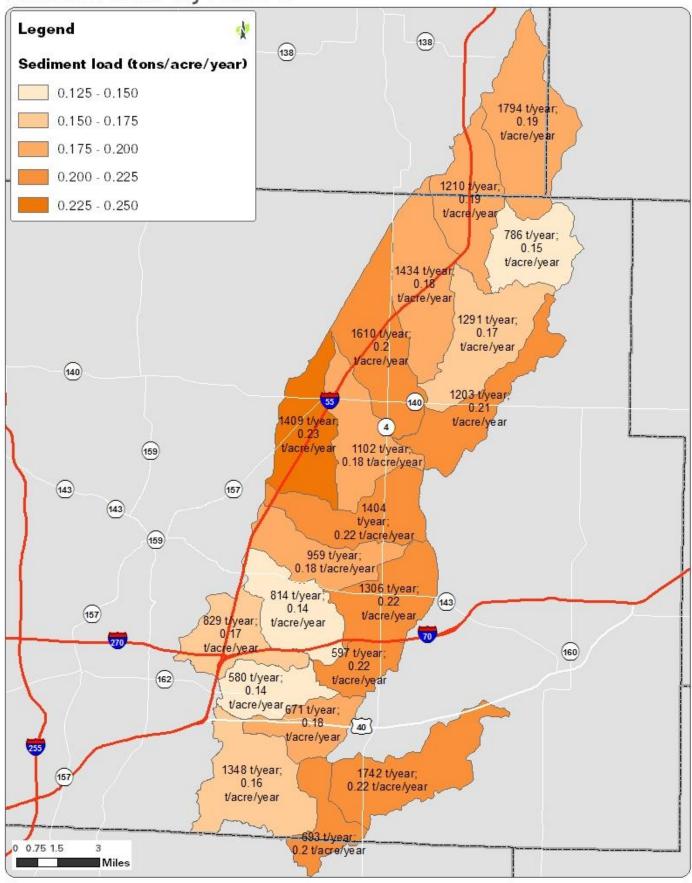


Figure A.66. Sediment loads to the HUC14s in the Upper Silver Creek watershed, as modeled using STEPL.

Data Tables

Hydrologic soil groups by HUC14

Table A.67. Area of hydrologic soil groups by HUC14.

		Aı	rea of Hydrol	ogic Soil Gro	oup (acres)			Total area
HUC14	Unclassified*	Α	В	B/D	С	C/D	D	(acres)
07140204050101	34		2072	114	1409	501	5483	9613
07140204050102	37	114	1623	406	1966	231	895	5273
07140204050201	245	293	1924	307	1109	446	2195	6518
07140204050202	47	321	2906	522	1909	315	1730	7750
07140204050203	79	416	2776	1359	1750	98	1278	7756
07140204050301	63	296	2824	2262	1453	195	959	8050
07140204050302	29	118	1493	663	1709	38	1747	5797
07140204050303	35	141	3011	1022	1512	117	225	6064
07140204050304	28	21	2861	1722	1073	236	284	6225
07140204050401	14		3124	1042	1479	175	457	6291
07140204050402	33		2645	386	1273	744	109	5188
07140204050501	51		4463		256	896	132	5799
07140204050502	13		1896	1141	1609	727	456	5843
07140204050601	17		1054	274	527	823	65	2758
07140204050602	28		4745		239			5012
07140204050603	70		3514		366	69	36	4055
07140204050604	26		2461		241	861	93	3681
07140204050901	8		1211		181	942	8	2350
07140204050902	15		2391	774	2049	1785	748	7762
07140204050903	63		7224		694	290	27	8298
Total	935	1720	56217	11993	22803	9488	16926	120082

Soil types with hydric category and hydrologic group

Table A.68. Soil types in the watershed with their hydric category and hydrologic group.

	N4==			Non-	I I and all a	Takal
	Мар			Hydric	Hydric	Total
Hydrologic	Symbol Code	Soil Type (SSLIDCO man unit name)	Hydric Soil?	Soils area	Soils area	area
Soil Group	Code	Soil Type (SSURGO map unit name)	Solls	(acres)	(acres)	(acres)
۸	01402	Atlas-Grantfork Silty clay loam 10-18%	No	472		472
Α	914D3	slope severely eroded	No	472		472
۸	01463	Atlas-Grantfork Silty clay loam 5-10%	No	1240		1240
A B	914C3	slope severely eroded	No	1248		1248
	438B	Aviston silt loam 2-5% slopes	No	445		445
В	438C2	Aviston silt loam 5-10% slope eroded	No	159		159
_	20724	Beaucoup silty clay loam 0-2% slope	.,		4544	4544
В	3070A	frequently flooded	Yes		1544	1544
		Beaucoup silty clay loam undrained 0-				
D	40701	2% slope occasionally flooded long	V		422	422
В	1070L	duration	Yes	4440	122	122
В	90A	Bethalto silt loam 0-2% slope	Some*	1418	71	1489
C/D	22244	Birds silt loam 0-2% slope frequently	V		5070	F070
C/D	3334A	flooded	Yes		5078	5078
C/D	5C2	Blair silt loam 5-10% slope eroded	No	4		4
C/D	F4FD2	Bunkum silty clay loam 10-18%	No	663		cca
C/D	515D3	severely eroded	No	663		663
C/D	E4ED2	Bunkum silty clay loam 2-5% severely eroded	No	F14		F14
C/D	515B3		No	514		514
C/D	515B3	Bunkum silty clay loam 2-5% slopes eroded	No	10		10
C/D C/D	515C2		No	11		11
<u>C/D</u>	313C2	Bunkum silty clay loam 5-10% eroded	INO	11		11
C/D	515C3	Bunkum silty clay loam 5-10% severely eroded	No	1974		1974
С/Б	31303	Bunkum-Atlas silt loams 10-18% slopes	NO	1974		1974
C/D	897D2	eroded	No	120		120
C/D	03702	Bunkum-Atlas silt loams 5-10% slopes	110	120		120
C/D	897C2	eroded	No	327		327
<u> </u>	037.02	Bunkum-Atlas silt loams 5-10% slopes	110	32,		327
C/D	897C3	severely eroded	No	62		62
<u> </u>	037.03	Bunkum-Atlas sitly clay loams 10-18%	110			02
C/D	897D3	slope severely eroded	No	331		331
C/D	657A	Burksville silt loam 0-2% slope	Yes	331	394	394
D	657A	Burksville silt loam 0-2% slope	Yes		989	989
В	267B	Caseyville silt loam 0-2% slope	No	1825	303	1825
В	2075	Caseyville silt loam 2-5% slope	No	1556		1556
ט		Coffeen silt loam 0-2% slopes	INU	1330		1330
В	3428A	frequently flooded	No	495		495
	37207	Coulterville -Darmstadt silt loams 2-5%	140	455		433
D	880B2	slope	No	1239		1239
	00002	Coulterville-Grantfork silty clay loam 5-	140	1233		1233
		Counterville-Grantifork Silly Clay 10dfff 5-		1	İ	1

D	112A	Cowden silt loam 0-2% slope	Yes		36	36
В	993A	Cowden-Piasa silt loam 0-2% slope	Yes		282	282
D	993A	Cowden-Piasa silt loam 0-2% slope	Yes		10119	10119
В	283B	Downsouth silt loam 2-5% slope	No	1055		1055
		Downsouth silt loam 5-10% slope				
В	283C2	eroded	No	190		190
Unclassified	536	Dumps	No	227		227
В	384A	Edwardsville silt loam 0-2% slope	No	2461		2461
		Elco silty clay loam 10-18% slope				
В	119D2	eroded	No	776		776
_		Elco silty clay loam 10-18% slope				
В	119D3	severely eroded	No	1081		1081
В	119C2	Elco silty clay loam 5-10% slope eroded	No	11		11
	44000	Elco silty clay loam 5-10% slope		2047		2247
В	119C3	severely eroded	No	2317		2317
D	6B2	Fishhook silt loam 2-5% slope eroded	No	104		104
D	6C2	Fishhook silt loam 5-10% slope eroded	No	89		89
6	74224	Geff silt loam 0-2% slope rarely		42		42
С	7432A	flooded	No	43		43
В	127A	Harrison silt loam 0-2% slopes	No	8		8
В	127B	Harrison silt loam 2-5% slopes	No	45		45
В	46A	Herrick silt loam 0-2% slopes	No	3298		3298
В	790A	Herrick-Biddle Silt loam 0-2% slope	No	5		5
		Herrick-Biddle-Piasa silt loams 0-2%		7204		7004
В	894A	slope	No	7204		7204
D	0D3	Hickory clay loam 10-18% slope	No	4		1
В	8D3	severely eroded	No	4		4
В	8D	Hickory silt loam 10-18% slope	No	23		23
В	8D2	Hickory silt loam 10-18% slope eroded	No	163		163
В	8d3	Hickory silt loam 10-18% slope severely eroded	No	391		391
В	8F	Hickory silt loam 18-35% slope	No	2976		2976
В	8F2	Hickory silt loam 18-35% slope eroded	No	100		100
В	8G			38		
В	582B	Hickory silt loam 35-60% slope Homen silt loam 2-5% slope	No No	4053		4053
В	582C2	 	No	654		654
В	470B2	Homen silt loam 5-10% slope eroded Keller silt loam 2-5% slopes eroded	No	79		79
В	47082	Lawson silt loam 0-2% slope frequently	NO	79		79
В	3451A	flooded	No	1064		1064
C	517A	Marine silt loam 0-2% slope	No	5360		5360
В	517B	Marine silt loam 2-5% slope	No	3300		J300 /I
C	517B	Marine silt loam 2-5% slope	No	5743		5743
В	385A	Mascoutah silty clay loam 0-2% slope	Yes	3743	1457	1457
В	79F	Menfro silt loam 18-35% slope	No	2320	143/	2320
В	79F	Menfro silt loam 2-5% slope	No	2573		2573
		·				
В	79C2	Menfro silt loam 5-10% slope eroded	No	538		538
D	7002	Menfro silty clay loam 5-10% slope	No	12		12
В	79C3	severely eroded Monfro silty loam 10 18% slope	No	13		13
D	79D2	Menfro silty loam 10-18% slope eroded	No	1434		1/12/
В	1302	cioueu	No	1434		1434

		Menfro silty loam 10-18% slope				
В	79D3	severely eroded	No	413		413
В		Menfro-Hickory silt loam 18-35% slope	No	485		485
		Menfro-Orthents Urban land complex				
В	2079D	8-15% slopes	No	6		6
Unclassified	M-W	Miscellaneous water	No	22		22
С	113A	Oconee silt loam 0-2% slope	No	37		37
С	113A	Oconee silt loam 0-5% slopes	No	237		237
С	113B	Oconee silt loam 2-5% slope	No	3209		3209
		Oconee-Coulterville-Darmstadt silt				
С	882A	loams 0-2% slope	No	39		39
		Oconee-Coulterville-Darmstadt silt				
С	882B	loams 2-5% slope	No	3036		3036
		Oconee-Coulterville-Darmstadt silt				
С	882B2	loams 2-5% slope eroded	No	103		103
С		Oconeee silt loam 2-5% slopes	No	100		100
		Orion silt loam 0-2% slopes frequently				
С	3415A	flooded	No	1979		1979
В	802D	Orthents loamy hilly	No	174		174
В	802B	Orthents loamy undulating	No	128		128
В	801D	Orthents silty hilly	No	237		237
В	801B	Orthents silty undulating	No	147		147
D	474A	Piasa silt loam 0-2% slope	Yes		691	691
D	31A	Pierron silt loam 0-2% slopes	Yes		1163	1163
		Pierron-Burksville silt loams 0-2%				
D	703A	slope	Yes		862	862
В	583B	Pike silt loam 2-5% slope	No	1		1
		Ridgway silt loam 2-5% slope rarely				
В	7434B	flooded	No	14		14
В	491D2	Ruma silt loam 10-18% slope eroded	No	338		338
		Ruma silt loam 10-18% slope severely				
В	491D3	eroded	No	105		105
В	491B	Ruma silt loam 2-5% slope	No	704		704
В	491C2	Ruma silt loam 5-10% slopes eroded	No	583		583
В		Ruma-Hickory silt loams 18-35% slope	No	211		211
D	16A	Rushville silt loam 0-2% slopes	Yes			0
D	581B	Tamalco silt loam 2-5% slope	No	27		27
D	581B2	Tamalco silt loam 2-5% slope eroded	No	183		183
Unclassified	533	Urban land	No	26		26
В	250D	Velma silt loam 10-18% slopes	No	5		5
B/D	50A	Virden silt loam 0-2% slope	Yes		1903	1903
		Virden-Fosterburg silt loams 0-2%				
B/D	885A	slope	Yes		10059	10059
		Wakeland silt loam 0-2% slope				
В	3333A	frequently flooded	No	65		65
		Wakeland silt loam 0-2% slope				
B/D	3333A	frequently flooded	No	30		30
		Wakeland silt loam 0-2% slope				
C	3333A	frequently flooded	No	2879		2879
D	3333A	Wakeland silt loam 0-2% slope	No	157		157

		frequently flooded				
В	441B	Wakenda silt loam 2-5% slope	No	139		139
С	441B	Wakenda silt loam 2-5% slope	No	18		18
В	441C2	Wakenda silt loam 5-10% slope eroded	No	51		51
С	441C2	Wakenda silt loam 5-10% slope eroded	No	19		19
Unclassified	W	Water	No	661		661
D	165A	Weir silt loam 0-2% slope	Yes		302	302
		Wilbur silt loam 0-2% slope frequently				
В	3336A	flooded	No	10		10
		Winfield silt loam 10-18% slope				
В	477D	severely eroded	No	1129		1129
В	477B	Winfield silt loam 2-5% slope	No	3972		3972
		Winfield silt loam 2-5% slope severely				
В	477B3	eroded	No	28		28
В	477C2	Winfield silt loam 5-10% slope eroded	No	951		951
		Winfield silt loam 5-10% slope severely				
В	477C3	eroded	No	1815		1815
		Winfield-Orthents Urban Land 2-8%				
В	2477B	slope	No	253		253
	Total			84977	35072	120050

Hydric soils by HUC14

Table A.69. Hydric and non-hydric soil areas by HUC14 subwatershed.

	Area of Non-	Area of	.
HUC14	Hydric Soils	Hydric Soils	Total area
	(acres)	(acres)	(acres)
07140204050101	4494	5119	9613
07140204050102	4112	1160	5273
07140204050201	3821	2697	6518
07140204050202	5186	2564	7750
07140204050203	5162	2594	7756
07140204050301	4555	3495	8050
07140204050302	3701	2095	5797
07140204050303	4076	1988	6064
07140204050304	4160	2065	6225
07140204050401	4336	1955	6291
07140204050402	4202	987	5188
07140204050501	4714	1085	5799
07140204050502	4592	1251	5843
07140204050601	1761	997	2758
07140204050602	4806	206	5012
07140204050603	3704	351	4055
07140204050604	2692	990	3681
07140204050901	1447	902	2350
07140204050902	5724	2038	7762
07140204050903	7732	566	8298
Total	84978	35104	120082

Highly erodible soils by HUC14

Table A.70. Area of highly erodible and non-highly erodible soils by HUC14.

	Highly erodible	Not highly erodible	Total area
HUC14	soils (acres)	soils (acres)	(acres)
07140204050101	2101	7512	9613
07140204050102	1768	3504	5273
07140204050201	1596	4921	6518
07140204050202	2186	5564	7750
07140204050203	1769	5987	7756
07140204050301	1656	6393	8050
07140204050302	1713	4083	5797
07140204050303	1667	4397	6064
07140204050304	1291	4934	6225
07140204050401	1201	5090	6291
07140204050402	1478	3711	5188
07140204050501	2671	3127	5799
07140204050502	1258	4585	5843
07140204050601	564	2195	2758
07140204050602	2161	2851	5012
07140204050603	1707	2347	4055
07140204050604	1377	2304	3681
07140204050901	477	1873	2350
07140204050902	1874	5888	7762
07140204050903	4314	3984	8298
Grand Total	34832	85250	120082

Land use/land cover by HUC14

Table A.71. Land use/land cover by HUC14 in the watershed. Note: Total watershed area is different from total identified in Watershed Boundaries section as a result of differences in projection of the layer files.

	HUC14	0714020405 0101	0714020405 0102	0714020405 0201	0714020405 0202	0714020405 0203	0714020405 0301	0714020405 0302	0714020405 0303	0714020405 0304	0714020405 0401
Barren Land	Area (Acres)	2	0	0	0	0	1	0	0	2	0
	Area (%)	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cultivated crop	Area (Acres)	5764	2474	3490	4238	4323	5169	3872	3493	4621	4735
	Area (%)	60.0	47.0	54.13	14.2	55.8	64.2	66.8	57.6	73.4	75.3
Deciduous forest	Area (Acres)	1778	1671	932.8	1955	574	914	515	863	136	536
	Area (%)	18.5	31.7	19.77	25.2	7.4	11.4	8.9	14.2	2.2	8.5
Developed, High Intensity	Area (Acres)	12	0	10.67	0	3	8	2	14	10	4
	Area (%)	0.1	0.0	0.082	0.0	0.0	0.1	0.0	0.2	0.2	0.1
Developed, Low Intensity	Area (Acres)	420	59	495.7	91	459	349	179	211	381	159
	Area (%)	4.4	1.1	4.389	1.2	5.9	4.3	3.1	3.5	6.1	2.5
Developed, Medium Intensity	Area (Acres)	49	12	102.7	6	43	48	43	92	77	21
	Area (%)	0.5	0.2	0.825	0.1	0.6	0.6	0.7	1.5	1.2	0.3
Developed, Open Space	Area (Acres)	417	276	509.1	283	428	385	374	275	361	331
	Area (%)	4.3	5.2	5.729	3.7	5.5	4.8	6.5	4.5	5.7	5.3
Emergent herbaceuous	A = 0.2 (A o = 0.5)	0	0	0	0	0	0	0	0	2	2
wetlands	Area (Acres)	0	0	0	0.0	0.0	0	0	0	2	0.0
Evergreen forest	Area (%) Area (Acres)	0.0	0.0	0.445	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Evergreen forest	Area (%)	0.0	0.0	0.003	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hay/Pasture	Area (%)	1114	714	907.2	1097	1898	1084	783	1065	701	484
riay/ Fasture	Area (%)	11.6	13.5	14.04	14.2	24.5	13.5	13.5	17.6	11.1	7.7
Herbaceous	Area (Acres)	28	43	12.89	32	12	74	4	31	1	4
Herbaceous	Area (%)	0.3	0.8	0.304	0.4	0.1	0.9	0.1	0.5	0.0	0.1
Mixed forest	Area (Acres)	0.5	0.0	0.504	0.4	0.1	0.5	0.1	0.5	0.0	0.1
Wilked forest	Area (%)	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Water	Area (Acres)	23	20	55.8	40	10	13	20	15	5	8
Open water	Area (%)	0.2	0.4	0.683	0.5	0.1	0.2	0.3	0.3	0.1	0.1
Shrub/Scrub	Area (Acres)	0	0	0	0	0	0	0	0	0	0
	Area (%)	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood wetlands	Area (Acres)	0	1	0	7	0	0	0	3	0	5
	Area (%)	0.0	0.0	0.044	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total Area (Acres)	, ,	9606	5269	6517	7748	7751	8049	5795	6063	6296	6290

Table A.71 (continued). Land use/land cover by HUC14 in the watershed.

	HUC14	0714020405 0402	0714020405 0501	0714020405 0502	0714020405 0601	0714020405 0602	0714020405 0603	0714020405 0604	0714020405 0901	0714020405 0902	0714020405 0903	Grand Total
Barren Land	Area (Acres)	3	8	0	0	0	7	0	0	0	0	23
	Area (%)	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	
Cultivated crop	Area (Acres)	3134	2328	4285	1743	2442	1203	1698	1820	5650	4089	70572
	Area (%)	60.4	40.2	73.4	63.2	48.8	29.7	46.9	54.0	72.9	49.2	
Deciduous forest	Area (Acres)	647	1341	151	312	782	539	432	392	380	1617	16470
	Area (%)	12.5	23.1	2.6	11.3	15.6	13.3	12.0	11.6	4.9	19.4	
Developed, High												
Intensity	Area (Acres)	0	4	2	2	21	27	17	0	5	13	155
Davidanad Law	Area (%)	0.0	0.1	0.0	0.1	0.4	0.7	0.5	0.0	0.1	0.2	
Developed, Low Intensity	Area (Acres)	120	245	490	79	423	992	441	81	146	330	6148
cerioicy	Area (%)	2.3	4.2	8.4	2.9	8.4	24.4	12.2	2.4	1.9	4.0	00
Developed,	7 ii Ca (70)	2.3				3. .				2.3		
Medium Intensity	Area (Acres)	11	36	54	4	84	197	100	7	10	73	1068
	Area (%)	0.2	0.6	0.9	0.1	1.7	4.9	2.8	0.2	0.1	0.9	
Developed, Open	A (A)	162	225	250	445	462	544	227	0.4	262	572	5004
Space	Area (Acres)	162	335	260	115	462	641	337	94	363	573	6981
Emergent herbaceuous	Area (%)	3.1	5.8	4.4	4.2	9.2	15.8	9.3	2.8	4.7	6.9	
wetlands	Area (Acres)	0	0	0	0	0	0	61	21	7	3	95
	Area (%)	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.6	0.1	0.0	
Evergreen forest	Area (Acres)	0	0	0	0	6	5	0	0	0	0	18
	Area (%)	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	
Hay/Pasture	Area (Acres)	1071	1397	580	203	761	395	295	446	955	1455	17404
	Area (%)	20.6	24.1	9.9	7.4	15.2	9.7	8.2	13.2	12.3	17.5	
Herbaceous	Area (Acres)	19	16	0	6	0	6	23	31	7	18	368
	Area (%)	0.4	0.3	0.0	0.2	0.0	0.2	0.6	0.9	0.1	0.2	
Mixed forest	Area (Acres)	0	0	0	0	0	0	0	0	0	0	0
	Area (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Open Water	Area (Acres)	18	34	12	17	27	23	52	16	11	46	466
	Area (%)	0.3	0.4		0.6	0.5	0.6	1.4	0.5	0.1	0.6	
Shrub/Scrub	Area (Acres)	0	0	0	0	0	0	0	0	0	0	0
	Area (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wood wetlands	Area (Acres)	5	51	5	277	0	20	223	485	227	102	1411
	Area (%)	0.1	0.9	0.1	10.0	0.0	0.5	6.2	14.4	2.9	1.2	
Total Area (Acres)		5189	5796	5838	2757	5007	4056	3679	3393	7759	8319	121179

Future land use/land cover by HUC14

Table A.72. Existing and predicted future land use/land cover by HUC14. Predicted land use/land cover is based on zoning identified in the Comprehensive Plans of municipalities in the watershed for the 1.5 mile zone outside their current boundaries. Total watershed area is different from total identified in Watershed Boundaries section as a result of differences in projection of the layer files. Where current acres in a category are 0 and there is a projected increase, "[increase]" is noted (percentage change cannot be calculated using 0 as a starting point).

Land Use/Land Cover Description by HUC14	Land Use Code	Current Area (Acres)	Current Area (%)	Predicted Area (acres)	Predicted area (%)	Change (acres)	Percent Change
07140204050101		9606.5	100%	9606.5	100%	0.0	
Barren Land	31	1.6	0%	1.0	0%	-0.5	-34%
Cultivated crop	82	5763.6	60%	3786.6	39%	-1977.0	-34%
Deciduous forest	41	1778.4	19%	1234.3	13%	-544.1	-31%
Developed, High Intensity	24	11.6	0%	7.6	0%	-4.0	-34%
Developed, Low Intensity	22	419.9	4%	2340.8	24%	1920.9	457%
Developed, Medium Intensity	23	49.1	1%	1064.7	11%	1015.6	2067%
Developed, Open Space	21	417.0	4%	274.0	3%	-143.0	-34%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1113.9	12%	830.7	9%	-283.2	-25%
Herbaceous	71	28.0	0%	18.4	0%	-9.6	-34%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	23.3	0%	31.8	0%	8.5	36%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	16.5	0%	16.5	0%
07140204050102		5269.4	100%	5269.4	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	2474.2	47%	1053.6	20%	-1420.6	-57%
Deciduous forest	41	1670.6	32%	771.9	15%	-898.7	-54%
Developed, High Intensity	24	0.0	0%	0.0	0%	0.0	0%
Developed, Low Intensity	22	58.7	1%	1921.0	36%	1862.3	3173%
Developed, Medium Intensity	23	12.0	0%	953.1	18%	941.1	7840%
Developed, Open Space	21	276.3	5%	117.7	2%	-158.7	-57%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	713.6	14%	394.6	7%	-319.0	-45%
Herbaceous	71	42.9	1%	18.3	0%	-24.6	-57%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	20.0	0%	23.6	0%	3.6	18%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	1.1	0%	15.6	0%	14.5	1304%
07140204050201		6516.5	100%	6516.9	100%	0.4	

Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	3489.7	54%	640.5	10%	-2849.1	-82%
Deciduous forest	41	932.8	14%	277.6	4%	-655.1	-70%
Developed, High Intensity	24	10.7	0%	2.0	0%	-8.7	-82%
Developed, Low Intensity	22	495.7	8%	3425.3	53%	2929.6	591%
Developed, Medium Intensity	23	102.7	2%	1686.0	26%	1583.3	1542%
Developed, Open Space	21	509.1	8%	93.4	1%	-415.6	-82%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	907.2	14%	326.1	5%	-581.1	-64%
Herbaceous	71	12.9	0%	2.4	0%	-10.5	-82%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	55.8	1%	36.8	1%	-19.0	-34%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	26.6	0%	26.6	0%
07140204050202		7748.0	100%	7748.0	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	4238.4	55%	2423.6	31%	-1814.8	-43%
Deciduous forest	41	1955.1	25%	1184.3	15%	-770.8	-39%
Developed, High Intensity	24	0.0	0%	0.0	0%	0.0	0%
Developed, Low Intensity	22	90.7	1%	2130.8	28%	2040.1	2249%
Developed, Medium Intensity	23	5.8	0%	1042.8	13%	1037.0	17942%
Developed, Open Space	21	282.5	4%	161.6	2%	-121.0	-43%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.4	0%	0.3	0%	-0.2	-43%
Hay/Pasture	81	1096.8	14%	726.7	9%	-370.1	-34%
Herbaceous	71	31.8	0%	18.2	0%	-13.6	-43%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	39.6	1%	39.2	1%	-0.4	-1%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	6.9	0%	20.5	0%	13.6	198%
07140204050203		7750.7	100%	7750.7	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	4323.3	56%	1913.7	25%	-2409.6	-56%
Deciduous forest	41	574.4	7%	340.7	4%	-233.8	-41%
Developed, High Intensity	24	3.1	0%	1.4	0%	-1.7	-56%
Developed, Low Intensity	22	458.8	6%	2910.2	38%	2451.4	534%
Developed, Medium Intensity	23	42.7	1%	1372.5	18%	1329.8	3116%
Developed, Open Space	21	428.1	6%	189.5	2%	-238.6	-56%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1898.2	24%	969.8	13%	-928.4	-49%
Herbaceous	71	11.6	0%	5.1	0%	-6.4	-56%

Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	10.4	0%	26.2	0%	15.8	151%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	21.6	0%	21.6	0%
07140204050301		8048.8	100%	8048.8	100%	0.0	
Barren Land	31	1.3	0%	0.6	0%	-0.7	-56%
Cultivated crop	82	5169.4	64%	2291.9	28%	-2877.5	-56%
Deciduous forest	41	913.7	11%	494.7	6%	-419.0	-46%
Developed, High Intensity	24	8.2	0%	3.6	0%	-4.6	-56%
Developed, Low Intensity	22	349.2	4%	2962.5	37%	2613.3	748%
Developed, Medium Intensity	23	48.0	1%	1425.1	18%	1377.1	2868%
Developed, Open Space	21	384.6	5%	170.5	2%	-214.1	-56%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	3.3	0%	1.5	0%	-1.9	-56%
Hay/Pasture	81	1084.2	13%	615.1	8%	-469.1	-43%
Herbaceous	71	73.6	1%	32.6	0%	-41.0	-56%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	13.3	0%	28.3	0%	15.0	112%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	22.4	0%	22.4	0%
07140204050302		5795.1	100%	5795.1	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	3871.8	67%	1942.3	34%	-1929.5	-50%
Deciduous forest	41	514.8	9%	316.0	5%	-198.8	-39%
Developed, High Intensity	24	1.8	0%	0.9	0%	-0.9	-50%
Developed, Low Intensity	22	179.2	3%	1899.7	33%	1720.5	960%
Developed, Medium Intensity	23	43.1	1%	926.5	16%	883.4	2048%
Developed, Open Space	21	374.4	6%	187.8	3%	-186.6	-50%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	2.9	0%	1.4	0%	-1.4	-50%
Hay/Pasture	81	782.7	14%	479.3	8%	-303.4	-39%
Herbaceous	71	4.2	0%	2.1	0%	-2.1	-50%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	20.2	0%	24.6	0%	4.4	22%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	14.4	0%	14.4	0%
07140204050303		6063.0	100%	6063.0	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	3493.4	58%	1907.5	31%	-1585.9	-45%
Deciduous forest	41	863.4	14%	526.5	9%	-336.9	-39%
Developed, High Intensity	24	13.8	0%	7.5	0%	-6.3	-45%
Developed, Low Intensity	22	210.7	3%	1839.9	30%	1629.2	773%
		210.7	3,0	2000.0	3070		,

Developed, Open Space	21	275.4	5%	150.4	2%	-125.0	-45%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1065.0	18%	664.1	11%	-400.9	-38%
Herbaceous	71	31.1	1%	17.0	0%	-14.1	-45%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	15.3	0%	22.1	0%	6.8	44%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	2.7	0%	15.2	0%	12.6	471%
07140204050304		6296.0	100%	6296.0	100%	0.0	
Barren Land	31	1.6	0%	0.7	0%	-0.8	-53%
Cultivated crop	82	4620.6	73%	2148.9	34%	-2471.7	-53%
Deciduous forest	41	136.4	2%	130.8	2%	-5.6	-4%
Developed, High Intensity	24	10.4	0%	4.8	0%	-5.5	-53%
Developed, Low Intensity	22	380.9	6%	2287.7	36%	1906.8	501%
Developed, Medium Intensity	23	76.7	1%	1091.0	17%	1014.2	1322%
Developed, Open Space	21	360.7	6%	167.7	3%	-192.9	-53%
Emergent herbaceous wetlands	95	1.8	0%	0.8	0%	-1.0	-53%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	700.9	11%	427.0	7%	-273.9	-39%
Herbaceous	71	1.4	0%	0.6	0%	-0.7	-53%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	4.7	0%	19.0	0%	14.3	303%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	16.8	0%	16.8	0%
07140204050401		6289.8	100%	6289.8	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	4735.4	75%	4699.8	75%	-35.6	-1%
Deciduous forest	41	536.2	9%	533.1	8%	-3.1	-1%
Developed, High Intensity	24	4.4	0%	4.4	0%	0.0	-1%
Developed, Low Intensity	22	158.9	3%	187.4	3%	28.4	18%
Developed, Medium Intensity	23	20.9	0%	35.5	1%	14.7	70%
Developed, Open Space	21	330.8	5%	328.3	5%	-2.5	-1%
Emergent herbaceous wetlands	95	1.6	0%	1.5	0%	0.0	-1%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	484.2	8%	481.9	8%	-2.2	0%
Herbaceous	71	3.8	0%	3.8	0%	0.0	-1%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	8.2	0%	8.4	0%	0.2	2%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	5.3	0%	5.5	0%	0.2	4%
							.,,
07140204050402		5188.9	100%	5188.9	100%	0.0	

Cultivated crop	82	3133.8	60%	2077.7	40%	-1056.1	-34%
Deciduous forest	41	647.3	12%	464.2	9%	-183.2	-28%
Developed, High Intensity	24	0.0	0%	0.0	0%	0.0	0%
Developed, Low Intensity	22	119.6	2%	1175.1	23%	1055.5	883%
Developed, Medium Intensity	23	10.7	0%	555.0	11%	544.3	5101%
Developed, Open Space	21	161.6	3%	107.1	2%	-54.5	-34%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1071.0	21%	762.6	15%	-308.5	-29%
Herbaceous	71	19.3	0%	12.8	0%	-6.5	-34%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	17.8	0%	20.5	0%	2.8	15%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	4.9	0%	12.0	0%	7.1	145%
07140204050501		5796.5	100%	5796.5	100%	0.0	
Barren Land	31	8.4	0%	4.7	0%	-3.7	-44%
Cultivated crop	82	2328.1	40%	1296.7	22%	-1031.4	-44%
Deciduous forest	41	1340.9	23%	798.2	14%	-542.7	-40%
Developed, High Intensity	24	4.2	0%	2.4	0%	-1.9	-44%
Developed, Low Intensity	22	244.5	4%	1711.2	30%	1466.7	600%
Developed, Medium Intensity	23	36.5	1%	859.2	15%	822.7	2257%
Developed, Open Space	21	335.5	6%	186.8	3%	-148.6	-44%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1397.2	24%	855.2	15%	-541.9	-39%
Herbaceous	71	16.2	0%	9.0	0%	-7.2	-44%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	34.0	1%	31.8	1%	-2.2	-7%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	50.9	1%	41.2	1%	-9.7	-19%
07140204050502		5838.0	100%	5838.0	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	4284.8	73%	1300.0	22%	-2984.8	-70%
Deciduous forest	41	151.4	3%	127.3	2%	-24.1	-16%
Developed, High Intensity	24	1.6	0%	0.5	0%	-1.1	-70%
Developed, Low Intensity	22	489.7	8%	2642.9	45%	2153.1	440%
Developed, Medium Intensity	23	53.8	1%	1344.8	23%	1291.0	2400%
Developed, Open Space	21	259.6	4%	78.8	1%	-180.9	-70%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	579.8	10%	297.9	5%	-281.9	-49%
Herbaceous	71	0.0	0%	0.0	0%	0.0	0%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%

Open Water	11	12.2	0%	24.0	0%	11.8	97%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	5.1	0%	21.9	0%	16.8	328%
07140204050601		2757.2	100%	2757.2	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	1742.8	63%	1661.4	60%	-81.4	-5%
Deciduous forest	41	312.1	11%	300.1	11%	-12.0	-4%
Developed, High Intensity	24	1.8	0%	8.1	0%	6.4	357%
Developed, Low Intensity	22	79.1	3%	139.8	5%	60.7	77%
Developed, Medium Intensity	23	3.8	0%	46.1	2%	42.3	1120%
Developed, Open Space	21	114.7	4%	117.1	4%	2.4	2%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	203.2	7%	197.6	7%	-5.6	-3%
Herbaceous	71	5.6	0%	5.3	0%	-0.3	-5%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	17.1	1%	17.0	1%	-0.2	-1%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	277.0	10%	264.7	10%	-12.3	-4%
07140204050602		5007.3	100%	5007.3	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	2442.0	49%	102.0	2%	-2340.0	-96%
Deciduous forest	41	781.8	16%	128.6	3%	-653.2	-84%
Developed, High Intensity	24	20.9	0%	240.8	5%	219.9	1052%
Developed, Low Intensity	22	423.0	8%	2416.8	48%	1993.7	471%
Developed, Medium Intensity	23	83.6	2%	1586.9	32%	1503.3	1799%
Developed, Open Space	21	462.2	9%	307.2	6%	-155.0	-34%
Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	6.0	0%	0.3	0%	-5.8	-96%
Hay/Pasture	81	760.7	15%	175.7	4%	-585.0	-77%
Herbaceous	71	0.0	0%	0.0	0%	0.0	0%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	27.1	1%	25.1	1%	-2.0	-7%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	0.0	0%	24.0	0%	24.0	0%
07140204050603		4056.3	100%	4056.3	100%	0.0	
Barren Land	31	6.9	0%	2.9	0%	-4.0	-58%
Cultivated crop	82	1203.3	30%	505.6	12%	-697.7	-58%
Deciduous forest	41	539.1	13%	273.6	7%	-265.5	-49%
Developed, High Intensity	24	27.3	1%	129.1	3%	101.7	372%
					200/	600.0	C10/
Developed, Low Intensity	22	991.7	24%	1592.6	39%	600.9	61%
Developed, Low Intensity Developed, Medium Intensity	22 23	991.7 197.2	24% 5%	1592.6 858.9	39% 21%	661.8	336%

Emergent herbaceous wetlands	95	0.0	0%	0.0	0%	0.0	0%
Evergreen forest	42	4.9	0%	2.1	0%	-2.8	-58%
Hay/Pasture	81	395.5	10%	236.7	6%	-158.7	-40%
Herbaceous	71	6.4	0%	2.7	0%	-3.7	-58%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	22.7	1%	21.3	1%	-1.4	-6%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	20.2	0%	20.3	0%	0.0	0%
07140204050604		3679.1	100%	3679.1	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	1697.9	46%	847.6	23%	-850.3	-50%
Deciduous forest	41	432.4	12%	252.7	7%	-179.7	-42%
Developed, High Intensity	24	16.9	0%	100.6	3%	83.7	495%
Developed, Low Intensity	22	440.6	12%	1141.2	31%	700.6	159%
Developed, Medium Intensity	23	99.6	3%	657.7	18%	558.2	560%
Developed, Open Space	21	337.5	9%	279.0	8%	-58.4	-17%
Emergent herbaceous wetlands	95	61.1	2%	30.5	1%	-30.6	-50%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	295.0	8%	202.5	6%	-92.5	-31%
Herbaceous	71	22.7	1%	11.3	0%	-11.4	-50%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	52.0	1%	35.2	1%	-16.8	-32%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	223.4	6%	120.7	3%	-102.7	-46%
07140204050901		3392.7	100%	3392.7	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	1820.4	54%	1747.0	51%	-73.4	-4%
Deciduous forest	41	391.7	12%	378.6	11%	-13.1	-3%
Developed, High Intensity	24	0.0	0%	2.7	0%	2.7	0%
Developed, Low Intensity	22	81.1	2%	161.8	5%	80.6	99%
Developed, Medium Intensity	23	6.7	0%	48.3	1%	41.7	625%
Developed, Open Space	21	94.5	3%	90.7	3%	-3.8	-4%
Emergent herbaceous wetlands	95	20.7	1%	19.8	1%	-0.8	-4%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	445.7	13%	431.8	13%	-13.9	-3%
Herbaceous	71	30.9	1%	29.7	1%	-1.2	-4%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	16.0	0%	16.0	0%	0.0	0%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	485.1	14%	466.2	14%	-18.9	-4%
07140204050902		7759.4	100%	7759.4	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	5650.0	73%	3296.8	42%	-2353.1	-42%

Deciduous forest	41	380.4	5%	286.6	4%	-93.8	-25%
Developed, High Intensity	24	4.9	0%	67.5	1%	62.6	1280%
Developed, Low Intensity	22	146.1	2%	2067.3	27%	1921.3	1315%
Developed, Medium Intensity	23	10.0	0%	996.9	13%	986.9	9865%
Developed, Open Space	21	362.6	5%	211.6	3%	-151.0	-42%
Emergent herbaceous wetlands	95	6.7	0%	3.9	0%	-2.8	-42%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	954.6	12%	653.9	8%	-300.6	-31%
Herbaceous	71	6.9	0%	4.0	0%	-2.9	-42%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	10.7	0%	22.4	0%	11.7	110%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	226.7	3%	148.5	2%	-78.3	-35%
07140204050903		8319.4	100%	8319.4	100%	0.0	
Barren Land	31	0.0	0%	0.0	0%	0.0	0%
Cultivated crop	82	4089.0	49%	2202.8	26%	-1886.2	-46%
Deciduous forest	41	1617.2	19%	948.0	11%	-669.3	-41%
Developed, High Intensity	24	13.1	0%	83.8	1%	70.7	539%
Developed, Low Intensity	22	329.9	4%	2531.5	30%	2201.6	667%
Developed, Medium Intensity	23	72.7	1%	1216.0	15%	1143.3	1573%
Developed, Open Space	21	573.3	7%	308.9	4%	-264.5	-46%
Emergent herbaceous wetlands	95	2.9	0%	1.6	0%	-1.3	-46%
Evergreen forest	42	0.0	0%	0.0	0%	0.0	0%
Hay/Pasture	81	1455.2	17%	899.1	11%	-556.1	-38%
Herbaceous	71	18.5	0%	9.9	0%	-8.5	-46%
Mixed forest	43	0.0	0%	0.0	0%	0.0	0%
Open Water	11	45.8	1%	43.9	1%	-1.9	-4%
Shrub/Scrub	52	0.0	0%	0.0	0%	0.0	0%
Wood wetlands	90	101.8	1%	74.0	1%	-27.8	-27%
Grand Total		121178.6		121178.6		0.0	

Stream reach data

Table A.73. NHD stream reaches in the Upper Silver Creek watershed, with length in feet and the HUC14(s) they fall within. Some reaches are present in more than one HUC14.

HUC14 & Reach Code	Length (ft)
07140204050101	160158
07140204000256	15794
07140204000257	5118
07140204000258	12520
07140204001279	262
07140204001280	3485
07140204001281	7694
07140204001282	24925
07140204001283	9507
07140204001284	7080
07140204001285	18347
07140204003144	3694
07140204003145	2208
07140204003146	1069
07140204003147	2001
07140204003148	3153
07140204003149	5421
07140204003150	3127
07140204003151	4649
07140204003152	1984
07140204003154	2697
07140204003155	2261
07140204003156	4409
07140204003157	5842
07140204003158	605
07140204003159	2987
07140204003160	846
07140204003163	2655
07140204003164	4043
07140204003165	565
07140204003167	1210
07140204050101 & 07140204050102	11991
07140204000255	11991
07140204050102	95015
07140204000253	837
07140204000254	955
07140204001273	9169
07140204001274	4908

07140204001275	7628
07140204001277	8742
07140204001278	8997
07140204001286	6177
07140204003170	3210
07140204003172	3867
07140204003174	2711
07140204003175	4912
07140204003176	2609
07140204003180	3755
07140204003181	3412
07140204003182	917
07140204003184	1104
07140204003185	1418
07140204003186	1816
07140204003187	2535
07140204003188	877
07140204003189	2395
07140204003190	2045
07140204003191	2228
07140204003194	3002
074 4000 4000 405	4=00
07140204003195	4789
07140204003195 07140204050102 & 07140204050202	4789 8052
07140204050102 & 07140204050202	8052
07140204050102 & 07140204050202 07140204000252	8052 8052
07140204050102 & 07140204050202 07140204000252 07140204050201	8052 8052 102610
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288	8052 8052 102610 7332
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290	8052 8052 102610 7332 12619
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292	8052 8052 102610 7332 12619 7739
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293	8052 8052 102610 7332 12619 7739 14488
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001294	8052 8052 102610 7332 12619 7739 14488 7413
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001294 07140204001295	8052 8052 102610 7332 12619 7739 14488 7413 4760
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001294 07140204001295 07140204001297	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001294 07140204001295 07140204001297 07140204001298	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001294 07140204001295 07140204001297 07140204001298 07140204001299	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003168	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733 9327
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001293 07140204001294 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003166	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001292 07140204001293 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003168	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733 9327
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001293 07140204001294 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003168 07140204003169	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733 9327 2576 2172 1710
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001290 07140204001293 07140204001294 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003168 07140204003171 07140204003177 07140204003192	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733 9327 2576 2172 1710 3529
07140204050102 & 07140204050202 07140204000252 07140204050201 07140204001288 07140204001292 07140204001293 07140204001295 07140204001297 07140204001298 07140204001299 07140204003161 07140204003168 07140204003171 07140204003177	8052 8052 102610 7332 12619 7739 14488 7413 4760 6081 5008 7159 3729 733 9327 2576 2172 1710

07140204013635	185
07140204013636	110
07140204013637	189
07140204013638	1742
07140204013642	457
07140204013643	127
07140204050201 & 07140204050202	7608
07140204001287	7608
07140204050202	161357
07140204000243	3701
07140204000244	3564
07140204000245	6286
07140204000246	2251
07140204000247	5661
07140204000248	1169
07140204000249	4535
07140204000250	3696
07140204000251	140
07140204001263	5281
07140204001264	5622
07140204001265	7806
07140204001266	8885
07140204001267	6792
07140204001268	3672
07140204001270	3368
07140204001271	10940
07140204001272	13867
07140204001300	12187
07140204003196	678
07140204003200	3541
07140204003203	3689
07140204003204	3643
07140204003205	542
07140204003206	1838
07140204003207	2498
07140204003211	3648
07140204003213	2624
07140204003217	3903
07140204003218	1959
07140204003220	686
07140204003223	3259
07140204003224	2552
07140204003225	2580

07140204003229	1959
07140204003237	3135
07140204003244	3070
07140204003255	2478
07140204013691	1281
07140204013692	958
07140204013693	1413
07140204050202 & 07140204050301	5752
07140204000242	5752
07140204050203	126861
07140204001302	6450
07140204001303	9208
07140204001304	8088
07140204001305	13894
07140204001306	11855
07140204001307	9833
07140204001308	12616
07140204001309	20292
07140204003173	3301
07140204003178	1124
07140204003179	1490
07140204003183	2401
07140204003193	3567
07140204003197	2416
07140204003201	3000
07140204003202	1178
07140204003212	3878
07140204003221	3217
07140204003228	2044
07140204003242	4362
07140204003243	2647
07140204050203 & 07140204050301	4144
07140204001301	4144
07140204050301	121298
07140204000240	3026
07140204001311	20527
07140204001312	5255
07140204001313	6722
07140204001314	15057
07140204001315	6044
07140204003214	2777
07140204003222	2041
07140204003227	5323
07140204003227	5323

07140204002220	1000
07140204003230 07140204003231	1809 3519
07140204003231	647
07140204003233	3217
07140204003233	3004
07140204003236	
	2401
07140204003248	4332
07140204003253	8641
07140204003254	3219
07140204003261	4571
07140204003264	4055
07140204003265	1089
07140204003269	1037
07140204003270	1040
07140204003271	2024
07140204003273	970
07140204003274	1940
07140204003282	2959
07140204005944	702
07140204005998	1758
07140204005999	1592
07140204050301 & 07140204050302	14708
07140204000239	14708
07140204000239 07140204050302	14708 100297
07140204050302	100297
07140204050302 07140204001255	100297 2017
07140204050302 07140204001255 07140204001256	100297 2017 11377
07140204050302 07140204001255 07140204001256 07140204001257	100297 2017 11377 17929
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258	100297 2017 11377 17929 11235
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259	2017 11377 17929 11235 8378
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260	100297 2017 11377 17929 11235 8378 6176
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261	100297 2017 11377 17929 11235 8378 6176 896
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262	100297 2017 11377 17929 11235 8378 6176 896 7345
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238	2017 11377 17929 11235 8378 6176 896 7345 2479
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250 07140204003260	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250 07140204003266	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250 07140204003266 07140204003267	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501 1282
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204003238 07140204003250 07140204003266 07140204003267 07140204003268	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501 1282 1754
07140204050302 07140204001255 07140204001256 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250 07140204003266 07140204003267 07140204003268 07140204003272	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501 1282 1754 4701
07140204050302 07140204001255 07140204001256 07140204001257 07140204001258 07140204001259 07140204001260 07140204001261 07140204003238 07140204003250 07140204003266 07140204003267 07140204003272 07140204003278	2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501 1282 1754 4701 2876
07140204050302 07140204001255 07140204001256 07140204001258 07140204001259 07140204001260 07140204001261 07140204001262 07140204003238 07140204003250 07140204003266 07140204003267 07140204003272 07140204003278 07140204003279	100297 2017 11377 17929 11235 8378 6176 896 7345 2479 3877 2171 1501 1282 1754 4701 2876 1845

07140204003291	2542
07140204003302	2139
07140204003316	3079
07140204050302 & 07140204050303	7624
07140204001254	7624
07140204050303	125177
07140204000235	3876
07140204000236	3557
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07140204050502 07140204001231 07140204001234 07140204001235 07140204001239 07140204001240 07140204001242 07140204003528 07140204003530 07140204003556 07140204003585 07140204003585 07140204003598 07140204003600 07140204003601 07140204003601 07140204003615	111007 5479 6037 2810 10435 11345 2748 7351 5504 7420 3023 1466 2154 1443 1321 1357 2587 2409 2458

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07140204003629	1611
07140204003630	1065
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07140204003640	2086
07140204003644	737
07140204003649	1123
07140204003654	2034
07140204003657	4691
07140204003658	1369
07140204003671	1591
07140204006002	7492
07140204050502 & 07140204050601	9799
07140204001230	4886
07140204003707	4913
07140204050601	27752
07140204001229	12465
07140204003070	855
07140204003690	172
07140204003691	755
07140204003739	6365
07140204003742	1102
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07140204003747	342
07140204003762	4436
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07140204003705	2701
07140204003708	1529
07140204003717	2922
07140204003720	2885
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07140204003726	4918
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07140204003730	3367
07140204003731	3037
07140204003733	181
07140204003734	2356
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07140204003736	1814
07140204003737	4222
07140204003741	5718
07140204003744	651
07140204003745	1526
07140204003755	6096
07140204003756	1914
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07140204050603	86263
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07140204001350	15577
07140204001351	18673
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07140204003763	1618
07140204003765	1450
07140204003766	1997
07140204003775	3249
07140204003777	2556

074 4020 4002770	2.404
07140204003778	3481
07140204003779	1535
07140204003781	1837
07140204003783	1087
07140204003784	1165
07140204003785	1299
07140204003791	609
07140204003795	3823
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07140204001357	19211
07140204001358	4176
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07140204003816	1539
07140204003817	2540
07140204003820	5574
07140204003823	1608
07140204003824	2050
07140204003831	1789
07140204003839	2062
07140204050604 & 07140204050901	1063
07140204000196	1063
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07140204000191	4378
07140204000192	3414
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07140204003858	3533
07140204003880	3511
07140204003929	2342
07140204003937	195
07140204003946	727
07140204003951	3774
07140204006006	1856
07140204050901 & 07140204050902	17239
07140204002277	12318
07140204006005	4921
07140204050901 & 07140204050903	9749
07140204000475	9749
07140204050902	133552

07140204000436	2122
07140204000437	15410
07140204000438	17185
07140204001187	8771
07140204001359	3705
07140204001360	21758
07140204001361	3673
07140204002247	8408
07140204003114	1609
07140204003115	908
07140204003798	2972
07140204003815	4909
07140204003827	2294
07140204003842	7690
07140204003844	1787
07140204003850	3431
07140204003852	1159
07140204003853	1958
07140204003854	2194
07140204003855	896
07140204003856	4418
07140204003857	1040
07140204003873	1280
07140204003875	4223
07140204003892	5359
07140204003896	1759
07140204003898	2216
07140204005945	418
07140204050903	230141
07140204000476	1532
07140204000478	14671
07140204000479	2699
07140204000480	5884
07140204001362	4167
07140204001363	10675
07140204001364	2923
07140204001365	9530
07140204001366	3870
07140204001367	7417
07140204001368	3355
07140204001368 07140204001369	3355 4892

07140204001372	4525
07140204001373	5452
07140204001374	8734
07140204003819	1572
07140204003822	2358
07140204003828	533
07140204003829	103
07140204003830	2187
07140204003836	1746
07140204003837	3103
07140204003838	1940
07140204003841	1517
07140204003848	2100
07140204003849	1264
07140204003859	630
07140204003861	2892
07140204003862	1317
07140204003863	1330
07140204003864	1436
07140204003865	2381
07140204003866	2004
07140204003867	656
07140204003868	1298
07140204003870	2105
07140204003871	2211
07140204003872	2534
07140204003876	1306
07140204003883	1251
07140204003887	5097
07140204003891	2033
07140204003893	711
07140204003901	3785
07140204003903	3016
07140204003904	3122
07140204003906	215
07140204003907	1212
07140204003909	2548
07140204003910	1506
07140204003914	981
07140204003915	1145
07140204003918	697
07140204003919	1623
07140204003921	248

Grand Total	2527758
07140204003961	5565
07140204003958	2925
07140204003953	3089
07140204003952	1999
07140204003949	7797
07140204003948	749
07140204003947	2308
07140204003944	3534
07140204003943	91
07140204003942	2129
07140204003940	1987
07140204003939	1523
07140204003938	3604
07140204003936	1941
07140204003935	847
07140204003934	1577
07140204003933	3214
07140204003932	2496
07140204003931	1331
07140204003930	2421
07140204003928	2129
07140204003320	1286
07140204003323	5043
07140204003923	1693
07140204003922	2019

Streambank erosion by stream reach

Table A.74. Streambank erosion along stream reaches in the watershed.

Stroom or		Stream Length Assessed	None or Low I	Erosion	Moderate Ero	sion	High Erosion	
Stream or Tributary Name	Reach Code	(ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
Silver Creek	07140204000256	15862.9	3557.0	22%	6982.5	44%	5323.4	34%
Silver Creek	07140204000257	5114.8	2370.3	46%	427.7	8%	2316.9	45%
Silver Creek	07140204000258	12582.0	8209.7	65%	2155.3	17%	2216.9	18%
Sirver Greek	07140204001279	262.5	0.9	0%	206.8	79%	54.9	21%
	07140204001280	3484.3	448.1	13%	552.3	16%	2483.8	71%
	07140204001281	7693.6	4698.9	61%	2429.6	32%	565.1	7%
	07140204001282	24944.2	18272.1	73%	3771.9	15%	2900.2	12%
	07140204001283	9573.5	7332.6	77%	1704.2	18%	536.6	6%
	07140204001284	7063.6	5112.2	72%	1313.2	19%	638.2	9%
	07140204001285	18431.8	14436.3	78%	3132.3	17%	863.1	5%
	07140204003145	2211.3	1987.1	90%	224.2	10%	003.1	0%
	07140204003146	1059.7	778.9	74%	102.5	10%	178.3	17%
	07140204003148	3166.0	3044.1	96%	102.3	0%	121.9	4%
	07140204003149	5393.7	5203.2	96%	99.9	2%	90.6	2%
	07140204003150	3136.5	2949.2	94%	24.4	1%	162.9	5%
	07140204003151	4675.2	4602.2	98%		0%	73.0	2%
	07140204003152	1981.6	1887.5	95%		0%	94.1	5%
	07140204003156	4429.1	4186.5	95%		0%	242.6	5%
	07140204003158	600.4	491.2	82%		0%	109.2	18%
Silver Creek	07140204000255	12024.3	3616.0	30%	4130.4	34%	4277.9	36%
Silver Creek	07140204000253	830.1	190.9	23%	43.5	5%	595.7	72%
Silver Creek	07140204000254	958.0	260.8	27%	588.9	61%	108.4	11%
Silver Creek	07140204000234	9140.4	5591.5	61%	928.1	10%	2620.8	29%
	07140204001274	4865.5	686.9	14%	3366.4	69%	812.2	17%
	07140204001274	7585.3	5031.6	66%	199.1	3%	2354.5	31%
	07140204001277	8763.1	6738.2	77%	872.2	10%	1152.8	13%
	07140204001277	9042.0	8489.7	94%	072.2	0%	552.3	6%
	07140204001276	6200.8	6157.9	99%		0%	42.9	1%
	07140204001200	3205.4	3075.1	96%		0%	130.3	4%
	07140204003170	3868.1	3781.8	98%	86.3	2%	150.5	0%
	07140204003172	2713.3	2695.5	99%	00.5	0%	17.8	1%
	07140204003174	3756.6	3716.9	99%	39.7	1%	17.0	0%
	07140204003184	1108.9	263.4	24%	407.9	37%	437.6	39%
	07140204003185	1420.6	1320.9	93%	99.7	7%	437.0	0%
	07140204003186	1814.3	160.6	9%	353.0	19%	1300.7	72%
	07140204003187	2545.9	2423.7	95%	122.3	5%	1300.7	0%
	07140204003187	876.0	530.7	61%	345.2	39%		0%
	07140204003188	2040.7	1314.8	64%	393.5	19%	332.4	16%
	07140204003190	2240.8	2161.5	96%	333.3	0%	79.3	4%
Silver Creek	07140204003191	8077.4	1849.6	23%	3285.9	41%	2942.0	36%
JIIVEL CLEEK	07140204000232	7362.2	5086.5	69%	1613.0	22%	662.7	30% 9%
	07140204001292	7762.5	6018.5	78%	1648.0	21%	96.0	1%

07140204001294	7437.7	4568.0	61%	2497.6	34%	372.1	5%
07140204001295	4780.2	2156.2	45%	1162.4	24%	1461.5	31%
07140204001299	7178.5	6054.6	84%	970.1	14%	153.8	2%
07140204003168	9376.6	8269.2	88%	1107.4	12%		0%
07140204003169	2585.3	2472.9	96%	112.4	4%		0%
07140204003171	2171.9	2036.1	94%	135.8	6%		0%
07140204003177	1702.8	1577.1	93%		0%	125.7	7%
07140204003192	3510.5	3217.3	92%	174.1	5%	119.1	3%
07140204001287	7631.2	2688.5	35%	3424.1	45%	1518.7	20%
07140204000243	3687.7	180.6	5%	229.5	6%	3277.6	89%
07140204000244	3569.6	218.6	6%	1074.9	30%	2276.0	64%
07140204000245	6318.9	1561.0	25%	4166.5	66%	591.4	9%
07140204000246	2250.7	389.2	17%	295.2	13%	1566.3	70%
07140204000247	5662.7	1444.7	26%	703.0	12%	3515.0	62%
07140204000248	1168.0	197.4	17%	309.7	27%	660.9	57%
07140204000249	4563.6	1954.3	43%	1702.8	37%	906.6	20%
07140204000250	3707.3	1076.4	29%	1263.6	34%	1367.4	37%
07140204000251	141.1	3.2	2%	137.9	98%		0%
07140204001263	5259.2	5067.6	96%		0%	191.6	4%
07140204001264	5580.7	5107.2	92%	286.5	5%	187.0	3%
07140204001265	7762.5	7642.5	98%	120.0	2%		0%
07140204001266	8864.8	8775.1	99%		0%	89.7	1%
07140204001267	6784.8	6667.2	98%		0%	117.6	2%
07140204001271	10912.1	10855.1	99%	57.0	1%		0%
07140204003217	3910.8	3747.4	96%		0%	163.4	4%
07140204003220	685.7	573.6	84%	112.1	16%		0%
07140204003224	2552.5	2367.4	93%		0%	185.1	7%
07140204003255	2483.6	2425.2	98%	58.4	2%		0%
07140204000242	5744.8	1243.6	22%	1747.4	30%	2753.7	48%
07140204001304	8113.5	4315.8	53%	1132.1	14%	2665.6	33%
07140204001305	13956.7	1330.8	10%	5866.1	42%	6759.8	48%
07140204001306	11932.4	11458.8	96%	473.6	4%		0%
07140204001307	9878.6	4498.5	46%	3469.1	35%	1911.1	19%
07140204001308	12670.6	12101.9	96%	321.2	3%	247.4	2%
07140204003173	3313.6	2117.4	64%	1196.2	36%		0%
07140204003179	1502.6	1251.0	83%		0%	251.6	17%
07140204003183	2421.3	1974.6	82%	446.6	18%		0%
07140204003193	3572.8	3289.2	92%	225.3	6%	58.3	2%
07140204003197	2408.1	1979.6	82%	235.3	10%	193.2	8%
07140204003212	3881.2	3478.9	90%		0%	402.3	10%
07140204001301	4156.8	3098.5	75%	75.5	2%	982.9	24%
07140204000240	3051.2	1016.2	33%	1813.1	59%	221.9	7%
07140204001311	20626.6	14441.4	70%	4533.4	22%	1651.8	8%
07140204001313	6732.3	1739.9	26%	3465.1	51%	1527.2	23%
07140204001314	15105.0	8464.5	56%	2787.6	18%	3852.9	26%
07140204001315	6086.0	5886.0	97%	199.9	3%	3032.3	0%
07140204001315	3234.9	3020.6	93%	214.3	7%		0%
07140204003236	2998.7	311.2	10%	1347.6	45%	1339.9	45%
07140204003253	8681.1	1166.3	13%	3895.9	45%	3618.9	42%
07140204003253	4580.1	4396.8	96%	132.3	3%	50.9	1%
0/170204003201	-300.I	+330.0	2070	132.3	3/0	30.3	1/0

	07140204003264	4035.4	3819.3	95%	211.8	5%	4.4	0%
	07140204003269	1033.5	952.3	92%		0%	81.2	8%
	07140204003274	1925.9	1907.4	99%		0%	18.5	1%
	07140204003282	2952.8	2829.8	96%		0%	122.9	4%
	07140204005944	698.8	146.5	21%	361.3	52%	191.0	27%
	07140204005998	1752.0	49.0	3%	1017.0	58%	686.0	39%
	07140204005999	1591.2	468.4	29%	494.8	31%	628.0	39%
	07140204000239	14701.4	944.0	6%	3841.9	26%	9915.6	67%
	07140204001255	2007.9	317.1	16%	932.5	46%	758.3	38%
	07140204001256	11361.5	2596.5	23%	3871.5	34%	4893.6	43%
	07140204001257	17919.9	1189.1	7%	4413.7	25%	12317.2	69%
	07140204001258	11282.8	7341.2	65%	1568.6	14%	2373.0	21%
	07140204001260	6161.4	5995.9	97%	165.5	3%		0%
	07140204001261	892.4	727.9	82%		0%	164.5	18%
	07140204001262	7388.5	7194.8	97%		0%	193.7	3%
	07140204003238	2490.2	2272.5	91%		0%	217.7	9%
	07140204003250	3858.3	3579.0	93%		0%	279.3	7%
	07140204003260	2162.1	1498.9	69%	663.2	31%		0%
	07140204003268	1765.1	1655.9	94%	109.2	6%		0%
	07140204003278	2867.5	2721.5	95%		0%	145.9	5%
	07140204003284	4120.7	3987.8	97%	132.9	3%		0%
	07140204003291	2552.5	2420.7	95%		0%	131.8	5%
	07140204001254	7582.0	1597.1	21%	2815.1	37%	3169.8	42%
Silver Creek	07140204000235	3871.4	327.9	8%	232.9	6%	3310.6	86%
Silver Creek	07140204000236	3549.9	1130.6	32%	545.1	15%	1874.2	53%
Silver Creek	07140204000237	3359.6	607.7	18%	1480.1	44%	1271.7	38%
Silver Creek	07140204000237	4655.5	506.5	11%	1019.9	22%	3129.1	67%
Silver Creek	07140204001253	5410.1	4916.6	91%	1015.5	0%	493.5	9%
	07140204001233	8021.7	8001.5	100%	20.2	0%	433.3	0%
	07140204001317	8182.4	8057.2	98%	20.2	0%	125.2	2%
	07140204001317	7650.9	7528.2	98%		0%	123.2	2%
	07140204001322	4553.8	4464.4	98%	89.4	2%	122.7	0%
	07140204003323	2322.8	2058.1	89%	65.4	0%	264.7	11%
	07140204003332	4858.9	4844.1	100%	14.8	0%	204.7	0%
	07140204003337			92%				
		2447.5	2257.9		189.6	8%		0%
Cilvan Crook	07140204003400 07140204000234	3061.0	2865.5	94%	195.5 4575.5	6%	2799.5	0%
Silver Creek		10433.1	3058.1	29%		44%		27%
Silver Creek	07140204000233	2959.3	1771.4	60%	1150.4	39%	37.5	1%
	07140204001323	8041.3	3813.3	47%	3112.3	39%	1115.7	14%
	07140204001324	4832.7	846.7	18%	1432.3	30%	2553.6	53%
	07140204001325	5128.0	4788.7	93%	317.2	6%	22.1	0%
	07140204001326	2618.1	950.5	36%	1255.8	48%	411.8	16%
	07140204001327	5843.2	1940.4	33%	2341.0	40%	1561.8	27%
	07140204001328	13743.4	9409.4	68%	3582.1	26%	751.9	5%
	07140204001329	6414.0	6338.8	99%		0%	75.3	1%
	07140204003257	2437.7	2379.8	98%	57.9	2%	_	0%
	07140204003276	1525.6	1349.0	88%		0%	176.6	12%
	07140204003289	2778.9	2596.6	93%		0%	182.2	7%
	07140204003314	531.5	263.7	50%	96.9	18%	170.9	32%
	07140204003319	2408.1	2230.4	93%		0%	177.7	7%

	07140204003334	1387.8	1173.0	85%	214.8	15%		0%
	07140204003374	1922.6	1793.4	93%	129.2	7%		0%
Silver Creek	07140204000231	4028.9	670.2	17%	944.2	23%	2414.5	60%
Silver Creek	07140204000232	1732.3	955.0	55%	435.3	25%	342.0	20%
	07140204001246	4396.3	336.3	8%	2243.6	51%	1816.4	41%
	07140204001247	15862.9	6302.1	40%	6064.8	38%	3496.0	22%
	07140204001248	4898.3	4311.8	88%	115.0	2%	471.5	10%
	07140204001332	4790.0	4678.7	98%	111.3	2%		0%
	07140204003336	2267.1	2168.6	96%		0%	98.4	4%
	07140204003364	3310.4	3221.3	97%	23.3	1%	65.8	2%
	07140204003406	2017.7	1974.4	98%	43.3	2%		0%
	07140204003444	1820.9	1746.1	96%	74.8	4%		0%
	07140204003454	1843.8	1700.6	92%	143.2	8%		0%
Silver Creek	07140204000230	3487.5	864.0	25%	1392.4	40%	1231.2	35%
	07140204003460	1328.7	1105.2	83%	223.5	17%		0%
Silver Creek	07140204000227	3244.8	805.3	25%	1123.5	35%	1315.9	41%
Silver Creek	07140204000228	9668.6	1476.7	15%	3123.7	32%	5068.2	52%
Silver Creek	07140204000229	1679.8	104.2	6%	535.0	32%	1040.6	62%
	07140204001245	14301.2	13992.7	98%	114.7	1%	193.8	1%
	07140204001337	2913.4	1086.1	37%	684.9	24%	1142.3	39%
	07140204001338	4517.7	4391.7	97%	126.0	3%		0%
	07140204001339	4117.5	89.0	2%	1056.5	26%	2971.9	72%
	07140204001340	11076.1	6641.7	60%	1332.0	12%	3102.5	28%
	07140204001341	6781.5	6699.4	99%		0%	82.1	1%
	07140204003429	948.2	850.2	90%		0%	98.0	10%
	07140204003447	1669.9	1600.5	96%	69.5	4%		0%
	07140204003475	1384.5	1252.7	90%		0%	131.8	10%
	07140204003484	3356.3	3289.4	98%		0%	66.9	2%
	07140204003496	892.4	706.5	79%		0%	185.9	21%
	07140204003505	2280.2	2088.4	92%		0%	191.8	8%
	07140204003510	554.5	439.5	79%		0%	114.9	21%
	07140204003511	144.4	0.0	0%		0%	144.35696	100%
	07140204003512	1030.2	803.2	78%		0%	227.0	22%
	07140204003525	1269.7	1234.6	97%		0%	35.1	3%
	07140204003536	899.0	725.0	81%		0%	174.0	19%
Silver Creek	07140204000226	5374.0	959.8	18%	1269.3	24%	3144.9	59%
Silver Creek	07140204000223	12398.3	4494.1	36%	4204.0	34%	3700.2	30%
Silver Creek	07140204000224	5990.8	1512.2	25%	384.1	6%	4094.5	68%
Silver Creek	07140204000225	12595.1	3558.0	28%	3204.2	25%	5832.9	46%
	07140204001243	9685.0	9579.9	99%	105.1	1%		0%
	07140204001342	13664.7	13534.5	99%		0%	130.2	1%
	07140204001343	1853.7	1643.2	89%		0%	210.5	11%
	07140204003583	1404.2	1339.1	95%		0%	65.1	5%
	07140204003611	4616.1	4360.2	94%		0%	255.9	6%
	07140204003617	1496.1	1427.0	95%	69.0	5%		0%
	07140204003624	2808.4	2739.0	98%		0%	69.4	2%
	07140204003632	2860.9	2735.6	96%	125.3	4%		0%
	07140204003672	813.6	636.4	78%	177.2	22%		0%
	07140204003683	751.3	503.0	67%		0%	248.3	33%
	07140204003687	4560.4	4328.0	95%		0%	232.4	5%

	07140204003722	2837.9	2753.2	97%	84.7	3%		0%
Silver Creek	07140204000222	1374.7	679.3	49%	695.4	51%		0%
	07140204001231	5452.8	607.9	11%	3410.3	63%	1434.6	26%
	07140204001232	6020.3	5946.0	99%	74.4	1%		0%
	07140204001234	2795.3	384.8	14%	2214.2	79%	196.3	7%
	07140204001235	10416.7	9979.1	96%	437.6	4%		0%
	07140204001240	2765.7	2540.5	92%	225.2	8%		0%
	07140204003498	5518.4	5345.2	97%		0%	173.2	3%
	07140204003528	7444.2	1789.5	24%	5285.5	71%	369.2	5%
	07140204003629	1601.0	1456.5	91%		0%	144.5	9%
	07140204003639	1302.5	466.7	36%	835.7	64%		0%
	07140204003640	2089.9	2008.2	96%	81.7	4%		0%
	07140204003644	738.2	1.5	0%	736.7	100%		0%
	07140204003657	4727.7	4543.8	96%	183.8	4%		0%
	07140204003671	1597.8	1379.7	86%	139.4	9%	78.6	5%
	07140204006002	7519.7	3154.6	42%	3116.0	41%	1249.1	17%
	07140204001230	4904.9	1051.0	21%	2749.8	56%	1104.0	23%
	07140204003707	4911.4	4548.8	93%	362.6	7%		0%
	07140204003762	4439.0	4326.9	97%	112.1	3%		0%
Silver Creek	07140204000201	331.4	205.5	62%		0%	125.8	38%
Silver Creek	07140204000221	14163.4	5293.1	37%	5510.6	39%	3359.7	24%
Wendell Branch	07140204000558	3963.3	1137.8	29%	2042.6	52%	782.8	20%
	07140204001348	8284.1	8268.9	100%		0%	15.2	0%
	07140204003641	3353.0	3210.6	96%	142.5	4%		0%
Wendell Branch	07140204003642	1269.7	645.9	51%	116.4	9%	507.4	40%
Wendell Branch	07140204003650	1548.6	741.4	48%	235.4	15%	571.7	37%
	07140204003651	7194.9	7040.8	98%	114.9	2%	39.2	1%
Wendell Branch	07140204003664	2060.4	439.9	21%	662.7	32%	957.8	46%
Wendell Branch	07140204003669	839.9	142.0	17%	247.2	29%	450.7	54%
Wendell Branch	07140204003676	1295.9	172.3	13%	202.9	16%	920.7	71%
	07140204003677	3356.3	3257.7	97%	98.6	3%		0%
Wendell Branch	07140204003696	6348.4	2830.9	45%	2928.6	46%	588.9	9%
	07140204003698	810.4	552.7	68%	251.2	31%	6.5	1%
	07140204003699	4261.8	4094.3	96%	152.5	4%	15.0	0%
	07140204003700	3812.3	3568.1	94%	244.3	6%		0%
	07140204003708	1528.9	735.1	48%	338.2	22%	455.6	30%
Wendell Branch	07140204003720	2897.0	1820.3	63%	808.5	28%	268.2	9%
	07140204003726	4895.0	4803.2	98%	91.8	2%		0%
	07140204003729	2191.6	2142.2	98%	49.4	2%		0%
	07140204003730	3349.7	3241.2	97%	108.5	3%		0%
	07140204003733	183.7	3.0	2%	180.7	98%		0%
	07140204003734	2355.6	2200.0	93%	38.4	2%	117.3	5%
Wendell Branch	07140204003737	4215.9	723.6	17%	2211.7	52%	1280.6	30%
Wendell Branch	07140204003741	5705.4	1926.5	34%	2982.6	52%	796.3	14%
	07140204003744	656.2	409.8	62%	139.5	21%	106.8	16%
Wendell Branch	07140204003745	1528.9	2.4	0%	877.7	57%	648.7	42%
	07140204003755	7040.7	5859.0	83%	792.7	11%	389.0	6%
Wendell Branch	07140204003752	1364.8	54.7	4%	851.5	62%	458.7	34%
Wendell Branch	07140204000555	5774.3	3251.3	56%	2141.8	37%	381.2	7%
Wendell Branch	07140204000556	4645.7	878.1	19%	3170.4	68%	597.1	13%
	1.1.0201000000	.5 .5.,	3,3.1	_3/0	31,0.4	3070	337.1	_3/0

	07140204001349	1591.2	1239.0	78%	262.4	16%	89.9	6%
	07140204001350	15570.9	8012.2	51%	4273.0	27%	3285.6	21%
	07140204001351	18645.0	7600.7	41%	5878.8	32%	5165.5	28%
	07140204001352	6460.0	6388.9	99%		0%	71.1	1%
	07140204003758	2283.5	2258.9	99%		0%	24.6	1%
	07140204003759	1217.2	1163.6	96%	53.6	4%		0%
	07140204003766	2001.3	2000.3	100%	1.0	0%		0%
	07140204003791	610.2	525.4	86%		0%	84.9	14%
Silver Creek	07140204000197	6026.9	1222.5	20%	2104.5	35%	2700.0	45%
	07140204001357	19130.6	8179.3	43%	3385.5	18%	7565.8	40%
	07140204001358	4150.3	3959.4	95%	190.9	5%		0%
Silver Creek	07140204003804	9796.6	3762.4	38%	1287.0	13%	4747.2	48%
	07140204003816	1535.4	1436.1	94%		0%	99.3	6%
Silver Creek	07140204003820	5584.0	2901.3	52%	1011.1	18%	1671.6	30%
	07140204003823	1601.0	1525.4	95%	55.7	3%	20.0	1%
Silver Creek	07140204000196	1066.3	297.4	28%	171.2	16%	597.6	56%
Silver Creek	07140204000191	6975.1	3214.0	46%	1911.7	27%	1849.3	27%
Silver Creek	07140204000192	3402.2	4.9	0%	1389.1	41%	2008.2	59%
	07140204001186	6650.3	6300.9	95%		0%	349.3	5%
East Fork Silver				2221		001		401
Creek	07140204003840	11942.3	11836.3	99%	46.1	0%	59.8	1%
	07140204003880	3494.1	2957.2	85%	536.9	15%		0%
	07140204003929	2342.5	2180.5	93%	162.1	7%		0%
Silver Creek	07140204006006	1860.2	823.2	44%	418.0	22%	619.1	33%
Silver Creek	07140204002277	12372.0	1772.3	14%	9602.1	78%	997.6	8%
Silver Creek	07140204006005	4921.3	341.8	7%	3835.6	78%	743.9	15%
Mill Creek	07140204000475	9770.3	9177.6	94%	592.7	6%		0%
Lake Fork	07140204000436	2106.3	1259.2	60%	347.5	16%	499.6	24%
Lake Fork	07140204000437	15397.0	3937.1	26%	6596.3	43%	4863.5	32%
Lake Fork	07140204000438	17181.8	6339.8	37%	7117.9	41%	3724.1	22%
	07140204001361	3697.5	3308.1	89%	183.9	5%	205.4	6%
Lake Fork	07140204002247	8382.5	4640.7	55%	2469.7	29%	1272.2	15%
	07140204003798	2956.0	2849.7	96%	106.3	4%		0%
	07140204003892	5400.3	5255.9	97%	144.4	3%		0%
North Fork Mill	07140204001262	4176.5	422.1	100/	1576.4	200/	2169.0	F20/
Creek	07140204001362		432.1	10%	1576.4	38%	2168.0	52%
North Fork Mill	07140204001363	10652.9	5972.6	56%	3104.7	29%	1575.6	15%
Creek	07140204001364	2939.6	366.8	12%	1309.0	45%	1263.8	43%
North Fork Mill								
Creek	07140204001365	9534.1	4736.1	50%	2129.4	22%	2668.7	28%
	07140204001370	2185.0	376.6	17%	324.6	15%	1483.8	68%
	07140204001371	4606.3	602.5	13%	2286.8	50%	1717.0	37%
	07140204001372	4553.8	4398.8	97%	155.0	3%		0%
	07140204001373	5439.6	3531.6	65%	326.5	6%	1581.6	29%
	07140204001374	8684.4	3231.3	37%	1855.7	21%	3597.4	41%
	07140204003838	1935.7	1925.9	99%	9.8	1%		0%
	07140204003861	2900.3	2855.5	98%	44.7	2%		0%
	07140204003867	659.4	561.0	85%	98.4	15%		0%
	07140204003868	1302.5	1259.6	97%		0%	42.9	3%
	07140204003870	2089.9	2009.4	96%	80.5	4%		0%

	07140204003909	2532.8	2434.7	96%	98.1	4%		0%
	07140204003921	249.3	70.4	28%		0%	179.0	72%
	07140204003927	1286.1	1149.6	89%		0%	136.5	11%
	07140204003930	2427.8	2348.2	97%		0%	79.6	3%
	07140204003935	853.0	779.0	91%		0%	74.0	9%
	07140204003936	1935.7	1835.4	95%		0%	100.3	5%
		1456952.						
TOTAL		1	908914.2		283512.7		264525.2	
AVERAGE				65%		18%		17%

Channelization by stream reach

Table A.75. Degree of channelization along assessed stream reaches in the watershed.

Stream or			Stream	None or Low		Moderate		lliah Channal	:*:
Silver Creek 07140204000191 4379.0 4379 100% 0% 0% 0% Silver Creek 07140204000195 3414.0 3414 100% 0% </td <td>Stream or</td> <td>Poach Codo</td> <td>Length</td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td>	Stream or	Poach Codo	Length					_	
Silver Creek 07140204000192 3414.0 3414.1 100% 0	•					(11)		(11)	
Silver Creek 07140204000196 1063.0 1063 100% 0% 0% Silver Creek 07140204000197 5842.0 5842 100% 0% 0% 0% Silver Creek 07140204000221 14163.0 6362 45% 7801 55% 0% Silver Creek 07140204000222 1838.0 1383 100% 0% 0% Silver Creek 07140204000223 12394.0 12394 100% 0% 0% Silver Creek 07140204000225 12586.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000225 5306.0 5306.0 1506 100% 0% 1679 25% Silver Creek 07140204000223 3248.0 1569 48% 0% 0% 0% Silver Creek 07140204000231 4032.0 378 92% 204 3% 0% Silver Creek 07140204000231 4032.0 378 92% 0% <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Silver Creek 07140204000197 5842.0 5842.1 100% 327 100% 0% Silver Creek 07140204000221 14163.0 6362 45% 7801 55% 0% Silver Creek 07140204000222 1383.0 1383 100% 0% 0% 0% Silver Creek 07140204000223 12394.0 12394 100% 0% 0% 0% Silver Creek 07140204000225 52586.0 7580 66% 2049 34% 0% Silver Creek 07140204000225 52586.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000227 3248.0 1569 48% 0% 0% 10% 0% 1579 52% 5160 0% 0% 0% 0% 0% 0% 0% 50% 5169 50% 0% 0% 0% 0% 0% 0% 0% 50% 5169 0% 0% 0% 0%									
Silver Creek 07140204000221 14163.0 6362 45% 7801 55% 0% Silver Creek 071402040002221 14163.0 6362 45% 7801 55% 0% Silver Creek 07140204000223 12394.0 12394 100% 0% 0% Silver Creek 07140204000224 5990.0 3941 66% 2049 34% 0% Silver Creek 07140204000225 5258.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000227 3248.0 1569 48% 0% 0% 0% Silver Creek 07140204000228 9689.0 1669 14% 0% 0% 0% Silver Creek 07140204000223 1677.0 1677 100% 0% 0% 0% Silver Creek 07140204000233 4932.0 378 92% 0% 333 432 48% Silver Creek 07140204000233 2934.0 10%									
Silver Creek 07140204000221 14163.0 6362 45% 7801 55% 0% Silver Creek 07140204000222 1383.0 1333 100% 0% 0% Silver Creek 07140204000223 12394.0 12394 100% 0% 0% Silver Creek 07140204000225 12586.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000226 5306.0 5306 100% 0% 167 226% Silver Creek 07140204000227 3248.0 1569 48% 0% 167 228 Silver Creek 07140204000229 1677.0 1677 100% 0% 0% 0% Silver Creek 07140204000231 4032.0 3708 92% 2204 63% 0% Silver Creek 07140204000233 2934.0 0% 0% 0% 1715 100% Silver Creek 07140204000233 2934.0 0% 0% 0% <td< td=""><td></td><td></td><td></td><td>3842</td><td></td><td>227</td><td></td><td></td><td></td></td<>				3842		227			
Silver Creek 07140204000222 1383.0 1383 100% 0% 0% Silver Creek 07140204000224 12394.0 12394 100% 0% 0% Silver Creek 07140204000225 12586.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000227 3248.0 1569 44% 0% 1679 52% Silver Creek 07140204000228 9689.0 1669 44% 0% 1679 52% Silver Creek 07140204000223 1677.0 1677 100% 0% 0% 0% Silver Creek 07140204000231 4032.0 378 92% 0% 324 8% Silver Creek 07140204000233 1715.0 370 0% 0% 1715 100% Silver Creek 07140204000233 1793.0 0% 0% 173 100% Silver Creek 07140204000234 1040.0 3132 30% 32 0% 72				6363					
Silver Creek 07140204000223 12394.0 12394.1 10% 0% 0% 0% Silver Creek 07140204000224 5990.0 3941. 66% 2049. 34% 0% Silver Creek 07140204000225 12586.0 5306. 60% 1791. 14% 26% Silver Creek 07140204000227 3248.0 1569. 48% 0% 0% 0% Silver Creek 07140204000228 9689.0 160% 10% 0% 0% 0% Silver Creek 07140204000223 1677.0 1677. 100% 0% 334 0% Silver Creek 07140204000231 4032.0 370.8 29% 0% 324 8% Silver Creek 07140204000233 1715.0 0% 0% 20% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% <td< td=""><td></td><td></td><td></td><td></td><td></td><td>7801</td><td></td><td></td><td></td></td<>						7801			
Silver Creek 07140204000225 12586.0 3941 66% 2049 34% 0% Silver Creek 07140204000225 12586.0 7580 60% 1791 14% 3215 26% Silver Creek 07140204000227 3248.0 1569 48% 0% 1679 52% Silver Creek 07140204000228 9689.0 9689 100% 0% 0% 0% Silver Creek 07140204000230 3473.0 1269 37% 2204 63% 0% Silver Creek 07140204000231 4032.0 3788 92% 0% 324 8% Silver Creek 07140204000233 1715.0 0% 0% 1715 100% Silver Creek 07140204000233 1934.0 0% 0% 2934 100% Silver Creek 07140204000233 1934.0 330 32 0% 723 70% Silver Creek 07140204000233 3356.0 3376 100% 0%									
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Silver Creek 07140204000234 10402.0 3132 30% 32 0% 7238 70% Silver Creek 07140204000235 3876.0 3876 100% 0% 0% 0% Silver Creek 07140204000236 3556.0 3556 100% 0% 0% 0% Silver Creek 07140204000237 3373.0 1771 53% 1602 47% 0% Silver Creek 07140204000238 4652.0 0% 4652 100% 0% 07140204000240 3027.0 165 5% 0% 2862 95% 07140204000242 5752.0 4207 73% 0% 142 27% 07140204000243 3701.0 3701 100% 0% 0% 0% 07140204000244 3564.0 3048 86% 0% 16 14% 07140204000245 6286.0 2462 39% 2729 43% 109 0% 07140204000246 2251.0 <t< td=""><td></td><td>07140204000232</td><td>1715.0</td><td></td><td>0%</td><td></td><td>0%</td><td>1715</td><td>100%</td></t<>		07140204000232	1715.0		0%		0%	1715	100%
Silver Creek 07140204000235 3876.0 3876.0 100% 0 0 0 Silver Creek 07140204000236 3556.0 3556.0 3556.0 100% 0 0 0 Silver Creek 07140204000237 3373.0 1771 53% 1602 47% 0 Silver Creek 07140204000238 4652.0 0% 4652 100% 0% 07140204000240 3027.0 165 5% 0% 2862 95% 07140204000242 5752.0 4207 73% 0% 1545 27% 07140204000243 3701.0 3701 100% 0% 1545 27% 07140204000244 3564.0 3048 86% 0% 0% 156 14% 07140204000245 6286.0 2462 39% 2729 43% 1095 17% 07140204000247 5661.0 5661 100% 0% 0% 0% 07140204000249 4534.0 924	Silver Creek	07140204000233	2934.0		0%		0%	2934	100%
Silver Creek 07140204000236 3556.0 3556.0 100% 0 0% 0% Silver Creek 07140204000237 3373.0 1771 53% 1602 47% 0% Silver Creek 07140204000238 4652.0 0% 4652 100% 0% 07140204000239 14708.0 8988 61% 5720 39% 0% 0% 07140204000240 3027.0 165 5% 0% 2862 95% 07140204000242 5752.0 4207 73% 0% 1545 27% 07140204000243 3701.0 3701 100% 0% 516 14% 07140204000244 3564.0 3048 86% 0% 516 14% 07140204000245 6286.0 2462 39% 2729 43% 1095 17% 07140204000247 5661.0 5661 100% 0% 0% 0% 07140204000249 4534.0 924 20% 3610	Silver Creek	07140204000234	10402.0	3132	30%	32	0%	7238	70%
Silver Creek 07140204000237 3373.0 1771 53% 1602 47% 0% Silver Creek 07140204000238 4652.0 0% 4652 100% 0% 07140204000239 14708.0 8988 61% 5720 39% 0% 07140204000240 3027.0 165 5% 0% 2862 95% 07140204000243 3701.0 3701 100% 0% 1545 27% 07140204000244 3564.0 3048 86% 0% 516 14% 07140204000245 6286.0 2462 39% 2729 43% 1095 17% 07140204000246 2251.0 2251 100% 0% 0% 0% 07140204000247 5661.0 5661 100% 0% 0% 0% 07140204000248 1170.0 802 69% 368 31% 0% Silver Creek 07140204000252 7936.0 6065 76% 1871 24%	Silver Creek	07140204000235	3876.0	3876	100%		0%		0%
Silver Creek 07140204000238 4652.0 0% 4652 100% 0% 07140204000239 14708.0 8988 61% 5720 39% 0% 07140204000240 3027.0 165 5% 0% 2862 95% 07140204000242 5752.0 4207 73% 0% 1545 27% 07140204000243 3701.0 3701 100% 0% 516 14% 07140204000244 3564.0 3048 86% 0% 516 14% 07140204000245 6286.0 2462 39% 2729 43% 1095 17% 07140204000246 2251.0 2251 100% 0% 0% 0% 07140204000247 5661.0 5661 100% 0% 0% 0% 07140204000248 1170.0 802 69% 368 31% 0% Silver Creek 07140204000252 7936.0 6065 76% 1871 24% 0%	Silver Creek	07140204000236	3556.0	3556	100%		0%		0%
No.	Silver Creek	07140204000237	3373.0	1771	53%	1602	47%		0%
07140204000240 3027.0 165 5% 0% 2862 95% 07140204000243 3701.0 3701 100% 0% 0% 0% 0% 0% 0%	Silver Creek	07140204000238	4652.0		0%	4652	100%		0%
		07140204000239	14708.0	8988	61%	5720	39%		0%
07140204000243 3701.0 3701 100% 0% 0% 0% 14% 07140204000244 3564.0 3048 86% 2729 43% 1095 17% 07140204000245 6286.0 2262 39% 2729 43% 1095 17% 07140204000246 2251.0 2251 100% 0% 0% 0% 0% 0% 0%		07140204000240	3027.0	165	5%		0%	2862	95%
No. No.		07140204000242	5752.0	4207	73%		0%	1545	27%
07140204000245 6286.0 2462 39% 2729 43% 1095 17% 07140204000246 2251.0 2251 100% 0% 0% 0% 0% 0% 07140204000247 5661.0 5661 100% 0% 0% 0% 0% 07140204000248 1170.0 802 69% 368 31% 0% 0% 07140204000249 4534.0 924 20% 3610 80% 0% 0% 07140204000250 3695.0 2637 71% 1058 29% 0% 0% 0% 07140204000252 7936.0 6065 76% 1871 24% 0% 0% 0% 0% 0% 0% 0%		07140204000243	3701.0	3701	100%		0%		0%
07140204000246 2251.0 2251 100% 0% 0% 0% 0% 0% 0%		07140204000244	3564.0	3048	86%		0%	516	14%
07140204000247 5661.0 5661 100% 0% 0% 0% 0% 07140204000248 1170.0 802 69% 368 31% 0% 0% 07140204000249 4534.0 924 20% 3610 80% 0% 0% 07140204000250 3695.0 2637 71% 1058 29% 0% 0% 0% 0% 0% 0% 0%		07140204000245	6286.0	2462	39%	2729	43%	1095	17%
07140204000248		07140204000246	2251.0	2251	100%		0%		0%
07140204000249 4534.0 924 20% 3610 80% 0% Silver Creek 07140204000250 3695.0 2637 71% 1058 29% 0% Silver Creek 07140204000252 7936.0 6065 76% 1871 24% 0% Silver Creek 07140204000253 837.0 837 100% 0% 0% Silver Creek 07140204000254 955.0 955 100% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 3123 39% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%		07140204000247	5661.0	5661	100%		0%		0%
Silver Creek 07140204000250 3695.0 2637 71% 1058 29% 0% Silver Creek 07140204000252 7936.0 6065 76% 1871 24% 0% Silver Creek 07140204000253 837.0 837 100% 0% 0% Silver Creek 07140204000254 955.0 955 100% 0% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 3123 39% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%		07140204000248	1170.0	802	69%	368	31%		0%
Silver Creek 07140204000252 7936.0 6065 76% 1871 24% 0% Silver Creek 07140204000253 837.0 837 100% 0% 0% Silver Creek 07140204000254 955.0 955 100% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 3123 39% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%		07140204000249	4534.0	924	20%	3610	80%		0%
Silver Creek 07140204000253 837.0 837 100% 0% 0% Silver Creek 07140204000254 955.0 955 100% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 3123 39% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%		07140204000250	3695.0	2637	71%	1058	29%		0%
Silver Creek 07140204000254 955.0 955 100% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 319 6% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%	Silver Creek	07140204000252	7936.0	6065	76%	1871	24%		0%
Silver Creek 07140204000254 955.0 955 100% 0% 0% Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 319 6% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%	Silver Creek	07140204000253	837.0	837	100%		0%		0%
Silver Creek 07140204000255 11990.0 11201 93% 789 7% 0% Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 319 6% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%	Silver Creek	07140204000254	955.0	955			0%		0%
Silver Creek 07140204000256 15794.0 10247 65% 4668 30% 879 6% Silver Creek 07140204000257 5118.0 4799 94% 0% 319 6% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%	Silver Creek					789			
Silver Creek 07140204000257 5118.0 4799 94% 0% 319 6% Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%								879	
Silver Creek 07140204000258 8107.0 4984 61% 0% 3123 39%									
Wendell Branch 07140204000555 5815.0 745 13% 0% 5070 87%									

Wandall Dranch	07140204000556	4651.0	4651	1000/		00/		00/
Wendell Branch Wendell Branch	07140204000556	4651.0	4651	100%	1800	0% 48%		0%
Wenden Branch	07140204000558 07140204001230	3970.0 4887.0	2080 3888	52% 80%	1890	48% 0%	999	0% 20%
	07140204001230	5182.0	3644	70%		0%	1538	30%
	07140204001231	2810.0	3044	0%		0%	2810	100%
	07140204001234	4397.0	4397	100%		0%	2810	0%
	07140204001248	4397.0 11176.0	6854	61%		0%	4322	39%
	07140204001247	7624.0	3465	45%	4159	55%	4322	39% 0%
	07140204001254	2017.0	1205	60%	812	40%		0%
	07140204001255						440	0% 4%
		11378.0	10022	88%	907	8%	449	
	07140204001257	17928.0	11936	67%	3986	22%	2006	11%
	07140204001258	3855.0	4220	0%	1661	43%	2194	57%
	07140204001273	4647.0	1238	27%	871	19%	2538	55%
	07140204001274	4742.0	137	3%	4605	97%		0%
	07140204001275	2711.0	2711	100%	1007	0%		0%
	07140204001277	8742.0	6755	77%	1987	23%		0%
	07140204001278	8997.0	7633	85%	1364	15%		0%
	07140204001279	262.0	262	100%		0%		0%
	07140204001280	3485.0	3485	100%		0%	204	0%
	07140204001281	5250.0	4956	94%	2244	0%	294	6%
	07140204001282	15814.0	13603	86%	2211	14%	4252	0%
	07140204001283	8109.0	3757	46%		0%	4352	54%
	07140204001284	3423.0	3423	100%	055	0%	7044	0%
	07140204001285	10996.0	3100	28%	855	8%	7041	64%
	07140204001287	7609.0	1075	14%	3634	48%	2900	38%
	07140204001288	7331.0	7232	99%	2.00	0%	99	1%
	07140204001292	7738.0		0%	3109	40%	4629	60%
	07140204001294	7414.0	3884	52%	651	9%	2879	39%
	07140204001295	4668.0	2722	58%	1946	42%		0%
	07140204001299	5766.0	4508	78%		0%	1258	22%
	07140204001301	4142.0	4142	100%		0%		0%
	07140204001304	8088.0	7537	93%	551	7%		0%
	07140204001305	13894.0	10771	78%	754	5%	2369	17%
	07140204001307	7307.0	2944	40%	3581	49%	782	11%
	07140204001311	8923.0	5823	65%		0%	3100	35%
	07140204001313	5785.0	4857	84%		0%	928	16%
	07140204001314	10719.0	8825	82%	1148	11%	746	7%
	07140204001323	8007.0	3943	49%	2769	35%	1295	16%
	07140204001324	4816.0		0%	4816	100%		0%
	07140204001326	2611.0	2020	77%	591	23%		0%
	07140204001327	5822.0	5325	91%		0%	497	9%
	07140204001328	8147.0	2743	34%	3918	48%	1486	18%
	07140204001337	2905.0	2905	100%		0%		0%
	07140204001339	4110.0	4110	100%		0%		0%
	07140204001340	7648.0	6486	85%	1162	15%		0%
	07140204001349	114.0	114	100%		0%		0%
	07140204001350	15577.0	13843	89%		0%	1734	11%
	07140204001351	16174.0	11306	70%	4868	30%		0%
	07140204001357	18123.0	13681	75%	1341	7%	3101	17%
North Fork Mill	07140204001362	4167.0	4167	100%		0%		0%

Creek								
North Fork Mill	07140204001363	7461.0	6518	87%	417	6%	526	7%
Creek North Fork Mill	07140204001364	2923.0	2923	100%		0%		0%
Creek	07140204001365	7537.0	7537	100%		0%		0%
	07140204001370	1978.0		0%	1978	100%		0%
	07140204001371	4612.0	4612	100%		0%		0%
	07140204001373	2674.0	2257	84%	417	16%		0%
	07140204001374	7376.0	3925	53%	1689	23%	1762	24%
Silver Creek	07140204002277	12320.0	1695	14%	7269	59%	3356	27%
	07140204003145	2208.0		0%	457	21%	1751	79%
	07140204003146	1017.0	1017	100%		0%		0%
	07140204003156	2158.0	1746	81%		0%	412	19%
	07140204003168	9327.0	7825	84%	1379	15%	123	1%
	07140204003173	3301.0		0%		0%	3301	100%
	07140204003184	1104.0		0%	1104	100%		0%
	07140204003186	1753.0	1596	91%	157	9%		0%
	07140204003190	2001.0		0%	2001	100%		0%
	07140204003236	2543.0	2543	100%		0%		0%
	07140204003253	8641.0	8641	100%		0%		0%
	07140204003511	146.0	146	100%		0%		0%
	07140204003528	7420.0	1743	23%		0%	5677	77%
	07140204003639	1109.0		0%		0%	1109	100%
Wendell Branch	07140204003642	1274.0	1274	100%		0%		0%
	07140204003644	737.0		0%	737	100%		0%
Wendell Branch	07140204003650	1546.0	1546	100%		0%		0%
Wendell Branch	07140204003664	2063.0	2063	100%		0%		0%
Wendell Branch	07140204003669	839.0	839	100%		0%		0%
Wendell Branch	07140204003676	1293.0	1293	100%		0%		0%
Wendell Branch	07140204003696	6324.0	4773	75%	1551	25%		0%
	07140204003698	814.0		0%	814	100%		0%
	07140204003708	1529.0	1529	100%		0%		0%
Wendell Branch	07140204003720	2885.0	2885	100%		0%		0%
	07140204003733	181.0	181	100%		0%		0%
Wendell Branch	07140204003737	4222.0	4222	100%		0%		0%
Wendell Branch	07140204003741	5719.0	5719	100%		0%		0%
Wendell Branch	07140204003745	1526.0	1526	100%		0%		0%
Wendell Branch	07140204003752	1362.0	1362	100%		0%		0%
	07140204003755	2607.0	2222	85%		0%	385	15%
Silver Creek	07140204003804	9796.0	4194	43%	5602	57%		0%
Silver Creek	07140204003820	5574.0	5574	100%		0%		0%
	07140204003838	231.0	231	100%		0%		0%
East Fork Silver	07140204002040	106.0	106	100%		0%		0%
Creek	07140204003840	106.0 161.0	106	100%				
	07140204003861	161.0 656.0	161 656	100% 100%		0% 0%		0% 0%
	07140204003867 07140204003909			59%	71 Γ	41%		0%
	07140204003909	1734.0 702.0	1019 702	100%	715	41% 0%		0%
	07140204005944	1758.0	702	0%		0%	1758	100%
	0/140204003338	1/36.0		U70		U%	1/38	100%

	07140204005999	1592.0		0%		0%	1592	100%
	07140204006002	7421.0	3876	52%		0%	3545	48%
Silver Creek	07140204006005	4921.0	4674	95%	247	5%		0%
Silver Creek	07140204006006	1851.0	1029	56%		0%	822	44%
TOTAL		759477.0	511793.0		127952.0		119732.0	
AVERAGE				68%		16%		15%

Riparian condition by stream reach

Table A.76. Riparian condition along assessed stream reaches in the watershed (total stream length assessed and average channelization conditions).

Stream or Tributary Name		Stream Length Assessed	Good Condition	on	Fair Condition		Poor Condition	n
(GNIS name)	Reach Code	(ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
Silver Creek	07140204000192	1144	1144	100%	(-7	0%	(-7	0%
Silver Creek	07140204000196	1063	559	53%	505	47%		0%
Silver Creek	07140204000197	6040	3544	59%	2497	41%		0%
Silver Creek	07140204000201	327	-	0%	327	100%		0%
Silver Creek	07140204000221	14162	11274	80%	2888	20%		0%
Silver Creek	07140204000222	1383	439	32%	944	68%		0%
Silver Creek	07140204000223	12394		0%	12394	100%		0%
Silver Creek	07140204000224	5990	5505	92%	485	8%		0%
Silver Creek	07140204000225	12586	4978	40%	7608	60%		0%
Silver Creek	07140204000226	5368	2452	46%	2916	54%		0%
Silver Creek	07140204000227	3249	2415	74%	834	26%		0%
Silver Creek	07140204000228	9689	654	7%	9035	93%		0%
Silver Creek	07140204000229	1677		0%	1677	100%		0%
Silver Creek	07140204000230	3475		0%	3475	100%		0%
Silver Creek	07140204000231	4032		0%	4032	100%		0%
Silver Creek	07140204000232	1715		0%	1715	100%		0%
Silver Creek	07140204000233	2934	2404	82%	530	18%		0%
Silver Creek	07140204000234	10402	4463	43%	5938	57%		0%
Silver Creek	07140204000235	3876		0%	3876	100%		0%
Silver Creek	07140204000236	3557		0%	3557	100%		0%
Silver Creek	07140204000237	3373		0%	3373	100%		0%
Silver Creek	07140204000238	4652		0%	4652	100%		0%
	07140204000239	14708	3120	21%	11589	79%		0%
	07140204000240	3026	1987	66%	1040	34%		0%
	07140204000242	5752	1616	28%	4136	72%		0%
	07140204000243	3701	2025	55%	1676	45%		0%
	07140204000244	3564	1982	56%	1583	44%		0%
	07140204000245	6286	4496	72%	1789	28%		0%
	07140204000246	2251	576	26%	1675	74%		0%
	07140204000247	5661	3924	69%	1737	31%		0%
	07140204000248	1169	279	24%	891	76%		0%
	07140204000249	4535	4535	100%		0%		0%
	07140204000250	3696	1551	42%	2145	58%		0%
	07140204000251	140	140	100%		0%		0%
Silver Creek	07140204000252	8052	7955	99%	97	1%		0%
Silver Creek	07140204000253	830	830	100%		0%		0%
Silver Creek	07140204000254	955	606	63%	350	37%		0%
Silver Creek	07140204000255	11990	5599	47%	6391	53%		0%
Silver Creek	07140204000256	15794	10428	66%	5366	34%		0%
Silver Creek	07140204000257	5118		0%	4642	91%	476	9%
Silver Creek	07140204000258	12521	5256	42%	7265	58%	222	0%
Lake Fork	07140204000438	13429	10040	75%		0%	3389	25%
Mill Creek	07140204000475	684	684	100%	534	0%		0%
Wendell Branch	07140204000555	4749	4215	89%	534	11%		0%
Wendell Branch	07140204000556	4651	3960	85%	691	15%		0%

Wendell Branch	07140204000558	3970	1716	43%	2131	54%	123	3%
	07140204001230	4887	1649	34%	3238	66%		0%
	07140204001231	5479	3125	57%	966	18%	1389	25%
	07140204001234	2810	658	23%		0%	2152	77%
	07140204001246	4396	1691	38%	2683	61%	22	0%
	07140204001247	14534	5213	36%	3998	28%	5323	37%
	07140204001254	7624	3803	50%	3821	50%		0%
	07140204001255	2008	2008	100%		0%		0%
	07140204001256	11377	5033	44%	1689	15%	4654	41%
	07140204001257	17928	9702	54%	7549	42%	676	4%
	07140204001258	3855	1581	41%		0%	2274	59%
	07140204001273	4837	1427	29%	3298	68%	112	2%
	07140204001274	4688	4378	93%	310	7%		0%
	07140204001275	2711		0%	2711	100%		0%
	07140204001278	5558	5558	100%		0%		0%
	07140204001279	262	188	72%		0%	74	28%
	07140204001280	3485	563	16%	2922	84%		0%
	07140204001281	5250	1770	34%	3186	61%	294	6%
	07140204001282	15814	6737	43%	8693	55%	384	2%
	07140204001283	8108	7156	88%		0%	952	12%
	07140204001284	3423	2152	63%	1271	37%		0%
	07140204001285	11032	6795	62%	4237	38%		0%
	07140204001287	5077	4011	79%		0%	1066	21%
	07140204001288	7331	3958	54%	3374	46%		0%
	07140204001292	7739	2690	35%		0%	5049	65%
	07140204001294	6954	1407	20%	5547	80%		0%
	07140204001295	4668	1273	27%	3395	73%		0%
	07140204001299	5798	4126	71%	353	6%	1319	23%
	07140204001301	934	934	100%	333	0%	1313	0%
	07140204001301	3439	490	14%		0%	2949	86%
	07140204001304	13893	10364	75%	2365	17%	1163	8%
	07140204001303	7306	5148	70%	2159	30%	1103	0%
	07140204001307	8874	8517	96%	2133	0%	357	4%
	07140204001311	5787	2458	42%	3329	58%	337	0%
	07140204001313	10719	2977	28%	6586	61%	1156	11%
	07140204001314	8007	5802	72%		14%	1049	13%
					1155	0%	1049	0%
	07140204001324	4816	4816	100%	404		1649	
	07140204001326	2611	559	21%	404	15%	1648	63%
	07140204001327	5822	2232	38%	3590	62%	F04	0%
	07140204001328	8255	4353	53%	3321	40%	581	7%
	07140204001337	2905	1360	47%	1545	53%		0%
	07140204001339	4110		0%	4110	100%		0%
	07140204001340	7649	4541	59%	2057	27%	1050	14%
	07140204001349	1593		0%	1593	100%	0.40	0%
	07140204001350	15501	5238	34%	9417	61%	846	5%
	07140204001351	16176	9822	61%	6354	39%		0%
Name E. J. A. C.	07140204001357	18025	8579	48%	9082	50%	364	2%
North Fork Mill	07140204001262	4167	4467	1000/		00/		00/
Creek	07140204001362	4167	4167	100%	4534	0%	F.C.C	0%
North Fork Mill	07140204001363	7459	5360	72%	1534	21%	566	8%
Creek	07140204001364	2923	2923	100%		0%		0%
North Fork Mill	0/140204001304	2323	2323	100/0		070		070
Creek	07140204001365	7536	6853	91%	684	9%		0%
	1. 1.510.001000		5555	5-70	00.	570		0,3

	07140204001370	1993	490	25%	1503	75%		0%
	07140204001371	4613	1669	36%	2944	64%		0%
	07140204001373	2674	521	19%	2153	81%		0%
	07140204001374	7374	1950	26%	4542	62%	881	12%
Silver Creek	07140204002277	12318	9931	81%	1091	9%	1297	11%
	07140204003145	2208	1643	74%		0%	565	26%
	07140204003146	1060	1060	100%		0%		0%
	07140204003156	2158	1840	85%		0%	318	15%
	07140204003168	9327	3621	39%	5706	61%		0%
	07140204003173	3301	3301	100%		0%		0%
	07140204003184	1104	1104	100%		0%		0%
	07140204003186	1816	726	40%	1090	60%		0%
	07140204003190	2045	2029	99%	16	1%		0%
	07140204003236	2538	2538	100%		0%		0%
	07140204003253	8641	6323	73%	1386	16%	933	11%
	07140204003528	7420	497	7%	1390	19%	5533	75%
	07140204003639	1295		0%		0%	1295	100%
Wendell Branch	07140204003642	1274		0%	1274	100%		0%
	07140204003644	737		0%		0%	737	100%
Wendell Branch	07140204003650	1546		0%	1546	100%		0%
Wendell Branch	07140204003664	2063		0%	2063	100%		0%
Wendell Branch	07140204003669	840		0%	840	100%		0%
Wendell Branch	07140204003676	1293		0%	1293	100%		0%
Wendell Branch	07140204003696	6323	2101	33%	4222	67%		0%
	07140204003698	816		0%		0%	816	100%
	07140204003708	1529	1089	71%		0%	440	29%
Wendell Branch	07140204003720	2885	1387	48%	1498	52%		0%
Wendell Branch	07140204003737	4216	4216	100%		0%		0%
Wendell Branch	07140204003741	5718	3928	69%	1790	31%		0%
Wendell Branch	07140204003745	1526	1526	100%		0%		0%
Wendell Branch	07140204003752	1362	1362	100%		0%		0%
	07140204003755	2529	2282	90%		0%	248	10%
Silver Creek	07140204003804	9795	7773	79%	2022	21%		0%
Silver Creek	07140204003820	5574	256	5%	5318	95%		0%
	07140204003838	227	227	100%		0%		0%
	07140204003861	161		0%	161	100%		0%
	07140204003867	656		0%	656	100%		0%
	07140204003909	1867	829	44%	1037	56%		0%
	07140204005944	699	699	100%		0%		0%
	07140204005998	1758	406	23%	1352	77%		0%
	07140204005999	1591	1591	100%		0%		0%
	07140204006002	7491	1312	18%	2781	37%	3398	45%
Silver Creek	07140204006005	4921	621	13%	4299	87%		0%
Silver Creek	07140204006006	1856	690	37%	1166	63%		0%
TOTAL		739602.0	375036.2		306647.8		57918.0	
AVERAGE				49.9%		41.5%		8.5%

Streambed erosion by stream reach

Table A.77. Degree of streambed erosion along assessed stream reaches in the watershed.

	Stream Length Assessed	Low Stream Erosion	nbed	Moderate S Erosion	Streambed	High Stream Erosion	mbed
Reach Code	(ft)	(ft)	(%)	(ft)	(%)	(ft)	(%)
07140204000223	250	250	100%	, ,	0%	. ,	0%
07140204000226	200	200	100%		0%		0%
07140204000233	50	50	100%		0%		0%
07140204000237	150	150	100%		0%		0%
07140204000240	200	200	100%		0%		0%
07140204000245	200		0%	200	100%		0%
07140204000250	200	200	100%		0%		0%
07140204000252	100	100	100%		0%		0%
07140204000255	250	250	100%		0%		0%
07140204000258	300	100	33%	200	67%		0%
07140204000436	100		0%		0%	100	100%
07140204000437	450		0%	100	22%	350	78%
07140204000438	400	50	13%	200	50%	150	38%
07140204000475	200	200	100%		0%		0%
07140204000476	100		0%		0%	100	100%
07140204000478	400	100	25%	300	75%		0%
07140204000479	300		0%		0%	300	100%
07140204000555	300	300	100%		0%		0%
07140204000556	100		0%	100	100%		0%
07140204000558	200		0%	200	100%		0%
07140204001231	200		0%		0%	200	100%
07140204001234	50		0%	50	100%		0%
07140204001246	50	50	100%		0%		0%
07140204001247	350		0%	350	100%		0%
07140204001254	500	500	100%		0%		0%
07140204001256	200	100	50%	100	50%		0%
07140204001257	375	225	60%	150	40%		0%
07140204001258	50	50	100%		0%		0%
07140204001273	50	50	100%		0%		0%
07140204001277	100	100	100%		0%		0%
07140204001282	250	100	40%	150	60%		0%
07140204001283	50		0%	50	100%		0%
07140204001285	150	150	100%		0%		0%
07140204001287	100	100	100%		0%		0%
07140204001288	250	250	100%		0%		0%
07140204001292	100		0%	100	100%		0%
07140204001294	50	50	100%		0%		0%
07140204001299	200	100	50%	100	50%		0%
07140204001302	150	150	100%		0%		0%
07140204001305	400	400	100%		0%		0%
07140204001307	200	200	100%		0%		0%
07140204001311	250	250	100%		0%		0%

07140204001313	200	200	100%		0%		0%
07140204001314	300	300	100%		0%		0%
07140204001323	200	50	25%		0%	150	75%
07140204001324	300		0%	300	100%		0%
07140204001326	50		0%	50	100%		0%
07140204001327	100	100	100%		0%		0%
07140204001328	300	150	50%		0%	150	50%
07140204001340	450	450	100%		0%		0%
07140204001350	600	200	33%	400	67%		0%
07140204001351	650		0%	650	100%		0%
07140204001357	150	50	33%		0%	100	67%
07140204001362	400		0%		0%	400	100%
07140204001363	150		0%	150	100%		0%
07140204001365	75		0%	75	100%		0%
07140204001370	300		0%		0%	300	100%
07140204001373	150	150	100%		0%		0%
07140204001374	400		0%	200	50%	200	50%
07140204002277	200	200	100%		0%		0%
07140204003145	50	50	100%		0%		0%
07140204003156	250		0%		0%	250	100%
07140204003168	150	150	100%		0%		0%
07140204003186	200		0%	200	100%		0%
07140204003190	50		0%	50	100%		0%
07140204003236	100	100	100%		0%		0%
07140204003253	200	200	100%		0%		0%
07140204003528	250		0%		0%	250	100%
07140204003657	100		0%	100	100%		0%
07140204003696	150		0%	150	100%		0%
07140204003720	100	100	100%		0%		0%
07140204003741	150		0%	150	100%		0%
07140204003804	150	150	100%		0%		0%
07140204003838	250		0%		0%	250	100%
07140204003861	100	100	100%		0%		0%
07140204003933	300		0%		0%	300	100%
07140204005998	200	200	100%		0%		0%
07140204006002	125		0%	125	100%		0%
07140204006006	300	300	100%		0%		0%
TOTAL	16675	8175		4950		3550	
AVERAGE			53%		30%		17%

Detention/retention basin site visit data

Table A.78. Detention and retention basin site visit data. "Naturalized" indicates native trees and vegetation around the basin. Inlets counted do not include black pipes from roof gutters.

Coordinates & road name	Туре	Approx. size (ac)	# inlets	# outlets	Type of outlets	Trash rack present?	Maintenance/design problems	Potential improvements recommended	Condition
38.787996 -89.886048	Retention				Overflow channel		Algae present	Dredging Use overflow pipe rather	
Staunton Rd	Wet bottom	0.59	2	1	(vegetated)	No	Sediment	than outlet channel, or a rock overflow	POOR
	Not naturalized				flowing to		Scouring of outlet channel	Native vegetation instead of	
	Turf slopes				a field			turf	
38.894895 -89.841558	Retention						Sediment filled in the sides (grass growing)	Dredging Bank stabilization (more	
Cimarron Dr	Wet bottom				Overflow		Algae present	riprap)	AV/ED A GE
	Not naturalized	0.44	2	1	pipe (under road)	No	Bank erosion	Longer outlet pipe reaching further into basin	AVERAGE
	Turf slopes				Today		Murky milky water Trash present	Native vegetation instead of turf	
38.885043 -89.741828	Retention						Small amount of algae	Bank stabilization on W side	
Landolt Dr	Wet bottom	4.78	>2	1	Pipe (overflow)	No	Bank erosion on W side (Unclear where overflow water	Native vegetation instead of	GOOD
	Not naturalized	4.76			(overnow)		goes - hazard?)	turf	
	Turf slopes						0		
38.765788 -89.813362	Detention						Algae present	Maintenance plan for	
Virginia Dr	Dry bottom		1	1	Channel?	Not seen	Trash Presence of invasives -	removal of invasives and	GOOD
	Naturalized	1.35	1	1	Not visible.	Not seen	multiflora rose	controlling spread of willow	GOOD
	Trees/grasses on slopes						Willow may take over the area	as desired	
38.731492 -89.834977	Retention	1.12			Swale			Continue riprap stabilization	
Schmalz Rd	Wet bottom	1.12	1	1	(overflow)	No	Algae present	on steeper S slope	GOOD
	Not naturalized								

	50:50 turf & riprap slopes								
38.723060 -89.856693	Detention						Invasive species - very dense phragmites	Mow basin more often	
Oakshire Dr	Dry bottom	0.51					Very dense cattails	(Dale Grapperhaus)	
	Naturalized		2	1	Pipe	No	Trash present Outlet pipe leads towards	Remove/treat invasive phragmites and plant native	POOR
	Turf slopes						power station - potentially unsafe	grasses/trees	
38.727221 -89.873027	Retention						(Treated for place, water blue		
Theresa Dr	Wet bottom				Natural		(Treated for algae - water blue Old railroad ties stabilizing S	Replace railroad ties with	
	Not naturalized	2.06	1	1	overflow	No	bank are getting older and	stabilizing feature before banks cave in	GOOD
	Turf slopes						starting to disintegrate	baliks cave iii	
38.706187 -89.866577	Retention						(Treated for algae - water blue)	Dredging Unclog culvert under road	
Country Ln	Wet bottom		1	2	Culverts in the dam	No	Road floods (according to	Replace trees on dam wall	AVERAGE
	Not naturalized	0.88	1	2	wall	NO	neighbor) - blocked under-road pipe from field to basin	with rock/material that	AVERAGE
	Turf slopes						Sediment	won't degrade its structural integrity	
38.706796 -89.897205	Retention				Pipe to creek and		(Treated for algae - water blue) Sediment	Bank stabilization on S end	
Antler Dr	Wet bottom	4.05	2	2	overflow	No	Submerged inlet pipe	Replace inlet pipe with one	AVERAGE
	Not naturalized	1.85			grassed		Road narrowing uphill from the	above water level	
	Turf slopes	_			swale		basin as it collapses		
38.745551 -89.920539	Retention					Yes -			
Whitworth Dr	Wet bottom	0.52	3	1	3-pipe outlet (very	screens on 2 of	None	None	GOOD
	Not naturalized				large pipes)	the 3			
	Riprap slopes					pipes			

References

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³ NOAA (National Oceanic and Atmospheric Administration). National Climatic Data Center. Climate data search for Madison, Macoupin, and Montgomery counties. Accessed July 2014 from http://www.ncdc.noaa.gov/
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COMMUNITY FLOOD SURVEY REPORT 2014



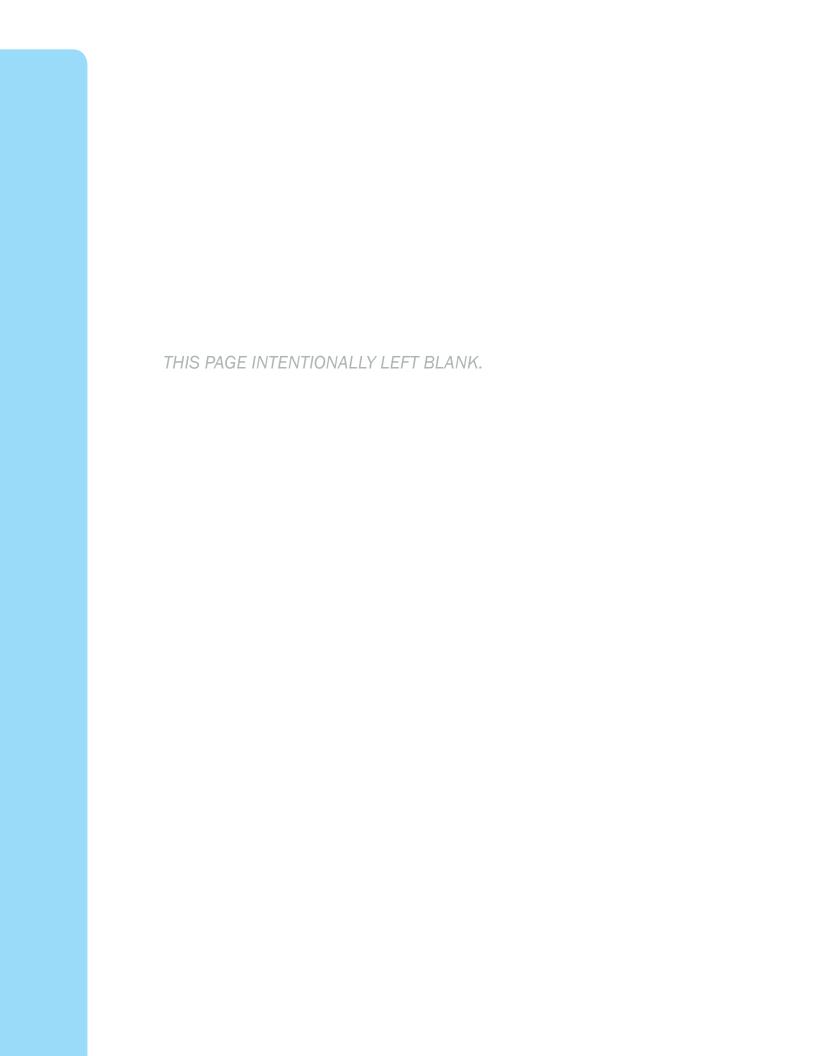
UPPER SILVER CREEK WATERSHED MADISON COUNTY, ILLINOIS

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EXECUTIVE SUMMARY

This report summarizes the findings of the Madison County Community Flood Survey, which was distributed to homeowners and business owners in the Upper Silver Creek Watershed to gather information about the location, extent, impacts, and causes of flooding in the watershed.

A total of 477 surveys were completed from within the study area out of 2,000 mailed out, giving a response rate of 24%. Some of these were collected via an online survey.

A watershed is an area that drains to a defined point. Watersheds are defined at a variety of scales for different purposes. For management and analysis purposes, the Upper Silver Creek Watershed is defined by smaller hydrologic units between up-stream and down-stream points. Each unit has a unique 14-digit hydrologic unit code (HUC), and these units are informally called HUC14 subwatersheds. Thirty percent (30%) of survey respondents were within the HUC14 subwatershed that contains Troy, 07140204050603. All HUC14 subwatersheds had at least 2 respondents.

Key Findings

- **PREVALENCE**: Over a quarter of respondents (26%) experienced flooding in the last 10 years.
- **FREQUENCY**: 55% of respondents with flooding experienced flooding at least once per year in the last 10 years. On average, respondents with flooding experience 2.7 floods per year.

AVERAGE

2.7

FLOODS PER YEAR

- **EXTENT OF DAMAGE**: Of those who had been flooded in the last 10 years:
 - 45% said that the flooding had damaged their primary home or business;
 - 43% had damage to fences, auxiliary buildings, and other structures; and
 - 46% had damage to yards and landscaping.
- NEIGHBORS: Half of all survey respondents were aware of flooding on one or more of their neighbors' properties. Of the survey respondents who had been flooded, half said that their neighbors had also been flooded.



- TOP FOUR CAUSES OF FLOODING:
 - 1. Heavy rainstorms
 - 2. Water draining from a neighboring property
 - 3. Flooding from a nearby river, stream, lake, ditch, or pond
 - 4. Blocked or unmaintained pipe, culvert, or ditch
- **REPORTING:** Over half of respondents who had flooding did not report it to anyone. Those that did report it were most likely to contact their city or village (18%) or their township (13%).
- EFFECTS FROM FLOODING: Stress was the most commonly reported impact from flooding. Others included loss of access to property, including loss of access to major entry/exit routes to their homes; lost business income; crop damage; and repair and replacement costs of goods and structures.



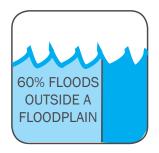
 MONETARY LOSS: Two-thirds who reported a monetary loss said their monetary loss over 10 years was less than \$5,000. Another 24% said that the loss was between \$5,000 and \$20,000. Two respondents (4% of those who answered) said their losses were between \$100,000 and \$500,000.

Respondents reported a total of at least \$330,016 in costs due to flooding over the last 10 years. Each respondent who reported a cost paid at least \$6,471 over 10 years. The average cost paid was \$18,579 over 10 years. It is estimated that about \$42,902,080 was lost due to flooding over the last 10 years in the Upper Silver Creek Watershed.

\$43 Mill

LOST DUE TO
FLOODS IN LAST 10
YEARS

- RELATIONSHIP TO FLOODPLAINS: Floodplains designated by the Federal Emergency Management Agency (FEMA) constitute close to 11% of the total acreage in the Upper Silver Creek Watershed within Madison County, and 13% of the survey responses came from parcels wholly or partly within a FEMA-designated floodplain. However, 10% of survey respondents did not know that they lived or owned property in a FEMA-designated floodplain.
- FLOODING OUTSIDE OF THE FLOODPLAIN: Flooding does not always
 occur in floodplains in the watershed. Respondents reported that
 approximately 146 events per year occur outside of FEMA-designated
 floodplains in the watershed. Within floodplains, approximately 88 flood
 events per year were reported.



- FLOOD INSURANCE: Fourteen percent (14%) of respondents have flood insurance.
- **FLOOD INSURANCE CLAIMS**: Eight percent (8%) of people who have flood insurance (5 respondents) have made one or more claims. Of those respondents who have flood insurance, 54 (82%) have it on structures that are not in a floodplain.
- **DOWNSPOUTS**: Ninety percent (90%) of respondents said their downspouts flow out onto their lawn or other ground surface. Five prercent (5%) of respondents said their downspouts were connected to cisterns, rain barrels, or other rainwater harvesting storage, and the remaining 5% said they were connected to storm sewers.



ACTIONS TAKEN TO PREVENT FLOODING: 138 respondents made one
or more improvements to try to prevent or reduce flooding on their
properties.

- CROPLAND FLOODING: Six percent (6%) of all survey respondents own cropland that has flooded. Two-thirds of these respondents said that the cropland had flooded 6-10 times in the last 10 years.
- VALUING WATER MANAGEMENT: Respondents to the survey place high value on clean drinking water, prevention of flood damage, water-based recreation, and healthy ecosystems (in that order).
- FLOODING "HOTSPOTS": Three (3) HUC14 subwatersheds, 07140204050401, 07140204050304, and 07140204050101, were reported "hotspots" for flooding in the Upper Silver Creek Watershed. These hotspots were determined based on a simple ranking/prioritization tool that considers percentage of respondents reporting flooding, frequency of flooding, occurrences of neighbors' flooding, and monetary loss due to flooding. However, these HUC14s also had a low number of respondents (6, 17, and 2, respectively).

INTRODUCTION

This section provides a brief overview of the survey and its purpose.

Overview

Several areas in Madison County regularly experience flooding. Some of this flooding occurs in floodplains designated by the Federal Emergency Management Agency (FEMA), which cover almost 15 percent of the county's area (approximately 110 square miles) and contain at least 4,128 structures with a total value of more than \$213 million.¹ A great deal of flooding also occurs outside of floodplains. During heavy storms, inadequate drainage or stormwater infrastructure, coupled with large expanses of impervious surfaces, can cause flooding almost anywhere. Although structures in designated floodplains have been identified, and their owners made aware of their flood risk through the National Flood Insurance Program (NFIP), there is no data or notification system for structures outside of floodplains in Madison County.

Madison County promotes flood-safe development practices and the protection of existing development from flood risk. To determine how to best allocate resources and address flood problems, the locations, causes, and extents of flooding need to be identified. Map-based data and other data gathered by government agencies and organizations are useful to identify flood problems. However, a survey of homeowners and businesses is the most direct way to reveal the location, cause, and extent of flood problems they face.

The economic, social, and environmental consequences of flooding can be substantial to people and communities. Chronically wet houses and land result in higher insurance rates and deductibles, and industry experts estimate that wet basements decrease property values by 10-25 percent.² Almost 40 percent (40%) of small businesses never reopen their doors following a flooding disaster.³ In the streams, rivers, lakes, and ponds that collect floodwater, erosion becomes a significant problem and water quality declines as sediment and other pollutants enter the water supply.

The Illinois Department of Natural Resources (IDNR) is currently conducting a survey on urban flooding, as directed by the Urban Flooding Awareness Act. Urban flooding is defined in the Act as "the inundation of property in a built environment, particularly in more densely populated areas, caused by rainfall overwhelming the capacity of drainage systems, such as storm sewers. "Urban flooding" does not include flooding in undeveloped or agricultural areas." Using this definition, the Madison County Community Flood Survey has collected data on urban flooding as well as non-urban flooding. The State of Illinois will use the results of the Urban Flood Survey to develop strategies for minimizing flood damage and increase the availability, affordability, and effectiveness of flood insurance.

Survey Area - Upper Silver Creek Watershed

The Upper Silver Creek watershed is located 20 miles northeast of St. Louis, Missouri in southwestern Illinois. The majority of the watershed is in Madison County, and small portions fall within Macoupin and Montgomery counties. Silver Creek flows south from the project area to join the Kaskaskia River, which ultimately drains into the Mississippi River.

The majority of the watershed's population lives in unincorporated areas. Portions of thirteen (13) municipalities are also in the watershed, including Troy, Mount Olive, Marine, and Livingston.

Silver Creek has been identified as an impaired water by the Illinois Environmental Protection Agency (IEPA) because of pollution from animal feeding operations, municipal point source discharges, urban runoff, and crop production. In addition, the watershed experiences flooding inside and outside of its designated 100-year floodplains, causing damage to property and threatening life safety.

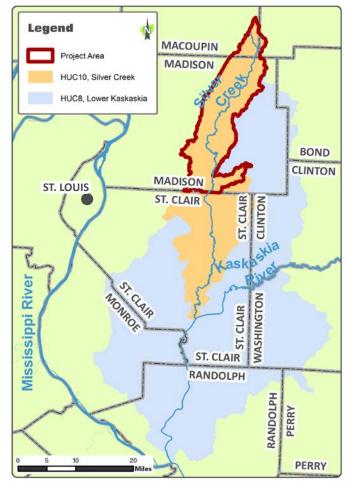


FIGURE 1. UPPER SILVER CREEK PROJECT AREA

The Madison County Community Flood Survey ("the Survey") was conducted in the summer and fall of 2014 to get a better understanding of flooding issues in the Upper Silver Creek project area. The findings of the Survey will be incorporated in the Upper Silver Creek Watershed Plan. When completed, the Plan will provide recommendations for improving water quality and flooding.

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METHODOLOGY

This section discusses survey design, the survey area, how the results were mapped, and limitations of the data.

Survey Area

The survey was mailed to recipients in the Upper Silver Creek watershed, which encompasses 120,091 acres. This watershed extends from Mount Olive in Macoupin County in the north to the Madison-St. Clair County boundary line in the south, and from Troy in the west to Marine in the east. The survey was also available online for community members in the watershed. Some survey respondents provided addresses outside the watershed. These responses were not considered in the results of this report.

Subwatersheds

A watershed is an area that drains to a defined point. Watersheds are defined at a variety of scales for different purposes. For management and analysis purposes, the Upper Silver Creek Watershed is defined by smaller hydrologic units between up-stream and down-stream points. Each unit has a unique 14-digit hydrologic unit code (HUC), and these units are informally called HUC14 subwatersheds or "HUC14s".

The watershed plan project area and survey distribution area is composed of 20 HUC14 subwatersheds (See map on next page). The HUC14s were delineated using methods employed by United States Geological Survey (USGS) to define watersheds in the Watershed Boundary Dataset (WBD), a component of the National Hydrography Dataset (NHD), a nationwide database of waterways and waterbodies. The HUC14s range from 2,758 to 9,613 acres in size.

Survey Design

The Madison County Community Flood Survey consisted of sixteen (16) questions covering a variety of flooding topics, including frequency of flooding, causes of flooding, the extent and costs of flood damage, flood insurance coverage, and personal values about water quality. A full copy of the survey is available in the Appendix.

Questions were created using best practices to maximize survey response, such as:

- **Powerful purpose:** The survey stated that Madison County is trying to identify and solve flooding problems to make it safer to invest and live in Madison County.
- Simple to return: The survey was made as easy to return as possible, with a stamped, self-addressed envelope enclosed. For those wishing to take the survey online, a QR code directed phone users directly to the survey on the website.
- Privacy assurance: Survey respondents feel more comfortable providing information when they know how it will be used and that it will be kept private. The first question included a disclaimer that addresses will be kept confidential.

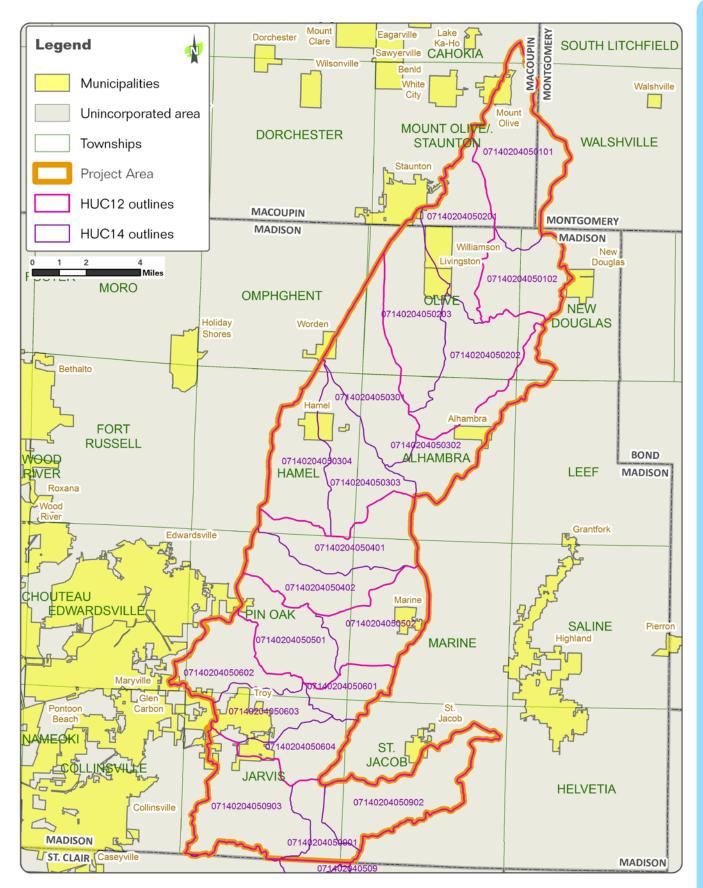


FIGURE 2. UPPER SILVER CREEK WATERSHED PROJECT AREA WITH HUC14 LOCATIONS AND LOCAL JURISDICTIONS.

Survey Distribution and Outreach

Two thousand (2,000) surveys were mailed to randomly selected addresses in the Upper Silver Creek Watershed. Most addresses were in Madison County and a few were in Macoupin County. The randomized list of addresses was created by assigning a number to each parcel in the watershed, and then generating 2,000 random addresses within the range to correspond to the parcels. Duplicate addresses and names were omitted, as were P.O. Box addresses and addresses outside the watershed. These filters resulted in a mailing list of residents, businesses, and property owners currently living or working in the watershed. Madison County printed and mailed the surveys, received the returned responses, and entered the response data.

The survey was also available on the web via SurveyMonkey.com. The mailed survey contained a link to the online survey so recipients could fill it out online instead of by hand. The survey link was also sent to email addresses of interested people and organizations. Some of the recipients of the emailed link may have forwarded it to others.

The survey was publicized at individual and group stakeholder meetings, public open houses, and other meetings for the Upper Silver Creek Watershed Plan. Two weeks after the survey was mailed, reminder postcards were distributed to the same list of mailing addresses to maximize the response rate (and promote the concurrent Open House events for the Watershed Plan). The reminder postcard is available in the Appendix.

Survey Results Mapping

For those respondents who provided an address, the parcel number associated with that address was identified so that the responses could be mapped. Parcel numbers were found using data files from Madison County and the County Assessor's online database.

The response data was grouped and mapped by HUC14 subwatershed. Further geographic breakdown of the response data, such as by Census block, was not possible while maintaining the privacy of respondents' locations.

Data Limitations

It is likely that people who have experienced flooding and received the survey were more likely to reply to the survey than those who have not experienced flooding. Those who received the survey and have never been flooded were more likely not to respond. Of those who did complete the survey, some may not have owned the property for all of the previous 10 years, meaning their estimates are underestimates of frequency and cost. Poor handwriting may also have led to data entry errors. For example, there were at least 35 typos/misinterpretations among responses in the "address" field.

Urban areas were geographically overrepresented in this survey because of the randomized parcel selection process; the ratio of the number of urban to rural parcels is greater than the ratio of the area of urban to rural parcels. This effect is compounded by the fact that a single property owner in a rural area often owns several parcels, and duplicate names were removed in the address selection process causing fewer rural parcels were on the list. Essentially, a geographically representative sample, or one that gave greater weight to answers from rural parcels based on their larger size, would have looked very different.

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SURVEY RESULTS

This section provides the compiled results of the survey. Additional survey response information is available in the Appendix.

Response Rate

A total of 501 unique surveys were completed and returned. Of the total respondents, 477 were properties within the Upper Silver Creek Watershed survey area, and 24 were outside the survey area. The results discussed here are only from the 477 within the study area.

The number of responses exceeded the initial goal of 400 surveys. With this sample size, the survey results are accurate within +/-5% at the 95% confidence level. The response rate of surveys within the watershed is 24%.

Most surveys were returned in hard copy by mail, six (6) were returned at open house events, and other responses were entered online. The online survey gathered responses from 38 people who had not been sent a mailed survey. One hundred thirty-six (136) mailed surveys were returned to the County as a result of invalid addresses.

Survey responses were received from throughout the watershed. Over half of the survey responses came from the Troy area (zip code 62294). At least two (2) responses were received from within each HUC14. A median of 14 responses were received from each HUC14. In HUC14 subwatersheds with only a few respondents, the sample size cannot support strong conclusions. Furthermore, respondents who said they had been flooded in the last 10 years represent an even smaller subset of the population. The number of respondents in each subwatershed replying that they had been flooded ranged between one (1) (four HUC14 subwatersheds) and 34 (HUC 07140204050603).

TABLE 1. ZIP CODE OF SURVEY RESPONDENTS WITHIN WATERSHED PLAN PROJECT AREA

ZIP CODE	RESPONDENTS IN WATERSHED		
Troy (62294)	257	53.9%	
Edwardsville (62025)	64	13.4%	
St. Jacob (62281)	43	9.0%	
Marine (62061)	33	6.9%	
Alhambra (62001)	32	6.7%	
Hamel (62046)	10	2.1%	
Staunton (62088)	10	2.1%	
Worden (62097)	10	2.1%	
New Douglas (62074)	8	1.7%	
Highland (62249)	6	1.3%	
Glen Carbon (62034)	4	0.8%	
TOTAL	477	100%	

Most of the responses (470)

were able to be mapped by identifying parcel information from the address given. All of these mappable responses came from the Madison County portion of the watershed.

HUC 07140204050603 (Troy/NW St. Jacob) had the highest concentration of surveys returned with 151, or 30% of all survey responses. The next highest, with 69 responses and 14% of surveys returned is HUC 07140204050604 (E Troy/W St. Jacob), followed by HUC 07140204050903 (Southern Troy Area) with 59 responses, or 12% of all survey responses.

The total land area of the parcels from which surveys were returned is 2,841 acres (2.4% of the overall Watershed Plan Project Area). Parcel sizes ranged between 0.03 and 174 acres, with an average of six (6) acres.

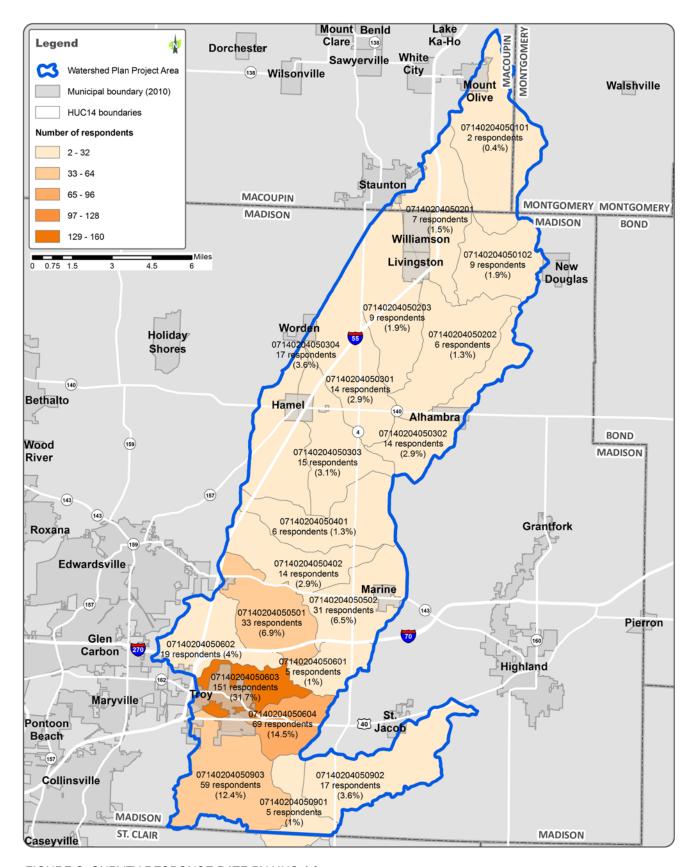


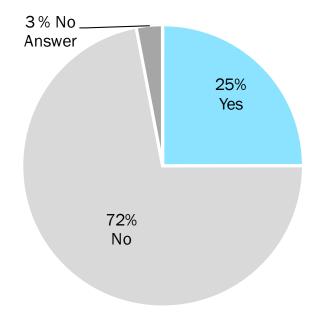
FIGURE 3. SURVEY RESPONSE RATE BY HUC 14

Note: Several respondents' properties were within two HUC14s and were counted in both.

Prevalence

Over a quarter of respondents (26%) replied that they had experienced flooding in the last 10 years.

FIGURE 4. PERCENT OF RESPONDENTS WITH FLOODING IN THE LAST 10 YEARS



HUC 07140204050603 (Troy/NW St. Jacob) had the largest number of respondents with flooding in the last 10 years, with 34 responses. HUCs 07140204050601 (S Marine/NW St. Jacob), 07140204050202 (NE Alhambra/SW New Douglas), and 07140204050101 (Mt. Olive) had the highest percentages of respondents who experienced flooding events in the last 10 years. The lowest percentage of respondents that had been flooded was for the subwatershed containing Williamson (HUC 07140204050201).

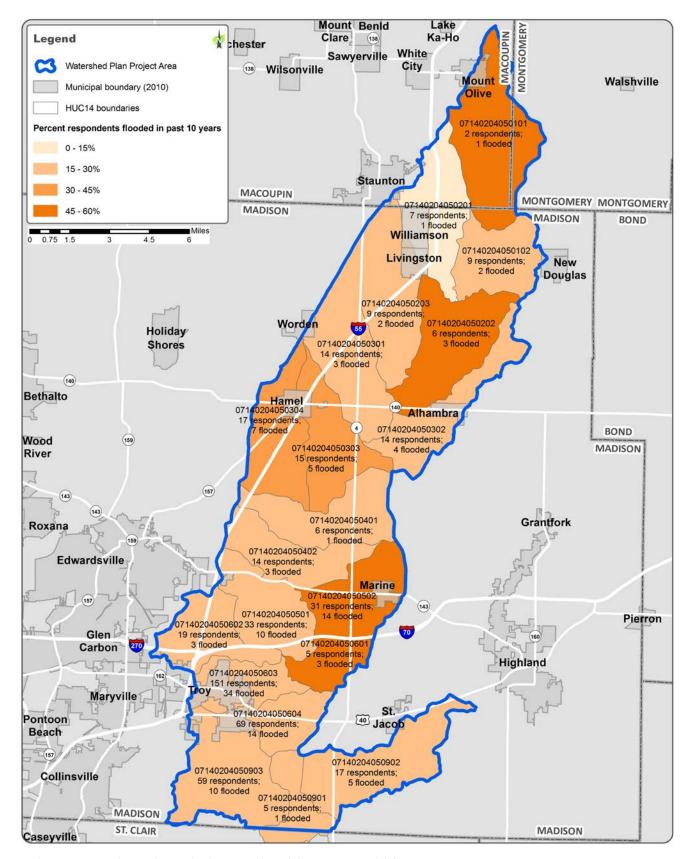


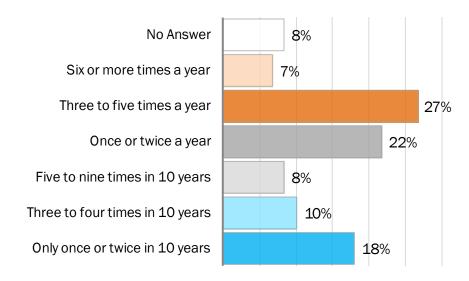
FIGURE 5. PERCENT OF RESPONDENTS FLOODED BY HUC14

Note: Several respondents' properties were within two HUC14s and were counted in both.

Frequency

Of the respondents who had experienced flooding in the last 10 years, 55% experienced flooding at least once per year in the last 10 years. The two most popular responses regarding flooding frequency were three to five times per year (27%), and once or twice per year (22%).

FIGURE 6. FREQUENCY OF RESPONDENTS' FLOODING OVER 10 YEARS



Respondents reported a total of 238 flood events per year in the watershed. When spread over 10 years, it totals around 2,375 flood events. Multiple respondents may have reported the same flood events, and, therefore, they may appear twice or more in the results.

TABLE 2. FREQUENCY OF FLOODING

FLOODING FRQUENCY	RESP	ONSES	AVG. TIMES PER YEAR	AVG. FREQUENCY x RESPONSES
1-2 Times in 10 Years	22	18%	0.15	3.3
3-4 Times in 10 Years	12	10%	0.35	4.2
5-9 Times in 10 Years	10	8%	0.7	7.0
1-2 Times Per Year	26	22%	1.5	39.0
3-5 Times Per Year	32	27%	4.0	128.0
6 or More Times Per Year	8	7%	7.0	56.0
No Answer	10	8%	-	-
TOTAL	120		2.7 (AVG)	

Based on a weighted average of responses per HUC14, the areas with the highest reported frequency of flooding are HUC 07140204050401 (South of Alhambra) and HUC14 07140204050901 (south of Troy at the Madison and St. Clair Counties' border), each with an average of seven (7) flood events per year. On average, respondents with flooding experience 2.7 floods per year across the watershed.

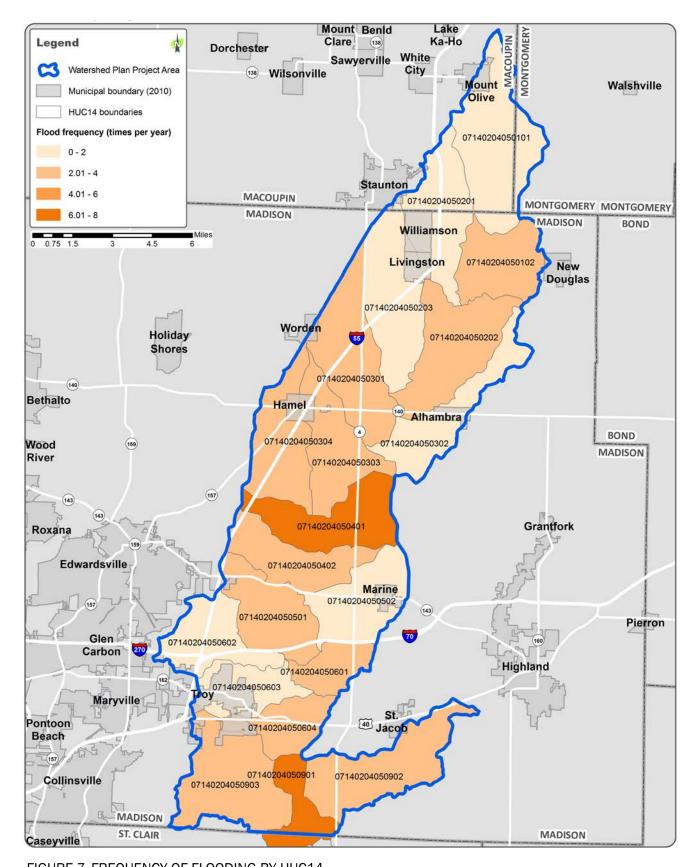


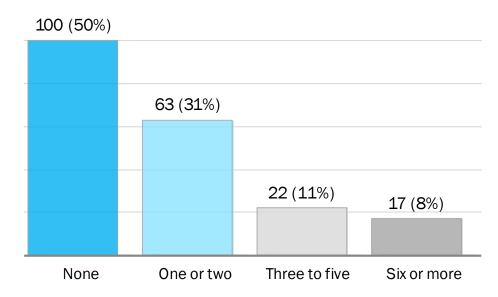
FIGURE 7. FREQUENCY OF FLOODING BY HUC14

Note: Several respondents' properties were within two HUC14s and were counted in both.

Neighbors with Flooding

Half of respondents were not aware of any flooding on neighboring properties. Nearly one-third of respondents were aware of flooding on one to two neighboring properties. Of the respondents who had been flooded, half said that their neighbors had also been flooded.

FIGURE 8. RESPONDENTS' NEIGHBORS THAT ALSO HAD FLOODING IN THE LAST 10 YEARS



Note: Although only 120 respondents reported flooding on their own properties, 205 people responded to this question about their neighbors, which is about 43% of all survey respondents.

On average, 53% of respondents per HUC14 who had flooding in the last 10 years also reported flooding on neighboring properties. This amounts to an average of 1.5 neighboring properties with flooding per respondent with flooding.

All respondents with flooding in HUCs 07140204050401 (center of the watershed) and 07140204050101 (Mt. Olive) also had neighbors with flooding. HUC 07140204050401 also had the highest weighted average of flooded neighboring properties, with an average of seven (7) neighboring properties with flooding per respondent. HUCs 07140204050901 (Madison-St. Clair County border), 07140204050202 (Alhambra/New Douglas), 07140204050203 (Livingston), and 07140204050304 (Hamel/Worden) had an average of two (2) or more neighboring properties with flooding per respondent.

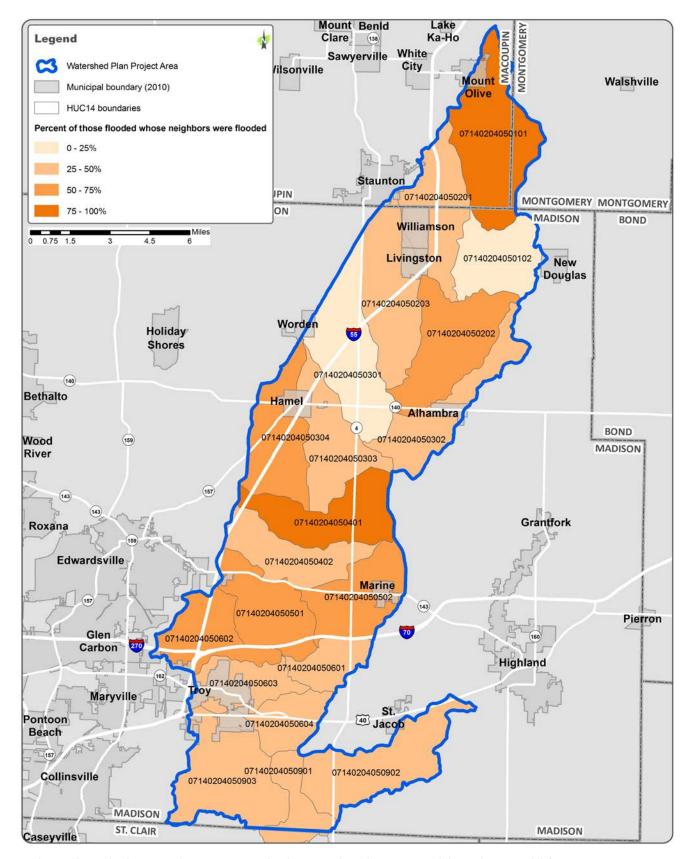


FIGURE 9. RESPONDENTS WITH AT LEAST ONE NEIGHBOR WITH FLOODING BY HUC14

Note: Several respondents' properties were within two HUC14s and were counted in both. Map shows the weighted average of respondents who had been flooded and who said that at least one of their neighbors had been flooded in the last 10 years, as a weighted average, by HUC14

Extent of Flood Damage

Of those who had been flooded in the last 10 years, 45% said that the flooding had damaged their primary home or business; 43% had damage to fences, auxiliary buildings, and other structures; 46% had damage to yards and landscaping; and 70% had little to no yard damage.

Out of the 54 respondents who said their primary home or business had been damaged by floods, 72% said the flooding reached the basement, and 26% said it reached the first floor or habitable space.

FIGURE 10. EXTENT OF FLOODING DAMAGE IN THE LAST 10 YEARS Note: Respondents could select more than one answer to this question

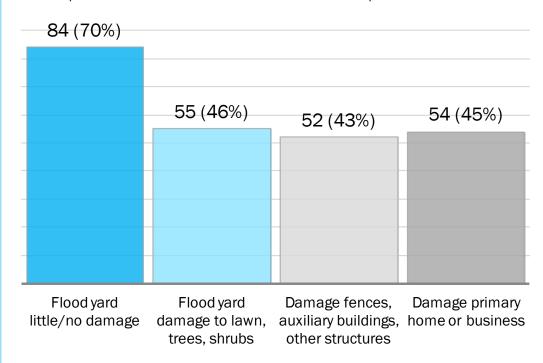
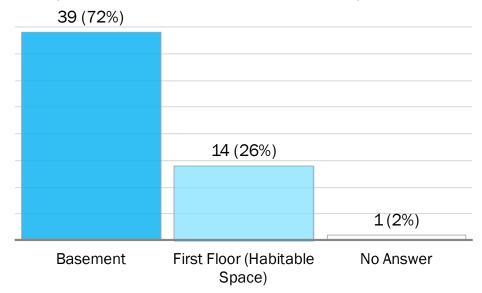


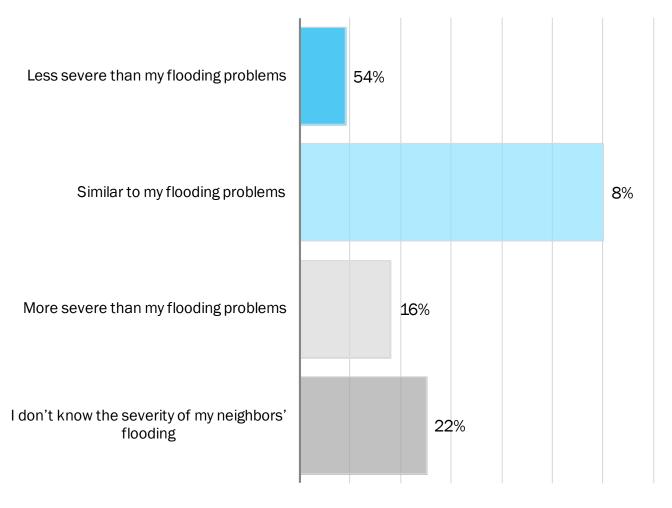
FIGURE 11. LOCATION OF DAMAGE TO PRIMARY HOME OR BUSINESS Note: Respondents could select more than one answer to this question



Severity of Neighbors' Flood Damage

Half of the respondents who had been flooded said that their neighbors had also been flooded. Of these, 54% said that the extent of their neighbors' flooding was similar to their own. Another 16% said their neighbors' flooding was more severe than their own, while 8% said it was less severe. This indicates that the flood damage reported by respondents about their own property may be representative or an understatement of the wider effects of flooding on their communities.

FIGURE 12. EXTENT OF NEIGHBORS' FLOODING DAMAGE IN THE LAST 10 YEARS



Causes of Flooding

All respondents who had been flooded said that heavy rainstorms were a cause of their flooding. Other causes with responses were water draining from a neighboring property (48%); flooding from a nearby river, stream, lake, ditch, or pond (37%); and a blocked or unmaintained pipe, culvert, or ditch (34%). For this question, respondents could choose more than one answer, so these responses were not mutually exclusive.

TABLE 3. CAUSES OF RESPONDENTS' FLOODING

CAUSE	RESPONSES		
Heavy Rainstorm	120	100%	
Water Draining from Neighboring Property	57	48%	
Flooding from Nearby River, Stream, Lake, Ditch, or Pond	41	37%	
Pipe, Culvert, or Ditch that was Blocked/Needs Maintenance	33	34%	
Lack of Drainage Facilities to Drain Water From Property	30	28%	
Log-Jam or Other Obstruction in Nearby Watercourse/Waterbody	26	25%	
Sewer Backup	7	22%	
I Don't Know	4	6%	
Other (see Appendix)	44	3%	

Forty-four (44) respondents listed other causes of flooding. Some common responses include malfunctioning sump pumps (including no backup power available to run the pump during a power outage), crawl space or basement present in high water table areas, improper drainage/grading design of subdivision, and blocked or improperly sized culverts. The full list is provided in the Appendix.

Overflow from a river, stream, ditch, or pond was reported as a cause of flooding by all respondents in HUCs 07140204050101 (Mt. Olive/Walshville) and 07140204050202 (Alhambra/New Douglas), and two-thirds of respondents with flooding in HUC 07140204050601 (Marine/St. Jacob).

Neighboring properties contributed floodwater to all respondents' properties within HUCs 07140204050101 (Mt. Olive), 07140204050201 (Williamson/Staunton), and 07140204050203 (Livingston), and to more than two-thirds of respondents in HUCs 07140204050604 (Troy/St. Jacob), 07140204050202 (Alhambra/New Douglas), and 07140204050402 (between Edwardsville and Marine).

Blocked or unmaintained pipes, culverts, or ditches contributed to flooding in more than one-quarter of respondents with flooding in HUCs 07140204050203 (greater Livingston) and 07140204050601 (Marine/St. Jacob). See Appendix for full breakdown.

Reporting

Over half of respondents who were flooded did not report their flooding to anyone. Respondents that did report it were most likely to contact their city/village (18%) or their township (13%).

TABLE 4. HOW RESPONDENTS REPORTED FLOODING

REPORTED FLOODING TO:	RESPONSES		
I did not report my flooding to anyone	81	53%	
My city/village	27	18%	
My township	20	13%	
My insurance company	13	9%	
Madison County	7	5%	
Crop insurance company*	1	<1%	
Developer*	1	<1%	
Former mayor*	1	<1%	
Homeowners insurance*	1	<1%	
Public hearing on neighbor's development project*	1	<1%	

^{*} Written in under "Other"

Impacts and Effects from Flooding

The most commonly reported impact from flooding was stress. Loss of access to the property was the next most common impact, with respondents commenting under "Other" that floods had restricted access on their own land (e.g., their driveway flooded) or blocked an entrance road to their subdivision. Several responses noted costs associated with repairing flood damage or replacing lost items (a combined 17%). Respondents identified other specific effects including increases in homeowners' insurance rates, the presence of mosquitoes in floodwater, and delays and difficulties with yard maintenance.

TABLE 5. EFFECTS FLOODING HAD ON RESPONDENTS

EFFECT FROM FLOODING	RESP	ONSES
It caused stress	60	24%
No significant effect	47	19%
Partial loss of access to property	37	1 5%
Time off work to clean up	30	12%
Monetary loss due to repair of flood damage	29	11%
Monetary loss due to lost valuables or equipment	15	6%
Lost business income	7	3%
Affected/damaged crops	5	2%
It affected the physical health of someone in your household or business	4	2%
Damaged fencing*	3	1%
Debris cleanup*	2	1%
Washing/cleaning structures/materials*	2	1%
Affected livestock*	1	<1%
Affected farmland*	1	<1%
Concern about power outage knocking out sump pump*	1	<1%
Unknown damage behind walls*	1	<1%
Damaged farmland*	1	<1%
Mosquito infestation*	1	<1%
Danger to children and small animals*	1	<1%
Delayed lawn maintenance*	1	<1%
Increase in homeowners insurance*	1	<1%
Landscaping not done to avoid future flood damage*	1	<1%
Logjams*	1	<1%
Soft ground difficult to mow*	1	<1%
Potential decrease in home value*	1	<1%
the NAME and the second and WOAD and		

^{*} Written in under "Other"

Costs from Flooding

Of those who said they had been flooded and provided their monetary loss due to flooding (within a range), 67% said that the loss was less than \$5,000 over the last 10 years. Another 24% said that the loss was between \$5,000 and \$20,000. Two respondents (4% of those who answered) said their loss was between \$100,000 and \$500,000.

FIGURE 13. COSTS ASSOCIATED WITH RESPONDENTS' FLOODING OVER THE LAST 10 YEARS

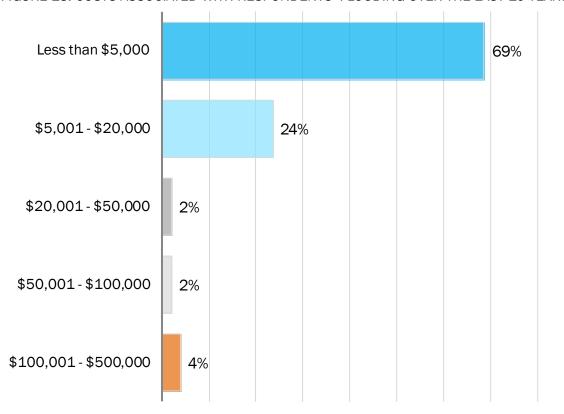


TABLE 6. COSTS ASSOCIATED WITH RESPONDENTS' FLOODING OVER THE LAST 10 YEARS

COST OVER 10 YEARS	RESPONSES*		LOWEST COST IN CATEGORY	LOWEST COST x RESPONSES	AVG. COST IN CATEGORY	AVG. COST x RESPONSES
Less than \$5,000	35	69%	\$0	\$0	\$2,500	\$87,500
\$5,001 - \$20,000	12	24%	\$5,001	\$60,012	12,501	\$150,006
\$20,001 - \$50,000	1	2%	\$20,001	\$20,001	\$35,001	\$35,001
\$50,001 - \$100,000	1	2%	\$50,001	\$50,001	\$75,001	\$75,001
\$100,001 - \$500,000	2	4%	\$100,001	\$200,002	\$300,001	\$600,001
I don't know	32	-	-	-	-	-
I prefer not answering	6	-	-	-	-	-
No Answer	388	-	-	-	-	-
TOTAL	477	LOW ESTIMATE:		\$330,016	HIGH ESTIMATE:	\$947,508

^{*} Percent = percentage of respondents who answered with a cost

The lowest estimate of the total costs reported by respondents is \$330,016 over the last 10 years. Divided by the 51 respondents who reported a cost in this question, each respondent paid an average of \$6,471 over 10 years. Using the average of the amounts reported, the total spent by respondents is \$947,508, with an average of \$18,579 spent by each respondent over the last 10 years.

Using the lower estimate of costs, and extrapolating to the population of 61,994 in the watershed (estimated in the Watershed Resource Inventory of the ongoing Upper Silver Creek Watershed Plan), i.e., multiplied by 130 [61,994/477], an estimated \$42,902,080 of monetary loss has occurred due to flooding over the last 10 years in the Upper Silver Creek watershed.

The greatest average monetary damage occurred in the two central HUC14s in the watershed, between Hamel, Edwardsville, and Marine (HUCs 07140204050304 and 07140204050401).

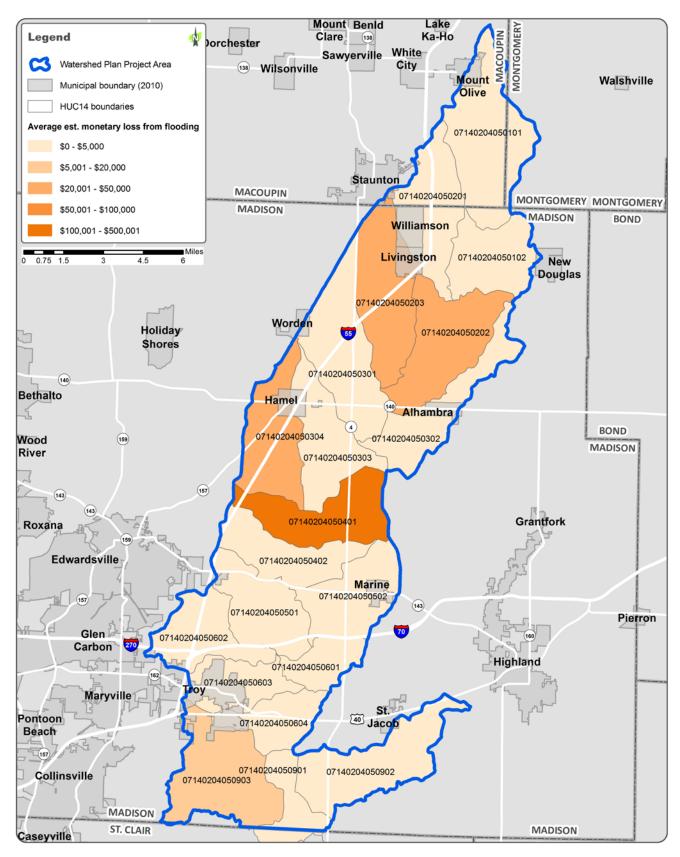


FIGURE 14. MONETARY LOSS FROM FLOODING BY HUC14 (USING LOW ESTIMATE)

Note: Several respondents' properties were within two HUC14s and were counted in both.

Correlation with Floodplains

FEMA-designated floodplains cover close to 11% of the total acreage in the Upper Silver Creek Watershed within Madison County. A similar proportion of surveys, 13%, came from parcels wholly or partly within these floodplains. However, only 3% of survey respondents (13 people) responded that they lived in a FEMA-designated floodplain. Forty (40) respondents, or 10% of those who answered the survey question, unknowingly own property that is wholly or partly in a floodplain.

FIGURE 15. RESPONDENTS' PROPERTY WITHIN OR OUTSIDE A FLOODPLAIN

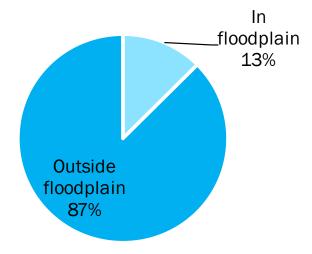
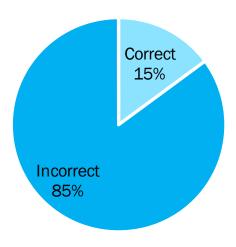


FIGURE 16. RESPONDENTS WHO CORRECTLY KNEW THEIR PROPERTY IS IN A FLOODPLAIN

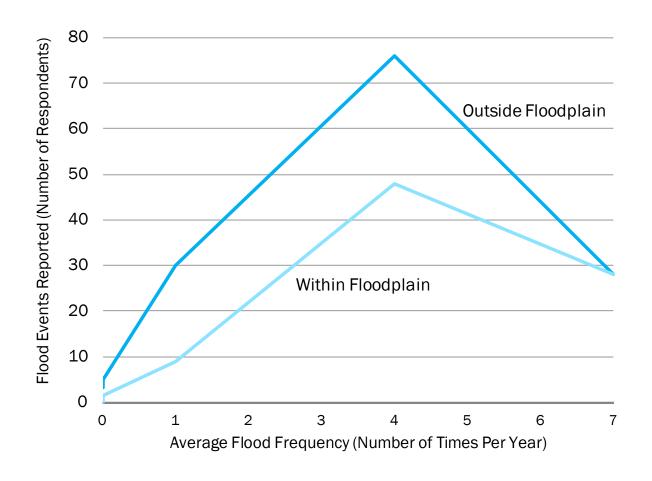


Respondents reported a total of approximately 146 events per year taking place outside of FEMA-designated floodplains over the last 10 years. Within floodplains, approximately 88 parcels per year were flooded.

TABLE 7. FLOOD FREQUENCY BY PROPERTY LOCATION

		PARCELS	IN FLOODPLAIN	PARCELS OUTSIDE FLOODPLAIN		
FLOOD FREQUENCY	AVG. TIMES PER YEAR	NUMBER	NUMBER OF TIMES FLOODED PER YEAR	NUMBER	NUMBER OF TIMES FLOODED PER YEAR	
1-2 Times in 10 Years	0.15	0	0.0	22	3.3	
3-4 Times in 10 Years	0.35	1	0.35	11	3.85	
5-9 Times in 10 Years	0.7	2	1.4	7	4.9	
1-2 Times Per Year	1.5	6	9.0	20	30	
3-5 Times Per Year	4.0	12	48.0	19	76	
6 or More Times Per Year	7.0	4	4 28.0 4		28	
TOTAL	2.7	59	86.75	83	146.05	

FIGURE 17. FLOOD FREQUENCY BY PROPERTY LOCATION WITHIN OR OUTSIDE OF A FLOODPLAIN



Flood Insurance Coverage

Madison County, Macoupin County, Montgomery County, and five (5) communities in the watershed are enrolled in the National Flood Insurance Program (NFIP), allowing floodplain residents to purchase flood insurance for their properties. The average flood insurance premium paid by Madison County residents is \$732 per year.⁴ Nationwide, approximately 20% of NFIP claims are for properties located outside floodplains, some of which are from flooding caused by local drainage problems.⁵

Fourteen percent (14%) of respondents (66 people) said that they have flood insurance. Of these respondents, 11% made a claim in the watershed in the last 10 years.

Fifty-four (54), or 82%, of the survey respondents have flood insurance on structures that are not in a floodplain.

Notes on Figures 18 and 19: Those who responded that they did not have flood insurance and then left the claims question blank are assumed not to have made a claim. (4 respondents).

Two (2) respondents said they did not have flood insurance but did make a claim. These respondents may be confused about the claim made; it may have been to their home insurance company instead of a flood insurance company.

FIGURE 18. RESPONDENTS' FLOOD INSURANCE COVERAGE

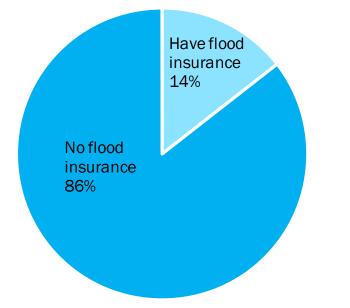
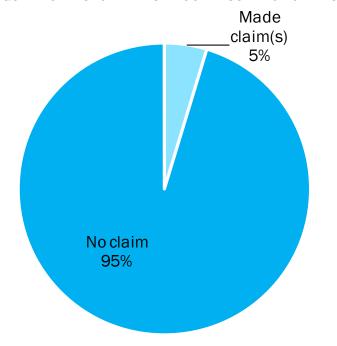


FIGURE 19. RESPONDENTS' FLOOD INSURANCE CLAIMS



Downspout Connections

When downspouts are connected directly to a sanitary sewer system or private sewer system, heavy rainfall can lead to sewer backups into the building. When downspouts open out onto a lawn or other ground surface, the imperviousness and slope of the surface determines where and how fast the water flows. If there is inadequate infiltration, floodwaters can accumulate quickly around a building. A direct connection between downspouts and a storm sewer system quickly transports the water away from the building and into a detention pond or local waterway. Rainwater harvesting methods such as rain barrels or cisterns collect runoff from the roof, preventing it from contributing to flooding around the building or downstream. This is the optimal downspout connection scenario, as it does not allow stormwater to accumulate by the structure or downstream. Rainwater harvesting also allows for reuse of the water in, for example, gardening.

The majority of respondents (90%) who knew where their downspouts connected/terminated said that they flowed out onto their lawn or other ground surface. Smaller proportions of respondents, just over 5% each, said their downspouts were connected to cisterns, rain barrels, or other rainwater harvesting storage, or to storm sewers. The survey did not ask if downspouts were connected to a sanitary or private sewer system.

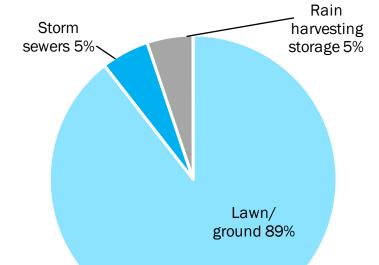


FIGURE 20. WHERE RESPONDENTS' DOWNSPOUTS CONNECT

Measures to Prevent Future Flooding

138 respondents, or 29%, said they had made one or more improvements in an attempt to prevent future flooding/flood damage. Several respondents (12%) said they installed or enlarged swales or ditches as a flood mitigation improvement. Eight percent (8%) said they planted native vegetation or buffer strips, or took another conservation measure. Creating or enlarging ponds, detention, or retention basins was the next most popular option, at five percent (5%) of respondents. Respondents were given the option to write in other improvements they had made, and several noted that they had installed sump pumps, extended their downspouts, and installed drain tiles and lines. See Appendix for full list of "Other" responses to improvements.

TABLE 8. TOP ACTIONS TAKEN BY RESPONDENTS TO PREVENT FUTURE FLOODING

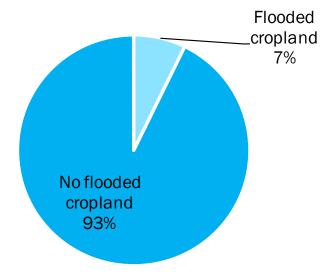
ACTION TAKEN	RESPONSES		
Installed or enlarged swales or ditches	57	12%	
Planted native vegetation, buffer strips, or other conservation measures	38	8%	
Created or enlarged a pond, detention, or retention basin	23	5%	
Installed sump pump*	9	2%	
Extended downspouts*	8	2%	
Installed drain(s)/drain tile/lines*	8	2%	
Installed permeable paving	7	2%	
Elevated/graded land*	7	2%	
Dug new waterway/ditch*	4	1%	
Installed French drain*	4	1%	
No flood problem	4	1%	
Installed a rain garden	3	<1%	
Installed levee/retaining wall*	3	<1%	

^{*} Written in under "Other"

Cropland

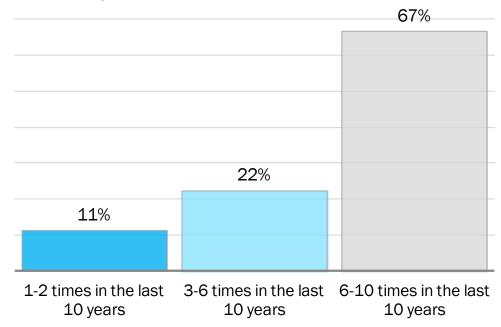
Twenty-seven (27) respondents said they own cropland that has flooded, which is 6% of all survey respondents.

FIGURE 21. FLOODING STATUS OF RESPONDENTS WHO OWN CROPLAND



Two-thirds of respondents whose cropland had flooded said that the cropland had flooded 6-10 times in the last 10 years.

FIGURE 22. FREQUENCY OF FLOODED CROPLAND

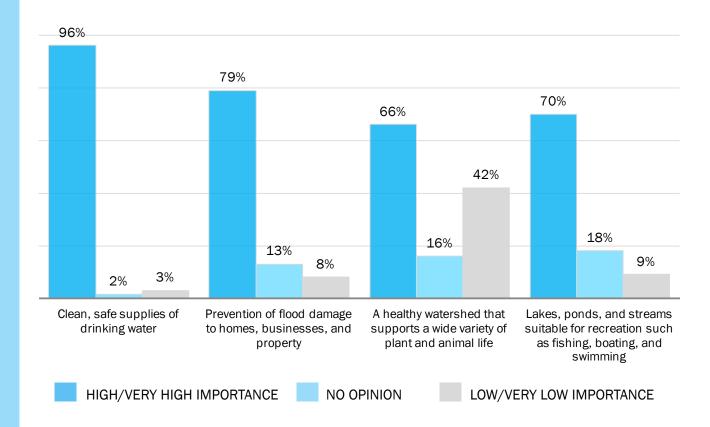


Values of Water Management

Most respondents replied to the question about their values on water-related issues, whether or not they had experienced flooding. The question asked how important four (4) issues were to respondents, and gave an importance scale with five (5) options – very low importance to very high importance.

The highest importance was placed on "clean, safe supplies of drinking water", followed by "prevention of flood damage to homes, businesses, and property"; then "lakes, ponds and streams suitable for recreation such as fishing, boating, and swimming"; and "a healthy watershed that supports a variety of plant and animal life."

FIGURE 23. IMPORTANCE OF WATER MANAGEMENT VALUES TO SURVEY RESPONDENTS



Flooding "Hotspots"

HUC14s in the Upper Silver Creek Watershed were ranked as "hotspots" for flooding. The ranking was determined by assessing four (4) attributes: 1) percentage of respondents who said they had been flooded, 2) flood frequency, 3) percentage who said that neighbors had been flooded, and 4) monetary loss as a result of flooding.

The top three (3) flooding hotspots based on the survey results are HUCs 07140204050401, 07140204050304, and 07140204050101. However, these subwatersheds also had a small number of respondents (6, 17, and 2, respectively) and fewer respondents who said they had been flooded (1, 7, and 1, respectively).

TABLE 9. RANKING OF HUC14 FLOODING "HOTSPOTS"

HUC14	RESPONDENTS FLOODED	AVG. TIMES FLOODED PER YEAR	WITH FLOODED NEIGHBORS	ESTIMATED MONETARY LOSS	RANKING
07140204050401	17%	7	100%	\$300,001	1
07140204050304	41%	3	60%	\$101,667	2
07140204050101	50%	1	100%	-	3
07140204050202	50%	2	67%	\$38,750	4
07140204050601	60%	3	50%	\$2,500	5
07140204050901	20%	7	50%	-	6
07140204050502	45%	1	64%	\$2,500	7
07140204050501	30%	2	64%	\$5,000	8
07140204050303	33%	3	50%	\$2,500	9
07140204050203	22%	1	50%	\$38,750	10
07140204050302	29%	1	50%	\$7,500	10
07140204050603	23%	2	50%	\$5,834	10
07140204050602	16%	2	67%	\$2,500	11
07140204050102	22%	4	25%	\$2,500	11
07140204050301	21%	2	25%	\$2,500	11
07140204050402	21%	3	33%	\$2,500	11
07140204050604	20%	3	46%	\$5,000	11
07140204050903	17%	3	35%	\$15,625	11
07140204050902	29%	3	38%	-	11
07140204050201	14%	2	33%	-	12



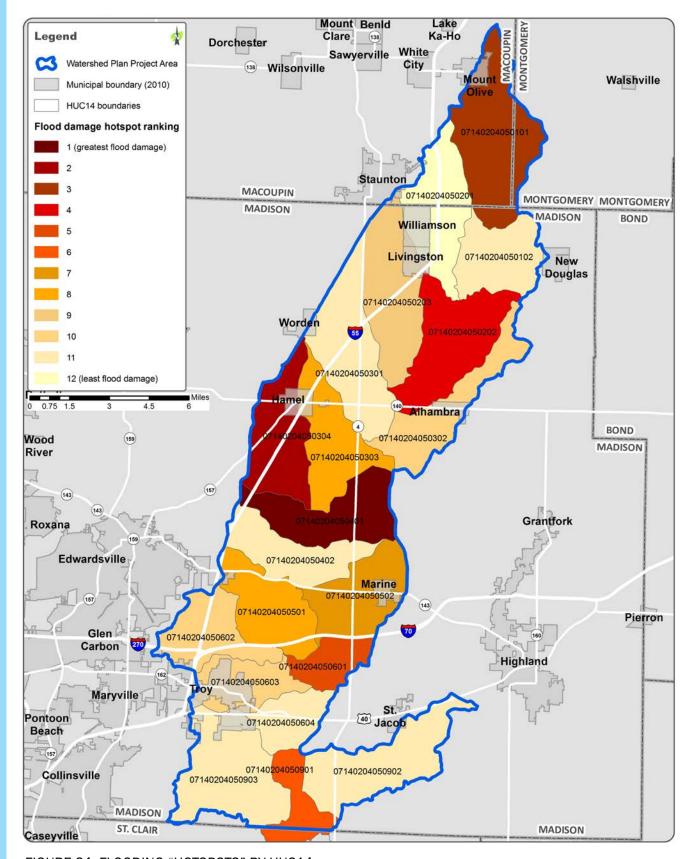


FIGURE 24. FLOODING "HOTSPOTS" BY HUC14

Note: Several respondents' properties were within two HUC14s and were counted in both.

NEXT STEPS

Next Steps

The findings of this survey will be incorporated into the Upper Silver Creek Watershed Plan. Some data about the location and extent of flooding in the watershed has already been gathered from interviews with stakeholders including mayors, township highway road commissioners, property owners, and landowners. The results of this survey will be considered alongside this data as the Technical Committee for the Watershed Plan considers recommendations for mitigating water quality and flooding issues.

More community flood surveys may be undertaken in other watersheds in Madison County and the region as further watershed planning takes place. Having more extensive knowledge about flooding problems in multiple areas will help county and municipal governments prioritize flood mitigation and protection projects across their entire jurisdictions.

Further research into flooding issues and their solutions may include gathering data from private insurers about flood insurance claims. Insurance data would allow for the calculation of the distribution of flood insurance and the costs of flooding through verified policies and claims, rather than best estimates.

REFERENCES

- ¹ Madison County Planning and Development Department and Madison County Emergency Management Department, Madison County Hazard Mitigation Plan, June 2006, http://www.state.il.us/iema/planning/Documents/Plan_MadisonCounty.pdf
- ² Center for Neighborhood Technology, The Prevalence and Cost of Urban Flooding, May 14, 2013, http://www.cnt.org/resources/the-prevalence-and-cost-of-urban-flooding/
- ³ FEMA, as cited in Center for Neighborhood Technology, The Prevalence and Cost of Urban Flooding, May 14, 2013, http://www.cnt.org/resources/the-prevalence-and-cost-of-urban-flooding/
- ⁴ FEMA, Policy Statistics by state as of 9/30/2013, http://bsa.nfipstat.fema.gov/reports/1011. htm
- ⁵ FEMA, National Flood Insurance Program Community Rating System Coordinator's Manual, FIA-15/2013, OMB No. 1660-0022, expires: September 30, 2013, http://www.fema.gov/media-library-data/20130726-1557-20490-9922/crs_manual_508_ok_5_10_13_bookmarked.pdf

Photo Credit: Village of Marine

APPENDIX

The Appendix includes:

- Causes of flooding written in by respondents under "Other"
- Improvements Made to Prevent Future Flooding written in by respondents under "Other"
- Detailed table outlining the Top 3 Causes of Flooding by HUC14
- · A copy of the Madison County Community Flood Survey, as mailed
- Postcard survey reminder sent to area residents, businesses, and property owners

Other Causes of Flooding

Causes written in by respondents under "Other", by response keyword (corresponds to Table 3 on Page 22):

TABLE 10. OTHER CAUSES OF FLOODING

OTHER CAUSE	RESPONSES
Inadequate drainage infrastructure	4
Poor drainage design/grading	4
Sump pump failure	4
Neighboring property	3
Heavy rain	2
Removal of vegetation	2
Dam built downstream	1
Drainage tile on farm fields	1
Ephemeral/historic waterways filling up	1
Power failure at pumping station	1
Rising water table, rising creek	1
Lack of drainage infrastructure maintenance	1
Levees built downstream	1
Logjams	1
Damage to drainage pipes	1
Drainage tile on farm fields	1
New subdivision	1
Bad window well drainage	1
High water table	1
Power outage causing sump pump failure	1

Other Actions Taken to Prevent Flooding

Improvements written in by respondents under "Other", by response keyword (corresponds to Table 6 on page 32):

TABLE 11. OTHER ACTIONS TAKEN TO PREVENT FLOODING

OTHER ACTIONS	RESP	ONSES
Installed sump pump	9	2%
Extended downspouts	8	2%
Installed drain(s)/drain tile/lines	8	2%
Elevated/graded land	7	2%
Dug waterway/ditch	4	1%
Installed French drain	4	1%
No flood problem	4	1%
Installed levee/retaining wall	3	1%
Built dam(s)	2	<1%
Connected downspout(s) to storm sewer	2	<1%
Planted tree(s)	2	<1%
Cleared obstruction(s)	1	<1%
Drain tiled basement	1	<1%
Dug deeper into stream	1	<1%
Seeded waterway/ditch	1	<1%
Installed deck/porch	1	<1%
Installed gutters and downspouts	1	<1%
Installed rain barrel	1	<1%
Installed small cofferdams	1	<1%
Laid sandbags, logs, and plywood as barriers	1	<1%
Laid straw bales	1	<1%
Maintain ditches	1	<1%
Rerouted drainage to drain	1	<1%

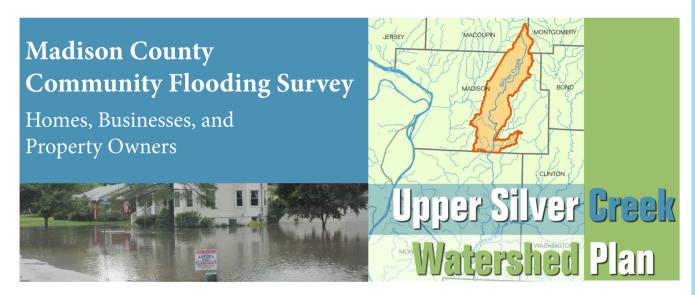
Top 3 Flooding Causes in the Watershed by HUC14

All respondents with flooding said heavy rainfall was one of the causes. The next most popular responses – from a neighboring property, a watercourse or waterbody, and a pipe, culvert, or ditch issue – are assessed by subwatershed.

TABLE 12. TOP 3 CAUSES OF FLOODING IN THE WATERSHED (EXCEPT HEAVY RAIN) BY HUC 14

HUC14	NEIGHBORING PROPERTY	WATERCOURSE OR WATERBODY	PIPE, CULVERT, OR DITCH PROBLEMS
07140204050603	53%	5%	6%
07140204050604	71%	5%	8%
07140204050903	30%	7%	5%
07140204050501	40%	10%	7%
07140204050502	43%	19%	24%
07140204050602	33%	-	-
07140204050304	29%	13%	13%
07140204050902	60%	21%	13%
07140204050303	20%	25%	-
07140204050302	50%	17%	-
07140204050301	33%	17%	17%
07140204050402	67%	17%	17%
07140204050102	50%	13%	-
07140204050203	100%	13%	29%
07140204050201	100%	-	-
07140204050202	67%	100%	20%
07140204050401	-	-	-
07140204050601	33%	67%	25%
07140204050901	-	25%	-
07140204050101	100%	100%	-

Madison County Community Flood Survey- Cover



Thank you in advance for taking the time to fill out this survey regarding the impact of floods on homes, businesses, and property in Madison County. This voluntary survey is an important part of the Upper Silver Creek Watershed Plan. Your response is greatly appreciated and will help in determining strategies and recommendations for addressing flooding problems in the Silver Creek Watershed. Flooding has tremendous costs including damage to homes, businesses, and infrastructure.

This survey is part of a larger planning effort for the Upper Silver Creek Watershed. The watershed plan is an opportunity to identify strategies to improve water quality and reduce the impacts of flooding in the watershed. The Upper Silver Creek watershed is one of ten watersheds in Madison County and the watershed plan is an important component of Madison County's Stormwater Plan. By documenting existing conditions and developing recommendations and strategies for best practices to improve water quality and reduce flooding, the plan will be a roadmap for communities, agencies, and landowners for future improvements. Strategies for mitigating flooding will help reduce costs for homeowners, businesses, and taxpayers. Multiple partners are involved with this effort including Madison County, HeartLands Conservancy, Madison County Soil and Water Conservation District, and the Great Rivers Research and Education Center.

Please complete and return this survey by **September 12, 2014.**

Your time and input is greatly appreciated!

If you have questions about the survey or the Upper Silver Creek Watershed Plan visit:

www.HeartLandsConservancy.org/UpperSilverCreek

or contact:

Janet Buchanan at HeartLands Conservancy, (618) 566-4451 ext. 25 janet.buchanan@heartlandsconservancy.org







You can complete this survey in three ways:

- 1. Fill out and return the survey via the enclosed return envelope.
- 2. Fill out and return at one of two open houses for the Upper Silver Creek Watershed Plan:

 Tuesday, August 19th at Troy City Hall,
 6pm 9pm

 Wednesday, August 20th at Hamel
 Community Center, 6pm 9pm
- 3. Fill out the survey on-line at: www.surveymonkey.com/s/UpperSilverCreek



Turn Page to Start Survey

Madison County Community Flood Survey- Page 1

Start Survey 1. Please provide your address: (Note: Addresses will be kept confidential, unless you request follow-up information below. By giving your address, it allows the planning team to identify areas of flooding.) City: Zip: _____ Address: Check here if you would like to be put on our mailing list to receive updates and more information. Provide your name, phone, and e-mail below: 2. Has your home, business, or property at this address been flooded in the last 10 years? No (If you or your neighbors have not experienced flooding, skip to Question #10) If yes, how often has your home, business, or property been flooded over the last 10 years? (Choose one) Only once or twice in 10 years. Once or twice a year. Three to four times in 10 years. Three to five times a year. Five to nine times in 10 years. Six or more times a year. 3. If flooding does occur at your home, business, or property, does it: (Select all that apply) A. Flood your yard, with little or no damage? ☐ Yes ☐ No B. Flood your yard, with damage to lawn, trees, and shrubs? ☐ Yes ☐ No C. Damage fences, auxiliary buildings (sheds, etc) or other structures? ☐ Yes ☐ No D. Damage the primary home or business? ☐ Yes ☐ No If flooding damages your primary home or business, how far does the floodwater penetrate into your home or business? i. Basement ☐ Yes ☐ No ii. First floor (habitable space) ☐ Yes ☐ No 4. What was the cause of the flooding that affected your home, business, or property? (Select all that apply) ☐ Heavy rainstorm. Water draining from neighboring property. Flooding from nearby river, stream, lake, ditch, or pond. Log-jam or other obstruction in nearby river, stream, lake, ditch, or pond. Pipe, culvert, or ditch that was blocked or needs maintenance. Lack of drainage facilities (swales, ditches, storm sewers, etc.) to drain water from your property. Sewer backup. ☐ I don't know. Other (please explain): _____

Madison County Community Flood Survey- Page 2

		ng at their home, business, or property in the last 10
years. ((Choose one)	
	Yes. One or two neighboring properties.	
	Yes. Three to five neighbors neighboring propert	ies.
	Yes. Six or more neighbors neighboring propertion	es.
	No. I don't know of any neighbors who have exp	erienced flooding on their home or property.
-	ou answered yes above that your nearby neighbors rty; what was the severity of their flooding? (Choose	-
	Less severe than my flooding problems.	
\Box	Similar to my flooding problems.	
	More severe than my flooding problems.	
	I don't know the severity of my neighbors' floodi	ng.
7. Did y	you report your flooding to anyone? (Select all that a	apply)
] My city/village.	
\Box	My township.	
П	The Madison County Stormwater Hotline (618-29	96-7788).
$\overline{\Box}$	My insurance company.	,
\Box	I did not report my flooding to anyone.	
\Box	Other (please explain):	
_		
8 If you	ou have had flooding in the past at your home, busi	ness or property how have you been affected?
-	all that apply)	ness, or property, now have you been anected:
· 🗆	Monetary loss due to repair of flood damage.	
\Box	Monetary loss due to lost valuables or equipmen	t.
\Box	It caused stress.	
\Box	Time off work to clean up.	
\Box	Partial loss of access to property.	
	It affected the physical health of someone in you	r household or business.
	Lost business income.	
H	No significant affect.	
	Other (please explain):	
0 16		a last 10 was a family and a street was an
	ou suffered a monetary loss due to flooding over th ngs, lost valuables or equipment, lost wages or inco	
_	expenses over the last 10 years due to flooding?	me, etc., what was the estimate of your cumulative
		100,001 - \$500,000
		Over \$500,000
		don't know.
	<u> </u>	prefer not answering.
	- · · · · · · · · · · · · · · · · · · ·	·

Madison County Community Flood Survey- Page 3

,	,	,	property covered by		•	cyr			
11. Ha	ve you ever Yes	made a floo	d insurance claim?	designate			or prope	rty in a FE	MA-
13. Wh	They conn They flow	ect to the store out onto my onnected to	spouts connect to? (a orm sewers. lawn or other grour cisterns, rain barrels	nd surface.	n harvesti	ng storage			
	Installed a Created or Installed o Installed o Installed p Planted na	rain garden. rain garden. renlarged a prender enlarged sweet ermeable partive vegetati	oond, detention or rowales and ditches.	etention basir other conser	n. vation me		or flood	impacts?	
	e most freq 1-2 times. 3-6 times. 6-10 times	uent floodin	has flooded? (If you g) If yes , How many hat has flooded.	•					ne field
A. Cle B. Pre C. Lak bo	ean, safe supp evention of flo ses, ponds, an ating, and sw	lies of drinking ood damage to od streams suita imming:	owing water issues the water: homes, businesses, and the able for recreation such a corts a wide variety of plants.	property: as fishing,	Very Low Importance Graphics Graphics Graphics Graphics Fe: Graphics G	Low Importance	No Opinion	High Importance	Very High Importance

Please complete and return this survey by: September 12, 2014.

Thank you for completing this survey!

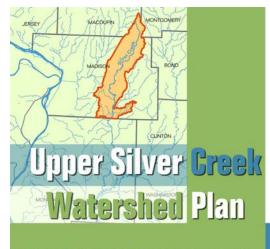
Your time and input is greatly appreciated. Survey responses will be used to help shape the recommendations for the Upper Silver Creek Watershed Plan.

Return this survey via the enclosed envelope or mail to:

Upper Silver Creek Survey - Madison County Planning and Development 157 North Main Street, Suite 254 For updates and progress on the Upper Silver Creek Watershed Plan, please visit:

www.HeartLandsConservancy.org/UpperSilverCreek

Madison County Community Flood Survey Postcard



Reminder to Take the Madison County Community Flooding Survey

Please take a moment to fill out the survey regarding flooding impacts to homes, businesses, and property in Madison County. This voluntary survey is an important part of the Upper Silver Creek Watershed Plan. Your response is greatly appreciated.

The survey will be open until: **September 12, 2014**

For more information about the survey and the Upper Silver Creek Watershed Plan visit: www.HeartLandsConservancy.org/UpperSilverCreek



You can complete the survey on-line!

To complete the survey on-line, go to: www.surveymonkey.com/UpperSilverCreek

Madison County Planning and Development 157 North Main Street, Suite 254 Edwardsville, IL 62025

Madison County Community Flooding Survey

Homes, Businesses, and Property Owners

Take the Community Flooding Survey on-line at:

www.surveymonkey.com/UpperSilverCreek by September 12, 2014















APPENDIX C - THE LANDOWNER/FARMER SURVEY

The Landowner/Farmer Survey was sent out to over 1,000 landowners in the watershed who own parcels of at least 5 acres in size. HeartLands Conservancy and Madison County collaborated to send out this survey in summer 2015. The aim of the survey was to create awareness among landowners about the types of grants that are available to them to implement the BMPs recommended in this Watershed Plan. This will help in creating a seamless transition between the planning and implementation processes, and will keep momentum going after the Plan is complete.

The mailing included information about the Watershed Plan, types of grants available for the implementation of various types of Best Management Practices (BMPs), and types of BMPs eligible for grants. The survey questions ask what types of issues landowners have found on their land and in the creeks. Contact information is provided so that interested landowners will know who to talk to about applying for the grant most appropriate for them.

This Appendix includes a copy of the survey, and the survey results as displayed in a SurveyMonkey report.







Landowner/Farmer Survey: Land Management Practices and Funding

Dear Landowner/Farmer,

As an owner and steward of some of southwestern Illinois' finest land, you already know the importance of clean water and a thriving agricultural economy to our region. You're probably also aware of issues with flooding, poor water quality, topsoil loss, and streambank erosion. Fortunately, there are efforts underway to address these issues in a thorough, effective manner – a Watershed Plan. And we'd love you to be a part of it.

Please take this opportunity to read about the Upper Silver Creek Watershed Plan underway in this area, funding sources for implementing Best Management Practices, and the types of practices eligible. Then take our quick survey to let us know what your issues are and what you would like to do!

Please return the survey by July 10th.

Upper Silver Creek Watershed Plan

The Upper Silver Creek Watershed Plan is an opportunity to address water quality and flooding problems in a strategic way in eastern Madison County. The upper Silver Creek watershed is the area that drains to Silver Creek above the Madison-St. Clair county border, including Troy, Hamel, Livingston, and Marine.

Within this area, water quality issues have been identified in the streams, and flooding has been reported both inside and outside of floodplains. (You may have received the Madison County Community Flood Survey last summer, which found widespread flooding experienced by 26% of respondents in the last 10 years). Funded by Madison County and Illinois EPA, the Watershed Plan is gathering information and feedback from the public in order to identify the locations where we can implement the most effective solutions.



Grants Available

Several grants are available to farmers and landowners in the upper Silver Creek watershed to pay for land conservation, restoration, and management practices.

A **319 grant** from Illinois EPA can help with construction costs of practices that protect soil and water quality. HeartLands Conservancy and the Madison County Soil and Water Conservation District (SWCD) are planning to apply for the grant this year, making funds available next year, if there is enough interest from landowners.

Field floods near Marine, 2014

Over the past 12 years, HeartLands has helped distribute \$2.7 million to landowners in Clinton County through the 319 grant program.

Other grant programs include the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), the Streambank Stabilization and Restoration Program (SSRP), and the Agricultural Conservation Easement Program (ACEP), which includes Agricultural Land Easements and Wetland Reserve Easements. Each program has a different focus and distributes funds in a different way. A cost share (monetary contribution from the landowner) is almost always needed; amounts and proportions vary depending on the grant and the type of project. Some projects in Madison County have been 95% paid for by a grant.

Best Management Practices (BMPs)

Several Best Management Practices (BMPs) may be eligible for funding and cost sharing, including the following:

ВМР	Description & Benefits
Terraces/ Contour Farming	Earthen embankments around a hillside that stop water flow and store or guide water safely off a field. Terraces reduce soil erosion and increase the ability to farm slopes.
Riparian Buffer	Vegetated zone immediately adjacent to a stream. The vegetation and well-structured soil can remove sediment, nutrients, and bacteria from runoff, stabilize streambanks, provide wildlife habitat, and encourage recreation.
Grassed Waterway	Vegetated channels with grass to drain water from areas of concentrated flow (eg gullies). The vegetation slows down the water and the channel conveys it to a stable outlet at a non-erosive velocity. Grass waterways trap sediment entering them via field surface runoff.
Filter Strip	Vegetated surfaces designed to treat sheet flow from adjacent surfaces. Filter strips slow runoff velocity, filter out sediment and other pollutants, and provide some infiltration into underlying soils.
Cover crops	Plants seeded into agricultural fields for the protection and enrichment of soil. Cover crops reduce soil erosion and limit the amount of nitrate-N leaching from the soil.
Water and Sediment Control Basin (WASCOB)	Earth embankment or combination ridge-and-channel built perpendicular to (across) a small watercourse or area of concentrated flow within a field. Runoff is slowed so that less topsoil is lost, sediments are trapped, and the watercourse is prevented from becoming a gully.
Wetlands/Wetland restoration	Areas that are typically wet and support vegetation adapted to live in wet environments. Wetland plants, soils, and microbes cleanse the water entering the wetland, recharge groundwater, store stormwater, reduce high water flows, and provide food and habitat for wildlife.
Pond	Small body of still water formed naturally or by hollowing or embanking. Ponds can trap floodwater, filter pollutants from water, allow water to infiltrate the soil, and provide fish and wildlife habitat.
Streambank and channel restoration	Stabilization of eroding streambanks, streambeds, and channels. This work involves improvements to a stream channel using artificial pool-riffle complexes, streambank stabilization using a combination of native vegetation and hard armoring with rock if needed, and adjacent riparian area improvements to vegetation. These practices together improve water quality by reducing sediment transport, increasing oxygen, and improving habitat. Stream restoration can reduce sediment, phosphorus, and nitrogen by as much as 90%.

Start Survey

1. Please provide your address: (Note: Addresses will be kept confi	dential.)	
Name:	Phone:	
Address:	_ City:	Zip:
E-mail:		
2. Which of these issues have you noticed on your land/cropland? Soil erosion Loss of topsoil / thin topsoil Gullies getting deeper Ponds / detention basins filling up with sediment Cropland floods Other issues (please state):	,	

	ave you noticed any of these issues in creeks and streams o	ii oi aajac	,		
,	A. Logjams Yes] No			
ı	3. Unstable streambanks] No			
(C. Muddy water] No			
ı	D. Streams getting deeper] No			
I	. Overtopping/stream flooding out of its banks 🔲 Yes 🗀] No			
ı	Other issues (please state):				
. V	hich of the following is present on your land? Check all tha	t apply.			
	☐ Forested area				
	Wetlands (farmable or not) / marsh / swamp / bog				
	Steep slopes				
	Highly erodible soil				
	☐ Floodplain				
_ ,	Which of the following progress are very portionative in 2.4.	عماديا امم	orograma (-)	might	ha inta
	Which of the following programs are you participating in? All participating in?				
			ently	Interes Particis	sted in pating?
	Program	Partici	Jacing:		
	Program Conservation Reserve Program (CRP)	Partici _l YES	NO NO	YES	NO
					NO NO
	Conservation Reserve Program (CRP)	YES	NO	YES	
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP)	YES	NO NO	YES YES	NO
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP)	YES YES YES	NO NO NO	YES YES YES	NO NO
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP)	YES YES YES YES	NO NO NO	YES YES YES YES	NO NO
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES	NO NO NO
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP)	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES	NO NO NO
	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment:	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment:	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment: f you are aware of any or all of the programs above, what constricipating?? Check all that apply.	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment: f you are aware of any or all of the programs above, what constrictions are all that apply. I didn't want to take cropland out of production	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment: f you are aware of any or all of the programs above, what constriction articipating?? Check all that apply. I didn't want to take cropland out of production My costs would be too high	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO
6.	Conservation Reserve Program (CRP) Conservation Reserve Enhancement Program (CREP) Environmental Quality Incentives Program (EQIP) Agricultural Conservation Easement Program (ACEP) Streambank Stabilization & Restoration Program (SSRP) EPA 319 Grant Other / Comment: f you are aware of any or all of the programs above, what constrictipating?? Check all that apply. I didn't want to take cropland out of production My costs would be too high The project/BMP wouldn't have a big enough impact	YES YES YES YES YES YES YES	NO NO NO NO NO	YES YES YES YES YES YES	NO NO NO NO

7.	What type(s) of projects might you be interested in implementing on your land? Check all that apply.
	☐ Terraces/contour farming ☐ Riparian buffer
	Grassed waterways
	Filter strips
	Cover crops
	Water and sediment control basin
	Wetland/wetlands restoration
	Pond
	☐ Sreambank/stream channel restoration
	Other (please explain):
8.	Are there any other issues on your land you may need assistance with?
9.	Would you like us to follow up with you about this survey and funding available for BMP projects? YES NO
10.	If YES, what's the best way to contact you? (e.g. phone, email)
11.	Questions/comments:

Thank you for completing this survey!

Return this survey in the enclosed envelope by July 10th to:
Upper Silver Creek Landowner Survey, attn: Janet Buchanan
HeartLands Conservancy
406 E. Main St.
Mascoutah, IL 62258

Contact Us

After completing this survey, if you are interested in receiving more information about the programs and funding available for conservation activities on your land, please contact Janet Buchanan at the address above, or by phone at 618-566-4451 ext. 25,

or by email at janet.buchanan@heartlandsconservancy.org.

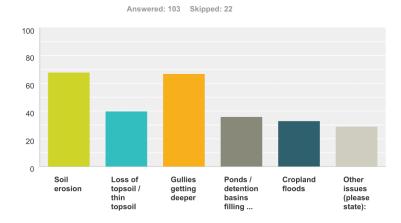
For updates and progress on the Upper Silver Creek Watershed Plan, please visit: www.HeartLandsConservancy.org/UpperSilverCreek.

Q1 Please provide your name, address, and contact information. (Note: This information will be kept confidential.)

Answered: 124 Skipped: 1

Answer Choices	Responses	
Name	100.00%	124
Company	0.00%	0
Address	99.19%	123
Address 2	0.00%	0
City/Town	0.00%	0
State/Province	0.00%	0
ZIP/Postal Code	0.00%	0
Country	0.00%	0
Email Address	62.10%	77
Phone Number	85.48%	106

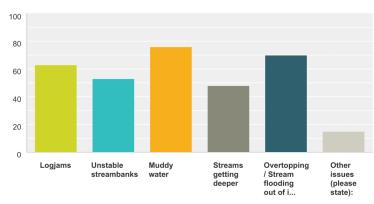
Q2 Which of these issues have you noticed on your land / cropland?



Answer Choices	Responses	
Soil erosion	66.02%	68
Loss of topsoil / thin topsoil	38.83%	40
Gullies getting deeper	65.05%	67
Ponds / detention basins filling up with sediment	34.95%	36
Cropland floods	32.04%	33
Other issues (please state):	28.16%	29
Total Respondents: 103		

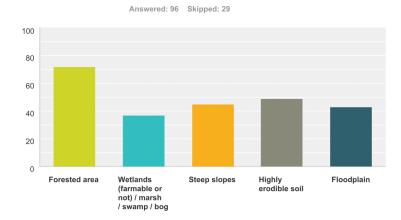
Q3 Which of these issues have you noticed in the creeks and streams on or adjacent to your land?





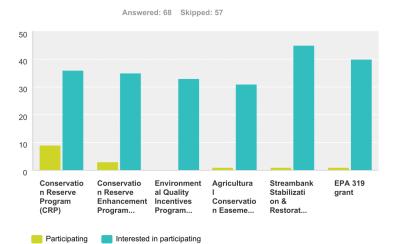
Answer Choices	Responses	
Logjams	64.29%	63
Unstable streambanks	54.08%	53
Muddy water	77.55%	76
Streams getting deeper	48.98%	48
Overtopping / Stream flooding out of its banks	71.43%	70
Other issues (please state):	15.31%	15
Total Respondents: 98		

Q4 Which of the following is present on your land?



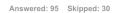
answer Choices	Responses		
Forested area	75.00%	72	
Wetlands (farmable or not) / marsh / swamp / bog	38.54%	37	
Steep slopes	46.88%	45	
Highly erodible soil	51.04%	49	
Floodplain	44.79%	43	
otal Respondents: 96			

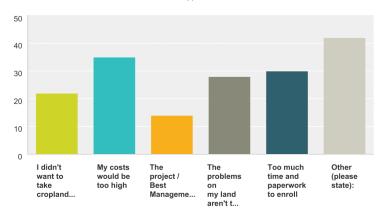
Q5 Which of the following programs are you participating in? And which program(s) might you be interested in participating in?



	Participating	Interested in participating	Total Respondents
Conservation Reserve Program (CRP)	20.45%	81.82%	
	9	36	44
Conservation Reserve Enhancement Program (CREP)	7.89%	92.11%	
	3	35	38
Environmental Quality Incentives Program (EQIP)	0.00%	100.00%	
	0	33	3:
Agricultural Conservation Easement Program (ACEP)	3.13%	96.88%	
	1	31	33
Streambank Stabilization & Restoration Program (SSRP)	2.17%	97.83%	
	1	45	41
EPA 319 grant	2.44%	97.56%	
	1	40	4

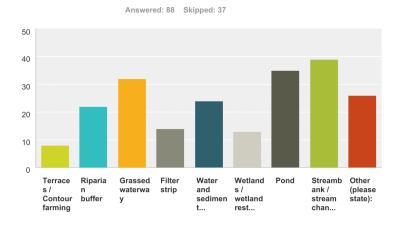
Q6 If you are aware of any or all of the programs above, what concerns prevented you from applying / participating?





nswer Choices			
I didn't want to take cropland out of production	23.16%	22	
My costs would be too high	36.84%	35	
The project / Best Management Practice wouldn't have a big enough impact	14.74%	14	
The problems on my land aren't that severe	29.47%	28	
Too much time and paperwork to enroll	31.58%	30	
Other (please state):	44.21%	42	
tal Respondents: 95			

Q7 What type(s) of projects might you be interested in implementing on your land?



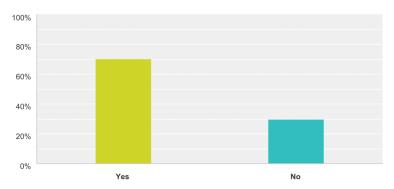
nswer Choices	Responses	
Terraces / Contour farming	9.09%	
Riparian buffer	25.00%	2
Grassed waterway	36.36%	3
Filter strip	15.91%	
Water and sediment control basin (WASCOB)	27.27%	
Wetlands / wetland restoration	14.77%	
Pond	39.77%	
Streambank / stream channel restoration	44.32%	
Other (please state):	29.55%	
otal Respondents: 88		

Q8 Are there any other issues on your land you may need assistance with?

Answered: 25 Skipped: 100

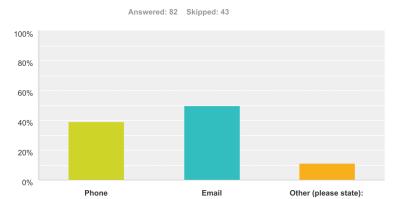
Q9 Would you like us to follow up with you about this survey and funding available for BMP projects?





Answer Choices	Responses
Yes	70.27% 78
No	29.73% 33
Total	111

Q10 If YES, what's the best way to contact you?



Answer Choices	Responses	
Phone	39.02%	32
Email	50.00%	41
Other (please state):	10.98%	9
Total		82

Q11 Questions / Comments:

Answered: 16 Skipped: 109

APPENDIX D - CRITICAL AREAS

This appendix includes descriptions of the source data used to delineate Critical Areas, and maps of each Critical Area. Maps of Best Management Practices as outputs from the Agricultural Conservation Planning Framework (ACPF) are also included.

How locations were identified

Several sources of information were used to identify Critical Area locations. These include wetland restoration ranking values from the Missouri Resource Assessment Partnership (MoRAP) and results from the U.S. Department of Agriculture's Agricultural Conservation Planning Framework (ACPF) tools.

Wetland restoration ranking values

Wetland restoration ranking values and wetland importance values were created for the watershed by the Missouri Resource Assessment Partnership (MoRAP). Several layers of data, especially topography, soil type, and land cover, were used to create maps of existing wetlands which it is highly important to protect, and areas which were formerly wetlands which it would be highly beneficial to restore.

Agricultural Conservation Planning Framework (ACPF)

The ACPF is a set of GIS-based tools developed by the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) that can substantially enhance watershed planning capabilities on agricultural land. The ACPF is currently available for Minnesota, Iowa, and Illinois, and uses new high-resolution data sources, such as soils, land use, crop rotations, and elevation (from LiDAR). The tools determine slope, flow accumulation, and other factors by HUC12, allowing analysis at watershed and field scales. The tools establish runoff pathways and a flow network for the HUC12, and field tile drainage is addressed. Among the outputs of the tools are possible beneficial locations for different types of practices placed in fields, at field edges, and in riparian zones.

The BMPs recommended by the model include grassed waterways, contour buffer strips, drainage water management, appropriate riparian vegetation, and nutrient management wetlands. The data analysis capabilities of the model also allow for further, independent assessment of different BMPs. Planning scenarios can be generated from the results and compared/evaluated in a simple way without additional input. No recommendations are made. The aim is to develop a planning resource, not a plan. Actual watershed planning is inherently a local consultative process involving landowners.

The results of the ACPF modeling were combined into one map in ArcMap. They were printed on 30 x 40 inch zoomed-in maps covering the whole watershed. These maps will be useful for the Madison County Soil and Water Conservation District and NRCS staff to explore BMP options with farmers interested in implementing a soil conservation or waterway protection project. The ACPF results were also useful in setting the numeric targets for this watershed plan.

The ACPF is focused on reducing runoff and preventing nutrient pollution from farmlands. It focuses on the value of wetlands as nutrient sinks and for flood control (as compared with the MoRAP assessment which considers wetland value as potential for restoration. Together, the ACPF and the MoRAP wetlands mitigation importance values will overlap in several places, showing wetlands of extremely high restoration and protection importance.

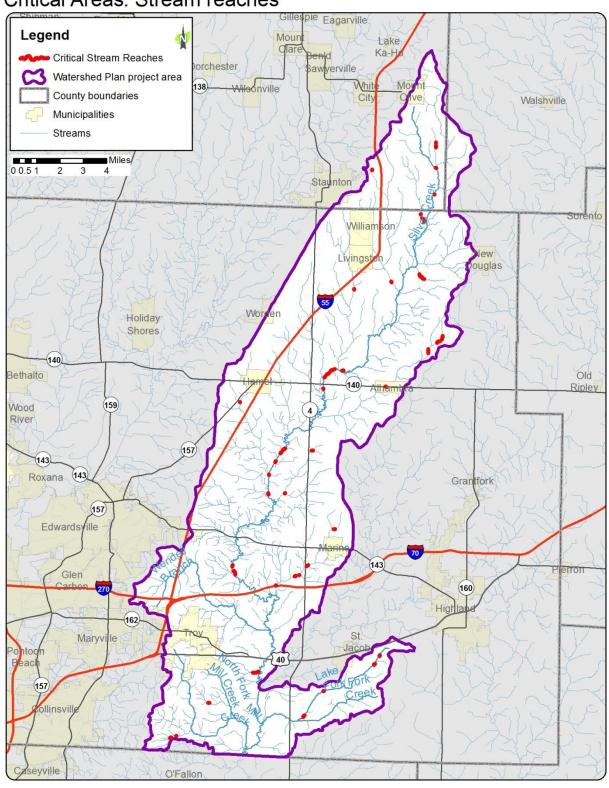
The following table (Table D.1) and maps show the ACPF results for several Best Management Practices.

Table D.1. Summary data for the ACPF results by HUC12.

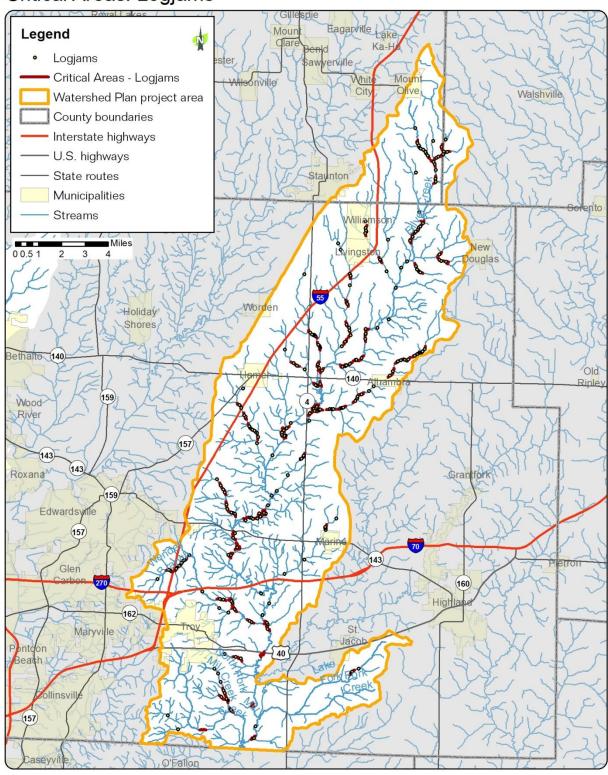
	HUC12							
ACPF results	071402040501	071402040502	071402040503	071402040504	071402040505	071402040506	071402040509	TOTAL
# nutrient removal wetlands	1	1	-	12	-	14	1	29
Nutrient removal wetlands area (wetland & buffers) (sq meters)	62,121	47,053		548,855		726,761	36,388	1,421,178
Wetland area only (sq meters)	21,111	27,180		191,518		368,616	8,619	617,044
Area draining to nutrient removal wetlands (sq meters)	3,250,539	1,530,909		17,546,796		39,285,873	706,257	62,320,374
# drainage management polygons	220	316	428	79	75	11	49	1,178
Area drainage management fields (sq meters)	25,202,075	32,021,560	45,922,435	8,551,558	6,820,055	676,125	4,911,316	124,105,124
# contour buffer strips	20	105	253	191	229	254	520	1,572
Total area contour buffer strips (sq meters)	12,607	84,279	202,805	162,395	189,581	203,402	456,756	1,311,825
Grass waterways total length (m)	91,174	118,996	179,475	49,898	73,264	79,129	130,866	722,802
# WASCOBs	57	159	57	70	106	138	404	1,291
Area WASCOB basins when filled (sq meters)	146,701	360,544	515,014	785,373	362,883	502,109	894,617	3,567,241
Riparian area: # Critical Zone segments (CZ)	22	25	51	2	26	12	25	163
Riparian area: # Multi Species Buffer (MSB)	22	24	44	14	16	13	23	156
Riparian area: # Stiff Stemmed Grasses (SSG)	56	80	97	36	35	33	66	403
Riparian area: # Deep Rooted Vegetation (DRV)	229	435	464	33	215	195	311	1,882
Riparian area: # Stream Bank Stabilization (SBS)	207	378	394	77	182	155	285	1,678

Critical Areas Maps

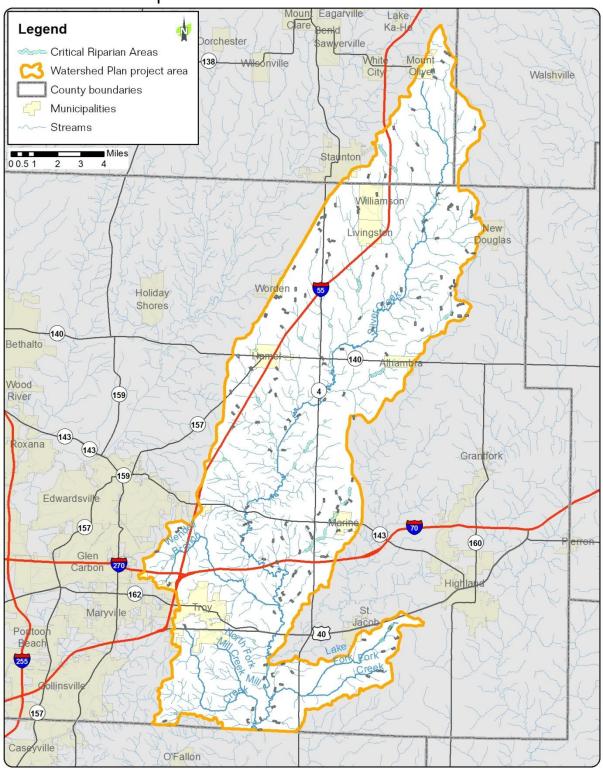
Critical Areas: Stream reaches



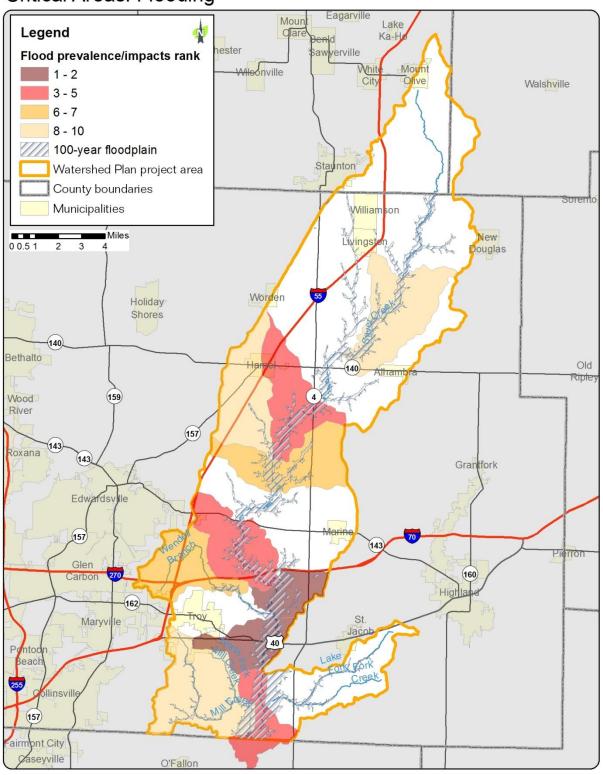
Critical Areas: Logjams



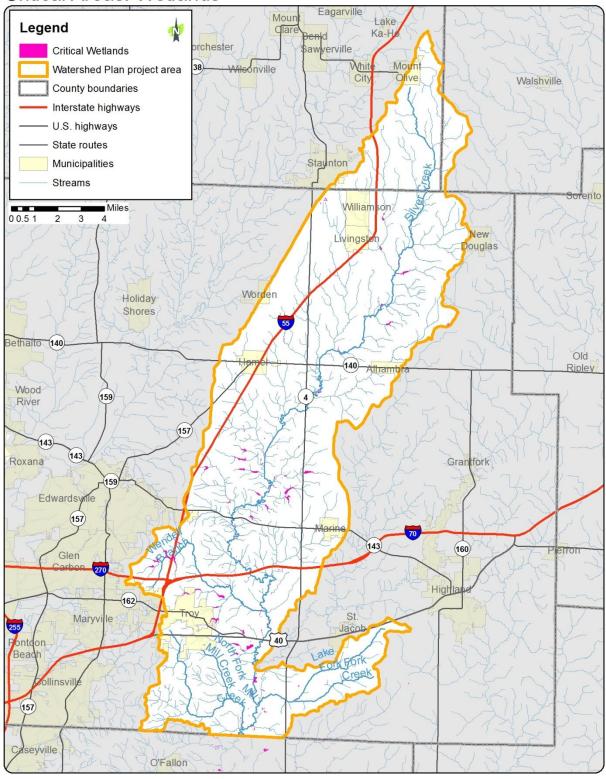
Critical Areas: Riparian areas



Critical Areas: Flooding

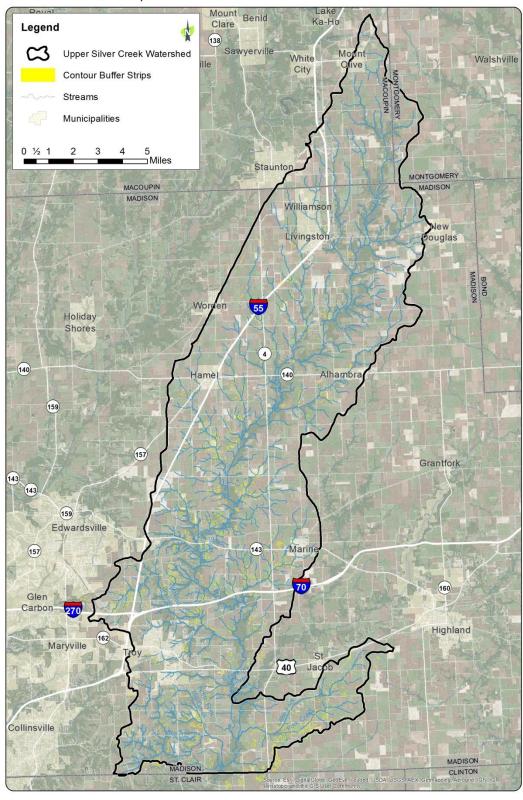


Critical Areas: Wetlands



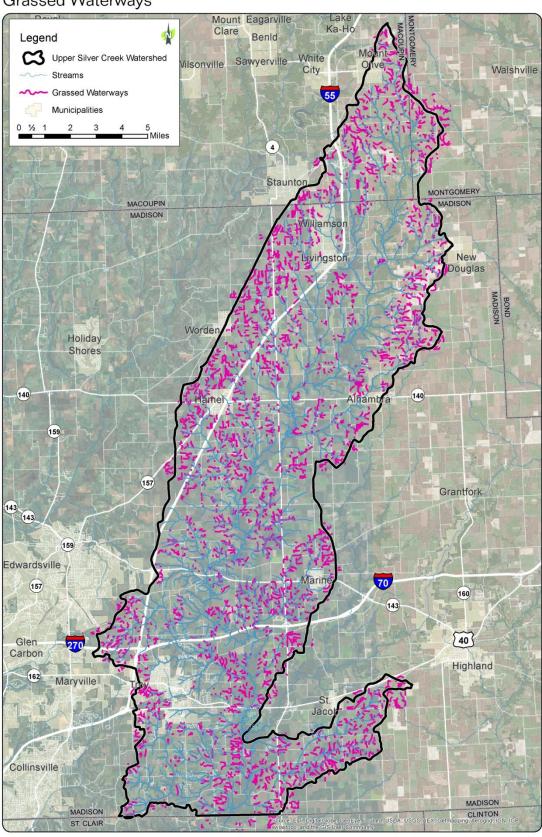
Agriculture Conservation Planning Framework (ACPF) output maps – BMPs

Contour Buffer Strips

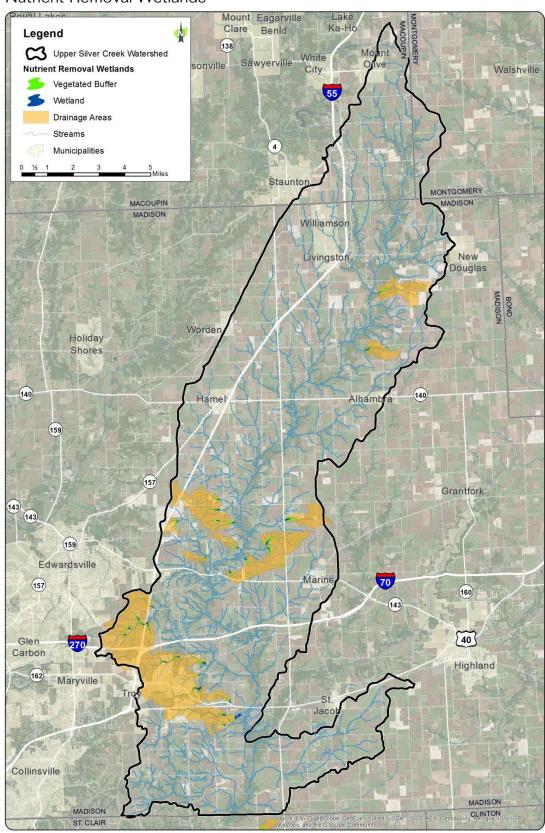


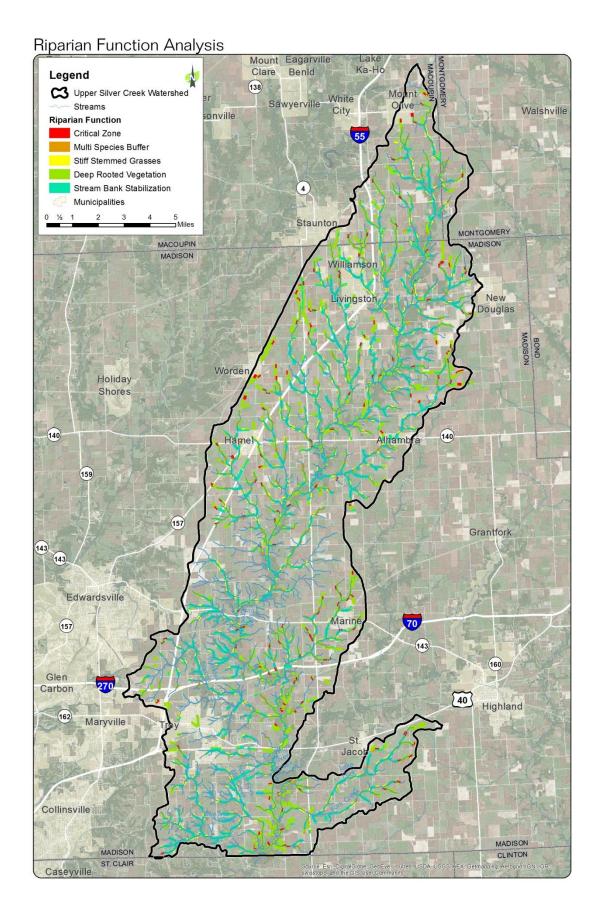
Drainage Management Mount Eagarville Clare Benid Lake Ka-Ho Legend 138 Upper Silver Creek Watershed White City Sawyerville onville Walshville Drainage Management Area Streams Municipalities MONTGOMERY MACOUPIN MADISON New Douglas Worde Holiday Shores 140 157 Grantfork 143 143 Edwardsville 70 157 160 Glen Carbon [40] Highland Maryville Collinsville MADISON MADISON CLINTON Aerogrid

Grassed Waterways



Nutrient Removal Wetlands





Water & Sediment Control Basins (WASCOBs) illespie Legend 4 Eagarville Upper Silver Creek Watershed Mount Clare Benid Lake Ka-Ho Water & Sediment Control Basin 138 Water & Sediment Control Basin Structure Sawyerville Streams Walshville Municipalities Bunker Hill Staunton MONTGOMERY MONTGOMERY BOND MACOUPIN MADISON MADISON Williamson New Douglas Worder Holiday Shores 140 140 Hamel Alhamb BOND Bethalto MADISON 159 Wood River 157 Grantfork 143 Roxana 70 ** Marine Edwardsville 143 Pierron 157 160 Carbon Highland Maryville Pontoon Beach (157) MADISON Collinsville MADISON CLINTON ST. CLAIR Caseyville O'Fallon

APPENDIX E - MANAGEMENT MEASURES

Quantifying the impacts of potential management measures

Quantifying pollutant reduction

Several sources were used to identify typical pollutant and flow reduction associated with each BMP recommended, where possible. These include:

- USEPA Region 5 Load Estimation Model Users Manual, Figure E6-2
- Long Run Creek Watershed Plan, Table 41
- Illinois Nutrient Reduction Strategy draft (2014), Table B1
- National Pollutant Removal Performance Database, seen in Lower Meramec Watershed Plan, Table 20
- SWIRCD, Thinking Outside the Pipe, seen in Lower Meramec Watershed Plan, Table 20
- Stormwater Management Center fact sheets, seen in Lower Meramec Watershed Plan, Table 20
 & Table 21
- Iowa Nutrient Reduction Strategy, Table 2 and Table 3
- Squaw Creek Watershed Management Plan, Table 6-1, based on Iowa Nutrient Reduction Strategy and EQIP database
- Pigeon Creek Watershed Management Plan, Table 67
- Deer Creek Watershed Plan, seen in Lower Meramec Watershed Plan, Table 20
- International Stormwater Best Management Practices (BMP) Database Pollutant Category Summary Statistical Addendum: TSS, Bacteria, Nutrients, and Metals, <u>www.bmpdatabase.org</u>, linked to by USEPA

Quantifying the costs of management measures

The costs of the management measures recommended were assembled from several sources, including the following primary sources:

- NRCS PFC Practice Component List FY2014
- Illinois Nutrient Loss Reduction Strategy, Table B1
- Stormwater Management Center fact sheets, seen in Lower Meramec Watershed Plan, Table 20
 & Table 21
- Long Run Creek Watershed Plan, Table 41
- Charles River Watershed Association, seen in Lower Meramec Watershed Plan, Table 21
- Iowa Nutrient Loss Reduction Strategy, Table 24
- Squaw Creek Watershed Management Plan, Table 6-1, based on Iowa Nutrient Reduction Strategy and EQIP database
- USEPA Stormwater Technology Fact sheet, 1999, seen in Lower Meramec Watershed Plan, Table
 21

The final costs used, and their sources, are shown in Table E.1.

Table E.1. Costs of recommended BMPs and sources of cost data.

Management measure	Cost	Cost unit	Cost data source(s)	URL
Contour buffer strips	\$ 227.90	/acre	Iowa Nutrient Reduction Strategy, Table 20	http://www.nutrientstrategy.iastate.edu/documents
Cover crops	\$ 53.39	/acre	Illinois Nutrient Loss Reduction Strategy (2015), Table B1 Squaw Creek Watershed Management Plan, Table 6-1 (for an lowa watershed), based on lowa Nutrient Loss Reduction Strategy and EQIP database	http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index https://www.storycountyiowa.gov/index.aspx?NID=1083
Grassed waterways	\$ 4,000.00	/acre	Andreas Consulting, professional estimate	
Ponds	\$15,000.00	/acre	Andreas Consulting, professional estimate	
Reduced tillage (conservation tillage/no-till)	\$ 33.33	/acre	NRCS PFC Practice Component List FY2014, obtained from the Madison County Soil and Water Conservation District (SWCD)	
Riparian buffers	\$ 10.03	/linear foot	Long Run Creek Watershed-Based Plan (for an Illinois watershed), Table 41	http://www.longruncreek.org/watershedplan
Terrace Waste storage	\$ 3.30	/linear foot	Andreas Consulting, professional estimate	
structure	\$ 250,000	/structure	Andreas Consulting, professional estimate	
Water and sediment control basin (WASCOB)	\$ 118.00	/acre	Squaw Creek Watershed Management Plan, Table 6-1 (for an lowa watershed), based on lowa Nutrient Loss Reduction Strategy and EQIP database	https://www.storycountyiowa.gov/index.aspx?NID=1083
Wetlands	\$23,153.22	/acre	Long Run Creek Watershed-Based Plan (for an Illinois watershed), Table 41 Illinois Nutrient Loss Reduction Strategy (2015), Table B1 Stormwater Management Center fact sheet, "Cost Considerations" Charles River Watershed Association, "Constructed Stormwater Wetlands" fact sheet	http://www.longruncreek.org/watershedplan http://www.epa.illinois.gov/topics/water-quality/watershed- management/excess-nutrients/nutrient-loss-reduction-strategy/index http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool6_S tormwater_Practices/Wetland/Wetland.htm http://www.crwa.org/hs-fs/hub/311892/file-634282714- pdf/Our_Work_/Blue_Cities_Initiative/Resources/Stormwater_BMPs/CR WA_Stormwater_Wetlands.pdf
Dry detention basins, new	\$41,600.00	/acre	USEPA "Dry Detention Ponds" web page	http://water.epa.gov/polwaste/npdes/swbmp/Dry-Detention-Ponds.cfm
Wet detention basins, new	\$45,700.00	/acre	USEPA "Wet Detention Ponds" web page	http://water.epa.gov/polwaste/npdes/swbmp/Wet-Ponds.cfm
Detention basin retrofits (native vegetation buffers, etc.)	\$14,456.30	/acre	Long Run Creek Watershed-Based Plan (for an Illinois watershed), Table 41	http://www.longruncreek.org/watershedplan

Detention basin maintenance (dredging, mowing, burning, invasives, etc.)	Ś	941.26	/acre	Long Run Creek Watershed-Based Plan (for an Illinois watershed), Table 42	http://www.longruncreek.org/watershedplan
burning, invasives, etc.)	٧	341.20	/acre		1
Pervious pavement	\$72	2,500.00	/acre	Low Impact Development Center, 2000-2002, seen in Lower Meramec Watershed Plan, Table 21	http://www.ewgateway.org/environment/waterresources/Watersheds/ LowerMeramec/lowermeramec.htm
Rain gardens	\$	7.99	/sq. ft.	Long Run Creek Watershed-Based Plan (for an Illinois watershed), Table 41 Charles River Watershed Association, "Rain Garden Design" fact sheet 10,000 Rain Gardens Kansas City, 2011, seen in Lower Meramec Watershed Plan, Table 21 The Groundwater Foundation, 2009, seen in Lower Meramec Watershed Plan, Table 21	http://www.longruncreek.org/watershedplan http://www.crwa.org/hs-fs/hub/311892/file-634297919- pdf/Our_Work_/Blue_Cities_Initiative/Resources/Stormwater_BMPs/CR WA_Rain_Garden.pdf http://www.ewgateway.org/environment/waterresources/Watersheds/ LowerMeramec/lowermeramec.htm
Jan Ban a cons	т		per		
Rainwater harvesting and reuse	\$	225.00	barrel/sm all cistern	Urban Design Tools: Low Impact Development, Rain Barrels and Cisterns web page	http://www.lid-stormwater.net/raincist_home.htm
Single property flood reduction strategies	\$ 1	.,000.00	per property	Approximate estimate, based on Illinois Urban Flooding Awareness Act report and Madison County Community Flood Survey results	http://www.sws.uiuc.edu/hilites/more.asp?id=ufaa&fr=hi
Storm drain system cleaning and expansion	\$	76.50	/linear foot	USEPA "Storm Drain System Cleaning" web page, using Ferguson et al (1997) estimate for cleaning [Added to] Olympia, WA Appendix J: Pipe Evaluation and Replacement Options and Costs: Stormwater System Inventory	http://water.epa.gov/polwaste/npdes/swbmp/Storm-Drain-System- Cleaning.cfm www.olympiawa.gov
Streambank & channel			/linear		
restoration	\$	75.00	foot	Midwest Streams, professional estimate	
Logjam removal	\$	30.00	/linear foot	Midwest Streams, professional estimate	

Descriptions of Management Measures (Best Management Practices, or BMPs)

Programmatic Management Measures

Conservation Development

Conservation Development is a design method that attempts to mitigate the environmental impacts of urbanization by conserving natural areas and their functions. In a Conservation Development subdivision, the aim is to allow for the maximum number of residences permitted under zoning laws, while disturbing as little land area as possible. This is especially important in areas containing floodplains, groundwater recharge areas, wetlands, woodlands, and streams. Developers assess the natural topography, natural drainage patterns, soils and vegetation on the site in the design stage. The result is compact, clustered lots surrounding a common open space.

The open space is typically preserved or restored natural areas that maintain natural hydrological processes and are integrated with newer natural stormwater features and recreational trails. This allows residents to feel like they have larger lots because most lots adjoin the open space. Conservation Development can also be used to integrate agricultural land uses harmoniously into the subdivision design.

The steps below are generally followed when designing a Conservation Development site:

- 1. Identify all natural resources, conservation areas, open space areas, physical features, and scenic areas and preserve and protect these areas from negative impacts from the development.
- 2. Locate building sites to take advantage of open space and scenic views by requiring smaller lot sizes or cluster housing in a way that protects the development rights of the property owner and maximizes the number of occupancy units permitted by zoning.
- 3. Design the transportation system. Roads should provide access to building sites, allow movement throughout the site and onto adjoining lands, and should not cross sensitive natural areas. Street design focuses on narrower widths, infiltration opportunities, eliminating curbs and gutters, adjusting the vehicular level of service (LOS), creating LOS for other modes of transportation, and designing connected street networks to support multiple uses.
- 4. Prepare engineering plans to show how each building site can be served by essential public utilities.

The Madison County Stormwater and Erosion Control Ordinance states the following general principles for new development, which support the Conservation Development design framework:

New development or redevelopment shall be related to the topography and soils of the site so as to create the least potential for erosion. Areas of steep slopes greater than thirty-three (33%) where high cuts and fills may be required are to be avoided whenever possible, and natural contours should be followed as closely as possible. [...] Natural vegetation shall be retained and protected wherever possible. Areas immediately adjacent to natural watercourses, lakes, ponds, sinkholes, and wetlands are to be left undisturbed wherever possible. Temporary crossings of watercourses, when permitted, must include appropriate stabilization measures. (Section 4.2)

Conservation Development also provides provisions for long-term and permanent resource protection. Mechanisms such as conservation easements and transfer of development rights can ensure that measures protecting the open space are more than just temporary.

Many communities' zoning ordinances do not yet permit Conservation Development design, because of code requirements for features such as minimum lot sizes, setbacks, and frontage distances. These ordinances should be amended to allow for Conservation Development design.

Federal and state programs

Federal and state agricultural easement and working lands programs such as the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP), the Environmental Quality Incentives Program (EQIP), and the Agricultural Conservation Easement Program (ACEP) are designed to recompense farmers and landowners for practices that protect soil and water health. More information on these programs is available in Appendix G, Funding Sources.

Financial support for stormwater infrastructure

Stormwater infrastructure, including green infrastructure, does not have a dedicated funding mechanism in many of the communities in the Upper Silver Creek Watershed. Maintenance and replacement of ageing infrastructure is a significant concern for these communities, and infrastructure failures such as pipe bursts can end up costing them more than timely repairs and replacement would have cost.

There are several policy options that assign dedicated funding for stormwater infrastructure that prevents flooding and allows infiltration. One of these approaches is a Stormwater Utility Tax/Fee. The downside is that people generally don't like paying taxes and fees, so a stormwater utility proposal may be unpopular. But where there is a demonstrated need for infrastructure investment, the benefits can be shown to outweigh the costs and people will understand the need for the program.

A stormwater utility charges landowners for the treatment of captured stormwater and for the operation and maintenance of the stormwater collection system. The utility would impose its fee based on how much stormwater is being generated by each landowner. This can be readily calculated from the amount of impervious surface on the parcel and the annual average precipitation. Stormwater diverted from the sewer system through infiltration or temporary retention (e.g. into a rain garden or rain barrels) could be given a credit against the utility fee equal to the volume of water averted and its treatment costs. This system offers the public greater transparency as to the true societal costs of managing stormwater runoff, and offers them an economic incentive to employ practices that divert more stormwater from the stormwater collection system. This has the effect of increasing its effective capacity of the stormwater system without having to expand it.

Flood Damage Prevention Ordinance

Madison County and five communities in the watershed are members of the National Flood Insurance Program (NFIP). Staunton and Macoupin County are NFIP members in the Macoupin County portion of the watershed. Montgomery County is also a member. As NFIP members, these communities have a Floodplain Ordinance in effect. (Eight incorporated communities in the watershed are not enrolled in

the NFIP and do not have such an ordinance.) Several features of the floodplain ordinances are based on Illinois DNR's Model Flood Damage Prevention Ordinance (a previous or current version).

HeartLands Conservancy prepared a draft Flood Damage Prevention Ordinance for Madison County, with implementation options on some of the policies to allow for customization. An updated, standalone ordinance like this would benefit all of the NFIP communities in the watershed. Among many other stipulations, the updated draft ordinance:

- Requires applicants for a development permit to obtain all other required local, state, and federal permits before the development permit is issued.
- Defines "substantial improvement" (which triggers compliance) as development which equals or exceeds fifty percent (50%) of the market value of the building before the improvement or repair is started, or increases the floor area of a building by more than 20%.
- Requires 2 feet of freeboard (height above the BFE) for structures in the floodplain.
- Allows accessory structures in floodplain provided they are non-habitable, are used only for the storage of vehicles and tools, and follow 8 other requirements.
- Stipulates information and materials to be included in the development proposal for a subdivision.
- Requires all new and substantially improved critical facilities to be located outside the
 floodplain, unless infeasible, in which case they must be elevated or floodproofed to the 500year flood elevation. Access routes must also be elevated to the BFE. Toxic substances must be
 sealed off from floodwaters.

Green infrastructure incentives

Green infrastructure is a vital concept that incorporates and informs many of the recommended practices in this Watershed-Based Plan. Green infrastructure can be defined as our region's natural resources, including open space, woodlands, wetlands, gardens, trees, and agricultural land. It can also be defined as the nodes and corridors of vegetation over the region, or the site-scale structures and landscaping that recreate natural processes. A regionally connected system of green infrastructure results in a higher diversity of plants and animals, removal of non-point source pollution, infiltration of stormwater, and healthier ecosystems. Corridors of green infrastructure along streams are extremely important because they provide biological conduits between hubs. However, most parcels forming corridors are not ideal green infrastructure until landowners and residents embrace the idea of managing stream corridors or creating backyard habitats.

Various regulatory incentives can be used to encourage the design and implementation of green infrastructure in new development. These incentives can include flexible implementation of regulations, fee waivers, tax abatement, access to municipal utilities, and a streamlined development review process. The incentives can be granted on a case-by-case basis.

Long-term management of natural areas

Conservation Development promotes the protection of sensitive natural areas and open space in new development, as well as incorporating green infrastructure into stormwater systems. In "traditional" development, too, there is often a piece of land set aside for a detention basin. Once set aside, this land can sometimes lose its ecosystem functions (such as water filtration, recreational value, and floodwater holding capacity) due to lack of maintenance.

The Madison County Stormwater and Erosion Control Ordinance sets out maintenance responsibilities for new stormwater infrastructure as follows:

Long Term Maintenance Responsibility: Maintenance of stormwater drainage, and erosion and sediment control facilities located on private property shall be the responsibility of the owner of that property. Before an appropriate permit is obtained from Madison County, Illinois the applicant shall execute a maintenance agreement with Madison County, Illinois of guaranteeing that the applicant and all future owners of the property will maintain its stormwater drainage and erosion and sediment control system and shall provide for access to the system for inspection by authorized personnel of Madison County, Illinois. (Section 5.1)

Developers should be encouraged to donate those natural areas and systems to a public agency or conservation organization for long-term management. Donation can be by either fee simple purchase of undeveloped land, or by acquisition of the development rights and establishing a conservation easement. If a local government takes on ownership or maintenance of the land, it can choose to fund it through mechanisms such as Development Impact Fees and Special Service Area (SSA) taxes.

Alternatively, Homeowners Associations (HOAs) can explicitly take on the management of the natural areas, writing rules about maintenance and fees into their byelaws. The members of the HOA will then share in the costs and decisions about maintenance of the natural area. For detention basins, Madison County recently began the best practice of including the transfer of authority for maintenance of the detention basin from the developer to the Homeowners Association once a new subdivision is 90% complete. From then on, the HOA has a maintenance responsibility for the detention basin. (See "Detention basins".)

Managing stormwater issues associated with development and urban sprawl

Continued land development and land use changes within cities and at the urban fringe present considerable challenges for environmental managers and land planners. The hydrologic changes associated with development include increased impervious area, soil compaction, and increased drainage efficiency, which generally lead to increased direct runoff, decreased groundwater recharge, and increased flooding. Declining water quality, deforestation, and degraded wildlife habitat are the other hallmarks of rapid urban development. In the Upper Silver Creek watershed, and particularly in Madison County, there has been considerable urbanization and population growth over the last 50 years. This development has placed great pressures on the environmental services the region provides to county residents.

Most municipalities in the watershed have a zoning ordinance, subdivision ordinance, comprehensive plan, and other regulations that guide future development in and around the municipality. Ordinances provide the legal basis for communities to require certain practices within their jurisdictions. Ordinances are used to control and oversee issues including stormwater management, weed control, and land development (land use). The EPA's Water Quality Scorecard is an excellent tool for communities to assess the gaps in current regulations and potential solutions that will help enhance water quality in current and future development.

Comprehensive Plans are an ideal venue in which to address water quality and flooding issues associated with development. Comprehensive plans should contain a natural resource protection and water quality protection elements with goals calling for preservation of identified critical natural

resource areas (such as those identified in this Watershed-Based Plan). They should establish criteria for areas which are available for development and areas which are a priority for preservation/protection. The counties and municipalities should work together more closely to address these issues.

Ordinances are used to control and oversee issues including stormwater management, weed control, and land development (land use). Ordinance effectiveness and implementation should be periodically reviewed.

Native landscaping

Weed control ordinances, whose purpose is primarily to maintain a pleasing aesthetic in community landscaping, often directly or inadvertently discourage or prohibit the use of native plants. Native landscaping can look "messier" than traditional landscaping, depending on the plants used. But when native plants are well chosen and well maintained, planting areas look very pleasing and offer many water quality and wildlife benefits. Garden nurseries and other native plant providers can be involved in educating customers and displaying the different "look" that native plants offer. Weed control ordinances can be amended to allow and encourage the use of these plants and provide guidance on species and maintenance.

Open space and natural area protection

Several actions can be taken to encourage the protection of natural areas and open space in new development. Some are regulatory, including the following practices from the U.S. EPA Water Quality Scorecard:

- Establish a dedicated source of funding for open space acquisition and management (e.g., bond proceeds, sales tax).
- Adopt regulations to protect steep slope, hillsides, and other sensitive natural lands (e.g., by limiting development on slopes > 30% or requiring larger lot sizes in sensitive areas).
- Create agriculture resource zoning districts (e.g., minimum lot size of 80 acres and larger) to preserve agricultural areas.
- Adopt neighborhood policies and ordinances that work to create neighborhood open space amenities that are within ¼ to ½ mile walking distance from every residence.

Other actions are non-regulatory:

- Provide financial support to or collaborate with land trusts or other conservation organizations to acquire critical natural areas.
- Adopt a community-wide open space and parks plan.
- Identify key natural resource areas for protection in jurisdiction's parks and open space plan.
- Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.

Private sewage monitoring

Private, residential septic systems are often not maintained properly, leading to failure. The U.S. Census Bureau has indicated that at least 10% of septic systems have stopped working. Failed septic systems can leach bacteria and nutrients into ground water or allow these contaminants to be exposed at the

surface and washed into receiving streams during storm events. Currently, inspections and enforcement of private septic systems are complaint-driven – there is no plan or resources for further enforcement.

Septic inspections are required during real estate transactions, but these are often many years apart. More regular inspections should be considered by the counties and municipalities, regardless of property ownership turnover. A rule in Jefferson County, Missouri requires that homeowners annually have their sewer system serviced and submit certification of it to the County.

Private sewage data on violations and water quality parameter exceedences should be collected and mapped. Additionally, an intensive inspection of private septic systems should be considered, to determine the location of any illicit discharges and to assess the condition of all septic systems in the watershed. This effort, commonly referred to as a sanitary sweep, could be eligible for grant funding. Following the identification of failing septic systems a course of action to correct these systems will need to be coordinated with the landowners, municipalities, counties, and relevant state agencies.

The U.S. EPA provides an excellent guide for septic system owners called "A Homeowner's Guide to Septic Systems" (USEPA, 2005), which explains how septic systems work, why and how they should be maintained, and what makes a system fail.

Riparian buffer ordinance

"Riparian", in its most general sense, means "adjoining a body of water". A riparian buffer is an undisturbed naturally vegetated strip of land adjacent to a body of water, such as a stream or lake. Among their many benefits, riparian buffers store floodwater, allow lateral stream movement, reduce streambank erosion, trap and remove sediment in runoff, mitigate stream warming through shade, provide habitat for wildlife, and increase property values. The literature indicates that forest provides more benefits in a riparian buffer than grassland does – with benefits including more wildlife habitat, stream shading and temperature control, and more debris as a food source for the stream – so oakhickory forest should be the first choice in riparian buffer vegetation.

A riparian buffer ordinance protects a riparian area of a certain width from new development and other disturbances, and promotes revegetation/reforestation. As a graduate student intern, Janet Buchanan (one of the authors of this Watershed-Based Plan) created a draft Riparian Buffer Ordinance for Madison County that would protect the riparian area in the unincorporated area of the county from certain kinds of development and activities. The ordinance has not yet been passed.

A riparian buffer ordinance may restrict the following activities and structures in the riparian buffer:

- Buildings, accessory structures, roads, parking lots, driveways, and other impervious surfaces
- Disturbance of vegetation (through clearing, construction, or other practices)
- Disturbance of soil (through grading, stripping of topsoil, plowing, cultivating, or other practices)
- Grazing of animals
- Filling or dumping
- Storage of hazardous materials

Sewage Treatment Plant upgrades/advanced treatment

Sewage treatment plants (STPs) are subject to National Pollutant Discharge Elimination System (NPDES) permit requirements. Upgrades to wastewater treatment plants in the watershed should be installed so that the limits set in these permits are not exceeded. According to recent studies, upgrades can reduce total phosphorus in plant effluent to below 1.0 mg/l and reduce total nitrogen in plant effluent to less than 5.5 mg/L. These would be significant improvements over the existing phosphorus and nitrogen concentrations in effluent from several of the sewage and wastewater treatment plants in the watershed (such as the Livingston STP). The US EPA 2008 Clean Watersheds Needs Survey (CWNS) identified \$874,797 worth of upgrades at the Alhambra Sewage Treatment Plant (STP) (permit ILG580004). No upgrades were identified for the Livingston or Troy STPs in this survey. (The results from other STPs in the watershed were not reported on the DMR Pollutant Loading Tool web pages where the other results were available). Funding for sewage treatment plant upgrades may be available from USEPA's Source Reduction grant program.

US EPA has published a report on advanced wastewater treatment methods to reduce phosphorus in effluent ("Advanced Wastewater Treatment to Achieve Low Concentration of Phosphorus"). The most effective treatment is the addition of aluminum- or iron-based coagulants followed by tertiary filtration, which reduces the final phosphorus level in effluent to near or below 0.01 mg/L. This treatment is affordable; monthly residential sewer fees charged by the facilities ranged between \$18 and \$46. Other pollutants such as BOD, TSS, and fecal coliform were also significantly reduced. Another treatment is enhanced biological nutrient removal (EBNR) in the secondary treatment process, which can often reduce total P to 0.3 mg/L or less prior to tertiary filtration. The process reduces operating costs for the tertiary filtration process and removes other pollutants as well.

Additionally, nutrient credit trading is a way to reduce overall nutrient discharge from the vicinity of the treatment plant. The plant pays for a conservation easement that reduces nutrient discharge from agricultural land, thus offsetting the plant's discharge. The two parties can agree with the state (Illinois EPA) that this amount of nutrient reduction can count against the treatment plant's discharge. These agreements have been made at several locations across the U.S.A., including Lancaster County, PA and the American Farmland Trust 3-state pilot project (Ohio, Indiana, and Kentucky). The agreement typically lasts for 10 years.

Stream Cleanup Team

A Stream Cleanup Team operated between 2008 and 2009 in Madison County and removed debris from selected streams in the county about which they received complaints. The cleanup team therefore contributed to improving water quality, reducing flooding, and monitoring stream health. The work was funded by a grant from the U.S. Department of Housing and Urban Development; the Team was comprised of paid workers. During the course of the cleanup operations, logjam locations were entered into a handheld GPS unit, and later processed by the county's IT department. Many county residents were vocal in their support of the Stream Cleanup Team, and said they would like to see a reprise of the program.

The program could be replicated expanded from its previous scope to include an education component and opportunities for volunteer involvement, mimicking other cleanup programs such as Missouri Stream Team, the Open Space Council's Operation Clean Stream, or Missouri River Relief Trash Bash.

Watershed-Based Plan supported and integrated into community plans

Copies of this Watershed-Based Plan will be made available to communities in the watershed. However, for maximum effectiveness, the Plan should be adopted and/or supported (via a resolution). The Plan will be most effective when its goals, objectives, and recommended actions are integrated with community policy.

Wetland mitigation banking / In-lieu fee mitigation

A wetland mitigation bank or in-lieu fee program can help to protect and restore critical wetland areas while other areas are developed. In-lieu fee mitigation is an opportunity to assist developers in meeting their mitigation needs while directing mitigation to high quality sites in the watershed. Under an in-lieu fee program, a developer can pay a fee in lieu of having to restore or protect wetland on the development site, or to mitigate losses of those sites by protecting or restoring wetland off-site. The fee goes to a third party organization which can direct the funds to high quality ecological sites for which restoration efforts will have the most environmental impact. HeartLands Conservancy is in the final stages of becoming an Approved Program Sponsor within the American Bottoms and Lower Kaskaskia River watersheds. Once approved, project implementation should begin in 2016. Mitigation sites will include both wetlands and streams. The U.S. EPA Water Quality Scorecard recommends compensation for damage to riparian/wetland areas to be on a minimum 2:1 basis on- or off-site.

Agricultural Management Measures

Contour buffer strips

Contour buffer strips are strips of perennial vegetation that alternate with strips of row crops on sloped fields. Contour buffers strips are usually narrower than the cultivated strips. The strips of perennial vegetation, consisting of adapted species of grasses or a mixture of grasses and legumes, slow runoff and remove from it sediment, nutrients, pesticides, and other contaminants. Buffer strips can also provide food and habitat (e.g. nesting cover) for wildlife. Contour buffer strips are most suited to uniform, non-undulating slopes of between 4 and 8 percent, but can also be used on steeper land. Contour buffer strips should be mown to maintain appropriate vegetative density and height for trapping sediment, and/or for providing habitat for target wildlife species. They should not be mown during critical erosion periods.

Cover crops

Cover crops provide both annual and long-term benefits to agricultural land. On an annual basis, they protect soil from water and wind erosion by providing a vegetative cover between the fall harvest and spring planting. They take up residual fertilizer nutrients and then release them back into the soil for the subsequent spring crop. Cover crops also suppress winter annual weeds. With consistent use of cover crops, the soil organic matter content will increase, and this provides many benefits to the soil, including improved soil tilth and health, increased porosity and infiltration, and sustained biological activity. Cereal grains, annual rye grass and radish are common cover crops for this purpose, but many other types are available. Some crops, such as radish and turnips, are selected to help break through compacted soil layers. Cover crops are often planted as a mix of multiple species that mutually provide a range of benefits.

More information about Cover Crop Plant Guides is available from NRCS' website: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/?cid=stelprdb1077238

Reduced tillage (conservation tillage/no-till)

Converting intensive tillage to conservation tillage consists of switching from moldboard to chisel plowing, which leaves at least 30% crop residue on the fields before and after planting to reduce soil erosion. Converting conservation tillage to no-till consists of switching existing chisel plowing to no-till where the ground is not tilled so as to not disturb the soil. This increases water infiltration, organic matter retention, and nutrient cycling, and reduces soil erosion.

Farmers may find that, initially, less tilling leads to growth of glyphosate-resistant (Roundup-resistant) weeds. Approximately ten species of weeds in the US are known to have become resistant to the herbicide. To avoid this, crop rotation and diversification is the best strategy to disrupt the weeds' emergence, following a long-term weed management plan. This plan should focus on the proper use of each herbicide, using diverse herbicide modes of action (MOA), and the rotation of both herbicides used and crops planted. See the Penn State Extension web page for more information about how this can be achieved (http://extension.psu.edu/plants/crops/soil-management/no-till/preventing-herbicide-resistant-weeds-in-a-no-till-system).

Terraces

Terraces are a soil conservation practice applied to prevent rainfall runoff on sloping land from accumulating and causing serious erosion. The term "terraces" often brings to mind "contour terraces" such as those in various mountainous regions of the world that follow contours in wavy lines. However, parallel terraces are the type of terrace used most commonly on agricultural land in the U.S. They are constructed parallel to each other in straight lines, and parallel to the direction of field operations as much as possible. Some terraces are constructed with steep backslopes that are kept in grass, but most are broad-based with gently sloped ridges that are cultivated as part of the field. Parallel terraces that discharge runoff through subsurface tile drains are known as parallel tile outlet (PTO) terraces. With this setup, water that accumulates behind a terrace ridge is discharged through a surface inlet into a subsurface drain. Some of the runoff is temporarily stored for long enough that sediment settles out of the water, but not so long as to damage the crop.

The major benefit of terraces is the conservation of soil and water, which in turn allows more intensive cropping than would otherwise be possible. There are additional benefits for PTO terraces: the total area can be farmed (no grassed waterways are needed); no interruptions in tilling or applying herbicide because there are no grassed waterways; reduced peak discharges; and the settling out of sediment and other contaminants before it reaches a receiving waterbody. Terraces are best suited to fields with long, fairly-uniform slopes that are not too steep (generally less than 8 percent), and where the soil is not too shallow (more than 6 inches). See the Purdue University Cooperative Extension Service page for more information on terraces. https://www.extension.purdue.edu/extmedia/ae/ae-114.html

Waste (Manure) Management

Proper livestock waste management is very important in maintaining water quality, especially for bacteria levels. Writing a Comprehensive Nutrient Management Plan helps farmers to integrate waste management into overall farm operations. Such a plan can recommend waste storage structures and

strategies that increase waste storage time, eliminate unwanted runoff, incorporate manure nutrients into crop nutrient budgets, and efficiently apply manure to cropland without runoff.

The following is a general approach to addressing bacterial pollution in streams as a result of animal manure.

- Identify known sources of bacteria to waterbodies (e.g. areas where livestock have access to streams), using local knowledge, windshield surveys, interviews with landowners, etc.
- Conduct monitoring of stream reaches, adding additional monitoring to help pinpoint potential sources of bacteria.
- Promote good manure application practices such as:
 - Using manure injection rather than surface application;
 - Applying manure to relatively dry fields;
 - Avoiding steep slopes;
 - Avoiding areas near waterbodies or drain tile intakes;
 - Avoiding areas prone to flooding; and
 - Avoiding application on frozen soil.

See the NRCS "Agricultural Waste Management Field Handbook" (AWMFH) for specific guidance on planning, designing, and managing systems that involve agricultural wastes.

Grassed waterways

Grassed waterways are vegetated channels designed to prevent gully erosion by slowing the flow of surface water with vegetation. Grassed waterways should be used where gully erosion is a problem. These areas are commonly located between hills and other low-lying areas on hills where water concentrates as it runs off the field. Grassed waterways trap sediment entering them via field surface runoff and in this manner perform similarly to riparian buffer strips.

The size and shape of a grassed waterway is based on the amount of runoff that the waterway must carry, the slope, and the underlying soil type. NRCS design standards for grassed waterways specify that the minimum capacity convey the peak runoff expected from the 10-year frequency, 24-hour duration storm. Enough freeboard above the designed depth should be provided to prevent damage to crops. The vegetation in the channel should be native plants suited to the site conditions and intended uses.

Riparian buffers

A riparian buffer is a vegetated area along a shoreline, wetland, or stream where development and row cropping is restricted. The buffer physically protects and separates the waterbody from future disturbance or encroachment, and reduces the amounts of pollutants that reach it. If properly designed, a buffer can sustain the integrity of stream ecosystems and habitats. As conservation areas, aquatic buffers are part aquatic ecosystem and part urban forest.

Different grading and vegetation at different locations can affect water quality in different ways. Where vegetation roots can interact with the water table, carbon cycling and denitrification may be enhanced. In areas where the water table depth exceeds the rooting depth, and overland runoff is high, stiff-stemmed grasses may be beneficial to intercept and reduce runoff and sediment from reaching the stream. Where appreciable amounts of neither runoff nor groundwater can be intercepted, streambank

stabilization has great benefits. Locations where these practices would be most suitable were identified by using USDA's ACPF model.

A riparian buffer ordinance is an important tool that communities can use to restrict new development in buffer areas in order to ensure that land adjacent to streams continues to protect water quality and moderate stormwater flow.

Water and Sediment Control Basins (WASCOBs)

Water and Sediment Control Basins (WASCOBs) are small earthen ridge-and-channel or embankments built across a small watercourse or area of concentrated flow in a field. WASCOBs hold field runoff that would otherwise create a gully or leave the field without sediment settling out. WASCOBs are usually straight, vegetated with grass, and just long enough to bridge an area of concentrated flow. The water detained in a WASCOB is released slowly via infiltration or a pipe outlet and tile line. The ACPF model identified locations where WASCOBs would be the most effective.

Wetlands

Wetlands, or Nutrient Removal Wetlands, provide significant water quality benefits. Wetland plants, soils, and microbes cleanse the water entering the wetland, removing approximately 78% sediment, 44% phosphorus, and 20% nitrogen from runoff, according to U.S. EPA's STEPL tool. This is achieved through settling and biological update by wetland plants and organisms. They also recharge groundwater, store stormwater, reduce high water flows, provide food and habitat for wildlife, and increase carbon sequestration. They are appropriate for agricultural and semi-urban land only, where there is limited development.

Natural wetlands should be protected from increased stormwater runoff from development, so as to continue functioning. Wetland vegetation should consist of native aquatic plant species.

Constructed wetlands are shallow, vegetated ponds that are engineered and constructed to mimic the structure, water quality function, wildlife habitat, and aesthetic value of naturally occurring wetlands. In some cases, they occur on sites that were historically wetlands, and can be considered wetland restoration projects. Since constructed wetlands need a somewhat constant water level to sustain their functions, the soils underlying the wetland must allow limited infiltration.

Wetland restoration is the rehabilitation of a degraded wetland or the re-establishment of a wetland so that the soils, hydrology, vegetative community, and habitat are an approximation of the original natural condition that existed prior to historic modification.

The USDA's ACPF tool identified suitable locations for nutrient removal wetlands in areas with high runoff risk in the Upper Silver Creek watershed. The MoRAP assessment of wetland restoration ranking identified wetland areas suitable for wetland restoration.

Urban Management Measures

Urban runoff management is somewhat different from agricultural settings in that the larger areas of impervious surfaces cause higher runoff volumes and, often, high nutrient concentrations. Structural infrastructure designed and constructed to collect, store, infiltrate, and treat storm water are some of the most expensive watershed improvement tools to implement and require consistent maintenance. According to Schueler and Holland (2000), the cost to maintain a storm water practice over 20 to 25 years can be equal to the initial construction costs. Nevertheless, structural storm water practices can be effective tools for pollutant removal, runoff reduction, and peak flow reduction when properly designed, constructed, and maintained.

Many of these Urban Management Measures fall under the definitions/categories of Low Impact Development (LID) and green infrastructure. They include design, construction, and post-construction (retrofit) practices. The following practices have been recommended for the Upper Silver Creek watershed.

Detention basins

Detention basins are human-made depressions for the temporary storage of stormwater runoff with controlled release following a rain event. There are at least 65 detention basins in the Upper Silver Creek watershed and most are associated with residential and commercial development (such as subdivisions and business parks). Many of the existing basins are wet bottom basins, which are essentially ponds planted with turf grass on their side slopes. Dry detention ponds (a.k.a. dry ponds or extended detention basins) are designed to detain stormwater runoff for some minimum time (e.g., 24 hours) to allow particles and associated pollutants to settle, but do not have a large permanent pool of water. They are often lined with concrete. These basins do not provide much, if any, infiltration, wildlife habitat, or water quality improvements.

When designed for multiple functions, however, detention basins can improve water storage, wildlife habitat, natural aesthetics, and water quality. According to USEPA, properly designed wet bottom basins designed to have wetland characteristics reduce total suspended solids (sediment) by 77.5%, total phosphorus by 44% and total nitrogen by 20%. Dry bottom infiltration basins reduce total suspended solids (sediment) by 75%, but have lower nutrient removal reduction of total phosphorus (65%), and total nitrogen (60%).

New basins should be:

- Located in natural depressions or drained hydric soil areas (especially when native vegetation is used);
- Located adjacent to existing green infrastructure (especially when native vegetation is used);
- Oriented/located so that outlets do not enter sensitive ecological areas.
- Designed to serve multiple development sites, so that several smaller basins are not needed;
- Designed with shallow side slopes and appropriate native vegetation;
- Designed with a shelf planted with native wet prairie vegetation, if a wet bottom basin; and
- Planted with mesic or wet-mesic prairie, if a dry bottom basin.

The Madison County Stormwater and Erosion Control Ordinance contains several requirements for new detention basins in floodplains, floodways, and connected to wetlands, rivers, streams, and ponds.

Retrofits to existing basins can also attain these benefits, through minor engineering changes, addition of extended detention basins/ponds, and the use of native vegetation. Many of the dry, wet, and wetland bottom basins in the watershed present excellent retrofit opportunities. Generally speaking, three years of management are needed to establish native plant communities. During the first two growing seasons following seeding, mowing and spot herbicide applications are needed to reduce annual and biennial weeds and eliminate problematic non-native/invasive species such as thistle, reed canary grass, and emerging unwanted saplings. In addition, the inlet and outlet structures should be checked for erosion and clogging during every site visit.

Maintenance of detention basins is of vital importance in sustaining their functions and extending the life of the infrastructure. Maintenance practices include regular dredging, mowing or burning (an inplace controlled burn of native grasses) of the vegetation, and removal of invasive species. The assessment of 10 basins on site visits for the Detention Basin Inventory detailed in the Watershed Resources Inventory yielded the following specific recommendations for those basins:

Recommendation	# sites
Native vegetation	7
Bank stabilization	5
Dredging	3
Maintenance/vegetation management	2
Longer outlet pipe reaching further into basin	1
Replace inlet pipe with one above water level	1
Unclog culvert under road	1
Use overflow pipe rather than outlet channel, or a rock	
overflow	1

These retrofits and maintenance issues are recommended in the Watershed-Based Plan, and will be referenced for these sites as they are proposed for new projects.

For existing subdivisions and areas already developed, it is unusual to have a long-term maintenance agreement in place. When detention basins get full of sediment, there is no clearly identified party responsible for dredging and maintenance. Outreach is needed to educate HOAs about taking on responsibility for dredging and other maintenance, and potentially change their byelaws to reflect this responsibility. For new development, Madison County recently began the best practice of including the transfer of authority for maintenance of the detention basin from the developer to the Homeowners Association once the subdivision is 90% complete. The Homeowners Association (HOA) then has a maintenance responsibility for the detention basin for the life of the project. Alternatively, developers should be encouraged to donate naturalized detention basins and other natural areas to a local municipality or conservation organization for long term management that can be funded by a mechanism such as a Special Service Area (SSA) tax. (See "Long-Term Management of Natural Areas".)

Pervious pavement

Pervious pavement is also referred to as porous or permeable pavement. Areas paved with pervious pavement allow water to infiltrate through small holes to a below-ground storage area, or to a pipe that leads to such an area. Pervious pavements reduce runoff rates and volumes from traditional impervious

pavements, and can be used in almost every capacity in which traditional asphalt, concrete, or pavers are used. Below ground, the stormwater can be treated through soil biology and chemistry, and the water is returned to groundwater and aquifers rather than increasing flows in streams. It is important to note that there are limitations to using pervious pavement based on subsoil composition, and that it requires annual maintenance (such as vacuuming with a specialized machine) to remain effective over time.

Design options for pervious pavement include:

- Porous pavement with underground storage/recharge beds;
- Concrete pavers infilled with soil/gravel and vegetated with grass; or
- Plastic or metal grid infilled with gravel or equivalent.

Ponds

Ponds are constructed basins with a permanent wet pool. Sediments settle out and nutrient uptake can occur with an active microbial community and healthy emergent and submerged aquatic vegetation. Widely used as a stormwater BMP, they can also have be stocked with fish and used for recreation. Ponds should be located at the outflow of a small drainage area in areas that are not highly urbanized. They may be used in conjunction with other measures such as erosion control, flood control or baseflow.

Rain gardens

Rain gardens, vegetated depressions that clean and infiltrate stormwater from rooftops and sump pump discharges, have become popular garden features. They work best when located in existing depressions or near gutters and sump pump outlets, and are typically planted with deep-rooted native wetland vegetation. Rain gardens significantly slow the flow of water, improve water quality, and provide food and shelter for birds, butterflies, and insects.

Rain gardens work well in combination with the disconnection of roof downspouts and the redirection of that water to the garden. This results in a significant increase in the infiltration of rainwater over a direct connection to the storm drain or to impervious surfaces.

Bioretention facilities are sometimes referred to as rain gardens, but the term rain garden is typically used to describe a small, planted depression on an individual homeowner's property, while a bioretention facility typically describes larger projects in community common areas as well as non-residential applications.

See "Thinking Outside the Pipe" from HeartLands Conservancy for more specifics on rain garden design and bioretention facilities.

Rainwater Harvesting and Reuse

Rainwater harvesting and re-use via rain barrels and cisterns is a straightforward and useful way to decrease the amount and intensity of stormwater runoff in a watershed and reduce the amount of water consumed from municipal sources. On most homes and buildings, rainwater flows from roofs into downspouts and then onto streets or into storm sewers. Reconnecting the downspouts to either rain barrels or cisterns can reduce the flood levels in local streams and make water available to the building

owner for irrigation and other uses. Water re-use differs based on the type of storage and water treatment.

Rain barrels sit above ground, and are connected to downspouts. A typical rain barrel stores 55 gallons of water. The water collected is often used for irrigation, which can result in significant cost savings; in many areas, residential irrigation can account for almost 50 percent of residential water consumption. Car washing and window cleaning are other common uses of the collected rainwater.

Cisterns are larger, sealed tanks that can sit above or below ground, and also collect rooftop runoff from downspouts. If installed below ground, a cistern requires a pump to bring the water up. With appropriate sanitation treatments, the "gray water" from cisterns can be reused for toilets, housecleaning, dishwashers, laundry, and even showers. Cisterns and rain barrels both reduce water demand in the summer months by reducing the potable water used for irrigation or other household uses.

Single property flood reduction strategies

A number of practices can be used to reduce flood damage on single properties. The key to successfully mitigating future damages is to identify the source(s) of flooding at the site scale. It is important to educate property owners about possible sources of flooding, flood mitigation practices, and the costs of those practices. Coordination with local community officials is often required to identify and confirm the most appropriate flood reduction strategy.

The Illinois Urban Flooding Awareness Act Final Report, published in June 2015, identified typical causes of basement flooding (overland flow, infiltration, or sewer backup), and mitigation options available to address these causes. Table E.2 is taken from this report, and shows these causes, along with mitigation options and their costs.

Table E.2. Flood damage mitigation options and the causes of flooding that they address, along with estimated costs. From the IDNR Urban Flooding Awareness Act report (June 2015), Table 9.1.

	Ca	use of Flood	ing		
Mitigation Options	Overland	Infiltration	Sewer backup	Damage reduction	Estimated Cost
Structural Inspection					\$250-\$800 each
Raise utilities and other valuable items				x	
Insurance				x	Based on coverage
Gutter maintenance	0	х	0		
Downspout disconnection			x		
Site grading, downspout extension	o	х			
Rain gardens	0				\$3-40 per square foot
Permeable/porous pavement	x				\$2-\$10 per square foot
Exterior drain tile		х			\$185 per foot
Interior drain tile		х	x		\$40-50 per foot
Seal wall and floor cracks		х	0		\$300-\$600 each
Sump pump with check valve	x	х	x		\$400-\$1,000 each
Sewer backup valves			х		\$3,000-\$5,000
Overhead sewer installation			x		\$2,000-\$10,000
x - primary reduction o - secondary reduction					

Storm drain system cleaning and expansion

Storm drain systems are vital for the timely removal of stormwater from areas where it would cause damage if it accumulated. When clogged, storm drains, culverts, and other stormwater infrastructure can cause overflows that lead to erosion and property damage. Cleaning this infrastructure increases dissolved oxygen and reduces levels of bacteria in the receiving waters. Cleaning storm drains by flushing is more successful for pipes smaller than 36 inches in diameter. Wastewater must be collected and treated once flushed through the system. For larger pipes, long pipes (700 feet or more), areas with relatively flat grades, and areas with low flows, flushing may be less effective.

In some cases, stormwater infrastructure is found to be too small to accommodate the flow it receives. Often, new development upstream has altered the watershed hydrology in some way, often increasing the amount of impervious surface and surface runoff flowing to it. In such cases, existing infrastructure such as road culverts and detention basins should be assessed and resized to accommodate the increased flows. The Madison County Stormwater and Erosion Control Ordinance requires that culvert crossings are sized to "consider entrance and exit losses as well as tailwater conditions" (3.4.12.3).

In-stream Management Measures

Streambank and channel restoration

Streambank and channel restoration includes streambank stabilization and stream channel improvements. These practices are typically done together alongside riparian buffer improvements. The USEPA reports that as much as 90% of sediment, phosphorus, and nitrogen can be reduced following stream restoration. Bank stabilization helps to preserve the stream environment in a natural state, building a strong, long-lasting natural system of deep rooted vegetation that will protect the topsoil from heavy wind and rain.

"Traditional" or "hard" methods of stabilization involve materials such as rip-rap, concrete, and steel. By utilizing bioengineering (natural mimicry or "soft") methods that incorporate vegetation, the project is often cheaper, provides more effective stabilization, and reduces overall pollution going into the stream. Targeting the outer bends of stream sections with poor riparian vegetation cover where most stream erosion occurs increases the effectiveness of streambank stabilization practices. Streambank bioengineering, which uses vegetative materials in combination with structural tools such as rock at the toe of the streambank, are most needed in areas of excessive streambank erosion or loss of farmland.

Streambank and channel restoration practices appropriate for the streams in this watershed include:

- Vegetative bioengineering;
- Stone toe protection;
- Two-stage channels;
- Riffle/pool complexes;
- Rock riprap; and
- Gabions (rock and wire baskets).

Stream restoration projects present some challenges for those implementing them. First, the development patterns that created the problem are not addressed. Second, the solutions are often technical and expensive, requiring permitting and construction from a qualified contractor. And third, routine maintenance is often not maintained as landowners lack the knowledge or capability to do the needed work. Several resources are available to landowners to help them navigate these challenges. St. Clair County NRCS has helped implement 938 ft of streambank and shoreline restoration between 2010 and 2015.

Logjams

A logjam is any woody vegetation, with or without other debris, which obstructs a stream channel and backs up stream water like a natural dam. Logjams occur naturally, providing beneficial stream structure and cover for fish and wildlife and allowing nutrient-rich sediments to be deposited on adjacent floodplain. However, logjams also impede the ability of streams in the watershed to drain and convey water from the land in a timely manner.

Logjams commonly form when a relatively large object, often a tree, falls into a stream channel and becomes wedged or blocked across the streambed. Populations of beavers in the watershed also contribute to the felling of trees in riparian areas. Sometimes human activities induce stream obstructions, like when yard trimmings or large appliances and other litter are dumped in a stream or left in a floodplain and subsequently are carried into the stream.

Logjams contribute to flooding by making less natural storage available in the stream channel, elevating the water out of its banks during periods of high flow. This can be significant to farm fields and residences in the floodplain and to particularly low-lying, flood-prone areas. A logjam can also lengthen the duration of inundation during these floods, which can have a significant impact on crops planted in floodplain fields. However, this does not make a big difference to overall flood elevation during large-scale floods. Removing logjams is generally only considered an effective measure to mitigate small-scale flooding.

Water quality is also affected when a logjam is created. As sediment is deposied behind the obstruction, the water that flows on down the stream has less total suspended solids. The stirring and mixing of the water as it cascades over, around, and through the logjam oxygenates the water. However, not all the water quality impacts are beneficial. As the water moves around the logjam along the route of least resistance, it scours away the streambanks, introducing more sediment and debris to the water. When the stream flow is powerful enough, a streambank "blow-out" can occur around it, taking large amounts of soil and debris from the bank into the stream channel as the stream creates a new path.

Stream channel changes resulting from water being redirected around a logjam can lead to the creation of a series of meanders. In an area where the riparian zone is vegetated, and development or cropland is not directly adjacent to the stream, this meandering and stream relocation is not really a problem. In developed or row cropped areas, these changes can inflict significant property damage and necessitate an expensive channel restoration project.

Logjams affect the habitat of species living in and near the stream. When a logjam forms, it slows the flow behind the obstruction, allowing sediment suspended in the water to settle out. The sediment adds to the obstruction and causes additional debris to become trapped there as well, enlarging and compacting the obstruction. This can create new habitat for fish and aquatic plants and macroinvertebrates. However, a tightly packed stream obstruction can act as a barrier to fish migration.

Determining whether a certain logjam should be removed requires these factors to be taken into account. Where logjams and potential channel changes would be detrimental to riparian property owners and stream water quality, property owners should be prepared to conduct routine stream inspections twice a year and after significant storm events to identify obstructions that need to be removed. The easiest way to deal with logjams is to remove them before significant sediment and debris has been deposited. A useful source for determining whether a logjam should be removed is "Stream Obstruction Removal Guidelines", prepared by the Stream Renovation Guidelines Committee, The Wildlife Society, and the American Fisheries Society in 1983. The document, which was endorsed by the U.S. Fish and Wildlife Service and other agencies, can be found at http://www.lakecountyil.gov/Stormwater/Documents/Planning/North%20Mill%20Creek/2011/D Compiled.pdf

APPENDIX F - MONITORING PLAN

Monitoring will be used to assess the effectiveness of agricultural and urban best management practices that are implemented as part of a watershed management plan. Continuous monitoring at the USGS gage 05594450 located on the main stem of Silver Creek near Route 40 east of Troy will provide a broad assessment of the effect of land management practices throughout the watershed on surface water quality throughout the year. It will also allow trends to be identified by comparing new monitoring data to historical water quality data collected by USGS and the Illinois Water Sciences Center (IWSC) from this same location during several periods from 1974 to 2011.

In addition to continuous monitoring at the USGS gage, secondary monitoring stations will be added upstream from the USGS gage in order to identify the relative contributions of HUC14 watersheds to overall water quality in the larger watershed. A sampling location will be identified near the outflow of each HUC14 and water samples will be collected quarterly to determine seasonal variations in water quality. Additional sampling will be done during major storm flow events.

Sample collection scheduling, monitoring equipment, and protocols

The sampling schedule begins in October 2015, with discrete sampling procedures at HUC14 sites that will generally be collected quarterly in March, June, September, and December 2016. Continuous monitoring at the USGS gage 05594450 will begin once the equipment is installed in March 2016. In 2016/17, future sampling strategies will be developed based on monitoring results from the first year.

The sampling plan for 2016 is relatively ambitious and labor intensive. It is likely that discrete sample collection will be less frequent starting the second year of monitoring. On the other hand, it may be intensified in specific HUC14s that were identified as major sources of sediments, nutrients or other contaminants. Continuous collection of water samples at the USGS Gauge 05594450 will continue in the second year, although the number of samples may be reduced.

The collection and analysis of monitoring data should be continued on a 3-5 year cycle through the year 2025, as funding allows. Opportunities for continuing or expanding the monitoring program should be evaluated periodically in order to further assess water quality conditions throughout the watershed, the causes and sources of pollution, the impact of nonpoint source pollution, and changes in water quality related to implementation of the watershed-based plan as well as social indicator data related to the watershed-based plan's goals and objectives. Quality Assurance Project Plans (QAPP) should be developed for those monitoring opportunities that are selected for implementation in support of the watershed-based plan.

Continuous monitoring at the USGS gage will use a programmable, automatic sampler (e.g., Isco 6712) for collecting water samples. The automatic sample works in combination with a depth sensor (e.g., Isco 720 module) to determine the timing and intensity of sample collection. Most sediments and nutrients are transported during periods of elevated flow following major precipitation events. Therefore, sample collection will be more frequent during periods of elevated flow and less frequent during periods of baseflow. The automatic sampler can collect up to 24 samples of 1 L volume. Each sample can consist of a single sampling event or a composite of multiple sampling events. Samples will be preserved in the

bottles using standard EPA methods until they can be retrieved and transported to the laboratory for chemical analysis.

Discrete sampling in wadeable streams at the HUC 14 level will use an area-velocity meter combined with cross-sectional stream measurements to calculate an instantaneous discharge rate. Concurrent water samples will be collected with a rod-mounted depth integrating sampler (US DH-81) when stream current exceeds 0.45 m/sec, or a grab sample at slower current velocities. Discrete samples will be preserved at 4°C and transferred to the laboratory on the same day of collection.

Parameters to be monitored

Flow

Continuous monitoring will be done at the USGS gage 05594450 to monitor stream height (ft) and discharge (ft³/min) on a continuous basis with updates at 15 minute intervals. The drainage area for discharge at this location is 98,560 acres, which represents 82% of the project area. However, it does not include flow from the East Fork Branch, Lake Fork Branch, and Mill Creek Branch, whose confluences with Silver Creek are located between USGS gage 05594450 and the southern limit of Madison County. The National Great Rivers Research & Education Center (NGRREC) receives daily updates of instantaneous discharge at the USGS site. Additionally, the data is available online at the following website: http://waterdata.usgs.gov/nwis/uv/?site_no=05594450. An automated sampler will be placed at this location to continuously collect water samples at intervals determined by the rate of discharge. Samples will be collected less frequently during periods of base flow, but with increasing frequency during periods of elevated flow. Water samples will be retrieved at two to three week intervals and transported to NGRREC for laboratory for analysis. Discharge data from the USGS gage will also be used to determine when conditions are appropriate for collection of discrete samples from HUC14 sites as described below.

Discrete monitoring will also be conducted in the watershed. A monitoring site will be established for each HUC 14 and will be located as close as possible to the outflow point of the HUC14. Each site will be monitored quarterly to capture trends in water quality that are a result of seasonal land management practices. Additionally, the sites will be monitored during a subset of storm flow events to determine the impact of major hydrologic events on sediment and nutrient transport in Silver Creek. Discrete sampling of the HUC14 monitoring sites will only be possible when wading conditions are safe, and thus, large spikes in flow will not be sampled. However, storm flow samples will be collected automatically at the USGS gage.

Sediment and Nutrients

Water samples collected by NGRREC will analyzed in the Center's Environmental Analytical Laboratory. Each water sample will be analyzed for those pollutants which have been identified by the IL-EPA as impairments. Samples collected with the Isco 6712 will be analyzed for total suspended sediments (TSS), total phosphorus (TP), total nitrogen (TN), and Non-Purgeable Organic Carbon (NPOC). In addition to the above-mentioned parameters, the samples collected at the HUC14 level will also be analyzed for soluble reactive phosphate (SRP), nitrite+nitrate-nitrogen (NO $_2$ +NO $_3$ -N), and ammonium-nitrogen (NH $_4$ -N). NGRREC will maintain a dataset of this data.

Other pollutants

Manganese (Mn) was included in the 303d list of impairments for Silver Creek in 2010, 2012, and 2014. Additional data is needed to determine the seriousness of the Mn impairment and to identify possible sources of the Mn. A subset of discrete samples collected from each of the HUC14 monitoring sites will be analyzed for soluble Mn. Based on the results of the initial Mn analysis, additional samples from subsequent monitoring events may be analyzed. One potential source of Mn deposition on the landscape is coal combustion from electrical generating plants which are ubiquitous in Illinois. If analytical results verify elevated concentrations of total and dissolved Mn in Silver Creek water samples, additional pollutants associated with coal combustion, such as mercury (Hg), may be measured to determine if coal combustion is implicated as the source of these pollutants. NGRREC will maintain a dataset of this data.

Biological data

Biological data related to macroinvertebrate populations in wadeable streams will be collected by Illinois RiverWatch citizen scientists. RiverWatch volunteers will collect data at three locations in the Upper Silver Creek watershed, as volunteers are available: one on Wendell Branch, one on Silver Creek adjacent to the Troy USGS gauge, and one near the outflow of East Fork Silver Creek. Each of these locations is a perennial stream with flow year-round, at which a 200-ft reach is monitored. The first two sites have been monitored a total of 22 times between 1996 and 2014. Data collected by RiverWatch volunteers is vetted by a professional aquatic biologist. It is then entered into and maintained in the Illinois RiverWatch database.

Flood event monitoring

The Madison County Stormwater Coordinator keeps a spreadsheet with information about complaints received about flooding in the unincorporated area of Madison County. In future, the County may set up a citizen complaint tool with a map component, to help identify locations of flooding, and especially recurring locations. Alternatively, a regional rain gauge system would help measure the severity of storms in conjunction with when and where flooding is occurring.

Monitoring schedule

Table F.1 shows the monitoring activities and month/year of monitoring activities to be undertaken by NGRREC and RiverWatch volunteers.

Future phased monitoring

If this initial monitoring reveals a need for further monitoring, another phase may be added. Smaller tributaries may be monitored to better pinpoint areas of high water pollution, or stream reaches that can be assessed to evaluate the performance of BMP implementation or restoration efforts on pollutant loading. Additionally, EPA should be encouraged to resume water quality monitoring at the USGS Troy gauge site.

Table F.1. Timeline for water quality monitoring in the Upper Silver Creek Watershed.

		201	5		20:	16											20	17					2018 - 2025
	Monitoring Activity	Se O	0	N	Ja	F	M	M A	M	J	J	A	S	0	N	D	Ja	F	M	A	M	J	
	Develop Standard Operating Procedures for collection									H						H							
	and laboratory analysis of samples																						
	Bi-weekly sampling of USGS gage site 05594450																						
2.1	Install continuous monitoring equipment																						
2.2	Monitor TSS, TP, TN, NPOC																						
2.3	Evaluate and adjust continous monitoring plan																						
2.4	Monitor TSS, TP, TN, NPOC based on revised plan																						
	Discrete sampling at the HUC14 level									H						H							
3.1	Establishment HUC 14 discrete sampling sites																						
3.2	TSS, TP, TN, NPOC, SRP, inorganic N										Г												
3.3	Analyze for soluble Mn																						
3.4	Evaluate and adjust discrete monitoring plan																						
3.5	Continue discrete monitoring based on revised plan																						

APPENDIX G - FUNDING SOURCES

The following funding sources are available for watershed management efforts. All the sources listed here are linked to one or more of the issues identified in and practices recommended for this watershed.

State/federal government

Illinois Environmental Protection Agency (Illinois EPA)

The Section 319(h) Nonpoint Source Pollution Control Financial Assistance Program implements Illnois' Nonpoint Source Management Program with federal funds through section 319(h) of the Clean Water Act. The funds can be for watershed planning, implementation of Best Management Practices (BMPs), or monitoring of water quality. Projects that address NPS pollution in Illinois waters that have impaired water quality are given priority. The Upper Silver Creek watershed is one of Illinois EPA's High Priority Watersheds for funding the implementation of BMPs in FY2016.

The **State Revolving Fund Loan Program** includes the Public Water Supply Loan Program (PWSLP) for drinking water projects and the Water Pollution Control Loan Program (WPCLP) for wastewater projects. Funds can be provided for flood relief if the projects are tied to water quality improvements. Green infrastructure projects such as street tree or urban forestry programs, stormwater harvesting programs, downspout disconnection projects, and street drainage practices that mimic natural hydrology may be funded.

Illinois Department of Agriculture (IDOA)

The **Streambank Stabilization and Restoration Program (SSRP)** is designed to demonstrate effective streambank stabilization at demonstration sites using inexpensive vegetative and bio-engineering techniques. Program funds may be used for labor, equipment, and materials. Recipients of the cost-share and project funding must maintain the streambank stabilization project for at least 10 years. This program is not currently funded, but funding may be reinstated in future.

The **Conservation Practice Program (CPP)** is implemented by the Soil and Water Conservation Districts (SWCDs) in Illinois. Cost-share funds are available through the SWCDs for various conservation practices including Filter Strips, Grassed Waterways, No-Till, and Terraces. A CPP-Special Project cost share program funds practices that meet local natural resource priorities but are not on the state-wide list of practices, such as stream crossings, rain gardens, and heavy area livestock use area protection. Applications received are prioritized based on tons of soil saved, acres benefited, cost per acre of practice, and cost per ton of soil saved. This program is not currently funded, but funding may be reinstated in future.

The **Sustainable Agriculture Grant Program** funds research, education, and on-farm demonstration projects that address one or more purposes related to sustainable farming. These purposes include minimizing environmental degradation, clarifying the connections between specific agricultural practices and types of pollution, testing approaches to on-farm research, and identifying critical research and education needs related to sustainable agriculture.

Illinois Department of Natural Resources (IDNR)

The **Urban Flood Control Program** has been implemented for many years under the authority of the Flood Control Act of 1945. IDNR's Office of Water Resources (OWR) has typically applied the program to out-of-bank riverine flooding, and to the development and construction of projects that provide an outlet for stormwater systems.

Illinois Emergency Management Agency

The **Flood Mitigation Assistance (FMA) program** is a cost-share program (75% federal, 25% local match) through which communities can receive grants for the development of a comprehensive flood mitigation plan and the implementation of flood mitigation projects. Communities must be members of the National Flood Insurance Program (NFIP). (See Table G.1.)

The **Pre-Disaster Mitigation (PDM) program** makes grants available to state and local governments to implement cotst-effective hazard mitigation activities that complement a comprehensive mitigation program. Funding is awarded for the development of an all-hazards mitigation plan or for a cost-effective hazard mitigation project. (See Table G.1.)

The **Hazard Mitigation Grant (HMG) program** makes grants available to state and local governments as well as eligible private, non-profit organizations to implement cost-effective, long-term mitigation measures following a major disaster declaration. A project does not have to be in a declared county to be eligible; every community that is vulnerable to natural hazards should consider applying. (See Table G.1.)

The **Severe Repetitive Loss program** provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the NFIP. These structures are residential properties insured under the NFIP that have had two or more large claims (see FEMA website for details). (See Table G.1.)

Illinois Department of Commerce and Economic Opportunity (DCEO)

The **Illinois Community Development Assistance Program** administers funds through the Federal Community Development Block Grants: Small Cities program. The Community Development Assistance Program is designed to help communities meet their greatest economic and community development needs, with a focus on communities with low- to moderate-income populations. The public infrastructure component of the program is used to mitigate conditions that are detrimental to public health and welfare, primarily in residential areas. These projects can include the design and construction of storm sewers. (See Table G.1.)

The following table shows Illinois EMA and DCEO funding sources with their associated program outputs, participation requirements, and funding limits (Table G.1).

Table G.1. Sources of funding, program outputs, and participation requirements for various types of flood hazard mitigation identified in the IDNR Urban Flooding Awareness Act draft report (adapted from Table 6.1 in that report).

and the second s	IDNR/OWR				Direct Legislative	DCEO CDAP PI and	DCEO CDP PI +	
Types of Projects/Outcomes	UFC	IEMA FMA	IEMA PDM	IEMA HMGP	Action	Emergency Pl	Design	IEPA Revolving Loan
Storm Sewer Improvements		х	х	х	x	x	x	x
Combined Sewer Improvements					x	x	x	x
Conveyance Improvements	x	x	х	х	x			
Levees	x				x			
Detention Basins	x	×	х	х	x			
Projects on Private Property		x	x	x				
Individual Basement Mitigation								
Repetitive Loss Structure Buyouts		×	x	x				
Planning Reports	x	x	х	х	х			
Program Outputs		•				1		
Project Specific Planning Documents	х				х		х	
Construction Documents	х				х	х	х	
Construction Funding	х	х	х	х	х	х	х	
Construction Engineering	х				х	х	х	
Local Participation Requirements		•				•		
Operation and Maintenance	х	x	х	х	х	х	х	х
Utility Relocations	х							
Land Rights Acquisition	x							
NFIP Participation	x	x	x	x		х	x	
Emphasis on Low to Moderate Income						х	х	
Pre-approved Planning		Mitigation Pl	Mitigation Pl	Mitigation Pl		х		х
Program Funding		_						
Federal Disaster Declaration Required				х				
Local Cost Share		25%	25%	25%		25%	25%	Low interest loan
B/C Ratio	≥ 1.0	≥ 1.0	≥ 1.0	≥ 1.0	None	None	None	None
Funding Limits						\$450,000 or \$200,000 for	\$450,000 max with \$150,000	
Funding Limits					1	Emergency	Design Included	

Acronyms used in Table G.1:

IDNR/OWR – Illinois Department of Natural Resources, Office of Water Resources

IEMA – Illinois Emergency Management Agency

FMA – Flood Mitigation Assistance program

PDM – Pre-Disaster Mitigation program

HMG – Hazard Mitigation Grant program

DCEO – Department of Commerce and Economic Opportunity

CDAP Pl and Emergency Pl – Community Development Assistance Program – Planning and Emergency Planning

CDP PI + Design - Community Development Assistance Program - Planning and Design

IEPA – Illinois Environmental Protection Agency

NFIP - National Flood Insurance Program

B/C ratio – Benefit/Cost ratio

Mitigation Pl – Mitigation Plan

U.S. Department of Housing and Urban Development (HUD)

The **National Disaster Resilience Competition**, announced in June 2014, invited communities that have experienced natural disasters to compete for funds to help them rebuild and increase their resilience to future disasters. The competition supports innovative resilience projects at the local level while encouraging communities to adopt policy changes and activities that plan for the impacts of extreme weather and climate change. All states with counties that experienced a Presidentially Declared Major Disaster in 2011, 2012 or 2013, which includes Illinois, were eligible to apply. This competition may be renewed in future years.

U.S. Environmental Protection Agency

The **USEPA Source Reduction Assistance grant program** supports pollution prevention projects that will provide an overall benefit to the environment by preventing pollutants at the source (i.e., not treatment or cleanup programs). Applicants must demonstrate new or innovative techniques for education or training that promote pollution prevention and source reduction efforts. State and local governments and non-profits are eligible to receive funds or cooperative agreements.

The **Environmental Education Grants Program** supports environmental education projects that promote environmental awareness and stewardship and help provide people with the skills to take responsible actions to protect the environment. Grants are issued to organizations including local education agencies, state schools, colleges, and nonprofit organizations.

The **Environmental Justice Small Grants Program** supports communities working on solutions to local environmental and public health issues through collaborative partnerships. One focus of successful applications is community-based preparedness and resilience efforts, particularly for climate resiliency.

The **Urban Waters Small Grants Program** improves coordination among federal agencies and collaborates with community-led revitalization efforts to improve the Nation's water systems. Fund go to research, investigations, training, surveys, studies, and demonstrations that will advance the restoration of urban waters by improving water quality through activities that also advance community priorities. Sponsored projects receive support in a number of different ways. There is currently no open Request for Proposals.

U.S. Department of Agriculture

The **Conservation Reserve Program (CRP)** is a federally funded voluntary program that contracts with agricultural producers so that environmentally sensitive land, such as wetland and floodplain, is not farmed or ranched, but instead used for conservation benefits. In the Upper Silver Creek watershed, at least 44 parcels in the floodplain are already enrolled in the CRP, as of 2013. Farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species such as native prairie grasses that will improve environmental health and quality, in exchange for a yearly rental payment. The land must be eligible for one or more conservation practices, including grass waterways, filter strips, wetland restoration, riparian buffers, flood control structures, and sediment retention. Contracts for land enrolled in CRP are 10-15 years in length. The long-term goals of the program are to reestablish valuable land cover that will help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.

The **Conservation Reserve Program (CRP) – Grasslands** program is part of the CRP program. It conserves working grasslands, rangeland, and pastureland while maintaining the areas as livestock grazing lands. Participants who establish long-term, resource-conserving plant covers (i.e. approved grasses or trees) are provided with annual rental payments up to 75 percent of the grazing value of the land. Cost-share assistance also is available for up to 50 percent of the covers and other practices, such as cross fencing to support rotational grazing or improving pasture cover to benefit pollinators or other wildlife. Participants may still conduct common grazing practices, produce hay, mow, or harvest for seed production, conduct fire rehabilitation, and construct firebreaks and fences.

The **Conservation Reserve Enhancement Program (CREP)** is an offshoot of the CRP that addresses high priority environmental problems in a partnership between the state and federal government. It funds the removal of environmentally sensitive land (such as wetlands and highly erodible land) from crop production, and the introduction of conservation practices. The Kaskaskia River Watershed is eligible for CREP agreements.

The **Agricultural Conservation Easement Program (ACEP)** is a Natural Resources Conservation Service (NRCS) program. It repeals the Farm and Ranch Lands Protection Program (FRPP), the Grassland Reserve Program (GRP), and the Wetlands Reserve Program (WRP) and consolidates the purposes of these programs into one easement program. The two easement enrollment components of ACEP are agricultural land easements (ACEP-ALE) and wetland reserve easements (ACEP-WRE).

- Agricultural Land Easements (ALEs) prevent the conversion of productive farmland to nonagricultural uses. Land eligible for agricultural easements includes cropland, rangeland, grassland, pastureland and nonindustrial private forest land. NRCS will prioritize applications that protect agricultural uses and related conservation values of the land and those that maximize the protection of contiguous acres devoted to agricultural use.
- Wetland Reserve Easements (WREs) provide habitat for wildlife, improve water quality, and reduce flooding. Technical and financial assistance is provided to restore, protect, and enhance wetlands. Land may be enrolled in easements for various time periods. Land eligible for wetland reserve easements includes farmed or converted wetland that can be successfully and costeffectively restored. NRCS will prioritize applications based the easement's potential for protecting and enhancing habitat for migratory birds and other wildlife.

The **Environmental Quality Incentive Program (EQIP)**, run by NRCS, provides financial and technical assistance to individuals and entities to address soil, water, air, plant, animal and other related natural resource concerns on their land. Funding can be provided for the implementation of structural and management practices, including conservation tillage, on eligible agricultural land.

The **Conservation Stewardship Program (CSP)** helps producers maintain and improve existing conservation systems and implement additional activities to address priority resources concerns. Payments made are based on performance of the practices. Two types of payments are provided through 5-year contracts: annual payments for installing new conservation practices and maintaining existing practices, and supplemental payments for adopting a resource-conserving crop rotation.

The **Healthy Forests Reserve Program (HFRP)** aims to assist landowners in restoring, enhancing, and protecting forestland resources on private land through easements, 30-year contracts, and 10-year cost-share agreements. The land must restore, enhance, or measurably increase the recovery of threatened or endangered species, improve biological diversity, or increase carbon storage.

The **Regional Conservation Partnership Program (RCPP)** encourages partnerships with producers on installing and maintaining conservation projects that increase the restoration and sustainable use of soil, water, wildlife, and related natural resources. Contracts and easement agreements are implemented through other NRCS programs: the Agricultural Conservation Easement Program (ACEP), the Environmental Quality Incentives Program (EQIP), the Conservation Stewardship Program (CSP), or the Healthy Forests Reserve Program (HFRP). The RCPP essentially provides more funding through these programs. There are three funding pools within the program: state, federal, and Critical Conservation Areas (CCAs). The Upper Silver Creek watershed is within the Mississippi River CCA.

Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies in agricultural production. The program allows NRCS to work with other public and private entities to accelerate technology transfer and adoption. There have been funding opportunities at the national and state level.

The Water & Waste Water Disposal Loan & Grant Program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and stormwater drainage to households and businesses in eligible rural areas. The program assists applicants who are not otherwise able to obtain commercial credit on reasonable terms for these projects. Areas served must be rural or towns populated with 10,000 people or fewer. Long-term, low interest loans are the primary funding type available. Grants may be combined with a loan if necessary and if funds are available.

The **Forest Legacy Program** protects environmentally sensitive "working forests" that protect water quality, provide habitat, forest products, opportunities for recreation, and other public benefits. It is designed to encourage the protection of privately owned forest lands through conservation easements. Program participants must prepare a multiple resource management plan for the land.

U.S. Fish and Wildlife Service

The **Partners for Fish and Wildlife Program** is run by the U.S. Fish and Wildlife Service (U.S. FWS) under the Department of the Interior (DOI). The Partners for Fish & Wildlife program works with private landowners to improve fish and wildlife habitat on their lands through voluntary, community-based stewardship. Noting that more than 90% of land in the Midwest is in private ownership, the program promotes high quality habitat through partnerships with private conservation organizations, state and federal agencies, and tribes to reach private landowners. Funding, materials, equipment, labor and expertise can be shared to meet shared restoration and conservation goals.

Non-Governmental Organizations (NGOs)

Several NGOs have programs or missions that support the recommendations in this Plan.

Environmental non-profit groups

The following groups may have funds to help carry out their missions at any given time:

• **Ducks Unlimited (DU)** – DU's Living Lake Initiative is established to provide support in enhancing shallow lake complexes.

- **Pheasants Forever** Local Chapters often provide food plot and native grass seed to landowners.
- Trees Forever The Working Watersheds Buffers & Beyond program provides a 50% cost share (up to a maximum of \$2,000) to implement a water quality project or demonstration site.
 Riparian buffer plantings are the main focus of the program, but other innovative projects are also considered.
- The Nature Conservancy (TNC) TNC works to protect diverse natural habitats including wetlands and forests.
- The National Fish and Wildlife Foundation (NFWF) NFWF provides grants on a competitive basis to projects that support fish and wildlife under. Its program areas include protecting critical habitat, capacity building for partner organizations, and wetland and forest stewardship.
- The National Wildlife Federation (NWF) The NWF supports projects that protect and restore fish and wildlife habitat.
- Water Environment Federation (WERF) The Water Environment Research Foundation funds
 water quality research and facilitates collaboration among partners. Currently, an open Request
 For Proposals solicits research projects on integrating water services planning with urban
 planning. Past projects have included innovative wastewater treatment plant upgrades.

Private Foundations/Companies

Companies such as Coca-Cola and Patagonia often have foundations or grant programs to support environmental missions. Some of these companies/foundations include:

- **Coca-Cola Foundation** Coca-Cola's Community Support program supports funding for program areas including water stewardship and education.
- McKnight Foundation The McKnight Foundation's environmental grantmaking is divided into
 projects that revolve around restoring water quality in the Mississippi River and that improve
 climate resilience in the Midwest.
- **Walton Foundation** The Walton Foundation supports projects including freshwater projects that sustain healthy communities in the Mississippi River Basin.
- Illinois American Water's 2015 Environmental Grant Program Illinois American Water distributed over \$15,000 for watershed projects around the state last year, including three in or near Madison County. Individual grants may be up to \$10,000.

Other

In-Lieu Fee Mitigation Program

In-lieu fee mitigation is a type of mitigation banking that can be used to compensate for unavoidable impacts to wetlands while directing funds to sites with high ecological value. A permittee pays a fee to a third party instead of conducting project-specific mitigation or buying credits from a wetland mitigation bank. The fee represents the estimated cost of replacing the wetland functions lost or degraded as a result of the permittee's project. The in-lieu fee mitigation program gathers several such fees and uses them to finance an extensive mitigation project. HeartLands Conservancy is in the final stages of becoming an Approved Program Sponsor within the American Bottoms and Lower Kaskaskia River watersheds. Once approved, project implementation should begin in 2016. Mitigation sites will include both wetlands and streams, so fees will go towards both wetland and stream restoration.

APPENDIX H - PROGRESS REPORT CARDS

PM = Progress made; A = Achieved

Goal 1: Improve Surface Water Quality

Existing Conditions

264,952 lbs/year of phosphorus, 60,230 tons/year of sediment, and 1,178,496 lbs/yr of nitrogen enter the upper Silver Creek watershed every year, based on the STEPL model. Silver Creek has seen low Dissolved Oxygen (DO) levels between 1972 and 2011, with a minimum of 2 mg/L (mean 7.7 mg/L).

High concentrations of dissolved manganese have been found in Silver Creek between 1972 and 2011 (mean 417 μg/L, median 290 μg/L, and maximum 3200 μg/L).

Fecal coliform levels in Silver Creek have spiked several times between 1972 and 2011 (with most spikes in the 70's and 80's); the median level was 630 cfu/100ml.

Over 3,000 private sewage systems are present in the watershed. Given a national estimated failure rate of 10%, 300 systems are currently failing. The actual number may be higher because many of these systems are older.

Watershed Impairment Reduction Targets and recommendations

25% or 66,238 lbs/year reduction in phosphorus loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy.

20% or 12,046 tons/year reduction in sediment loading by 2025, based on estimated impacts of proposed BMPs.

15% or 176,774 lbs/year reduction in phosphorus loading by 2025, based on the Illinois Nutrient Loss Reduction Strategy.

No DO samples lower than the minimum concentration in streams: March – July: 5.0 mg/L at any time, 6.0 mg/L as a daily mean averaged over 7 days; August – February: 3.5 mg/L at any time, 4.0 mg/L as a daily mean averaged over 7 days, 5.5 mg/L as a daily mean averaged over 30 days. Based on 35 III. Adm. Code 302.

No manganese samples higher than the general use water quality standard of 1,000 µg/L, and a general reduction in mean manganese concentrations.

68% or 430 cfu/100 ml reduction in fecal coliform, to reach a geometric mean of 200 cfu/100 ml in a minimum of 5 samples taken over a period of ≤30 days; based on 35 Ill. Adm. Code 302.

Removal of Silver Creek and Troy Creek from the Illinois EPA 303(d) list.

Programmatic changes regarding wastewater treatment, private sewer, and conservation easements.

Measurement Indicator	Milestone				Data source	Achieved?
	Short-term	Medium-	Long-term			
	(1-10	term (10-	(20+			
	years)	20 years)	years)			
Number and extent of Management Measures (BMPs) implemented	108	216	324	acres contour buffer strips (100% of locations identified by the ACPF) (cumulative)	SWCD, NRCS, farmers,	
	8,798	17,595	26,393	acres cover crops (30% of total agricultural land area) (cumulative)	contractors	
	60	119	179	acres grassed waterways (100% of locations identified by the ACPF) (cumulative)		
	33	67	100	acres ponds (cumulative)		

	10,264	20,528	30,792	acres reduced tillage (conservation tillage/no-till) (35% of total agricultural land area) (cumulative)		
	19,131	38,263	57,394	feet of poor condition riparian areas ecologically restored, including 100% Critical Riparian Areas (cumulative)		
	33,333	66,667	100,000	feet terraces (cumulative)		
	7	13	20	acres waste storage structures/waste management systems (cumulative)		
	294	587	881	acres Water and Sediment Control basins (100% of locations identified by the ACPF) (cumulative)		
	240	481	721	acres wetlands restored, enhanced, or created (100% of Critical Wetland Areas) (cumulative)		
	33	67	100	acres new dry detention basins (cumulative)	Counties,	
	33	67	100	acres new wet detention basins (cumulative)	municipalities,	
	31	63	94	acres detention basin retrofits (native vegetation buffers, etc.) (100% of the 67 basins identified in the watershed, with average size of 1.4 acres) (cumulative)	SWCD	
	22	45	67	detention basins maintained (dredging, mowing, burning, invasives, etc.) (100% of the 67 basins identified in the watershed, with average size of 1.4 acres) (cumulative)		
	50	100	150	acres pervious pavement (cumulative)	Counties,	
	6,667	13,333	20,000	square feet rain gardens (cumulative)	municipalities,	
	33	67	100	barrels/small cisterns for rainwater harvesting and reuse (cumulative)	contractors	
	56	112	168	properties use single property flood reduction strategies (168 is 3 times the number of Flood Survey responses that said floods damaged their primary home/business; 1.6% of all households in the watershed) (cumulative)		
	38,720	77,440	116,160	feet streambank & channel restoration (22 miles, or 5% of all streams), including 100% Critical Stream Areas (cumulative)	NRCS, SWCD, contractors	
	3,300	6,600	9,900	feet logjam removal sites (5% of the Critical Logjam Areas)		
Removal of Silver Creek and Troy Creek from Illinois EPA 303(d) list.	PM	PM	А	All streams in the watershed removed from the 303(d) list	Illinois EPA 303(d) list	
Concentrations and loads of instream pollutants	PM	PM	А	Measured reductions in in-stream phosphorus, sediment, nitrogen, fecal coliform, and manganese (see Monitoring	NGRREC (water quality monitoring	

				Plan). Measured increases in in-stream dissolved oxygen (see Monitoring Plan).	results)	
Nutrient removal technologies incorporated into upgrades of wastewater treatment plants	PM	PM	A	All wastewater treatment plants meet NPDES permit requirements; upgrades implemented as needed.	Individual treatment plants; US EPA Discharge Monitoring Report (DMR) Tool	
Percentage of new development projects with private sewer. Number of existing on-site treatment systems connected to public sewers.	10%	20%	30%	new development projects have public sewer. Also, 300 on-site treatment systems connected to public sewers (~10% of private sewage systems in the watershed)	County, municipal records	
Number and extent of local ordinances and programs requiring regular inspection and maintenance of on-site sewage systems.	4	8	13	municipalities and 3 counties require regular private sewage inspections (beyond complaint-based program)	Counties, municipalities	
Enrollment of land in conservation easements including CRP and CREP	1.5	2	2.5	times the 2015 acreage enrolled in CRP and CREP	NRCS	

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Goal 2: Reduce Flooding and Mitigate Flood Damage

Existing Conditions

26% of Flood Survey respondents experienced flooding in the last 10 years, reporting a total of >\$330,016 in costs over that time

Thousands of acres of wetlands have been lost since pre-settlement; the associated loss of ecosystem functions has been great since that time.

Watershed Impairment Reduction Targets and recommendations

100 acres dry detention basins installed

100 acres wet detention basins installed

Retrofits & maintenance on existing detention basins

Critical Flooding Areas prioritized

100% Critical Wetlands Areas restored

Stream flow reduced peak discharge during storm events

Programmatic changes regarding flood damage prevention ordinances, riparian buffer ordinances, and stormwater infrastructure funding

Measurement Indicator	Milestone				Data source	Achieved?
	Short- term (1- 10 years)	Medium- term (10- 20 years)	Long-term (20+ years)			
Number and extent of Management Measures (BMPs) implemented	19,131	38,263	57,394	feet of poor condition riparian areas ecologically restored, including 100% Critical Riparian Areas (cumulative)	SWCD, NRCS, farmers, contractors	
	240	481	721	acres wetlands restored, enhanced, or created (100% of Critical Wetland Areas) (cumulative)		
	3,333	6,667	10,000	feet storm drain system maintenance (cleaning) and expansion	Municipalities, contractors	
Stream flow data from the USGS gauge on mainstem Silver Creek, plus flow data collected under the Monitoring Plan at other HUC14 locations. Data correlated with rainfall.	PM	PM	A	No measured increase in mean peak stream discharge / Measured reductions in peak stream discharge	USGS National Water Information System, NGRREC (monitoring results)	
Number and extent of flood damage prevention ordinances, riparian buffer ordinances, and other actions by local governments to restrict construction in floodplains and riparian areas.	PM	PM	A	Madison County adopts Flood Damage Prevention Ordinance and Riparian Buffer Ordinance All municipalities engaged to inform about the ordinances and encourage adoption	Counties, municipalities, townships	

dedicate infrastru	of counties/municipalities with ed funding for stormwater acture, eg a Stormwater Utility. mount of revenue streams.	PM	PM	A	Madison County adopts a mechanism for dedicated funding for stormwater infrastructure All municipalities engaged to inform about stormwater infrastructure funding options	Counties, municipalities	
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Goal 3: Promote Environmentally Sensitive Development Practices

Existing Conditions

Current 3% impervious cover; 2.8% annual increase in impervious cover (2006-2011); current 6,981 acres developed open space (2011 NLCD) or 1,289 acres open space (recognized parks etc.)

Regulations and common practices in new development have not and generally still do not prioritize the protection of open space or natural features.

Watershed Impairment Reduction Targets and recommendations

Preservation of open space and infiltration measures in all new and redevelopment

Increase in rain gardens

Increase in pervious surfaces in new and redevelopment

Decrease in impervious surfaces in new and redevelopment

Increase in land in conservation easements

Programmatic changes including use of Conservation Development design, local ordinances, green infrastructure, and in-lieu fee mitigation

Measurement Indicator	Milestone				Data source	Achieved?
	Short- term (1- 10 years)	Medium- term (10- 20 years)	Long-term (20+ years)			
Number and extent of Management Measures (BMPs) implemented	33	67	100	acres new dry detention basins (cumulative)	Counties, municipalities, SWCD	
	33	67	100	acres new wet detention basins (cumulative)	Counties, municipalities, SWCD	
	31	63	94	acres detention basin retrofits (native vegetation buffers, etc.) (94 acres is 100% of the 67 basins identified in the watershed, with average size of 1.4 acres) (cumulative)	Counties, municipalities, SWCD	
	31	63	94	acres detention basin maintenance (dredging, mowing, burning, invasives, etc.) (100% of the 67 basins identified in the watershed, with average size of 1.4 acres) (cumulative)	Counties, municipalities, SWCD	
	50	100	150	acres pervious pavement (cumulative)	Counties, municipalities, contractors	
	6,667	13,333	20,000	square feet rain gardens (cumulative)	Counties, municipalities, contractors	

Area of impervious surfaces in new development	PM	PM	А	2.8% or less annual increase in impervious cover in the overall watershed (held to the predicted annual increase based on 2006-2011)	NLCD Percent Developed Impervious Surface dataset	
Enrollment of land in conservation easements including CRP and CREP	1.5	2	2.5	times the 2015 acreage enrolled in CRP and CREP	NRCS	
Number of new development proposals using Conservation Development design to protect natural features.	20%	40%	60%	of subdivision and other development proposals contain design elements from Conservation Development design, eg protection of open space	Counties, municipalities	
Number and extent of municipal ordinances that support: stormwater, flood management, green infrastructure, wetlands protection through in-lieu fee mitigation, and native landscaping.	PM	PM	A	Madison County adopts Flood Damage Prevention Ordinance and Riparian Buffer Ordinance All municipalities engaged to inform about the ordinances and green infrastructure, in-lieu fee mitigation programs to encourage adoption	Municipalities	
Number of counties and municipalities implementing green infrastructure incentives. Number of ordinance changes to allow or encourage native landscaping.	2	4	6	municipalities offer green infrastructure incentives such as flexible implementation of regulations, fee waivers, tax abatement, and streamlined development review process All municipalities allow and encourage native plants (eg changes to weed control ordinances)	Counties, municipalities	
Number of acres wetland restored and number of feet streambank restored under in-lieu fee mitigation program	PM	PM	A	In-lieu fee mitigation program established, covering the entire watershed Critical Wetland and Critical Stream Areas prioritized for restoration under in-lieu fee program	HeartLands Conservancy, US ACE	

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Goal 4: Support Healthy Fish and Wildlife Habitat

Existing Conditions

57,918 feet of riparian areas are currently in poor condition, per the aerial assessment results. Of this, 183,036 feet are Critical Riparian Areas. 37.5 miles Critical Logjam Areas have been identified.

Thousands of acres of wetlands have been lost since pre-settlement; the associated loss of ecosystem functions has been great since that time.

Watershed Impairment Reduction Targets and recommendations

100% Critical Riparian Areas restored

Majority of riparian areas in poor condition restored

100% Critical Logjam Areas assessed

5% Critical Logjam areas have logjams removed

100% Critical Wetlands Areas restored

Macrointertebrate & fish samples showing increased stream health

Programmatic changes regarding stream cleanup activities

Measurement Indicator	Milestone				Data source	Achieved?
	Short-	Medium-	Long-			
	term (1-	term (10-	term (20+			
	10 years)	20 years)	years)			
Number and extent of Management				feet of poor condition riparian areas ecologically	NRCS, SWCD,	
Measures (BMPs) implemented	19,131	38,263	57,394	restored, including 100% Critical Riparian Areas (cumulative)	contractors	
	240	481	721	acres wetlands restored, enhanced, or created (100% of Critical Wetland Areas) (cumulative)		
	3,300	6,600	9,900	feet logjam removal sites (5% of the Critical Logjam Areas)		
Macroinvertebrate sampling results (diversity and stream health indicators) from RiverWatch volunteers and fish sample data collected by the Illinois Natural History Survey.	PM	PM	A	All Illinois RiverWatch samples indicate "Good", "Fair", or "Excellent" Taxa Richness, EPT Taxa Richness, and MBI water quality scores No decrease in water quality indicated by Illinois Natural History Survey fish sampling	Illinois RiverWatch, Illinois Natural History Survey	
Number of programs and participants for stream cleanup activities in the watershed.	PM	PM	A	Stream Cleanup Team (or similar program) established Over 20 participants annually	Counties, municipalities, non- profit organizations	
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Goal 5: Develop Organizational Frameworks to Implement Watershed Goals

Existing Conditions

There are several potential partners in the region dedicated to different aspects of water quality and stormwater management, including federal agencies, state agencies, non-profits, land trusts, and local governments.

Several potential partners have funding available for projects that would further the mission of more than one group.

Watershed Impairment Reduction Targets and recommendations

Continued support from watershed partners and stakeholders, including funding.

Programmatic changes regarding local development ordinances, and open space protection.

Measurement Indicator	Milestone			Data source	Achieved?	
	Short-	Medium-	Long-term			
	term (1-	term (10-	(20+			
	10 years)	20 years)	years)			
Number of watershed partners adopt	PM	PM	Α	All watershed partners adopt and/or support (via a	Counties,	
and/or support (via a resolution) the				resolution) the Upper Silver Creek Watershed-Based Plan	municipalities,	
Upper Silver Creek Watershed-Based				as a "guidance document". Municipalities engaged and	townships, other	
Plan as a "guidance document".				encouraged to adopt the Plan as a "guidance document".	partners	
Number and extent of municipal	PM	PM	Α	Madison County adopts Flood Damage Prevention	Municipalities	
ordinances that support: stormwater,				Ordinance and Riparian Buffer Ordinance		
flood management, green				All municipalities engaged to inform about the		
infrastructure, wetlands protection (in-				ordinances and green infrastructure, in-lieu fee		
lieu fee mitigation), native landscaping.				mitigation programs to encourage adoption		
Number of new and redevelopment	20%	40%	60%	of subdivision and other development proposals	HOAs, counties,	
projects protecting sensitive natural				contain design elements from Conservation Development	communities,	
areas/open space and creating				design, eg protection of open space and creating	HeartLands	
naturalized stormwater systems. Area of				naturalized stormwater systems (green infrastructure)	Conservancy	
land donated to a public	10%	20%	30%	new development projects donate land to a public		
agency/conservation organization for				agency/conservation organization		
long-term management. Number of	33%	67%	100%	new HOAs' bylaws include rules about management		
HOAs with rules about management of				and fees for natural areas		
the natural areas in their bylaws.	17%	33%	50%	existing HOAs change their bylaws to include rules		
				about management and fees for natural areas		

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Goal 6: Conduct Education and Outreach

Existing Conditions

The public engagement process for the watershed plan revealed a need for education on water quality and flooding for the general public.

Many landowners came to meetings requesting technical support and assistance with obtaining funding to implement BMPs on their land. Municipalities also need access to resources and funding to implement projects in city limits.

Watershed Impairment Reduction Targets and recommendations
Increase in number of people effectively reached by outreach efforts
Increase in resident/property owner participation watershed improvements

Measurement Indicator	ment Indicator Milestone			Data source	Achieved?	
	Short- term (1- 10 years)	Medium- term (10- 20 years)	Long- term (20+ years)			
Number of people reached by and involved in outreach efforts related to this Watershed-Based Plan.	PM	PM	А	300 people (3 times the ~100 people reached in the Watershed Planning process) engaged in implementation/outreach activities annually.	Counties, municipalities, townships, NGRREC, SWCD, other partners	
Percent of county residents who know which watershed they live in (survey).	25%	50%	75%	of survey respondents (or all education session participants) in Madison County who can correctly identify which watershed they live in on an annual basis.		
Percent of education/outreach session attendees who rate presentations and other activities and good or excellent.	75%	85%	95%	of surveyed participants each year who rated outreach session(s) or presentation(s) as good or excellent.		
Percent of education/outreach session attendees who commit to action or follow-up with a watershed partner.	25%	50%	75%	of surveyed participants who indicate a commitment to action or contact the county, SWCD, NGRREC, HLC or other partner to make improvements on their land.		
Percent of schools that incorporate a watershed-based project or learning session.	10%	20%	30%	of schools that included at least one Silver Creek watershed-related learning experience or project each year.	Schools, School Districts, Counties	

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	BMP	5	,		
HUC14	Category	BMP Name	Number	Acres	Miles
07140204050101		Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101	In-stream	Streambank and channel restoration			
07140204050101		Streambank and channel restoration			
07140204050101	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050102	In-stream	Streambank and channel restoration			
07140204050201	In-stream	Streambank and channel restoration			
07140204050201	In-stream	Streambank and channel restoration			
07140204050202	In-stream	Streambank and channel restoration			
07140204050203	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050301	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050302	In-stream	Streambank and channel restoration			
07140204050303		Streambank and channel restoration			
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07140204050304	In-stream	Streambank and channel restoration
07140204050304	In-stream	Streambank and channel restoration
07140204050304	In-stream	Streambank and channel restoration
07140204050401	In-stream	Streambank and channel restoration
07140204050401	In-stream	Streambank and channel restoration
07140204050401	In-stream	Streambank and channel restoration
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07140204050501	In-stream	Streambank and channel restoration
07140204050501	In-stream	Streambank and channel restoration
07140204050502	In-stream	Streambank and channel restoration
07140204050502	In-stream	Streambank and channel restoration
07140204050502	In-stream	Streambank and channel restoration
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07140204050502	In-stream	Streambank and channel restoration
07140204050502	In-stream	Streambank and channel restoration
07140204050604	In-stream	Streambank and channel restoration
07140204050604	In-stream	Streambank and channel restoration
07140204050604	In-stream	Streambank and channel restoration
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07140204050902	In-stream	Streambank and channel restoration
07140204050902	In-stream	Streambank and channel restoration
07140204050902	In-stream	Streambank and channel restoration
07140204050903	In-stream	Streambank and channel restoration
07140204050903	In-stream	Streambank and channel restoration
07140204050903	In-stream	Streambank and channel restoration
07140204050903	In-stream	Streambank and channel restoration
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07140204050203	Agricultural	Riparian buffers
07140204050203	Agricultural	Riparian buffers
07140204050301	-	Riparian buffers
07140204050301	Agricultural	Riparian buffers

07140204050301	Agricultural	Riparian buffers
07140204050302	Agricultural	Riparian buffers
07140204050302	Agricultural	Riparian buffers
	-	•
07140204050302	Agricultural	Riparian buffers
07140204050304	Agricultural	Riparian buffers
07140204050304	Agricultural	Riparian buffers
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	-	•
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07140204050401	Agricultural	Riparian buffers
07140204050402	Agricultural	Riparian buffers
07140204050402	-	•
	Agricultural	Riparian buffers
07140204050502	Agricultural	Riparian buffers
	•	•
07140204050502	Agricultural	Riparian buffers
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07140204050602	Agricultural	Riparian buffers
07140204050603	Agricultural	Riparian buffers
07140204050603	Agricultural	Riparian buffers
07140204050603	Agricultural	Riparian buffers
07140204050604	-	•
	Agricultural	Riparian buffers
07140204050901	Agricultural	Riparian buffers
07140204050902	Agricultural	Riparian buffers
07140204050902	Agricultural	Riparian buffers
07140204050903	Agricultural	Riparian buffers
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071-020-030303	, ignicultural	Contour burier strips	0.17723

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	_	Contour buffer strips Contour buffer strips	0.393387
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07140204050903	-	Contour buffer strips	0.175153
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	-	•	

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	•	•	0.109
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07140204050101	Agricultural	Grassed waterways	0.369
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07140204050101	Agricultural	Grassed waterways	0.177
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07140204050101	Agricultural	Grassed waterways	0.132
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07140204050101	J	Grassed waterways	0.070
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07140204050201	-	Grassed waterways	0.004
07140204050201	-	Grassed waterways	0.018
J, 1 1020-030201	, Bricaltalai	C. assed Hater Hays	0.000

07140204050201	Agricultural	Grassed waterways	0.194
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07140204050201	Agricultural	Grassed waterways	0.642
07140204050201	Agricultural	Grassed waterways	0.437
07140204050201	Agricultural	Grassed waterways	0.070
07140204050201	Agricultural	Grassed waterways	0.402
07140204050201	Agricultural	Grassed waterways	0.231
07140204050201	Agricultural	Grassed waterways	0.339
07140204050201	Agricultural	Grassed waterways	0.115
07140204050201	Agricultural	Grassed waterways	0.033
07140204050201	Agricultural	Grassed waterways	0.283
07140204050201	Agricultural	Grassed waterways	0.545
07140204050201	Agricultural	Grassed waterways	0.202
07140204050201	Agricultural	Grassed waterways	0.374
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07140204050201	Agricultural	Grassed waterways	0.172
07140204050201	Agricultural	Grassed waterways	0.091
07140204050201	Agricultural	Grassed waterways	0.442
07140204050201	Agricultural	Grassed waterways	0.784
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07140204050201	Agricultural	Grassed waterways	1.332
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07140204050201	Agricultural	Grassed waterways	0.633
07140204050201	Agricultural	Grassed waterways	0.116
07140204050201	Agricultural	Grassed waterways	0.577
07140204050201	Agricultural	Grassed waterways	0.031
07140204050201	Agricultural	Grassed waterways	0.342
07140204050201	Agricultural	Grassed waterways	0.347
07140204050201	Agricultural	Grassed waterways	0.294
07140204050201	Agricultural	Grassed waterways	0.133
07140204050201	Agricultural	Grassed waterways	0.029
07140204050201	Agricultural	Grassed waterways	0.425
07140204050201	Agricultural	Grassed waterways	0.200
07140204050201	Agricultural	Grassed waterways	0.240
07140204050201	Agricultural	Grassed waterways	0.862
07140204050201	Agricultural	Grassed waterways	0.285
07140204050201	Agricultural	Grassed waterways	0.045
07140204050201	Agricultural	Grassed waterways	0.535
07140204050201	Agricultural	Grassed waterways	0.032
07140204050201	Agricultural	Grassed waterways	0.051

07140204050201	Agricultural	Grassed waterways	0.049
07140204050201	Agricultural	Grassed waterways	0.076
07140204050201	Agricultural	Grassed waterways	0.489
07140204050201	Agricultural	Grassed waterways	0.201
07140204050201	Agricultural	Grassed waterways	0.029
07140204050201	Agricultural	Grassed waterways	0.120
07140204050201	Agricultural	Grassed waterways	0.041
07140204050202	Agricultural	Grassed waterways	0.107
07140204050202	Agricultural	Grassed waterways	0.475
07140204050202	Agricultural	Grassed waterways	0.491
07140204050202	Agricultural	Grassed waterways	0.259
07140204050202	Agricultural	Grassed waterways	0.108
07140204050202	Agricultural	Grassed waterways	0.112
07140204050202	Agricultural	Grassed waterways	0.471
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07140204050202	_	Grassed waterways	0.173
07140204050202	_	Grassed waterways	0.084
07140204050202	_	Grassed waterways	0.447
07140204050202	_	Grassed waterways	0.220
07140204050202	_	Grassed waterways	0.807
07140204050202	_	Grassed waterways	0.104
07140204050202	_	Grassed waterways	0.400
07140204050202	_	Grassed waterways	0.601
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07140204050202	_	Grassed waterways	0.300
07140204050202	_	Grassed waterways	0.607
07140204050202	•	Grassed waterways	0.169
07140204050202	_	Grassed waterways	0.028
07140204050202	_	Grassed waterways	0.410
07140204050202	•	Grassed waterways	0.485
07140204050202	O	Grassed waterways	0.376
07140204050202	•	Grassed waterways	0.490
07140204050202	_	Grassed waterways	0.530
07140204050202	•	Grassed waterways	0.280
07140204050202	_	Grassed waterways	0.189
07140204050202	_	Grassed waterways	0.789
07140204050202	_	Grassed waterways	0.474
07140204050202	_	Grassed waterways	0.036
07140204050202	_	Grassed waterways	0.472
07140204050202	_	Grassed waterways	0.107
07140204050202	_	Grassed waterways	0.119
07140204050202	_	Grassed waterways	0.670
07140204050202	_	Grassed waterways	0.226
	<i>G</i> - 2 2 w.	, -	

07140204050202	Agricultural	Grassed waterways	0.390
07140204050202	Agricultural	Grassed waterways	0.525
07140204050202	Agricultural	Grassed waterways	0.247
07140204050202	Agricultural	Grassed waterways	0.602
07140204050202	Agricultural	Grassed waterways	0.363
07140204050202	Agricultural	Grassed waterways	0.289
07140204050202	Agricultural	Grassed waterways	0.803
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07140204050202	Agricultural	Grassed waterways	0.307
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07140204050202	Agricultural	Grassed waterways	0.208
07140204050202	-	Grassed waterways	0.043
07140204050202	-	Grassed waterways	0.066
07140204050202	-	Grassed waterways	0.193
07140204050202	J	Grassed waterways	0.486
07140204050202	-	Grassed waterways	0.274
07140204050202	J	Grassed waterways	0.530
07140204050202	J	Grassed waterways	0.114
07140204050202	-	Grassed waterways	0.592
07140204050202	_	Grassed waterways	0.048
07140204050202	_	Grassed waterways	0.133
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07140204050202		Grassed waterways	0.115
07140204050202	-	Grassed waterways	0.305
07140204050202	-	Grassed waterways	0.659
07140204050202	-	Grassed waterways	0.882
07140204050202	-	Grassed waterways	1.701
07140204050202	J	Grassed waterways	0.395
07140204050202	J	Grassed waterways	0.227
07140204050202	· ·	Grassed waterways	0.055
07140204050202	-	Grassed waterways	1.688
07140204050202	-	Grassed waterways	0.137
07140204050202	-	Grassed waterways	0.206
07140204050202	J	Grassed waterways	0.025
07140204050202	_	Grassed waterways	0.409
07140204050202	-	Grassed waterways	0.342 0.289
07140204050202 07140204050202	· ·	Grassed waterways	0.289
07140204050202	-	Grassed waterways Grassed waterways	0.600
07140204050202	-	Grassed waterways Grassed waterways	0.000
07140204050202	-	Grassed waterways Grassed waterways	0.021
07140204050202	-	Grassed waterways Grassed waterways	0.318
0,140204030202	Agricultural	Orassea waterways	0.274

07140204050202	Agricultural	Grassed waterways	0.272
07140204050202	Agricultural	Grassed waterways	0.249
07140204050202	Agricultural	Grassed waterways	0.605
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07140204050202	Agricultural	Grassed waterways	0.466
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07140204050202	Agricultural	Grassed waterways	0.058
07140204050202	Agricultural	Grassed waterways	0.159
07140204050202	Agricultural	Grassed waterways	0.100
07140204050202	Agricultural	Grassed waterways	1.105
07140204050202	Agricultural	Grassed waterways	0.138
07140204050202	Agricultural	Grassed waterways	0.028
07140204050202	Agricultural	Grassed waterways	0.913
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07140204050202	Agricultural	Grassed waterways	0.801
07140204050202	Agricultural	Grassed waterways	0.537
07140204050202	Agricultural	Grassed waterways	0.200
07140204050202	Agricultural	Grassed waterways	0.229
07140204050202	Agricultural	Grassed waterways	0.308
07140204050202	Agricultural	Grassed waterways	0.046
07140204050202	Agricultural	Grassed waterways	0.278
07140204050202	Agricultural	Grassed waterways	0.225
07140204050202	Agricultural	Grassed waterways	0.734
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07140204050202	Agricultural	Grassed waterways	0.058
07140204050202	Agricultural	Grassed waterways	0.506
07140204050202	Agricultural	Grassed waterways	0.064
07140204050202	Agricultural	Grassed waterways	0.093
07140204050202	Agricultural	Grassed waterways	0.321
07140204050202	Agricultural	Grassed waterways	0.124
07140204050202	Agricultural	Grassed waterways	0.199
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07140204050202	Agricultural	Grassed waterways	0.143
07140204050202	Agricultural	Grassed waterways	0.087
07140204050202	Agricultural	Grassed waterways	0.026
07140204050202	Agricultural	Grassed waterways	0.131
07140204050202	Agricultural	Grassed waterways	0.178
07140204050202	Agricultural	Grassed waterways	0.192
07140204050202	Agricultural	Grassed waterways	0.132
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07140204050202	Agricultural	Grassed waterways	1.057
07140204050202	Agricultural	Grassed waterways	1.427
07140204050202	Agricultural	Grassed waterways	0.780
07140204050202	Agricultural	Grassed waterways	0.805
07140204050202	Agricultural	Grassed waterways	1.313
07140204050202	Agricultural	Grassed waterways	0.272
07140204050202	Agricultural	Grassed waterways	0.039
07140204050202	Agricultural	Grassed waterways	0.293
07140204050202	Agricultural	Grassed waterways	0.096
07140204050202	Agricultural	Grassed waterways	0.221
07140204050202	Agricultural	Grassed waterways	0.098
07140204050202	Agricultural	Grassed waterways	0.112
07140204050202	Agricultural	Grassed waterways	0.473
07140204050202	Agricultural	Grassed waterways	0.275
07140204050202	Agricultural	Grassed waterways	0.116
07140204050202	Agricultural	Grassed waterways	0.195
07140204050202	Agricultural	Grassed waterways	0.084
07140204050202	-	Grassed waterways	0.039
07140204050202	Agricultural	Grassed waterways	0.062
07140204050202	Agricultural	Grassed waterways	0.059
07140204050202	•	Grassed waterways	0.136
07140204050202	-	Grassed waterways	0.386
07140204050202	Agricultural	Grassed waterways	0.395
07140204050202	•	Grassed waterways	0.331
07140204050202	Agricultural	Grassed waterways	0.262
07140204050202	Agricultural	Grassed waterways	0.175
07140204050202	_	Grassed waterways	0.599
07140204050202	•	Grassed waterways	0.081
07140204050202	•	Grassed waterways	1.485
07140204050202	_	Grassed waterways	0.145
07140204050202	_	Grassed waterways	0.527
07140204050202	-	Grassed waterways	0.103
07140204050202	Agricultural	Grassed waterways	0.692

07140204050202	Agricultural	Grassed waterways	0.074
07140204050202	Agricultural	Grassed waterways	0.188
07140204050202	Agricultural	Grassed waterways	0.754
07140204050202	Agricultural	Grassed waterways	0.928
07140204050202	Agricultural	Grassed waterways	0.231
07140204050202	Agricultural	Grassed waterways	0.112
07140204050202	Agricultural	Grassed waterways	0.440
07140204050202	Agricultural	Grassed waterways	0.229
07140204050202	Agricultural	Grassed waterways	0.275
07140204050202	Agricultural	Grassed waterways	0.057
07140204050202	Agricultural	Grassed waterways	1.077
07140204050202	_	Grassed waterways	0.903
07140204050202	_	Grassed waterways	0.405
07140204050202	_	Grassed waterways	0.168
07140204050202	_	Grassed waterways	0.721
07140204050202	•	Grassed waterways	0.916
07140204050202	_	Grassed waterways	1.074
07140204050202	_	Grassed waterways	0.106
07140204050202	•	Grassed waterways	0.039
07140204050202	_	Grassed waterways	0.003
07140204050202	_	Grassed waterways	0.048
07140204050202	-	Grassed waterways	0.164
07140204050202	-	Grassed waterways	0.322
07140204050202	_	Grassed waterways	0.235
07140204050202	_	Grassed waterways	0.039
07140204050202	-	Grassed waterways	0.963
07140204050202	_	Grassed waterways	0.686
07140204050203	•	Grassed waterways	0.112
07140204050203	_	Grassed waterways	0.112
07140204050203	_	Grassed waterways	1.176
07140204050203	_	Grassed waterways	0.865
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07140204050203	•	Grassed waterways	0.696
07140204050203	•	Grassed waterways	0.441
07140204050203	•	Grassed waterways	0.056
07140204050203	•	•	0.036
	_	Grassed waterways Grassed waterways	
07140204050203	•	•	1.555
07140204050203	•	Grassed waterways	0.122
07140204050203	•	Grassed waterways	0.442
07140204050203	_	Grassed waterways	0.068
07140204050203	-	Grassed waterways	0.525
07140204050203	_	Grassed waterways	1.617
07140204050203	_	Grassed waterways	0.504
07140204050203	_	Grassed waterways	0.245
07140204050203	•	Grassed waterways	0.898
07140204050203	•	Grassed waterways	0.451
07140204050203	Agricultural	Grassed waterways	0.411

07140204050203	Agricultural	Grassed waterways	0.920
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07140204050203	Agricultural	Grassed waterways	0.574
07140204050203	Agricultural	Grassed waterways	0.089
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07140204050203	Agricultural	Grassed waterways	0.040
07140204050203	Agricultural	Grassed waterways	0.117
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07140204050203	Agricultural	Grassed waterways	0.056
07140204050203	Agricultural	Grassed waterways	0.028
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07140204050203	Agricultural	Grassed waterways	0.046
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07140204050203	Agricultural	Grassed waterways	0.419
07140204050203	Agricultural	Grassed waterways	0.193
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07140204050203	Agricultural	Grassed waterways	0.036
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07140204050203	Agricultural	Grassed waterways	0.004
07140204050203	Agricultural	Grassed waterways	0.477
07140204050203	Agricultural	Grassed waterways	0.241
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07140204050203	Agricultural	Grassed waterways	0.121
07140204050203	Agricultural	Grassed waterways	0.427
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07140204050203	Agricultural	Grassed waterways	0.829
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07140204050203	Agricultural	Grassed waterways	0.522
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07140204050203	Agricultural	Grassed waterways	0.182
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07140204050203	Agricultural	Grassed waterways	0.123
07140204050203	Agricultural	Grassed waterways	0.076
07140204050203	Agricultural	Grassed waterways	0.330
07140204050203	Agricultural	Grassed waterways	0.041
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07140204050203	Agricultural	Grassed waterways	0.289
07140204050203	Agricultural	Grassed waterways	0.312
07140204050203	Agricultural	Grassed waterways	0.342
07140204050203	Agricultural	Grassed waterways	0.169
07140204050203	Agricultural	Grassed waterways	0.300
07140204050203	Agricultural	Grassed waterways	0.063
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07140204050203	Agricultural	Grassed waterways	0.124
07140204050203	Agricultural	Grassed waterways	0.174
07140204050203	Agricultural	Grassed waterways	0.627
07140204050203	Agricultural	Grassed waterways	0.118
07140204050203	Agricultural	Grassed waterways	0.224
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07140204050203	Agricultural	Grassed waterways	0.399
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07140204050203	Agricultural	Grassed waterways	0.375
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07140204050203	Agricultural	Grassed waterways	0.899
07140204050203	Agricultural	Grassed waterways	0.064
07140204050203	Agricultural	Grassed waterways	0.381
07140204050203	Agricultural	Grassed waterways	0.470
07140204050203	Agricultural	Grassed waterways	0.087
07140204050203	Agricultural	Grassed waterways	0.811
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07140204050203	Agricultural	Grassed waterways	0.092

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07140204050203	Agricultural	Grassed waterways	0.055
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07140204050203	Agricultural	Grassed waterways	0.038
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07140204050203	Agricultural	Grassed waterways	0.378
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07140204050203	Agricultural	Grassed waterways	0.546
07140204050203	Agricultural	Grassed waterways	0.687
07140204050203	Agricultural	Grassed waterways	0.972
07140204050203	Agricultural	Grassed waterways	0.139
07140204050203	Agricultural	Grassed waterways	0.555
07140204050203	Agricultural	Grassed waterways	0.768
07140204050203	Agricultural	Grassed waterways	0.094
07140204050203	Agricultural	Grassed waterways	0.489
07140204050203	Agricultural	Grassed waterways	0.621
07140204050203	Agricultural	Grassed waterways	0.587
07140204050203	Agricultural	Grassed waterways	0.901
07140204050203	Agricultural	Grassed waterways	0.193
07140204050203	Agricultural	Grassed waterways	0.902
07140204050203	Agricultural	Grassed waterways	1.094
07140204050203	Agricultural	Grassed waterways	0.063
07140204050203	Agricultural	Grassed waterways	0.148
07140204050203	Agricultural	Grassed waterways	0.045
07140204050203	Agricultural	Grassed waterways	0.467
07140204050203	Agricultural	Grassed waterways	0.380
07140204050203	Agricultural	Grassed waterways	0.044
07140204050203	Agricultural	Grassed waterways	0.105
07140204050203	Agricultural	Grassed waterways	0.167
07140204050203	Agricultural	Grassed waterways	0.090
07140204050203	Agricultural	Grassed waterways	0.351

07140204050203AgriculturalGrassed waterways0.3907140204050203AgriculturalGrassed waterways0.3807140204050203AgriculturalGrassed waterways0.9407140204050203AgriculturalGrassed waterways0.5207140204050203AgriculturalGrassed waterways0.3807140204050203AgriculturalGrassed waterways0.3607140204050203AgriculturalGrassed waterways0.2007140204050203AgriculturalGrassed waterways0.4207140204050203AgriculturalGrassed waterways0.4207140204050203AgriculturalGrassed waterways0.6407140204050203AgriculturalGrassed waterways0.2407140204050203AgriculturalGrassed waterways0.2407140204050203AgriculturalGrassed waterways0.2207140204050203AgriculturalGrassed waterways0.2707140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.67071402				
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07140204050203 Agricultural Grassed waterways 0.94 07140204050203 Agricultural Grassed waterways 0.52 07140204050203 Agricultural Grassed waterways 0.36 07140204050203 Agricultural Grassed waterways 0.20 07140204050203 Agricultural Grassed waterways 0.42 07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways	07140204050203	Agricultural	Grassed waterways	0.390
07140204050203 Agricultural Grassed waterways 0.52 07140204050203 Agricultural Grassed waterways 0.38 07140204050203 Agricultural Grassed waterways 0.20 07140204050203 Agricultural Grassed waterways 0.42 07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.24 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.17 07140204050203 Agricultural Grassed waterways	07140204050203	Agricultural	Grassed waterways	0.382
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07140204050203 Agricultural Grassed waterways 0.36 07140204050203 Agricultural Grassed waterways 0.42 07140204050203 Agricultural Grassed waterways 0.42 07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways	07140204050203	Agricultural	Grassed waterways	0.526
07140204050203 Agricultural Grassed waterways 0.42 07140204050203 Agricultural Grassed waterways 1.05 07140204050203 Agricultural Grassed waterways 1.05 07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.24 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.28 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.02 07140204050203 Agricultural Grassed waterways 0.02 07140204050203 Agricultural Grassed waterways 0.02 07140204050203 Agricultural Grassed waterways 0.05 07140204050203 Agricultural Grassed waterways 0.05 07140204050203 Agricultural Grassed waterways 0.05 07140204050203 Agricultural Grassed waterways 0.07 071402	07140204050203	Agricultural	Grassed waterways	0.384
07140204050203 Agricultural Grassed waterways 1.05 07140204050203 Agricultural Grassed waterways 1.05 07140204050203 Agricultural Grassed waterways 0.24 07140204050203 Agricultural Grassed waterways 0.24 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.7 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.37 07140204050203 Agricultural Grassed waterways 0.38 07140204050203 Agricultural Grassed waterways 0.38 07140204050203 Agricultural Grassed waterways 0.38 07140204050203 Agricultural Grassed waterways 0.37 0714020	07140204050203	Agricultural	Grassed waterways	0.361
07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.27 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.75 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.66 07140204050203 Agricultural Grassed waterways 0.66 07140204050203 Agricultural Grassed waterways 0.66 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.77 071402	07140204050203	Agricultural	Grassed waterways	0.201
07140204050203 Agricultural Grassed waterways 0.64 07140204050203 Agricultural Grassed waterways 0.24 07140204050203 Agricultural Grassed waterways 0.22 07140204050203 Agricultural Grassed waterways 0.7140204050203 Agricultural Grassed waterways 0.7140204050203 Agricultural Grassed waterways 0.7140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.26 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.13 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.28 07140204050203 Agricultural Grassed waterways 0.28 07140204050203 Agricultural Grassed waterways 0.28 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.07 07140204050203 Agricu	07140204050203	Agricultural	Grassed waterways	0.421
07140204050203AgriculturalGrassed waterways0.2407140204050203AgriculturalGrassed waterways2.2907140204050203AgriculturalGrassed waterways2.1907140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways1.2307140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.4307140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6007140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.07071402	07140204050203	Agricultural	Grassed waterways	1.051
07140204050203AgriculturalGrassed waterways2.1907140204050203AgriculturalGrassed waterways2.1907140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways1.2307140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.6007140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.05071402	07140204050203	Agricultural	Grassed waterways	0.646
07140204050203AgriculturalGrassed waterways2.1907140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.07071402	07140204050203	Agricultural	Grassed waterways	0.246
07140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways1.2307140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.4307140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0707140204050203AgriculturalGrassed waterways0.1707140204050203AgriculturalGrassed waterways0.1707140204050203AgriculturalGrassed waterways0.2707140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.05071402	07140204050203	Agricultural	Grassed waterways	0.228
07140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.7307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.1707140204050203AgriculturalGrassed waterways0.1707140204050203AgriculturalGrassed waterways0.6207140204050203AgriculturalGrassed waterways0.6207140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.05071402		-	Grassed waterways	2.196
07140204050203AgriculturalGrassed waterways0.2607140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.6207140204050203AgriculturalGrassed waterways0.6207140204050203AgriculturalGrassed waterways0.1607140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.0507140204050203AgriculturalGrassed waterways0.05071402	07140204050203	Agricultural	Grassed waterways	0.079
07140204050203AgriculturalGrassed waterways0.1307140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.1207140204050203AgriculturalGrassed waterways0.2807140204050203AgriculturalGrassed waterways0.1407140204050203AgriculturalGrassed waterways0.4307140204050203AgriculturalGrassed waterways0.5707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.6707140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0607140204050203AgriculturalGrassed waterways0.0207140204050203AgriculturalGrassed waterways0.1707140204050203AgriculturalGrassed waterways0.6207140204050203AgriculturalGrassed waterways0.1607140204050203AgriculturalGrassed waterways0.1607140204050203AgriculturalGrassed waterways0.7507140204050203AgriculturalGrassed waterways0.0507140204050203AgriculturalGrassed waterways0.0507140204050203AgriculturalGrassed waterways0.05071402	07140204050203	Agricultural	Grassed waterways	1.238
07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.12 07140204050203 Agricultural Grassed waterways 0.28 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.43 07140204050203 Agricultural Grassed waterways 0.57 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.14 07140204050203 Agricultural Grassed waterways 0.167 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.67 07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.06 07140204050203 Agricultural Grassed waterways 0.02 07140204050203 Agricultural Grassed waterways 0.17 07140204050203 Agricultural Grassed waterways 0.36 07140204050203 Agricultural Grassed waterways 0.36 07140204050203 Agricultural Grassed waterways 0.62 07140204050203 Agricultural Grassed waterways 0.16 07140204050203 Agricultural Grassed waterways 0.16 07140204050203 Agricultural Grassed waterways 0.16 07140204050203 Agricultural Grassed waterways 0.75 07140204050203 Agricultural Grassed waterways 0.08 07140204050203 Agricultural Grassed waterways 0.08 07140204050203 Agricultural Grassed waterways 0.08 07140204050203 Agricultural Grassed waterways 0.09 07140204050203 Agricultural Grassed waterways 0.05 07140204050203 Agricultural Grassed waterways 0.07		-	Grassed waterways	0.261
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	07140204030203	Agricultural	Grassed waterways	0.233

07140204050203	Agricultural	Grassed waterways	0.036
07140204050203	Agricultural	Grassed waterways	0.323
07140204050203	Agricultural	Grassed waterways	0.138
07140204050203	Agricultural	Grassed waterways	0.101
07140204050203	Agricultural	Grassed waterways	0.519
07140204050203	Agricultural	Grassed waterways	0.557
07140204050203	Agricultural	Grassed waterways	0.119
07140204050203	Agricultural	Grassed waterways	0.645
07140204050203	Agricultural	Grassed waterways	0.100
07140204050203	Agricultural	Grassed waterways	0.144
07140204050203	Agricultural	Grassed waterways	0.219
07140204050203	Agricultural	Grassed waterways	0.050
07140204050203	Agricultural	Grassed waterways	0.894
07140204050203	Agricultural	Grassed waterways	0.419
07140204050203	Agricultural	Grassed waterways	0.038
07140204050203	Agricultural	Grassed waterways	0.088
07140204050203	Agricultural	Grassed waterways	0.076
07140204050203	Agricultural	Grassed waterways	0.191
07140204050203	Agricultural	Grassed waterways	0.464
07140204050203	Agricultural	Grassed waterways	0.298
07140204050203	Agricultural	Grassed waterways	0.165
07140204050203	Agricultural	Grassed waterways	0.044
07140204050203	Agricultural	Grassed waterways	0.144
07140204050203	Agricultural	Grassed waterways	0.049
07140204050203	Agricultural	Grassed waterways	0.342
07140204050203	Agricultural	Grassed waterways	0.253
07140204050203	Agricultural	Grassed waterways	0.256
07140204050203	•	Grassed waterways	0.206
07140204050203	Agricultural	Grassed waterways	0.673
07140204050203	Agricultural	Grassed waterways	0.261
07140204050203	Agricultural	Grassed waterways	0.065
07140204050203	Agricultural	Grassed waterways	0.199
07140204050203	Agricultural	Grassed waterways	0.309
07140204050203	•	Grassed waterways	0.697
07140204050203	O	Grassed waterways	0.109
07140204050203	-	Grassed waterways	0.127
07140204050203	Agricultural	Grassed waterways	0.220
07140204050203	•	Grassed waterways	0.492
07140204050203	· ·	Grassed waterways	0.281
07140204050203	_	Grassed waterways	0.207
07140204050203	-	Grassed waterways	0.575
07140204050203	•	Grassed waterways	0.242
07140204050203	-	Grassed waterways	0.689
07140204050203	-	Grassed waterways	0.599
07140204050203	-	Grassed waterways	0.092
07140204050301	-	Grassed waterways	0.131
07140204050301	Agricultural	Grassed waterways	0.064

07140204050301	Agricultural	Grassed waterways	0.975
07140204050301	Agricultural	Grassed waterways	0.286
07140204050301	Agricultural	Grassed waterways	0.214
07140204050301	Agricultural	Grassed waterways	0.070
07140204050301	Agricultural	Grassed waterways	0.155
07140204050301	Agricultural	Grassed waterways	0.763
07140204050301	Agricultural	Grassed waterways	0.980
07140204050301	Agricultural	Grassed waterways	0.096
07140204050301	Agricultural	Grassed waterways	0.045
07140204050301	Agricultural	Grassed waterways	0.536
07140204050301	Agricultural	Grassed waterways	0.153
07140204050301	Agricultural	Grassed waterways	0.171
07140204050301	Agricultural	Grassed waterways	0.103
07140204050301	Agricultural	Grassed waterways	0.009
07140204050301	Agricultural	Grassed waterways	0.341
07140204050301	Agricultural	Grassed waterways	0.173
07140204050301	Agricultural	Grassed waterways	0.023
07140204050301	Agricultural	Grassed waterways	0.216
07140204050301	Agricultural	Grassed waterways	0.148
07140204050301	Agricultural	Grassed waterways	0.023
07140204050301	Agricultural	Grassed waterways	0.323
07140204050301	Agricultural	Grassed waterways	0.093
07140204050301	Agricultural	Grassed waterways	0.319
07140204050301	Agricultural	Grassed waterways	0.512
07140204050301	-	Grassed waterways	0.491
07140204050301	-	Grassed waterways	0.174
07140204050301	_	Grassed waterways	0.071
07140204050301	_	Grassed waterways	0.282
07140204050301	-	Grassed waterways	0.306
07140204050301	•	Grassed waterways	0.624
07140204050301	_	Grassed waterways	0.641
07140204050301	-	Grassed waterways	0.038
07140204050301	-	Grassed waterways	0.711
07140204050301	J	Grassed waterways	0.392
07140204050301	J	Grassed waterways	0.264
07140204050301	-	Grassed waterways	1.100
07140204050301	_	Grassed waterways	0.114
07140204050301	•	Grassed waterways	0.927
07140204050301	•	Grassed waterways	0.637
07140204050301	_	Grassed waterways	1.688
07140204050301	•	Grassed waterways	0.003
07140204050301	_	Grassed waterways	0.293
07140204050301	_	Grassed waterways	0.490
07140204050301	_	Grassed waterways	1.144
07140204050301	•	Grassed waterways	0.407
07140204050301	_	Grassed waterways	0.038
07140204050301	Agricultural	Grassed waterways	0.147

07140204050301	Agricultural	Grassed waterways	0.516
07140204050301	Agricultural	Grassed waterways	0.788
07140204050301	Agricultural	Grassed waterways	0.710
07140204050301	Agricultural	Grassed waterways	0.023
07140204050301	Agricultural	Grassed waterways	0.253
07140204050301	Agricultural	Grassed waterways	1.238
07140204050301	Agricultural	Grassed waterways	0.578
07140204050301	Agricultural	Grassed waterways	0.461
07140204050301	Agricultural	Grassed waterways	0.551
07140204050301	Agricultural	Grassed waterways	1.537
07140204050301	Agricultural	Grassed waterways	1.035
07140204050301	-	Grassed waterways	0.464
07140204050301	_	Grassed waterways	0.046
07140204050301	_	Grassed waterways	1.013
07140204050301	_	Grassed waterways	0.268
07140204050301	•	Grassed waterways	0.246
07140204050301	-	Grassed waterways	0.087
07140204050301	_	Grassed waterways	0.026
07140204050301	•	Grassed waterways	0.143
07140204050301	_	Grassed waterways	0.143
07140204050301	_	Grassed waterways	1.390
07140204050301	_	Grassed waterways	0.271
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	_	Grassed waterways	0.130
07140204050301 07140204050301	_	,	0.322
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	J	Grassed waterways	0.549 0.407
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	_		0.024
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07140204050301 07140204050301	-	Grassed waterways	0.406
07140204050301	-	Grassed waterways Grassed waterways	0.911 1.171
0/140204030301	Agricultulai	Grassea waterways	1.1/1

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07140204050302	Agricultural	Grassed waterways	0.723
07140204050302	Agricultural	Grassed waterways	0.211
07140204050302	Agricultural	Grassed waterways	0.297
07140204050302	Agricultural	Grassed waterways	0.525
07140204050302	Agricultural	Grassed waterways	0.231
07140204050302	Agricultural	Grassed waterways	0.111

07140204050302	Agricultural	Grassed waterways	0.315
07140204050302	Agricultural	Grassed waterways	0.108
07140204050302	Agricultural	Grassed waterways	0.569
07140204050302	Agricultural	Grassed waterways	0.299
07140204050302	Agricultural	Grassed waterways	0.457
07140204050302	Agricultural	Grassed waterways	0.378
07140204050302	Agricultural	Grassed waterways	0.107
07140204050302	Agricultural	Grassed waterways	0.039
07140204050302	Agricultural	Grassed waterways	0.029
07140204050302	Agricultural	Grassed waterways	0.487
07140204050302	Agricultural	Grassed waterways	0.506
07140204050302	Agricultural	Grassed waterways	0.069
07140204050302	Agricultural	Grassed waterways	0.071
07140204050302	Agricultural	Grassed waterways	0.060
07140204050302	Agricultural	Grassed waterways	0.184
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07140204050302	Agricultural	Grassed waterways	0.066
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07140204050302	Agricultural	Grassed waterways	0.078
07140204050302	Agricultural	Grassed waterways	0.025
07140204050302	Agricultural	Grassed waterways	1.178
07140204050302	Agricultural	Grassed waterways	0.094
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07140204050302	Agricultural	Grassed waterways	0.093
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07140204050302	-	Grassed waterways	0.125
07140204050302	-	Grassed waterways	0.428
07140204050302	Agricultural	Grassed waterways	0.062
07140204050302	J	Grassed waterways	0.223
07140204050302	· ·	Grassed waterways	0.149
07140204050302	_	Grassed waterways	0.128
07140204050302	-	Grassed waterways	0.064
07140204050302	-	Grassed waterways	0.003
07140204050302	J	Grassed waterways	0.274
07140204050302	_	Grassed waterways	0.266
07140204050302	-	Grassed waterways	0.283
07140204050302	-	Grassed waterways	0.037
07140204050302	_	Grassed waterways	0.096
07140204050302	_	Grassed waterways	0.136
07140204050302	_	Grassed waterways	0.039
07140204050302	-	Grassed waterways	0.078
11 2 10 20 10 00 00 0			2.0,0

07140204050302	Agricultural	Grassed waterways	0.395
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07140204050302	Agricultural	Grassed waterways	0.576
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07140204050302	Agricultural	Grassed waterways	0.331
07140204050302	Agricultural	Grassed waterways	0.088
07140204050302	Agricultural	Grassed waterways	0.169
07140204050302	Agricultural	Grassed waterways	0.783
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07140204050302	Agricultural	Grassed waterways	0.278
07140204050302	Agricultural	Grassed waterways	0.370
07140204050302	Agricultural	Grassed waterways	0.325
07140204050302	Agricultural	Grassed waterways	0.156
07140204050302	Agricultural	Grassed waterways	0.334
07140204050302	Agricultural	Grassed waterways	0.235
07140204050302	Agricultural	Grassed waterways	0.919
07140204050302	Agricultural	Grassed waterways	0.154
07140204050302	Agricultural	Grassed waterways	0.219
07140204050302	Agricultural	Grassed waterways	0.231
07140204050302	Agricultural	Grassed waterways	0.562
07140204050302	Agricultural	Grassed waterways	0.511
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07140204050303	Agricultural	Grassed waterways	0.197
07140204050303	Agricultural	Grassed waterways	0.638
07140204050303	Agricultural	Grassed waterways	1.619
07140204050303	Agricultural	Grassed waterways	0.137
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07140204050303	Agricultural	Grassed waterways	0.375
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07140204050303	Agricultural	Grassed waterways	0.088
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07140204050303	-	Grassed waterways	0.691
07140204050303	•	Grassed waterways	0.027
07140204050303	_	Grassed waterways	2.470
07140204050303	-	Grassed waterways	0.354
07140204050303	-	Grassed waterways	0.174
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07140204050303	Agricultural	Grassed waterways	0.149

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07140204050303	Agricultural	Grassed waterways	0.049
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07140204050303	Agricultural	Grassed waterways	0.310
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07140204050303	Agricultural	Grassed waterways	0.760
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07140204050303	Agricultural	Grassed waterways	0.321
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07140204050303	-	Grassed waterways	0.254
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07140204050303	Agricultural	Grassed waterways	0.175
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07140204050303	Agricultural	Grassed waterways	0.092
07140204050303	Agricultural	Grassed waterways	0.234
07140204050303	Agricultural	Grassed waterways	0.192
07140204050303	_	Grassed waterways	0.163
07140204050303	Agricultural	Grassed waterways	0.251
07140204050303	Agricultural	Grassed waterways	0.398
07140204050303	_	Grassed waterways	0.065
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07140204050303	_	Grassed waterways	0.039
07140204050303	Agricultural	Grassed waterways	0.383
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07140204050303	_	Grassed waterways	0.629
07140204050303	_	Grassed waterways	0.222
07140204050303	•	Grassed waterways	0.220
07140204050303	•	Grassed waterways	0.251
07140204050303	•	Grassed waterways	0.378
07140204050303	_	Grassed waterways	0.094
07140204050303	•	Grassed waterways	0.038
07140204050303	J	Grassed waterways	0.336
07140204050303	•	Grassed waterways	0.176
07140204050303	_	Grassed waterways	0.427
07140204050303	-	Grassed waterways	0.872
07140204050303	_	Grassed waterways	0.185
07140204050303	_	Grassed waterways	0.285
07140204050303	-	Grassed waterways	0.024
07140204050303	_	Grassed waterways	1.155
07140204050303	•	Grassed waterways	0.191
5. 1 1020 1030303		- account majo	3.232

07140204050303	Agricultural	Grassed waterways	0.034
07140204050303	Agricultural	Grassed waterways	0.293
07140204050303	Agricultural	Grassed waterways	0.138
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07140204050303	Agricultural	Grassed waterways	0.299
07140204050303	Agricultural	Grassed waterways	0.574
07140204050303	Agricultural	Grassed waterways	0.655
07140204050303	Agricultural	Grassed waterways	0.031
07140204050303	Agricultural	Grassed waterways	0.185
07140204050303	Agricultural	Grassed waterways	0.580
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07140204050303	_	Grassed waterways	0.511
07140204050303	_	Grassed waterways	0.114
07140204050303	-	Grassed waterways	0.102
07140204050303	•	Grassed waterways	0.815
07140204050303	•	Grassed waterways	0.099
07140204050303	_	Grassed waterways	0.232
07140204050303	-	Grassed waterways	0.323
07140204050303	J	Grassed waterways	0.136
07140204050303	-	Grassed waterways	0.129
07140204050303	•	Grassed waterways	0.122
07140204050303	_	Grassed waterways	0.440
07140204050303	•	Grassed waterways	0.164
07140204050303	-	Grassed waterways	0.151
07140204050303	-	Grassed waterways	0.110
07140204050303	_	Grassed waterways	0.050
07140204050303	-	Grassed waterways	0.038
07140204050303	•	Grassed waterways	0.246
07140204050303	_	Grassed waterways	0.145
07140204050303	-	Grassed waterways	0.480
07140204050303	_	Grassed waterways	0.373
07140204050303	-	Grassed waterways	0.969
07140204050303	_	Grassed waterways	0.897
07140204050303	•	Grassed waterways	0.071
07140204050303	•	Grassed waterways	0.130
07140204050303	· ·	Grassed waterways	0.171
07140204050303	_	Grassed waterways	0.547
07140204050303	•	Grassed waterways	0.271
07140204050303	•	Grassed waterways	0.090
07140204050303	· ·	Grassed waterways	0.919
07140204050303	_	Grassed waterways	0.651
07140204050303	_	Grassed waterways	0.394
07140204050303	-	Grassed waterways	0.572
07140204050303	_	Grassed waterways	0.040
07140204050303	_	Grassed waterways	0.040
07140204050303	-	Grassed waterways	0.230
07140204050303	· ·	Grassed waterways	0.061
U, 140204030303	, Bricaltalai	Ciassea water ways	5.205

07140204050303	Agricultural	Grassed waterways	0.121
07140204050303	Agricultural	Grassed waterways	0.391
07140204050303	Agricultural	Grassed waterways	0.461
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07140204050303	Agricultural	Grassed waterways	0.435
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07140204050303	Agricultural	Grassed waterways	0.004
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07140204050303	Agricultural	Grassed waterways	0.428
07140204050303	Agricultural	Grassed waterways	0.804
07140204050303	Agricultural	Grassed waterways	0.296
07140204050303	Agricultural	Grassed waterways	0.291
07140204050303	Agricultural	Grassed waterways	0.622
07140204050303	Agricultural	Grassed waterways	0.117
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07140204050303	Agricultural	Grassed waterways	0.122
07140204050303	Agricultural	Grassed waterways	0.112
07140204050303	Agricultural	Grassed waterways	1.964
07140204050303	Agricultural	Grassed waterways	0.037
07140204050303	Agricultural	Grassed waterways	0.142
07140204050303	Agricultural	Grassed waterways	0.262
07140204050303	Agricultural	Grassed waterways	0.003
07140204050303	Agricultural	Grassed waterways	0.257
07140204050303	Agricultural	Grassed waterways	0.183
07140204050303	Agricultural	Grassed waterways	0.226
07140204050303	Agricultural	Grassed waterways	0.514
07140204050303	Agricultural	Grassed waterways	0.576
07140204050303	Agricultural	Grassed waterways	0.033
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07140204050303	Agricultural	Grassed waterways	0.220
07140204050303	Agricultural	Grassed waterways	0.141
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07140204050303	Agricultural	Grassed waterways	0.056
07140204050303	Agricultural	Grassed waterways	0.990
07140204050303	Agricultural	Grassed waterways	0.184
07140204050303	Agricultural	Grassed waterways	0.387

07140204050303	Agricultural	Grassed waterways	0.797
07140204050303	Agricultural	Grassed waterways	0.258
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07140204050303	Agricultural	Grassed waterways	1.424
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07140204050303	Agricultural	Grassed waterways	0.218
07140204050303	-	Grassed waterways	0.172
07140204050303	-	Grassed waterways	0.281
07140204050303	_	Grassed waterways	0.164
07140204050303	•	Grassed waterways	0.436
07140204050303	•	Grassed waterways	1.277
07140204050303	-	Grassed waterways	0.570
07140204050303	_	Grassed waterways	0.797
07140204050303	J	Grassed waterways	0.024
07140204050303	_	Grassed waterways	0.298
07140204050303	•	Grassed waterways	0.743
07140204050303	_	Grassed waterways	0.473
07140204050303	•	Grassed waterways	0.293
07140204050303	_	Grassed waterways	0.289
07140204050303	_	Grassed waterways	0.848
07140204050303	_	Grassed waterways	0.102
07140204050303	_	Grassed waterways	0.164
07140204050303	•	Grassed waterways	0.512
07140204050303	_	Grassed waterways	0.342
07140204050303	_	Grassed waterways	0.371
07140204050303	•	Grassed waterways	0.303
07140204050303	_	Grassed waterways	0.658
07140204050303	•	Grassed waterways	0.354
07140204050303	•	Grassed waterways	0.952
07140204050303	•	Grassed waterways	0.300
07140204050303	•	•	0.300
	_	Grassed waterways Grassed waterways	
07140204050303	•	•	0.417
07140204050303	•	Grassed waterways	0.272
07140204050303	•	Grassed waterways	0.182
07140204050303	_	Grassed waterways	0.159
07140204050303	-	Grassed waterways	0.497
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07140204050303	_	Grassed waterways	0.935
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07140204050303	Agricultural	Grassed waterways	0.878

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07140204050304	Agricultural	Grassed waterways	0.522
07140204050304	Agricultural	Grassed waterways	0.217
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07140204050304	Agricultural	Grassed waterways	0.183
07140204050304	Agricultural	Grassed waterways	0.471
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07140204050304	Agricultural	Grassed waterways	0.148
07140204050304	Agricultural	Grassed waterways	1.065
07140204050304	Agricultural	Grassed waterways	1.429
07140204050304	Agricultural	Grassed waterways	0.113
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07140204050304	Agricultural	Grassed waterways	0.164
07140204050304	Agricultural	Grassed waterways	0.247
07140204050304	Agricultural	Grassed waterways	0.211
07140204050304	Agricultural	Grassed waterways	0.118
07140204050304	Agricultural	Grassed waterways	0.284
07140204050304	Agricultural	Grassed waterways	0.311
07140204050304	Agricultural	Grassed waterways	0.125
07140204050304	Agricultural	Grassed waterways	0.280
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07140204050304	Agricultural	Grassed waterways	0.896
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07140204050304	Agricultural	Grassed waterways	0.389
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07140204050304	Agricultural	Grassed waterways	0.652
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07140204050304	Agricultural	Grassed waterways	0.384
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07140204050304	Agricultural	Grassed waterways	0.645
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07140204050304	Agricultural	Grassed waterways	0.099
07140204050304	Agricultural	Grassed waterways	0.252
07140204050304	Agricultural	Grassed waterways	0.516
07140204050304	Agricultural	Grassed waterways	0.205
07140204050304	Agricultural	Grassed waterways	0.062
07140204050304	Agricultural	Grassed waterways	0.359
07140204050304	Agricultural	Grassed waterways	0.128
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07140204050304	Agricultural	Grassed waterways	0.217
07140204050304	Agricultural	Grassed waterways	0.234
07140204050304	Agricultural	Grassed waterways	0.373
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07140204050304	Agricultural	Grassed waterways	0.083
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07140204050304	Agricultural	Grassed waterways	0.762
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07140204050304	Agricultural	Grassed waterways	0.296
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07140204050304	Agricultural	Grassed waterways	0.198
07140204050304	Agricultural	Grassed waterways	0.281
07140204050304	Agricultural	Grassed waterways	0.168
07140204050304	Agricultural	Grassed waterways	0.099
07140204050304	Agricultural	Grassed waterways	0.185
07140204050304	Agricultural	Grassed waterways	0.129
07140204050304	Agricultural	Grassed waterways	0.413
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07140204050304	Agricultural	Grassed waterways	0.081
07140204050304	Agricultural	Grassed waterways	1.402
07140204050304	Agricultural	Grassed waterways	0.214
07140204050304	Agricultural	Grassed waterways	0.220
07140204050304	Agricultural	Grassed waterways	0.324
07140204050304	Agricultural	Grassed waterways	0.061

07140204050304	Agricultural	Grassed waterways	0.043
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07140204050304	Agricultural	Grassed waterways	0.279
07140204050304	Agricultural	Grassed waterways	0.740
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07140204050304	Agricultural	Grassed waterways	0.347
07140204050304	Agricultural	Grassed waterways	0.952
07140204050304	Agricultural	Grassed waterways	0.153
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07140204050304	Agricultural	Grassed waterways	0.223
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	-	Grassed waterways	
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07140204050401	_	Grassed waterways	0.206
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07140204050401	-	Grassed waterways	0.121
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			0.020

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	_	Grassed waterways	
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	_	•	0.213
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	•	WASCOB	0.234559
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3,1.0201030302	. D Gartarar		J., 23332

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07140204050903	Agricultural	WASCOB	0.246635
07140204050903	Agricultural	WASCOB	1.267371
07140204050903	Agricultural	WASCOB	0.530184
07140204050903	Agricultural	WASCOB	0.5839
07140204050903	Agricultural	WASCOB	0.646138
07140204050903	Agricultural	WASCOB	0.241052
07140204050903	Agricultural	WASCOB	0.332067
07140204050903	Agricultural	WASCOB	0.59107
07140204050903	Agricultural	WASCOB	0.635933
07140204050903	Agricultural	WASCOB	0.541313
07140204050903	Agricultural	WASCOB	0.416638
07140204050903	Agricultural	WASCOB	1.19205
07140204050903	Agricultural	WASCOB	0.356624
07140204050903	Agricultural	WASCOB	0.292591
07140204050903	Agricultural	WASCOB	0.786588
07140204050903	Agricultural	WASCOB	1.124074
07140204050903	Agricultural	WASCOB	0.400664
07140204050903	Agricultural	WASCOB	0.874456
07140204050903	Agricultural	WASCOB	0.447102
07140204050903	Agricultural	WASCOB	0.867231
07140204050903	Agricultural	WASCOB	0.250585
07140204050903	Agricultural	WASCOB	0.331428
07140204050903	Agricultural	WASCOB	0.732391
07140204050903	Agricultural	WASCOB	0.371003
07140204050903	Agricultural	WASCOB	0.989225

07140204050903	Agricultural	WASCOB	0.807623
07140204050903	Agricultural	WASCOB	0.897944
07140204050903	•	WASCOB	1.102774
07140204050202	_	Wetlands	5.22
07140204050202	_	Wetlands	10.13
	_	Wetlands	6.72
07140204050202	•		
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07140204050401	-	Wetlands	5.34
07140204050401	_	Wetlands	7.37
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07140204050401	Agricultural	Wetlands	12.17
07140204050401	Agricultural	Wetlands	2.43
07140204050401	Agricultural	Wetlands	9.26
07140204050401	Agricultural	Wetlands	2.86
07140204050401	Agricultural	Wetlands	5.72
07140204050401	•	Wetlands	3.02
07140204050401	_	Wetlands	6.67
07140204050402	_	Wetlands	7.57
07140204050402	•	Wetlands	14.72
	-	Wetlands	
07140204050402	•		2.53
07140204050402	_	Wetlands	5.11
07140204050402	_	Wetlands	5.51
07140204050402	_	Wetlands	8.55
07140204050402	_	Wetlands	3.59
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07140204050602	_	Wetlands	16.16
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07140204050602	_	Wetlands	2.45
07140204050602	_	Wetlands	3.76
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	•		2.47
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07140204050602	-	Wetlands	5.47
07140204050602	_	Wetlands	4.29
07140204050602	•	Wetlands	5.04
07140204050603	_	Wetlands	13.37
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07140204050603	Agricultural	Wetlands	10.20
07140204050603	Agricultural	Wetlands	4.20
07140204050603	•	Wetlands	4.05
	•		

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07140204050603	Agricultural	Wetlands	3.72
07140204050603	_	Wetlands	2.23
07140204050603	•	Wetlands	2.58
07140204050604	•	Wetlands	21.66
	•		
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07140204050604	_	Wetlands	5.00
07140204050604	_	Wetlands	5.72
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	-	Wetlands	0.02034
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07140204050102	_	Wetlands	0.103993
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	_		
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07140204050203	•	Wetlands	0.106969
07140204050203	•	Wetlands	0.02807
07140204050203	· ·	Wetlands	0.046062
	G		

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07140204050903	J	Wetlands	0.026184
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07140204050903	_	Wetlands	0.183926
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07140204050101		Logiam removal	
		Logiam removal	
07140204050101 07140204050101		Logiam removal	
0/140204030101	m-su eall	Logjam removal	

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07140204050101	In-stream	Logjam removal
07140204050102	In-stream	Logjam removal
07140204050102		
	In-stream	Logiam removal
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07140204050202	In-stream	Logjam removal
07140204050203	In-stream	Logjam removal
07140204050301	In-stream	
07140204050301		Logiam removal
	In-stream	Logiam removal
07140204050301	In-stream	Logiam removal
07140204050301	In-stream	Logjam removal

07140204050302	In-stream	Logjam removal
07140204050302	In-stream	Logjam removal
07140204050302	In-stream	
		Logjam removal
07140204050302	In-stream	Logjam removal
07140204050303	In-stream	Logjam removal
07140204050304	In-stream	Logjam removal
07140204050304	In-stream	Logjam removal
07140204050304	In-stream	0,
		Logiam removal
07140204050304	In-stream	Logjam removal
07140204050304	In-stream	Logjam removal
07140204050304	In-stream	Logjam removal
07140204050401	In-stream	Logjam removal
07140204050401	In-stream	Logjam removal
07140204050401	In-stream	Logjam removal
07140204050402	In-stream	
		Logiam removal
07140204050402	In-stream	Logjam removal
07140204050501	In-stream	Logjam removal
07140204050502	In-stream	Logjam removal

07140204050601	In-stream	Logjam removal
07140204050601	In-stream	Logjam removal
07140204050601	In-stream	Logjam removal
07140204050602	In-stream	Logjam removal
07140204050603	In-stream	Logjam removal
07140204050604	In-stream	Logjam removal
07140204050604	In-stream	Logjam removal
07140204050604	In-stream	Logjam removal
07140204050901	In-stream	Logjam removal
07140204050901	In-stream	Logjam removal
07140204050901	In-stream	Logjam removal
07140204050902	In-stream	Logjam removal
07140204050903	In-stream	Logjam removal

	Nitrogen	Phosphorus		Sediment		
	Load	Load		Load		
	Reduction	Reduction	Total Suspended	Reduction		
Feet	(lbs/year)	(lbs/year)	Solids (lbs/year)	(tons/year)	Latitude	Longitude
175	1.841	0.428	72.319	0.039	39.0412033	-95.707063
166	0.000	0.406	68.569	0.037	39.0391675	-95.706838
196	0.000	0.481	81.231	0.044	39.0383522	-95.706879
124	0.000	0.304	51.436	0.028	39.02546	-95.706344
190	0.000	0.465	78.528	0.043	38.9963352	-95.717354
250	0.000	0.612	103.398	0.056	38.9937634	-95.716079
165	0.000	0.403	68.155	0.037	38.9927009	-95.714704
56	0.000	0.138	23.294	0.013	39.0087639	-95.706942
114	0.000	0.279	47.127	0.026	38.9918513	-95.714622
301	0.000	0.738	124.686	0.068	38.9584928	-95.71688
130	0.000	0.319	53.897	0.029	38.9579285	-95.716519
338	0.000	0.827	139.781	0.076	38.9573854	-95.715822
256	0.000	0.627	105.920	0.057	38.9569737	-95.714975
126	0.000	0.308	52.038	0.028	38.9564862	-95.714489
291	0.000	0.714	120.649	0.065	38.9561931	-95.713676
160	0.000	0.392	66.191	0.036	38.9536939	-95.739308
96	0.000	0.235	39.725	0.022	39.0230022	-95.757396
348	0.000	0.851	143.862	0.078	38.8975263	-95.775966
214	0.000	0.523	88.399	0.048	38.9484	-95.768752
18	0.000	0.043	7.250	0.004	38.8929336	-95.790335
198	0.000	0.485	82.026	0.044	38.8858101	-95.791076
500	0.000	1.225	207.036	0.112	38.8951946	-95.787657
10	0.000	0.024	4.120	0.002	38.8937637	-95.789504
118	0.000	0.289	48.779	0.026	38.8930368	-95.790145
250	0.000	0.612	103.368	0.056	38.8980897	-95.782751
146	0.000	0.357	60.308	0.033	38.8976528	-95.783951
124	0.000	0.304	51.432	0.028	38.8974644	-95.784775
166	0.000	0.407	68.858	0.037	38.8968503	-95.785679
414	0.000	1.015	171.485	0.093	38.9204583	-95.697065
190	0.000	0.465	78.569	0.043	38.9196638	
295	0.000	0.723	122.221	0.066	38.9175843	-95.699698
336	0.000	0.823	139.052	0.075	38.9168734	-95.701058
909	0.000	2.225	376.076	0.204	38.9112447	-95.708118
179	0.000	0.438	74.093	0.040	38.8883771	-95.741302
92	0.000	0.226	38.249	0.021	38.918792	-95.697601
348	0.000	0.853	144.109	0.078	38.8450838	-95.823173
302	0.000	0.739	124.835	0.068	38.8395937	
41	0.000	0.102	17.161	0.009	38.8478889	-95.820004
494	0.000	1.211	204.595	0.111	38.8472391	
32	0.000	0.079	13.337	0.007	38.8479523	-95.819904

37	0.000	0.092	15.516	0.008	38.8309955	-95.832191
157	0.000	0.384	64.886	0.035	38.8312504	-95.832117
42	0.000	0.102	17.257	0.009	38.8759073	-95.85692
134	0.000	0.327	55.320	0.030	38.8471647	-95.797972
85	0.000	0.208	35.136	0.019	38.8471498	-95.798604
192	0.000	0.471	79.559	0.043	38.8200211	-95.818918
342	0.000	0.838	141.554	0.077	38.8192546	-95.83214
27	0.000	0.066	11.160	0.006	38.8472482	-95.797715
330	0.000	0.809	136.741	0.074	38.7739194	-95.858895
3	0.000	0.007	1.153	0.001	38.7707537	-95.858056
362	0.000	0.887	149.849	0.081	38.7704918	-95.857282
379	0.000	0.929	156.994	0.085	38.7688655	-95.856625
23	0.000	0.056	9.530	0.005	38.775719	-95.798743
107	0.000	0.262	44.224	0.024	38.7753451	-95.799381
335	0.000	0.820	138.596	0.075	38.7687243	-95.808723
66	0.000	0.163	27.494	0.075	38.7751845	-95.799602
317	0.000	0.103	131.405	0.013	38.798609	-95.778902
129	0.000	0.315	53.241	0.029	38.7694059	-95.805593
117	0.000	0.287	48.460	0.026	38.7624196	-95.823864
270	0.000	0.661	111.800	0.061	38.7082138	-95.835938
235	0.000	0.576	97.289	0.053	38.707672	-95.83783
196	0.000	0.481	81.226	0.044	38.7077475	-95.839787
368	0.000	0.900	152.177	0.082	38.7152122	-95.743751
241	0.000	0.589	99.622	0.054	38.6819734	-95.798214
320	0.000	0.784	132.448	0.072	38.6813606	-95.798809
125	0.000	0.307	51.849	0.028	38.6976525	-95.78329
282	0.000	0.690	116.641	0.063	38.7207497	-95.739568
147	0.000	0.361	60.946	0.033	38.68816	-95.874819
226	0.000	0.554	93.615	0.051	38.6656364	-95.903966
37	0.000	0.091	15.393	0.008	38.6880029	-95.873959
45	0.000	0.110	18.619	0.010	38.6667758	-95.899344
318	1.5	1.5	303.3	0.2	39.0209357	-95.720289
476	2.2	2.2	454.7	0.2	39.0255297	-95.706956
294	1.3	1.3	280.1	0.1	39.0340544	-95.684014
384	1.8	1.8	366.5	0.2	39.0361293	-95.699409
761	3.5	3.5	725.9	0.4	39.0271286	-95.705983
191	0.9	0.9	182.2	0.1	39.0467689	-95.708348
565	2.6	2.6	539.4	0.3	39.0684784	-95.717284
3107	14.2	14.2	2965.7	1.5	39.0192961	-95.756209
1066	4.9	4.9	1017.5	0.5	38.9526885	-95.738858
1319	6.0	6.0	1258.6	0.6	38.9889298	-95.769004
1941	8.9	8.9	1852.5	0.9	39.0082903	-95.746629
2949	13.5	13.5	2814.8	1.4	38.9344716	-95.770475
1030	4.7	4.7	982.8	0.5	38.9384909	-95.771936
134	0.6	0.6	127.6	0.1	38.9487367	-95.768761
334	1.5	1.5	318.9	0.2	38.9000004	-95.816049
822	3.8	3.8	784.6	0.4	38.9011559	-95.817119
522	5.0	5.0	704.0	0.4	30.3011333	33.017113

933	4.3	4.3	890.2	0.4	38.9092102	-95.793457
3547	16.2	16.2	3385.0	1.7	38.8804645	-95.755782
330	1.5	1.5	315.2	0.2	38.8784756	-95.760599
777	3.6	3.6	741.7	0.4	38.8828889	-95.750281
676	3.1	3.1	645.5	0.3	38.8882308	-95.741945
1354	6.2	6.2	1292.0	0.6	38.917013	-95.701042
855	3.9	3.9	816.3	0.4	38.9197072	-95.697338
65	0.3	0.3	62.3	0.0	38.9209334	-95.696991
1648	7.5	7.5	1572.4	0.8	38.8614296	-95.848752
683	3.1	3.1	652.1	0.3	38.84024	-95.836988
366	1.7	1.7	349.1	0.2	38.8412297	-95.838149
581	2.7	2.7	554.6	0.3	38.8927848	-95.852192
2857	13.1	13.1	2726.8	1.4	38.8347057	-95.808321
489	2.2	2.2	467.0	0.2	38.8307825	-95.810362
22	0.1	0.1	20.9	0.0	38.8198351	-95.819201
1412	6.5	6.5	1347.9	0.7	38.8216361	-95.818579
129	0.5	0.5	122.8	0.7	38.8301926	-95.811137
436	2.0	2.0	415.8	0.1	38.849733	-95.795025
628	2.9	2.9	599.7	0.3	38.8235712	-95.873607
422	1.9	1.9	402.7	0.2	38.8243166	-95.875071
1983	9.1	9.1	1892.1	0.9	38.8066059	-95.774205
1295	5.9	5.9	1235.6	0.6	38.7726483	-95.802712
737	3.4	3.4	703.1	0.4	38.7704536	-95.804581
1486	6.8	6.8	1417.9	0.7	38.7918875	-95.785087
2067	9.4	9.4	1972.6	1.0	38.7881458	-95.788078
1955	8.9	8.9	1865.5	0.9	38.7765734	-95.796424
1389	6.3	6.3	1325.2	0.7	38.7691781	-95.806698
198	0.9	0.9	188.7	0.1	38.7743568	-95.801607
145	0.7	0.7	138.4	0.1	38.777456	-95.793311
1836	8.4	8.4	1751.8	0.9	38.7801134	-95.792752
1415	6.5	6.5	1350.9	0.7	38.7992036	-95.777027
816	3.7	3.7	778.4	0.4	38.7627782	-95.913034
123	0.6	0.6	117.7	0.1	38.7629589	-95.91164
440	2.0	2.0	420.3	0.2	38.7616854	-95.914074
248	1.1	1.1	236.5	0.1	38.7551119	-95.920991
369	1.7	1.7	352.4	0.2	38.7248583	-95.874018
185	0.8	0.8	176.2	0.1	38.7291972	-95.886272
293	1.3	1.3	279.2	0.1	38.7285494	-95.88615
364	1.7	1.7	347.4	0.2	38.7110133	-95.846654
1297	5.9	5.9	1237.4	0.6	38.6951413	-95.834914
2009	9.2	9.2	1917.1	1.0	38.7228864	-95.738378
1380	6.3	6.3	1317.3	0.7	38.714742	-95.744483
566	2.6	2.6	540.0	0.7	38.6881681	-95.874908
249	1.1	1.1	237.3	0.3	38.6649191	-95.906156
116	0.5	0.5	111.0	0.1	38.6650086	-95.905529
314	1.4	1.4	299.7	0.1	38.6651633	-95.904806
202	0.9	0.9	193.2	0.1	38.6647296	-95.906897

0.0007	0.0002	0.026	1.32E-05	39.0124384	-89.723275
0.0004	0.0001	0.016	7.88E-06	39.0114589	-89.72351
0.0005	0.0001	0.020	9.94E-06	39.0131007	-89.722821
0.0005	0.0001	0.020	1.00E-05	39.0104241	-89.723442
0.0005	0.0001	0.020	1.00E-05	39.0087868	-89.719219
0.0005	0.0001	0.019	9.57E-06	39.0090419	-89.720249
0.0005	0.0001	0.018	8.93E-06	38.9583611	-89.732374
0.0005	0.0001	0.020	1.02E-05	38.9588258	-89.734723
0.0006	0.0002	0.022	1.10E-05	38.9578549	-89.735269
0.0008	0.0002	0.031	1.57E-05	38.972992	-89.708573
0.0007	0.0002	0.026	1.28E-05	38.9782601	-89.693428
0.0005	0.0001	0.020	9.95E-06	38.981209	-89.692044
0.0007	0.0002	0.025	1.27E-05	38.9749245	-89.694321
0.0005	0.0001	0.019	9.52E-06	38.9735031	-89.692872
0.0003	0.0001	0.013	8.65E-06	38.9614974	-89.698243
0.0004	0.0001	0.017	7.83E-06	38.9774439	-89.684906
0.0004	0.0001	0.010	1.09E-05	38.9784543	-89.695965
0.0006	0.0002		1.09E-05	38.960285	-89.688848
		0.025	9.27E-06		
0.0005	0.0001	0.019		38.9551231	-89.688042
0.0004	0.0001	0.016	7.91E-06	38.9607686	-89.68779
0.0005	0.0001	0.019	9.38E-06	39.006659	-89.745482
0.0006	0.0001	0.022	1.09E-05	39.008365	-89.745929
0.0007	0.0002	0.026	1.31E-05	39.0107746	-89.74511
0.0009	0.0002	0.035	1.75E-05	39.008781	-89.744934
0.0005	0.0001	0.020	9.93E-06	38.9725952	-89.751931
0.0005	0.0001	0.019	9.38E-06	38.973923	-89.752865
0.0005	0.0001	0.019	9.61E-06	38.9749796	-89.751972
0.0004	0.0001	0.016	8.21E-06	38.972701	-89.752678
0.0008	0.0002	0.032	1.60E-05	38.9909284	-89.736704
0.0004	0.0001	0.016	7.88E-06	38.933902	-89.748362
0.0007	0.0002	0.026	1.32E-05	38.9332366	-89.749203
0.0005	0.0001	0.020	9.90E-06	38.9294912	-89.745627
0.0004	0.0001	0.016	8.03E-06	38.9293539	-89.74647
0.0005	0.0001	0.018	8.83E-06	38.9289846	-89.747594
0.0008	0.0002	0.030	1.48E-05	38.9310244	-89.745169
0.0015	0.0004	0.059	2.95E-05	38.9210821	-89.751912
0.0006	0.0002	0.022	1.10E-05	38.9233424	-89.752377
0.0012	0.0003	0.045	2.25E-05	38.9218724	-89.751404
0.0008	0.0002	0.033	1.64E-05	38.9242574	-89.750802
0.0009	0.0002	0.036	1.81E-05	38.9240673	-89.754909
0.0018	0.0005	0.069	3.44E-05	38.9226067	-89.755368
0.0004	0.0001	0.016	8.19E-06	38.9219728	-89.757132
0.0005	0.0001	0.018	8.94E-06	38.9258335	-89.75506
0.0004	0.0001	0.017	8.69E-06	38.9328399	-89.720982
0.0005	0.0001	0.020	9.75E-06	38.934094	-89.722019
0.0006	0.0002	0.025	1.25E-05	38.9335565	-89.72004
0.0005	0.0001	0.018	9.22E-06	38.935917	-89.721039
			'		

0.0004	0.0001	0.016	8.00E-06	38.8972349	-89.748962
0.0005	0.0001	0.020	1.01E-05	38.9035148	-89.764447
0.0009	0.0003	0.036	1.82E-05	38.9057131	-89.764302
0.0007	0.0002	0.028	1.39E-05	38.9095651	-89.760187
0.0005	0.0001	0.020	1.00E-05	38.9459814	-89.708486
0.0004	0.0001	0.017	8.39E-06	38.9064713	-89.743256
0.0007	0.0002	0.026	1.32E-05	38.9360218	-89.714133
0.0009	0.0002	0.035	1.73E-05	38.8968665	-89.779829
0.0008	0.0002	0.032	1.62E-05	38.8963633	-89.77934
0.0008	0.0002	0.031	1.57E-05	38.9797516	-89.780931
0.0004	0.0001	0.016	8.00E-06	38.9777985	-89.781244
0.0006	0.0002	0.022	1.10E-05	38.9784048	-89.779923
0.0008	0.0002	0.031	1.57E-05	38.9784069	-89.783522
0.0005	0.0001	0.021	1.06E-05	38.9787269	-89.77323
0.0010	0.0003	0.040	1.99E-05	38.9496439	-89.801216
0.0004	0.0001	0.016	8.22E-06	38.9758346	-89.773739
0.0004	0.0001	0.016	8.08E-06	38.9728554	-89.774414
0.0005	0.0001	0.020	1.02E-05	38.9754932	-89.775028
0.0006	0.0002	0.024	1.21E-05	38.9545661	-89.772023
0.0004	0.0001	0.016	7.93E-06	38.9543638	-89.775215
0.0015	0.0004	0.058	2.90E-05	38.9565282	-89.771695
0.0006	0.0002	0.024	1.20E-05	38.9171448	-89.770438
0.0006	0.0002	0.023	1.16E-05	38.9161031	-89.770869
0.0007	0.0002	0.028	1.38E-05	38.9146491	-89.771527
0.0006	0.0002	0.023	1.13E-05	38.9035058	-89.771594
0.0011	0.0003	0.044	2.21E-05	38.942596	-89.763982
0.0006	0.0001	0.022	1.08E-05	38.9287753	-89.789114
0.0004	0.0001	0.016	8.14E-06	38.9255322	-89.783686
0.0007	0.0002	0.027	1.36E-05	38.9276929	-89.78767
0.0012	0.0003	0.046	2.31E-05	38.9290609	-89.78503
0.0012	0.0003	0.046	2.31E-05	38.9313694	
0.0006	0.0002	0.024	1.19E-05	38.9644348	-89.77502
0.0008	0.0002	0.032	1.60E-05	38.9661264	-89.777046
0.0015	0.0004	0.060	2.98E-05	38.9641076	-89.776405
0.0007	0.0002	0.029	1.46E-05	38.9656682	-89.777552
0.0005	0.0001	0.020	1.01E-05	38.9680565	-89.776725
0.0005	0.0001	0.020	9.87E-06	38.9696775	-89.778605
0.0005	0.0001	0.020	9.99E-06	38.9718637	-89.779443
0.0004	0.0001	0.016	8.12E-06	38.9719803	-89.77851
0.0005	0.0001	0.020	9.90E-06	38.970665	-89.780542
0.0006	0.0001	0.021	1.07E-05	38.9660278	-89.778872
0.0005	0.0001	0.018	8.86E-06	38.9722916	-89.781896
0.0009	0.0002	0.036	1.78E-05	38.9094668	-89.779119
0.0012	0.0003	0.045	2.25E-05	38.90788	-89.780288
0.0011	0.0003	0.044	2.19E-05	38.9681254	-89.801051
0.0006	0.0002	0.025	1.26E-05	38.9350146	-89.778957
0.0004	0.0001	0.017	8.39E-06	38.9374173	-89.780428

0.0005	0.0001	0.020	9.86E-06	38.9367231	-89.779454
0.0005	0.0001	0.020	9.87E-06	38.9333221	-89.787268
0.0006	0.0002	0.023	1.14E-05	38.9329133	-89.788335
0.0004	0.0001	0.016	8.24E-06	38.9374601	-89.790962
0.0009	0.0002	0.033	1.66E-05	38.9229272	-89.769739
0.0005	0.0001	0.018	8.91E-06	38.9904183	-89.78405
0.0006	0.0002	0.025	1.23E-05	38.9150963	-89.767377
0.0006	0.0001	0.021	1.07E-05	38.9137544	-89.767624
0.0005	0.0001	0.019	9.25E-06	38.9150094	-89.765585
0.0007	0.0002	0.026	1.30E-05	38.9437367	-89.777913
0.0004	0.0001	0.017	8.73E-06	38.9430446	-89.776495
0.0005	0.0001	0.019	9.28E-06	38.9445501	-89.777667
0.0004	0.0001	0.017	8.47E-06	38.9464284	-89.778626
0.0005	0.0001	0.021	1.07E-05	38.9463985	-89.779543
0.0003	0.0001	0.021	1.29E-05	38.9449742	-89.781183
0.0007	0.0002	0.028	8.93E-06	38.9447793	-89.779461
0.0003	0.0001	0.018	1.27E-05	38.9444873	-89.781917
	0.0002	0.023	1.27E-05	38.9466431	-89.780526
0.0006					
0.0005	0.0001	0.019	9.58E-06	38.9447921	-89.777007
0.0011	0.0003	0.042	2.11E-05	38.9427184	-89.786108
0.0013	0.0004	0.052	2.61E-05	38.9426632	-89.785865
0.0005	0.0001	0.020	1.00E-05	38.942802	-89.786753
0.0008	0.0002	0.032	1.61E-05	38.9615483	-89.794946
0.0011	0.0003	0.041	2.07E-05	38.9322691	-89.76314
0.0009	0.0002	0.036	1.78E-05	38.9343507	-89.763106
0.0011	0.0003	0.042	2.09E-05	38.9583843	-89.818991
0.0005	0.0001	0.019	9.27E-06	38.9505206	-89.82061
0.0004	0.0001	0.016	7.83E-06	38.9506214	-89.820634
0.0005	0.0001	0.018	8.80E-06	38.934168	-89.819891
0.0008	0.0002	0.030	1.50E-05	38.9699242	-89.801102
0.0004	0.0001	0.017	8.47E-06	38.9353968	-89.807349
0.0012	0.0003	0.047	2.37E-05	38.922712	-89.803377
0.0004	0.0001	0.017	8.44E-06	38.9248565	-89.803415
0.0004	0.0001	0.017	8.58E-06	38.9187804	-89.802743
0.0005	0.0001	0.019	9.40E-06	38.9208101	-89.802055
0.0005	0.0001	0.020	1.01E-05	38.9211287	-89.804577
0.0006	0.0002	0.024	1.21E-05	38.9224783	-89.806842
0.0005	0.0001	0.019	9.54E-06	38.921575	-89.806724
0.0005	0.0001	0.018	9.16E-06	38.9226158	-89.810543
0.0006	0.0002	0.023	1.14E-05	38.922112	-89.810231
0.0007	0.0002	0.026	1.30E-05	38.9247638	-89.808531
0.0005	0.0001	0.021	1.03E-05	38.9201054	-89.791417
0.0005	0.0001	0.018	8.78E-06	38.9195938	-89.792086
0.0005	0.0001	0.019	9.70E-06	38.9165465	-89.806539
0.0005	0.0001	0.021	1.05E-05	38.9132053	-89.813986
0.0006	0.0002	0.024	1.18E-05	38.9171392	-89.798181
0.0005	0.0001	0.020	9.81E-06	38.9043472	-89.800959
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0.0004	0.0001	0.017	8.30E-06	38.905792	-89.801793
0.0006	0.0002	0.022	1.12E-05	38.9025895	-89.796799
0.0005	0.0001	0.020	1.00E-05	38.8979503	-89.799604
0.0018	0.0005	0.069	3.44E-05	38.8707165	-89.788953
0.0005	0.0001	0.018	9.14E-06	38.8734609	-89.782625
0.0016	0.0004	0.062	3.12E-05	38.8710389	-89.787299
0.0007	0.0002	0.029	1.45E-05	38.8969053	-89.802901
0.0004	0.0001	0.017	8.39E-06	38.8980262	-89.80177
0.0008	0.0002	0.032	1.58E-05	38.8966012	-89.804088
0.0005	0.0001	0.019	9.72E-06	38.9016866	-89.802626
0.0005	0.0001	0.019	9.26E-06	38.8982837	-89.803587
0.0004	0.0001	0.017	8.53E-06	38.9238262	-89.801178
0.0014	0.0004	0.053	2.63E-05	38.9361653	-89.816408
0.0011	0.0003	0.040	2.01E-05	38.9787065	-89.804899
0.0010	0.0003	0.016	7.90E-06	38.9275901	-89.80391
0.0004	0.0001	0.017	8.31E-06	38.9036291	-89.796175
0.0004	0.0001	0.017	1.71E-05	38.9055617	-89.793617
0.0004	0.0001	0.016	8.02E-06	38.9069192	-89.794293 -89.799889
0.0005	0.0001	0.019	9.31E-06	38.8845736	
0.0010	0.0003	0.039	1.94E-05	38.9592412	-89.814382
0.0007	0.0002	0.029	1.45E-05	38.9603805	-89.817475
0.0017	0.0005	0.067	3.36E-05	38.9562575	-89.816498
0.0009	0.0002	0.034	1.70E-05	38.9604395	-89.801185
0.0006	0.0002	0.022	1.10E-05	38.8919825	-89.737212
0.0007	0.0002	0.028	1.40E-05	38.8933016	-89.736429
0.0007	0.0002	0.029	1.44E-05	38.9040759	-89.725157
0.0006	0.0002	0.023	1.13E-05	38.8640519	-89.771232
0.0010	0.0003	0.038	1.91E-05	38.8647187	-89.770069
0.0004	0.0001	0.016	8.21E-06	38.8636813	-89.769135
0.0009	0.0002	0.035	1.76E-05	38.8704537	-89.775816
0.0007	0.0002	0.028	1.38E-05	38.8719817	-89.776609
0.0007	0.0002	0.026	1.28E-05	38.8726277	-89.776223
0.0005	0.0001	0.021	1.03E-05	38.8719789	-89.773359
0.0008	0.0002	0.030	1.48E-05	38.8748852	-89.776603
0.0012	0.0003	0.048	2.40E-05	38.8766325	-89.77653
0.0006	0.0002	0.024	1.18E-05	38.8621005	-89.771122
0.0005	0.0001	0.020	9.85E-06	38.8612329	-89.76985
0.0007	0.0002	0.027	1.36E-05	38.8723218	-89.752197
0.0007	0.0002	0.026	1.32E-05	38.8729327	-89.752066
0.0006	0.0002	0.023	1.14E-05	38.8731792	-89.753792
0.0006	0.0002	0.023	1.16E-05	38.8613709	-89.779195
0.0005	0.0001	0.021	1.04E-05	38.8567643	-89.762403
0.0005	0.0001	0.019	9.43E-06	38.9297259	-89.701965
0.0018	0.0005	0.069	3.44E-05	38.8707165	-89.788953
0.0016	0.0004	0.062	3.12E-05	38.8710389	-89.787299
0.0005	0.0001	0.018	8.90E-06	38.8934437	-89.726001
0.0005	0.0001	0.018	8.81E-06	38.9056409	-89.717708

0.0005	0.0001	0.018	9.17E-06	38.8756819	-89.75997
0.0005	0.0001	0.018	9.16E-06	38.87684	-89.760471
0.0007	0.0002	0.029	1.43E-05	38.8755663	-89.754765
0.0010	0.0003	0.041	2.03E-05	38.8765653	-89.755664
0.0005	0.0001	0.020	1.02E-05	38.8765146	-89.75692
0.0004	0.0001	0.016	8.19E-06	38.8777723	-89.75948
0.0008	0.0002	0.031	1.55E-05	38.8743095	-89.755008
0.0006	0.0002	0.023	1.16E-05	38.8781778	-89.755949
0.0005	0.0001	0.019	9.72E-06	38.8766749	-89.762579
0.0006	0.0002	0.025	1.23E-05	38.8809363	-89.761373
0.0007	0.0002	0.027	1.36E-05	38.883843	-89.759897
0.0019	0.0005	0.076	3.78E-05	38.8835276	-89.761378
0.0004	0.0001	0.017	8.53E-06	38.8717541	-89.763326
0.0007	0.0002	0.028	1.38E-05	38.8731572	-89.758364
0.0004	0.0001	0.016	7.82E-06	38.8726139	-89.759236
0.0006	0.0002	0.025	1.26E-05	38.8731283	-89.756622
0.0006	0.0002	0.022	1.11E-05	38.8721897	-89.760463
0.0006	0.0002	0.024	1.21E-05	38.8804752	-89.773361
0.0005	0.0001	0.020	9.81E-06	38.8780817	-89.774253
0.0008	0.0002	0.033	1.65E-05	38.8780629	-89.775703
0.0006	0.0002	0.022	1.10E-05	38.8791531	-89.774918
0.0005	0.0001	0.018	9.01E-06	38.9074455	-89.710559
0.0003	0.0001	0.016	7.89E-06	38.9069195	-89.711991
0.0004	0.0001	0.016	8.00E-06	38.8978708	-89.825775
0.0006	0.0001	0.022	1.08E-05	38.8955332	-89.826361
0.0004	0.0001	0.017	8.36E-06	38.8918151	-89.82555
0.0007	0.0002	0.027	1.33E-05	38.890288	-89.825457
0.0006	0.0002	0.022	1.11E-05	38.8938327	-89.826938
0.0010	0.0003	0.040	1.99E-05	38.8846314	-89.824743
0.0005	0.0001	0.020	1.02E-05	38.884079	-89.826582
0.0005	0.0001	0.018	9.10E-06	38.8872444	-89.827267
0.0005	0.0001	0.021	1.05E-05	38.8849619	-89.823562
0.0007	0.0002	0.026	1.31E-05	38.8865292	-89.823709
0.0005	0.0001	0.021	1.06E-05	38.8820694	-89.818476
0.0007	0.0002	0.027	1.33E-05	38.8835374	-89.818108
0.0007	0.0002	0.026	1.31E-05	38.8491217	-89.824672
0.0007	0.0002	0.029	1.45E-05	38.8475896	-89.827591
0.0004	0.0001	0.017	8.72E-06	38.8517533	-89.822518
0.0008	0.0002	0.030	1.48E-05	38.8508551	-89.824402
0.0008	0.0002	0.032	1.58E-05	38.851662	-89.824345
0.0012	0.0003	0.045	2.27E-05	38.8471909	-89.83136
0.0015	0.0004	0.057	2.86E-05	38.8478517	-89.830579
0.0010	0.0003	0.040	1.98E-05	38.8481296	-89.828593
0.0005	0.0001	0.018	9.15E-06	38.8458909	-89.832279
0.0005	0.0001	0.019	9.67E-06	38.845479	-89.832804
0.0005	0.0001	0.020	9.97E-06	38.8369801	-89.824714
0.0005	0.0001	0.019	9.64E-06	38.8354813	-89.821692
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0.0004	0.0001	0.017	8.58E-06	38.835423	-89.822794
0.0006	0.0002	0.023	1.16E-05	38.8613709	-89.779195
0.0005	0.0001	0.021	1.04E-05	38.8555129	-89.791133
0.0004	0.0001	0.015	7.46E-06	38.8582616	-89.785354
0.0005	0.0001	0.018	8.97E-06	38.8589248	-89.784106
0.0010	0.0003	0.038	1.89E-05	38.8329745	-89.825965
0.0009	0.0002	0.033	1.67E-05	38.9055511	-89.837837
0.0005	0.0001	0.018	8.79E-06	38.8656844	-89.824425
0.0009	0.0002	0.034	1.68E-05	38.8644154	-89.824221
0.0006	0.0002	0.024	1.22E-05	38.86497	-89.818966
0.0004	0.0001	0.017	8.71E-06	38.866536	-89.823506
0.0005	0.0001	0.020	9.77E-06	38.8638381	-89.820392
0.0005	0.0001	0.021	1.03E-05	38.8634082	-89.823848
0.0005	0.0001	0.021	9.83E-06	38.8633834	-89.819697
0.0003	0.0001	0.075	3.75E-05	38.8648462	-89.821755
0.0015	0.0003	0.023	1.17E-05	38.8663559	-89.82226
0.0005	0.0002	0.023	8.83E-06	38.8413217	-89.827941
0.0005					
	0.0001	0.019	9.57E-06	38.8406364	-89.830405
0.0005	0.0001	0.019	9.59E-06	38.848808	-89.825904
0.0004	0.0001	0.016	7.88E-06	38.8520608	-89.82621
0.0012	0.0003	0.047	2.36E-05	38.8508735	-89.827642
0.0004	0.0001	0.016	7.96E-06	38.8566676	-89.829554
0.0004	0.0001	0.016	8.13E-06	38.8583307	-89.830954
0.0004	0.0001	0.017	8.28E-06	38.8562229	-89.830329
0.0007	0.0002	0.027	1.35E-05	38.8749289	-89.822003
0.0004	0.0001	0.017	8.45E-06	38.8746892	-89.822782
0.0004	0.0001	0.017	8.31E-06	38.8770613	-89.820908
0.0011	0.0003	0.045	2.23E-05	38.8785336	-89.821715
0.0007	0.0002	0.028	1.39E-05	38.8745827	-89.824744
0.0005	0.0001	0.021	1.06E-05	38.8758339	-89.820639
0.0008	0.0002	0.030	1.52E-05	38.8757505	-89.825615
0.0012	0.0003	0.047	2.37E-05	38.8799489	-89.82366
0.0004	0.0001	0.016	8.20E-06	38.8805922	-89.825267
0.0005	0.0001	0.019	9.59E-06	38.8764051	-89.82412
0.0004	0.0001	0.017	8.33E-06	38.880791	-89.827378
0.0013	0.0003	0.050	2.48E-05	38.8812245	-89.825972
0.0006	0.0002	0.025	1.25E-05	38.8787296	-89.831819
0.0005	0.0001	0.018	8.89E-06	38.8810274	-89.822371
0.0005	0.0001	0.018	9.13E-06	38.87175	-89.804454
0.0006	0.0002	0.022	1.09E-05	38.8736725	-89.819093
0.0005	0.0001	0.018	8.95E-06	38.8725868	-89.819026
0.0004	0.0001	0.016	7.86E-06	38.8710692	-89.806093
0.0005	0.0001	0.019	9.72E-06	38.8809928	-89.817071
0.0005	0.0001	0.019	9.50E-06	38.8753281	-89.817122
0.0005	0.0001	0.018	8.89E-06	38.8564151	-89.828538
0.0006	0.0002	0.022	1.11E-05	38.857721	-89.828879
0.0005	0.0001	0.019	9.49E-06	38.8641872	-89.825474

0.0006	0.0002	0.023	1.16E-05	38.8668689	-89.826258
0.0006	0.0002	0.024	1.18E-05	38.8619596	-89.833599
0.0006	0.0001	0.022	1.08E-05	38.8564375	-89.827632
0.0005	0.0001	0.018	8.97E-06	38.8687537	-89.825618
0.0005	0.0001	0.018	8.76E-06	38.8575699	-89.826377
0.0006	0.0002	0.023	1.16E-05	38.8651265	-89.825115
0.0005	0.0001	0.019	9.66E-06	38.8455041	-89.835415
0.0016	0.0004	0.062	3.12E-05	38.9090344	-89.849886
0.0005	0.0001	0.018	9.05E-06	38.893225	-89.861963
0.0007	0.0002	0.025	1.27E-05	38.8807567	-89.85989
0.0008	0.0002	0.031	1.57E-05	38.8785942	-89.861557
0.0007	0.0002	0.028	1.40E-05	38.8796383	-89.864135
0.0007	0.0002	0.029	1.43E-05	38.8808173	-89.863527
0.0009	0.0002	0.035	1.75E-05	38.8789849	-89.86442
0.0003	0.0002	0.028	1.41E-05	38.8809903	-89.861343
0.0007	0.0002	0.028	8.51E-06	38.863925	-89.846892
0.0004	0.0001	0.017	1.44E-05	38.8435573	-89.858917
0.0007	0.0002		9.58E-06	38.8467319	-89.852197
		0.019 0.017			-89.848807
0.0004	0.0001		8.66E-06	38.8462215	-89.850245
0.0007	0.0002	0.028	1.38E-05	38.8462365	
0.0010	0.0003	0.039	1.97E-05	38.8426227	-89.839441
0.0007	0.0002	0.027	1.33E-05	38.8418657	-89.842245
0.0004	0.0001	0.016	8.12E-06	38.844763	-89.841306
0.0020	0.0005	0.076	3.81E-05	38.8428894	-89.840928
0.0006	0.0002	0.024	1.19E-05	38.8664574	-89.869431
0.0008	0.0002	0.031	1.56E-05	38.8606662	-89.847835
0.0006	0.0002	0.024	1.20E-05	38.8604911	-89.846216
0.0009	0.0002	0.033	1.66E-05	38.8613004	-89.844675
0.0005	0.0001	0.021	1.06E-05	38.8622617	-89.850686
0.0004	0.0001	0.016	7.89E-06	38.8630066	-89.852259
0.0014	0.0004	0.054	2.70E-05	38.8622437	-89.847316
0.0014	0.0004	0.053	2.66E-05	38.8609677	-89.851437
0.0006	0.0002	0.024	1.22E-05	38.9114842	-89.848147
0.0006	0.0002	0.024	1.21E-05	38.8764395	-89.85982
0.0007	0.0002	0.027	1.35E-05	38.8661243	-89.840979
0.0005	0.0001	0.021	1.06E-05	38.8813773	-89.856347
0.0004	0.0001	0.016	7.89E-06	38.8804439	-89.856422
0.0013	0.0003	0.049	2.46E-05	38.8905919	-89.853961
0.0006	0.0002	0.023	1.13E-05	38.8857621	-89.853665
0.0004	0.0001	0.016	7.77E-06	38.8889536	-89.856776
0.0004	0.0001	0.017	8.68E-06	38.8446615	-89.855284
0.0004	0.0001	0.017	8.50E-06	38.844329	-89.856744
0.0007	0.0002	0.026	1.32E-05	38.844853	-89.853792
0.0004	0.0001	0.016	8.16E-06	38.8497038	-89.844137
0.0010	0.0003	0.038	1.90E-05	38.8488661	-89.84545
0.0005	0.0001	0.018	8.94E-06	38.8484717	-89.847859
0.0006	0.0002	0.022	1.10E-05	38.8487425	-89.849377

0.0009	0.0002	0.034	1.71E-05	38.8511735	-89.847355
0.0008	0.0002	0.032	1.60E-05	38.8489743	-89.851488
0.0005	0.0001	0.018	8.79E-06	38.8557997	-89.848366
0.0005	0.0001	0.020	1.00E-05	38.8511618	-89.844642
0.0006	0.0002	0.023	1.16E-05	38.8463657	-89.844996
0.0004	0.0001	0.016	7.91E-06	38.8460003	-89.845573
0.0006	0.0002	0.022	1.12E-05	38.8460548	-89.848335
0.0009	0.0002	0.036	1.78E-05	38.8460695	-89.846469
0.0007	0.0002	0.028	1.38E-05	38.8805104	-89.851541
0.0006	0.0001	0.022	1.08E-05	38.8410797	-89.836931
0.0015	0.0004	0.058	2.90E-05	38.8426535	-89.837493
0.0005	0.0001	0.020	1.01E-05	38.8440669	-89.83616
0.0005	0.0001	0.020	9.79E-06	38.8402055	-89.839416
0.0006	0.0002	0.024	1.22E-05	38.8402596	-89.841675
0.0005	0.0001	0.018	8.95E-06	38.8400816	-89.843846
0.0005	0.0001	0.021	1.06E-05	38.8397805	-89.840597
0.0006	0.0002	0.023	1.15E-05	38.8490477	-89.85955
0.0012	0.0003	0.046	2.32E-05	38.8513897	-89.860287
0.0005	0.0001	0.021	1.03E-05	38.8481986	-89.863048
0.0004	0.0001	0.017	8.75E-06	38.8457868	-89.86342
0.0005	0.0001	0.018	9.24E-06	38.8506321	-89.863904
0.0007	0.0002	0.026	1.31E-05	38.8514402	-89.863419
0.0005	0.0001	0.020	9.96E-06	38.8481712	-89.864906
0.0007	0.0002	0.028	1.42E-05	38.8465429	-89.863996
0.0006	0.0002	0.024	1.22E-05	38.8526997	-89.837514
0.0007	0.0002	0.026	1.29E-05	38.8551447	-89.838689
0.0007	0.0002	0.028	1.40E-05	38.8564135	-89.838896
0.0006	0.0002	0.022	1.10E-05	38.8574254	-89.849535
0.0008	0.0002	0.032	1.59E-05	38.8583215	-89.851031
0.0008	0.0002	0.032	1.59E-05	38.8571031	-89.852136
0.0008	0.0002	0.030	1.51E-05	38.8492595	-89.840605
0.0025	0.0007	0.096	4.78E-05	38.8509844	-89.841371
0.0014	0.0004	0.054	2.70E-05	38.8462774	-89.841975
0.0006	0.0002	0.023	1.17E-05	38.8458142	-89.83865
0.0008	0.0002	0.030	1.48E-05	38.8512138	-89.838794
0.0013	0.0003	0.050	2.48E-05	38.8479806	-89.8391
0.0006	0.0002	0.023	1.14E-05	38.8472392	-89.8365
0.0005	0.0001	0.019	9.66E-06	38.8455041	-89.835415
0.0008	0.0002	0.031	1.57E-05	38.8494087	-89.83742
0.0006	0.0002	0.022	1.12E-05	38.8532183	-89.839483
0.0021	0.0006	0.081	4.04E-05	38.8556083	-89.841553
0.0005	0.0001	0.018	8.80E-06	38.8562594	-89.840073
0.0004	0.0001	0.016	7.85E-06	38.8357364	-89.804752
0.0005	0.0001	0.020	9.93E-06	38.8254618	-89.81811
0.0008	0.0002	0.029	1.47E-05	38.8249256	-89.819089
0.0004	0.0001	0.017	8.63E-06	38.8292908	-89.816955
0.0004	0.0001	0.017	8.34E-06	38.8286455	-89.816785

0.0005	0.0001	0.021	1.05E-05	38.8265095	-89.81835
0.0010	0.0003	0.040	2.01E-05	38.8261216	-89.819699
0.0005	0.0001	0.020	1.02E-05	38.8202057	-89.817883
0.0006	0.0002	0.024	1.20E-05	38.8210563	-89.826395
0.0006	0.0002	0.024	1.21E-05	38.8217831	-89.819655
0.0006	0.0002	0.024	1.19E-05	38.8203286	-89.820146
0.0004	0.0001	0.016	7.95E-06	38.8197215	-89.815034
0.0007	0.0002	0.026	1.30E-05	38.8219469	-89.817536
0.0010	0.0003	0.039	1.96E-05	38.8205178	-89.81414
0.0005	0.0001	0.019	9.73E-06	38.8229372	-89.817328
0.0019	0.0005	0.074	3.70E-05	38.8217022	-89.820799
0.0005	0.0001	0.021	1.05E-05	38.8214835	-89.814958
0.0017	0.0005	0.066	3.30E-05	38.8218796	-89.825868
0.0007	0.0002	0.028	1.41E-05	38.8203736	-89.822296
0.0005	0.0001	0.019	9.45E-06	38.8211324	-89.823116
0.0011	0.0003	0.043	2.14E-05	38.8343468	-89.854059
0.0004	0.0001	0.017	8.54E-06	38.8122194	-89.82408
0.0010	0.0003	0.040	1.98E-05	38.8115233	-89.825995
0.0008	0.0002	0.030	1.52E-05	38.8187983	-89.82069
0.0005	0.0001	0.018	9.23E-06	38.8175021	-89.821127
0.0007	0.0002	0.027	1.34E-05	38.8185984	-89.807421
0.0004	0.0001	0.016	8.00E-06	38.8180235	-89.815838
0.0022	0.0006	0.084	4.20E-05	38.8187516	-89.811496
0.0009	0.0002	0.035	1.73E-05	38.816383	-89.811935
0.0004	0.0001	0.017	8.71E-06	38.8173844	-89.808989
0.0004	0.0001	0.017	8.60E-06	38.8166835	-89.80851
0.0004	0.0001	0.017	8.28E-06	38.8163761	-89.820916
0.0005	0.0001	0.019	9.75E-06	38.8166302	-89.816924
0.0006	0.0002	0.024	1.19E-05	38.8170422	-89.81547
0.0006	0.0002	0.024	1.19E-05	38.8214457	-89.800334
0.0005	0.0001	0.020	1.01E-05	38.8203872	-89.801872
0.0008	0.0002	0.031	1.55E-05	38.8221677	-89.797102
0.0004	0.0001	0.016	8.08E-06	38.8211043	-89.804441
0.0008	0.0002	0.030	1.51E-05	38.8243617	-89.802574
0.0007	0.0002	0.028	1.41E-05	38.8217059	-89.805931
0.0005	0.0001	0.019	9.41E-06	38.8260497	-89.802271
0.0009	0.0002	0.036	1.79E-05	38.8150331	-89.819557
0.0007	0.0002	0.025	1.27E-05	38.8142311	-89.820458
0.0014	0.0004	0.054	2.71E-05	38.8333985	-89.845934
0.0008	0.0002	0.029	1.47E-05	38.8244688	-89.814511
0.0005	0.0001	0.021	1.06E-05	38.8236483	-89.816102
0.0004	0.0001	0.017	8.43E-06	38.8248697	-89.811966
0.0006	0.0002	0.024	1.18E-05	38.8263378	-89.813989
0.0009	0.0002	0.034	1.72E-05	38.8292231	-89.812429
0.0008	0.0002	0.031	1.55E-05	38.8259887	-89.812988
0.0005	0.0001	0.021	1.07E-05	38.8296148	-89.809812
0.0004	0.0001	0.016	7.99E-06	38.820813	-89.808186

0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8355358 -89.81 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8196359 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	8762 7428 7556
0.0005 0.0001 0.018 8.91E-06 38.8341547 -89.80 0.0007 0.0002 0.025 1.27E-05 38.8328125 -89.80 0.0010 0.0003 0.039 1.97E-05 38.8310066 -89.81 0.0013 0.0004 0.052 2.61E-05 38.8313471 -89.80 0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8371693 -89.80 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8165204 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8145663 -89.84 0.0014 0.0004 0.055 2.76E-05 38.816508 -89.84 0.0005 </td <td>7428 7556</td>	7428 7556
0.0007 0.0002 0.025 1.27E-05 38.8328125 -89.80 0.0010 0.0003 0.039 1.97E-05 38.8310066 -89.81 0.0013 0.0004 0.052 2.61E-05 38.8313471 -89.80 0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8371693 -89.80 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.816508 -89.84 0.0005 0.0001 0.018 9.20E-06 38.819058 -89.83 0.0004 <td>7556</td>	7556
0.0010 0.0003 0.039 1.97E-05 38.8310066 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8313471 -89.83 0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8355358 -89.81 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8165204 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.033 1.49E-05 38.8145663 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8190619 -89.84 0.0006<	
0.0013 0.0004 0.052 2.61E-05 38.8313471 -89.8 0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8355358 -89.81 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8165204 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.033 1.49E-05 38.814596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.819058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 <td>2451</td>	2451
0.0005 0.0001 0.019 9.27E-06 38.8366965 -89.80 0.0007 0.0002 0.028 1.40E-05 38.8355358 -89.81 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8196359 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	2731
0.0007 0.0002 0.028 1.40E-05 38.8355358 -89.83 0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.83 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	1055
0.0005 0.0001 0.019 9.72E-06 38.8371693 -89.80 0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.84 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	6868
0.0008 0.0002 0.033 1.63E-05 38.8149218 -89.83 0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.84 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	0277
0.0008 0.0002 0.031 1.55E-05 38.8191235 -89.83 0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	7977
0.0008 0.0002 0.033 1.65E-05 38.8165204 -89.83 0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.84 0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	4171
0.0008 0.0002 0.030 1.49E-05 38.8214596 -89.84 0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.84 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.84 0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	7805
0.0014 0.0004 0.055 2.76E-05 38.8145663 -89.8 0.0006 0.0002 0.023 1.17E-05 38.816508 -89.8 0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.8 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.8 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.8 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.8	5125
0.0006 0.0002 0.023 1.17E-05 38.816508 -89.84 0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	7366
0.0005 0.0001 0.018 9.20E-06 38.8191058 -89.83 0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	3879
0.0013 0.0004 0.052 2.61E-05 38.8177508 -89.83 0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	1619
0.0006 0.0002 0.023 1.15E-05 38.8190619 -89.84 0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	9237
0.0009 0.0002 0.034 1.70E-05 38.8196359 -89.84	8991
	7253
0.0005 0.0001 0.019 9.315-06 38.8156849 -89.87	6726
0.0003 0.0001 0.013 9.511-00 30.0130049 -09.01	0144
0.0005 0.0001 0.019 9.68E-06 38.825245 -89.83	8135
0.0005 0.0001 0.018 9.10E-06 38.8253337 -89.83	9504
0.0022 0.0006 0.085 4.26E-05 38.8219138 -89.84	0176
0.0009 0.0002 0.036 1.82E-05 38.8222293 -89.84	7446
0.0009 0.0002 0.035 1.74E-05 38.8224485 -89.84	2452
0.0014 0.0004 0.055 2.73E-05 38.8227697 -89.84	4987
0.0009 0.0002 0.034 1.71E-05 38.8228239 -89.83	8452
0.0006 0.0002 0.022 1.12E-05 38.8237266 -89.8	4339
0.0004 0.0001 0.016 8.05E-06 38.8278265 -89.84	8488
0.0006 0.0002 0.023 1.14E-05 38.8241621 -89.8	3952
0.0006 0.0002 0.023 1.15E-05 38.8248108 -89.8	3828
0.0007 0.0002 0.026 1.29E-05 38.829833 -89.84	7866
0.0007 0.0002 0.027 1.36E-05 38.8269297 -89.82	7022
0.0013	7604
0.0006 0.0002 0.024 1.18E-05 38.8250733 -89.82	1442
0.0004 0.0001 0.017 8.45E-06 38.8243538 -89.82	5645
0.0005 0.0001 0.020 9.75E-06 38.8302489 -89.82	3757
0.0006 0.0002 0.025 1.24E-05 38.8243593 -89.82	2015
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0.0005 0.0001 0.018 8.79E-06 38.8131046 -89.85	8611
0.0004 0.0001 0.016 7.89E-06 38.8111426 -89.86	1914
0.0005 0.0001 0.019 9.35E-06 38.8041786 -89.85	9167
0.0006 0.0002 0.023 1.13E-05 38.8046654 -89.85	9061
0.0005 0.0001 0.019 9.41E-06 38.8088887 -89.85	
0.0009 0.0002 0.035 1.74E-05 38.8067376 -89.85	
0.0005 0.0001 0.020 1.02E-05 38.8071955 -89.85	6835
0.0007 0.0002 0.027 1.33E-05 38.8099863 -89.85	6835 7707

0.0004	0.0001	0.016	8.07E-06	38.8051299	-89.85603
0.0005	0.0001	0.019	9.63E-06	38.8051821	-89.85892
0.0005	0.0001	0.019	9.25E-06	38.8057772	-89.836297
0.0006	0.0002	0.023	1.17E-05	38.8045972	-89.836517
0.0005	0.0001	0.021	1.06E-05	38.8039492	-89.844205
0.0004	0.0001	0.017	8.63E-06	38.8045005	-89.84458
0.0006	0.0002	0.024	1.18E-05	38.8042755	-89.8426
0.0008	0.0002	0.031	1.53E-05	38.8041862	-89.84196
0.0006	0.0001	0.021	1.07E-05	38.8087698	-89.841068
0.0007	0.0002	0.028	1.40E-05	38.8091706	-89.842456
0.0006	0.0002	0.024	1.18E-05	38.8098889	-89.842581
0.0014	0.0004	0.053	2.66E-05	38.806001	-89.837884
0.0008	0.0002	0.029	1.47E-05	38.8077894	-89.839416
0.0004	0.0001	0.016	7.93E-06	38.8035735	-89.837521
0.0005	0.0001	0.018	8.89E-06	38.8074414	-89.840647
0.0006	0.0002	0.023	1.17E-05	38.8081947	-89.838248
0.0006	0.0002	0.025	1.23E-05	38.8091969	-89.838322
0.0006	0.0002	0.025	1.23E-05	38.8088582	-89.836736
0.0008	0.0002	0.031	1.56E-05	38.7982033	-89.841079
0.0005	0.0001	0.019	9.57E-06	38.797103	-89.841456
0.0009	0.0002	0.035	1.74E-05	38.797661	-89.837867
0.0005	0.0001	0.021	1.05E-05	38.7961544	-89.839553
0.0018	0.0005	0.070	3.49E-05	38.7966086	-89.837673
0.0005	0.0001	0.018	8.94E-06	38.7942916	-89.861606
0.0005	0.0001	0.018	8.80E-06	38.7926508	-89.862052
0.0006	0.0002	0.024	1.22E-05	38.795379	-89.862504
0.0018	0.0005	0.072	3.58E-05	38.7932235	-89.85309
0.0007	0.0002	0.027	1.34E-05	38.7944505	-89.849258
0.0006	0.0002	0.025	1.24E-05	38.7931792	-89.851182
0.0014	0.0004	0.056	2.82E-05	38.7900851	-89.852794
0.0014	0.0004	0.054	2.69E-05		-89.851781
0.0004	0.0001	0.017	8.33E-06	38.8125598	-89.882627
0.0005	0.0001	0.019	9.40E-06	38.8120119	-89.882829
0.0008	0.0002	0.033	1.64E-05	38.8101738	-89.825826
0.0009	0.0002	0.035	1.77E-05	38.8103001	-89.825126
0.0015	0.0004	0.057	2.85E-05	38.7980955	-89.830944
0.0006	0.0002	0.024	1.20E-05	38.7970246	-89.8311
0.0009	0.0002	0.036	1.78E-05	38.7971375	-89.834796
0.0005	0.0001	0.019	9.69E-06	38.7954614	-89.831659
0.0005	0.0001	0.021	1.05E-05	38.7986311	-89.826718
0.0009	0.0002	0.034	1.71E-05	38.7995441	-89.826964
0.0010	0.0003	0.039	1.95E-05	38.8003986	-89.827605
0.0004	0.0001	0.017	8.46E-06	38.8010621	-89.827778
0.0008	0.0002	0.030	1.48E-05	38.8056947	-89.820851
0.0011	0.0003	0.041	2.07E-05	38.8065997	-89.819703
0.0006	0.0002	0.025	1.25E-05	38.8107292	-89.809882
0.0006	0.0002	0.024	1.22E-05	38.8117755	-89.807899

0.0006	0.0002	0.024	1.18E-05	38.8120894	-89.804302
0.0007	0.0002	0.027	1.37E-05	38.802523	-89.848076
0.0006	0.0002	0.025	1.23E-05	38.8042549	-89.847089
0.0006	0.0002	0.024	1.18E-05	38.8041691	-89.848234
0.0005	0.0001	0.021	1.07E-05	38.8063587	-89.846931
0.0006	0.0002	0.023	1.14E-05	38.8038058	-89.852441
0.0006	0.0002	0.025	1.23E-05	38.8068044	-89.850162
0.0007	0.0002	0.026	1.28E-05	38.8050243	-89.850818
0.0004	0.0001	0.017	8.58E-06	38.8017003	-89.845739
0.0009	0.0002	0.036	1.81E-05	38.8018195	-89.843329
0.0006	0.0002	0.023	1.15E-05	38.8030134	-89.841303
0.0006	0.0002	0.023	1.17E-05	38.8063818	-89.845866
0.0007	0.0002	0.028	1.39E-05	38.8030494	-89.844443
0.0005	0.0001	0.020	1.00E-05	38.8029202	-89.843104
0.0003	0.0001	0.016	8.05E-06	38.8101485	-89.866504
0.0004	0.0001	0.010	1.20E-05	38.8091028	-89.866538
0.0007	0.0002	0.024	1.37E-05	38.8100008	-89.868306
0.0007	0.0002	0.027	8.61E-06	38.8101117	-89.871015
			2.02E-05		
0.0010	0.0003	0.040		38.8081774	-89.868282
0.0004	0.0001	0.016	7.91E-06	38.8044843	-89.815849
0.0006	0.0002	0.022	1.11E-05	38.8036255	-89.811135
0.0009	0.0002	0.034	1.70E-05	38.8037429	-89.816698
0.0008	0.0002	0.032	1.59E-05	38.8166836	-89.863599
0.0004	0.0001	0.016	8.17E-06	38.8172371	-89.862252
0.0006	0.0002	0.024	1.18E-05	38.8181081	-89.860265
0.0005	0.0001	0.020	1.01E-05	38.811835	-89.865363
0.0007	0.0002	0.028	1.38E-05	38.8120636	-89.867888
0.0006	0.0002	0.023	1.13E-05	38.8141535	-89.865474
0.0004	0.0001	0.016	7.95E-06	38.8170273	-89.866994
0.0021	0.0006	0.081	4.07E-05	38.8128399	-89.86738
0.0006	0.0002	0.023	1.15E-05	38.8220183	-89.868316
0.0012	0.0003	0.046	2.30E-05	38.8196054	-89.866823
0.0006	0.0002	0.022	1.12E-05	38.8209266	-89.866434
0.0007	0.0002	0.026	1.32E-05	38.8207149	-89.864674
0.0005	0.0001	0.021	1.06E-05	38.7990781	-89.864798
0.0004	0.0001	0.016	8.23E-06	38.8035326	-89.878174
0.0004	0.0001	0.017	8.43E-06	38.7890936	-89.88919
0.0010	0.0003	0.040	2.02E-05	38.7947971	-89.863744
0.0006	0.0002	0.025	1.24E-05	38.7953893	-89.862541
0.0005	0.0001	0.021	1.03E-05	38.78921	-89.853204
0.0008	0.0002	0.030	1.52E-05	38.7903481	-89.854078
0.0015	0.0004	0.057	2.86E-05	38.7901217	-89.852816
0.0004	0.0001	0.017	8.33E-06	38.789184	-89.846005
0.0005	0.0001	0.020	1.02E-05	38.7902479	-89.849324
0.0009	0.0002	0.035	1.75E-05	38.7915213	-89.849219
0.0014	0.0004	0.053	2.63E-05	38.7903326	-89.851783
0.0007	0.0002	0.028	1.40E-05	38.7904267	-89.871253

0.0007	0.0002	0.027	1.34E-05	38.7903491	-89.873441
0.0007	0.0002	0.029	1.45E-05	38.7909536	-89.873597
0.0006	0.0001	0.021	1.07E-05	38.7879556	-89.873596
0.0007	0.0002	0.028	1.40E-05	38.7894974	-89.874016
0.0007	0.0002	0.028	1.40E-05	38.7857405	-89.850354
0.0010	0.0003	0.039	1.95E-05	38.787039	-89.848343
0.0019	0.0005	0.074	3.69E-05	38.785451	-89.848075
0.0005	0.0001	0.019	9.33E-06	38.7885533	-89.848587
0.0011	0.0003	0.043	2.15E-05	38.7838058	-89.850828
0.0012	0.0003	0.047	2.34E-05	38.7836401	-89.850095
0.0010	0.0003	0.037	1.86E-05	38.7833938	-89.848302
0.0006	0.0002	0.025	1.23E-05	38.7684966	-89.876527
0.0007	0.0002	0.029	1.44E-05	38.7678271	-89.880926
0.0007	0.0002	0.027	1.33E-05	38.7678585	-89.881632
0.0006	0.0001	0.022	1.08E-05	38.7663624	-89.880578
0.0005	0.0001	0.021	1.05E-05	38.7667436	-89.880996
0.0005	0.0001	0.020	1.02E-05	38.7699866	-89.874743
0.0005	0.0001	0.020	9.87E-06	38.7709268	-89.876552
0.0005	0.0001	0.018	9.06E-06	38.7704871	-89.875483
0.0005	0.0001	0.019	9.55E-06	38.7703368	-89.87814
0.0013	0.0004	0.052	2.61E-05	38.7680805	-89.852723
0.0010	0.0003	0.037	1.86E-05	38.7710068	-89.854412
0.0006	0.0002	0.022	1.10E-05	38.772105	-89.854323
0.0004	0.0001	0.016	7.85E-06	38.7726684	-89.854535
0.0006	0.0002	0.022	1.12E-05	38.7665433	-89.850328
0.0007	0.0002	0.026	1.29E-05	38.7742259	-89.856316
0.0005	0.0001	0.021	1.06E-05	38.7668306	-89.847455
0.0007	0.0002	0.029	1.45E-05	38.7653024	-89.848586
0.0006	0.0002	0.023	1.17E-05	38.7699233	-89.846655
0.0006	0.0002	0.024	1.19E-05	38.7691219	-89.847742
0.0005	0.0001	0.020	1.01E-05	38.765255	-89.842047
0.0006	0.0002	0.023	1.13E-05	38.765244	-89.844548
0.0008	0.0002	0.032	1.58E-05	38.7685723	-89.842415
0.0007	0.0002	0.026	1.31E-05	38.7670884	-89.844143
0.0008	0.0002	0.032	1.61E-05	38.7674631	-89.844784
0.0005	0.0001	0.021	1.06E-05	38.7686603	-89.841436
0.0007	0.0002	0.026	1.30E-05	38.7580051	-89.854631
0.0005	0.0001	0.020	1.01E-05	38.7580666	-89.853525
0.0008	0.0002	0.031	1.53E-05	38.7618615	-89.854324
0.0007	0.0002	0.029	1.43E-05	38.7593255	-89.854122
0.0007	0.0002	0.027	1.35E-05	38.7605911	-89.853539
0.0015	0.0004	0.059	2.96E-05	38.7594532	-89.851701
0.0004	0.0001	0.017	8.74E-06	38.76883	-89.833731
0.0005	0.0001	0.021	1.07E-05	38.7698859	-89.833148
0.0007	0.0002	0.026	1.32E-05	38.770875	-89.834704
0.0005	0.0001	0.018	8.86E-06	38.7626731	-89.826277
0.0010	0.0003	0.037	1.86E-05	38.7662148	-89.829869

0.0005	0.0001	0.020	1.01E-05	38.7679565	-89.829179
0.0004	0.0001	0.017	8.26E-06	38.7703603	-89.83122
0.0008	0.0002	0.030	1.50E-05	38.8036373	-89.88263
0.0012	0.0003	0.045	2.24E-05	38.8035379	-89.88072
0.0006	0.0002	0.024	1.20E-05	38.7608722	-89.835253
0.0004	0.0001	0.016	8.07E-06	38.7621417	-89.831028
0.0004	0.0001	0.016	8.19E-06	38.7619232	-89.835948
0.0005	0.0001	0.019	9.45E-06	38.761375	-89.832282
0.0007	0.0002	0.026	1.31E-05	38.7646178	-89.831783
0.0004	0.0001	0.017	8.47E-06	38.7653166	-89.835772
0.0006	0.0002	0.022	1.12E-05	38.7987635	-89.89046
0.0006	0.0001	0.022	1.08E-05	38.7754098	-89.87234
0.0006	0.0002	0.022	1.10E-05	38.7756477	-89.873427
0.0005	0.0001	0.018	9.13E-06	38.7740493	-89.877319
0.0005	0.0001	0.020	1.01E-05	38.7742669	-89.875129
0.0004	0.0001	0.017	8.63E-06	38.7759044	-89.877311
0.0006	0.0002	0.024	1.20E-05	38.774591	-89.878516
0.0005	0.0001	0.020	9.78E-06	38.777041	-89.878028
0.0006	0.0002	0.022	1.09E-05	38.7749355	-89.874306
0.0008	0.0002	0.031	1.54E-05	38.7773866	-89.87695
0.0008	0.0002	0.032	1.59E-05	38.7789686	-89.877109
0.0005	0.0001	0.018	9.14E-06	38.7788955	-89.87873
0.0011	0.0003	0.042	2.08E-05	38.7802098	-89.877039
0.0009	0.0002	0.034	1.70E-05	38.7808767	-89.876413
0.0007	0.0002	0.026	1.32E-05	38.7828883	-89.845563
0.0008	0.0002	0.031	1.54E-05	38.7719695	-89.87553
0.0007	0.0002	0.028	1.40E-05	38.7733659	-89.879187
0.0004	0.0001	0.016	7.89E-06	38.7716856	-89.877767
0.0005	0.0001	0.021	1.04E-05	38.7727538	-89.877442
0.0004	0.0001	0.017	8.38E-06	38.7692238	-89.872838
0.0006	0.0002	0.025	1.24E-05	38.7706806	
0.0005	0.0001	0.019	9.31E-06	38.7700084	-89.870134
0.0009	0.0002	0.036	1.78E-05	38.7706678	-89.872924
0.0005	0.0001	0.020	9.79E-06	38.7728037	-89.874072
0.0005	0.0001	0.019	9.66E-06	38.7736646	-89.871989
0.0005	0.0001	0.019	9.29E-06	38.7735606	-89.876589
0.0005	0.0001	0.018	9.17E-06	38.798549	-89.865304
0.0005	0.0001	0.019	9.34E-06	38.7858553	-89.833915
0.0008	0.0002	0.030	1.48E-05	38.7898119	-89.824358
0.0005	0.0001	0.021	1.04E-05	38.777201	-89.827246
0.0005	0.0001	0.018	8.86E-06	38.7626731	-89.826277
0.0006	0.0001	0.022	1.09E-05	38.7647789	-89.824671
0.0005	0.0001	0.019	9.29E-06	38.7679782	-89.821421
0.0009	0.0002	0.035	1.75E-05	38.7718197	-89.822271
0.0010	0.0003	0.041	2.03E-05	38.7662718	-89.822854
0.0006	0.0002	0.025	1.26E-05	38.7661288	-89.82387
0.0006	0.0002	0.024	1.21E-05	38.7704726	-89.821105

0.0013	0.0003	0.050	2.49E-05	38.7684881	-89.822382
0.0007	0.0002	0.026	1.30E-05	38.7718342	-89.823893
0.0005	0.0001	0.021	1.03E-05	38.7701976	-89.824308
0.0007	0.0002	0.029	1.44E-05	38.7688233	-89.819919
0.0004	0.0001	0.016	8.13E-06	38.7674571	-89.819742
0.0006	0.0002	0.023	1.13E-05	38.7717009	-89.819498
0.0005	0.0001	0.019	9.27E-06	38.7673145	-89.817906
0.0008	0.0002	0.029	1.47E-05	38.7705631	-89.81862
0.0004	0.0001	0.016	8.11E-06	38.8017053	-89.765896
0.0006	0.0002	0.024	1.22E-05	38.7892298	-89.804517
0.0012	0.0003	0.046	2.28E-05	38.7875585	-89.804294
0.0006	0.0002	0.024	1.20E-05	38.7902664	-89.801966
0.0012	0.0003	0.045	2.27E-05	38.7690972	-89.811105
0.0005	0.0001	0.019	9.58E-06	38.7706365	-89.81285
0.0006	0.0001	0.022	1.08E-05	38.7737494	-89.813485
0.0007	0.0002	0.029	1.45E-05	38.7724131	-89.812933
0.0007	0.0002	0.027	1.34E-05	38.769161	-89.813494
0.0007	0.0002	0.028	1.40E-05	38.7702352	-89.814725
0.0011	0.0003	0.041	2.07E-05	38.7725777	-89.81584
0.0006	0.0001	0.022	1.09E-05	38.7706322	-89.815302
0.0004	0.0001	0.017	8.73E-06	38.7707414	-89.81591
0.0019	0.0005	0.076	3.78E-05	38.7735802	-89.803093
0.0010	0.0003	0.039	1.93E-05	38.7785511	-89.80478
0.0006	0.0002	0.023	1.15E-05	38.7724442	-89.805928
0.0007	0.0002	0.027	1.37E-05	38.7788949	-89.802654
0.0005	0.0001	0.021	1.04E-05	38.7762012	-89.803665
0.0004	0.0001	0.017	8.27E-06	38.7784509	-89.816778
0.0004	0.0001	0.016	7.99E-06	38.781656	-89.806691
0.0012	0.0003	0.047	2.35E-05	38.7968591	-89.798079
0.0007	0.0002	0.026	1.28E-05	38.7976825	-89.777983
0.0004	0.0001	0.017	8.29E-06	38.8004488	-89.780795
0.0005	0.0001	0.019	9.26E-06	38.7801647	-89.799307
0.0005	0.0001	0.019	9.34E-06	38.7794699	-89.799925
0.0005	0.0001	0.020	9.86E-06	38.7821706	-89.798681
0.0005	0.0001	0.021	1.04E-05	38.782886	-89.800417
0.0006	0.0002	0.023	1.14E-05	38.7859616	-89.80037
0.0011	0.0003	0.042	2.10E-05	38.7840933	-89.799686
0.0006	0.0002	0.025	1.25E-05	38.780423	-89.793147
0.0005	0.0001	0.020	1.01E-05	38.779839	-89.792366
0.0005	0.0001	0.020	9.91E-06	38.7820489	-89.791966
0.0006	0.0002	0.024	1.22E-05	38.7833087	-89.792644
0.0006	0.0002	0.022	1.09E-05	38.7864337	-89.794978
0.0005	0.0001	0.021	1.04E-05	38.776294	-89.797028
0.0006	0.0002	0.024	1.22E-05	38.7769773	-89.792427
0.0017	0.0005	0.067	3.35E-05	38.7756547	-89.79629
0.0007	0.0002	0.028	1.40E-05	38.7736134	-89.796762
0.0019	0.0005	0.075	3.73E-05	38.7771803	-89.798279
			- 1		

0.0005	0.0001	0.018	8.92E-06	38.7783008	-89.796145
0.0016	0.0004	0.061	3.05E-05	38.7775905	-89.794807
0.0004	0.0001	0.016	7.88E-06	38.7769586	-89.782094
0.0007	0.0002	0.026	1.28E-05	38.7764253	-89.781653
0.0004	0.0001	0.016	8.03E-06	38.7780154	-89.784133
0.0008	0.0002	0.031	1.54E-05	38.7710054	-89.802414
0.0008	0.0002	0.031	1.56E-05	38.7692737	-89.802707
0.0008	0.0002	0.032	1.60E-05	38.7712559	-89.804515
0.0009	0.0002	0.036	1.79E-05	38.7703663	-89.805978
0.0009	0.0002	0.034	1.70E-05	38.7686773	-89.804747
0.0008	0.0002	0.031	1.56E-05	38.7766496	-89.786417
0.0005	0.0001	0.018	9.18E-06	38.777929	-89.785586
0.0004	0.0001	0.017	8.51E-06	38.7772938	-89.785025
0.0005	0.0001	0.018	8.90E-06	38.7803211	-89.801384
0.0005	0.0001	0.018	9.15E-06	38.7797661	-89.802318
0.0017	0.0005	0.066	3.31E-05	38.7773873	-89.820546
0.0004	0.0001	0.017	8.27E-06	38.7772996	-89.819206
0.0005	0.0001	0.021	1.07E-05	38.7774818	-89.817333
0.0004	0.0001	0.016	7.89E-06	38.7810726	-89.821544
0.0007	0.0002	0.028	1.42E-05	38.7792745	-89.817773
0.0009	0.0002	0.035	1.73E-05	38.7784067	-89.787717
0.0013	0.0003	0.050	2.49E-05	38.776182	-89.789181
0.0006	0.0002	0.023	1.16E-05	38.7806001	-89.785872
0.0005	0.0001	0.021	1.04E-05	38.7812925	-89.786222
0.0005	0.0001	0.018	8.98E-06	38.7781745	-89.789909
0.0004	0.0001	0.016	8.07E-06	38.7783242	-89.791152
0.0009	0.0003	0.037	1.83E-05	38.7805318	-89.790678
0.0005	0.0001	0.020	1.00E-05	38.7660609	-89.792137
0.0006	0.0002	0.023	1.16E-05	38.7665494	-89.792104
0.0004	0.0001	0.017	8.30E-06	38.792498	-89.79931
0.0004	0.0001	0.017	8.29E-06	38.7926754	
0.0006	0.0002	0.022	1.12E-05	38.7916646	-89.798018
0.0008	0.0002	0.030	1.50E-05	38.7889122	-89.797063
0.0007	0.0002	0.028	1.41E-05	38.789824	-89.796568
0.0008	0.0002	0.030	1.50E-05	38.791208	-89.795338
0.0009	0.0002	0.034	1.71E-05	38.7873543	-89.795286
0.0014	0.0004	0.056	2.81E-05	38.7906053	-89.794338
0.0010	0.0003	0.038	1.92E-05	38.7881608	-89.795216
0.0025	0.0007	0.095	4.77E-05	38.7896841	-89.79453
0.0011	0.0003	0.045	2.24E-05	38.7896368	-89.794502
0.0006	0.0002	0.022	1.12E-05	38.7893566	-89.785595
0.0008	0.0002	0.031	1.54E-05	38.7910862	-89.784291
0.0006	0.0002	0.022	1.12E-05	38.7737281	-89.819802
0.0005	0.0001	0.018	8.95E-06	38.7727181	-89.819834
0.0010	0.0003	0.039	1.97E-05	38.7750522	-89.819517
0.0004	0.0001	0.016	7.95E-06	38.7753476	-89.821214
0.0010	0.0003	0.037	1.87E-05	38.7734329	-89.820965

0.0005	0.0001	0.019	9.36E-06	38.7783534	-89.822426
0.0011	0.0003	0.041	2.07E-05	38.7741696	-89.823627
0.0006	0.0002	0.024	1.19E-05	38.7759233	-89.822284
0.0004	0.0001	0.017	8.47E-06	38.7764355	-89.825785
0.0005	0.0001	0.021	1.06E-05	38.782914	-89.822313
0.0007	0.0002	0.027	1.33E-05	38.7804216	-89.82398
0.0010	0.0003	0.038	1.90E-05	38.7839231	-89.824076
0.0006	0.0002	0.024	1.20E-05	38.7833123	-89.823077
0.0006	0.0002	0.024	1.20E-05	38.7728837	-89.824388
0.0007	0.0002	0.028	1.39E-05	38.8004024	-89.77516
0.0007	0.0002	0.027	1.36E-05	38.7998242	-89.777386
0.0004	0.0001	0.017	8.37E-06	38.7734898	-89.795332
0.0005	0.0001	0.019	9.37E-06	38.7603276	-89.818444
0.0007	0.0002	0.026	1.31E-05	38.7605812	-89.816602
0.0008	0.0002	0.031	1.57E-05	38.7606472	-89.815012
0.0005	0.0001	0.018	9.06E-06	38.7611726	-89.818065
0.0005	0.0001	0.019	9.57E-06	38.7597991	-89.814528
0.0006	0.0002	0.025	1.24E-05	38.7597109	-89.813279
0.0006	0.0002	0.023	1.16E-05	38.7461972	-89.816756
0.0007	0.0002	0.028	1.40E-05	38.7453383	-89.810682
0.0008	0.0002	0.029	1.46E-05	38.7435849	-89.80859
0.0006	0.0002	0.024	1.21E-05	38.7460748	-89.808568
0.0005	0.0001	0.021	1.05E-05	38.743088	-89.807505
0.0004	0.0001	0.016	7.83E-06	38.7417231	-89.837767
0.0007	0.0002	0.027	1.36E-05	38.7343382	-89.822343
0.0006	0.0002	0.022	1.12E-05	38.7341559	-89.821345
0.0007	0.0002	0.029	1.46E-05	38.738021	-89.819443
0.0004	0.0001	0.016	7.92E-06	38.7396337	-89.819656
0.0006	0.0002	0.025	1.23E-05	38.7409422	-89.819333
0.0008	0.0002	0.030	1.52E-05	38.7400357	-89.814273
0.0005	0.0001	0.018	9.17E-06	38.7427919	-89.812311
0.0009	0.0002	0.033	1.67E-05	38.7405188	-89.815499
0.0006	0.0002	0.024	1.20E-05	38.741247	-89.816484
0.0004	0.0001	0.017	8.66E-06	38.7422471	-89.807774
0.0009	0.0002	0.036	1.78E-05	38.745709	-89.828425
0.0004	0.0001	0.017	8.25E-06	38.7345306	-89.816011
0.0007	0.0002	0.028	1.39E-05	38.7372267	-89.816663
0.0006	0.0002	0.024	1.18E-05	38.7375889	-89.812302
0.0004	0.0001	0.017	8.41E-06	38.7380408	-89.811804
0.0005	0.0001	0.018	8.97E-06	38.7405586	-89.834238
0.0004	0.0001	0.016	8.20E-06	38.7419598	-89.830749
0.0007	0.0002	0.028	1.39E-05	38.74065	-89.831293
0.0008	0.0002	0.031	1.56E-05	38.7418413	-89.835082
0.0012	0.0003	0.046	2.32E-05	38.7444176	-89.818987
0.0011	0.0003	0.043	2.17E-05	38.7467022	-89.819024
0.0013	0.0003	0.050	2.48E-05	38.7466759	-89.818327
0.0008	0.0002	0.030	1.51E-05	38.7390808	-89.833762

0.0004	0.0001	0.016	7.76E-06	38.738024	-89.834447
0.0006	0.0002	0.023	1.13E-05	38.7392648	-89.83471
0.0005	0.0001	0.019	9.30E-06	38.7786277	-89.903706
0.0012	0.0003	0.048	2.39E-05	38.779558	-89.906799
0.0007	0.0002	0.026	1.32E-05	38.7794767	-89.909098
0.0005	0.0001	0.019	9.47E-06	38.7805855	-89.907676
0.0007	0.0002	0.028	1.41E-05	38.7701404	-89.914434
0.0006	0.0002	0.023	1.17E-05	38.7669355	-89.917958
0.0004	0.0001	0.017	8.43E-06	38.755476	-89.927615
0.0005	0.0001	0.020	9.92E-06	38.7525218	-89.92895
0.0011	0.0003	0.044	2.22E-05	38.7542483	-89.913226
0.0013	0.0003	0.049	2.46E-05	38.7539463	-89.913955
0.0009	0.0002	0.036	1.81E-05	38.754501	-89.918988
0.0010	0.0003	0.040	1.98E-05	38.7530237	-89.919997
0.0008	0.0002	0.030	1.52E-05	38.7533555	-89.920688
0.0006	0.0002	0.023	1.15E-05	38.7535527	-89.92272
0.0006	0.0002	0.023	1.13E-05	38.7509438	-89.914222
0.0005	0.0001	0.018	8.91E-06	38.7499297	-89.917681
0.0005	0.0001	0.019	9.45E-06	38.7474973	-89.920083
0.0005	0.0001	0.020	1.01E-05	38.7689695	-89.90361
0.0007	0.0002	0.026	1.32E-05	38.768879	-89.907409
0.0009	0.0002	0.034	1.69E-05	38.7695037	-89.910937
0.0009	0.0002	0.035	1.75E-05	38.7683699	-89.910508
0.0009	0.0002	0.034	1.72E-05	38.7681053	-89.882632
0.0011	0.0003	0.044	2.19E-05	38.7632593	-89.881966
0.0004	0.0001	0.017	8.57E-06	38.7659774	-89.883629
0.0006	0.0002	0.023	1.14E-05	38.7667376	-89.881803
0.0006	0.0002	0.024	1.18E-05	38.7656239	-89.886795
0.0004	0.0001	0.017	8.64E-06	38.7657641	-89.888227
0.0007	0.0002	0.026	1.29E-05	38.7645525	-89.906492
0.0004	0.0001	0.016	7.95E-06	38.76402	-89.90858
0.0007	0.0002	0.029	1.45E-05	38.7631339	-89.907105
0.0016	0.0004	0.061	3.05E-05	38.7606671	-89.907837
0.0006	0.0002	0.024	1.22E-05	38.7592056	-89.907457
0.0013	0.0004	0.052	2.59E-05	38.7468367	-89.858239
0.0005	0.0001	0.018	8.77E-06	38.7456691	-89.862334
0.0013	0.0004	0.052	2.58E-05	38.7456899	-89.860497
0.0006	0.0002	0.023	1.13E-05	38.745728	-89.864197
0.0005	0.0001	0.018	8.96E-06	38.7468972	-89.854497
0.0005	0.0001	0.020	9.97E-06	38.7429092	-89.919051
0.0005	0.0001	0.019	9.69E-06	38.7594404	-89.922702
0.0004	0.0001	0.017	8.67E-06	38.758391	-89.925111
0.0004	0.0001	0.017	8.40E-06	38.7592184	-89.925628
0.0008	0.0002	0.031	1.55E-05 1.06E-05	38.7590932 38.755577	-89.922495 -89.921874
0.0005	0.0001	0.021		38.7556467	
0.0004 0.0010	0.0001	0.018	8.75E-06	38.7556467	-89.925887
0.0010	0.0003	0.037	1.86E-05	30.7032924	-89.899823

0.0007	0.0002	0.026	1.31E-05	38.7655482	-89.898208
0.0006	0.0002	0.025	1.24E-05	38.7645969	-89.899946
0.0005	0.0001	0.020	1.00E-05	38.7656807	-89.897487
0.0008	0.0002	0.032	1.58E-05	38.7654728	-89.895236
0.0005	0.0001	0.020	1.01E-05	38.7634667	-89.909293
0.0006	0.0002	0.025	1.24E-05	38.7621801	-89.910576
0.0005	0.0001	0.019	9.61E-06	38.7569373	-89.912424
0.0007	0.0002	0.027	1.33E-05	38.7583773	-89.915831
0.0007	0.0002	0.027	1.34E-05	38.7570039	-89.913422
0.0005	0.0001	0.021	1.03E-05	38.7638036	-89.9175
0.0007	0.0002	0.029	1.43E-05	38.7633625	-89.918229
0.0008	0.0002	0.031	1.55E-05	38.7646466	-89.920204
0.0006	0.0002	0.024	1.18E-05	38.7659797	-89.917317
0.0005	0.0001	0.020	9.92E-06	38.7630932	-89.912782
0.0007	0.0002	0.026	1.28E-05	38.7649855	-89.914988
0.0008	0.0002	0.031	1.56E-05	38.7647144	-89.912396
0.0012	0.0003	0.047	2.37E-05	38.7647642	-89.913672
0.0004	0.0001	0.016	8.15E-06	38.7650608	-89.912779
0.0007	0.0002	0.028	1.42E-05	38.7590933	-89.917856
0.0005	0.0001	0.020	1.01E-05	38.759309	-89.919879
0.0011	0.0003	0.043	2.16E-05	38.7565524	-89.920389
0.0008	0.0002	0.032	1.58E-05	38.7575353	-89.920316
0.0005	0.0001	0.020	1.01E-05	38.7557197	-89.919977
0.0007	0.0002	0.029	1.44E-05	38.7581609	-89.911256
0.0006	0.0002	0.023	1.16E-05	38.7583906	-89.909616
0.0010	0.0003	0.039	1.93E-05	38.7566467	-89.909722
0.0009	0.0002	0.034	1.70E-05	38.7564999	-89.910696
0.0006	0.0001	0.021	1.07E-05	38.7562087	-89.900412
0.0008	0.0002	0.032	1.60E-05	38.7603403	-89.899482
0.0005	0.0001	0.020	9.91E-06	38.7620463	-89.899692
0.0006	0.0002	0.024	1.18E-05	38.7554729	-89.894531
0.0005	0.0001	0.020	1.01E-05	38.7565194	-89.895262
0.0004	0.0001	0.016	8.05E-06	38.7571844	-89.89642
0.0005	0.0001	0.020	1.00E-05	38.7580473	-89.893624
0.0005	0.0001	0.019	9.25E-06	38.7537868	-89.898609
0.0004	0.0001	0.017	8.52E-06	38.746233	-89.903503
0.0006	0.0002	0.024	1.19E-05	38.7458207	-89.903964
0.0005	0.0001	0.020	1.00E-05	38.7533173	-89.930151
0.0004	0.0001	0.016	8.14E-06	38.7513588	-89.911411
0.0006	0.0002	0.024	1.22E-05	38.771127	-89.907447
0.0006	0.0002	0.022	1.10E-05	38.7483895	-89.928259
0.0007	0.0002	0.026	1.30E-05	38.7411149	-89.905476
0.0012	0.0003	0.045	2.24E-05	38.7499268	-89.862145
0.0010	0.0003	0.037	1.87E-05	38.750726	-89.863844
0.0008	0.0002	0.033	1.64E-05	38.7497075	-89.863819
0.0004	0.0001	0.016	7.83E-06	38.7514427	-89.856903
0.0012	0.0003	0.049	2.43E-05	38.7513825	-89.860525
			- 1		

0.0005	0.0001	0.020	1.01E-05	38.752049	-89.862974
0.0012	0.0003	0.047	2.33E-05	38.7515471	-89.857674
0.0007	0.0002	0.028	1.42E-05	38.752656	-89.857652
0.0005	0.0001	0.021	1.05E-05	38.753548	-89.858406
0.0019	0.0005	0.076	3.78E-05	38.7506392	-89.856028
0.0004	0.0001	0.016	8.15E-06	38.7503179	-89.85305
0.0013	0.0003	0.049	2.46E-05	38.753631	-89.856901
0.0006	0.0002	0.022	1.09E-05	38.7460661	-89.857436
0.0006	0.0002	0.023	1.15E-05	38.744146	-89.856335
0.0006	0.0002	0.023	1.15E-05	38.7446467	-89.858686
0.0014	0.0004	0.055	2.77E-05	38.7460459	-89.859546
0.0013	0.0004	0.052	2.59E-05	38.7468367	-89.858239
0.0004	0.0001	0.017	8.57E-06	38.7441191	-89.862952
0.0013	0.0004	0.052	2.58E-05	38.7456899	-89.860497
0.0006	0.0002	0.022	1.10E-05	38.7454319	-89.854203
0.0006	0.0002	0.022	1.14E-05	38.7274949	-89.910295
0.0004	0.0002	0.023	8.69E-06	38.7274545	-89.885951
0.0004	0.0001	0.017	1.28E-05	38.7229487	-89.890102
0.0007	0.0002	0.020	1.19E-05	38.7221573	-89.891342
0.0006	0.0002	0.024	2.09E-05	38.721573	-89.890976
0.0006	0.0001	0.021	1.07E-05	38.7192398	-89.886796
0.0004	0.0001	0.017	8.54E-06	38.7216268	-89.888469
0.0004	0.0001	0.016	8.09E-06	38.7241632	-89.889953
0.0009	0.0003	0.037	1.83E-05	38.72534	-89.892162
0.0005	0.0001	0.020	1.00E-05	38.7231364	-89.891401
0.0008	0.0002	0.031	1.55E-05	38.7245608	-89.891779
0.0005	0.0001	0.019	9.66E-06	38.7405376	-89.845318
0.0011	0.0003	0.041	2.05E-05	38.7410868	-89.846481
0.0005	0.0001	0.021	1.06E-05	38.7414686	-89.848368
0.0006	0.0002	0.024	1.21E-05	38.7415581	-89.847607
0.0004	0.0001	0.016	7.85E-06	38.7333751	-89.841593
0.0010	0.0003	0.037	1.87E-05	38.7364685	-89.839333
0.0005	0.0001	0.020	1.00E-05	38.7361945	-89.837582
0.0005	0.0001	0.021	1.04E-05	38.7317462	-89.837891
0.0006	0.0002	0.024	1.20E-05	38.7336338	-89.839393
0.0005	0.0001	0.018	8.92E-06	38.7283795	-89.86753
0.0010	0.0003	0.038	1.92E-05	38.729493	-89.869643
0.0012	0.0003	0.045	2.24E-05	38.7291515	-89.867789
0.0005	0.0001	0.018	9.24E-06	38.730448	-89.866793
0.0011	0.0003	0.043	2.17E-05	38.732432	-89.868951
0.0006	0.0002	0.022	1.10E-05	38.7307413	-89.869196
0.0004	0.0001	0.017	8.30E-06	38.7343995	-89.843366
0.0005	0.0001	0.018	9.01E-06	38.7421899	-89.851136
0.0005	0.0001	0.021	1.03E-05	38.7426204	-89.848998
0.0005	0.0001	0.018	9.01E-06	38.7432324	-89.851001
0.0010	0.0003	0.037	1.85E-05	38.7267013	-89.89603
0.0004	0.0001	0.016	8.22E-06	38.7277257	-89.897573

0.0005	0.0001	0.019	9.64E-06	38.7277753	-89.852922
0.0004	0.0001	0.017	8.54E-06	38.7351995	-89.834364
0.0006	0.0002	0.023	1.16E-05	38.7231525	-89.832326
0.0007	0.0002	0.027	1.37E-05	38.725279	-89.83398
0.0007	0.0002	0.026	1.31E-05	38.7267426	-89.833896
0.0004	0.0001	0.016	7.95E-06	38.726841	-89.836304
0.0004	0.0001	0.016	7.88E-06	38.7256963	-89.834873
0.0005	0.0001	0.021	1.07E-05	38.7204703	-89.844298
0.0008	0.0002	0.030	1.52E-05	38.7219293	-89.845644
0.0004	0.0001	0.017	8.66E-06	38.7235573	-89.838026
0.0005	0.0001	0.020	9.99E-06	38.724807	-89.841766
0.0006	0.0002	0.024	1.20E-05	38.7192668	-89.835404
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0.0014	0.0004	0.054	2.71E-05	38.7219476	-89.835513
0.0004	0.0001	0.017	8.48E-06	38.7228485	-89.839373
0.0005	0.0001	0.020	1.01E-05	38.7206679	-89.838402
0.0007	0.0002	0.025	1.27E-05	38.7169331	-89.823144
0.0005	0.0001	0.019	9.30E-06	38.7184977	-89.822276
0.0005	0.0001	0.018	8.96E-06	38.7162602	-89.84884
0.0009	0.0002	0.035	1.76E-05	38.7048278	-89.848289
0.0005	0.0001	0.018	8.89E-06	38.7038728	-89.850931
0.0004	0.0001	0.016	7.96E-06	38.7028018	-89.851854
0.0006	0.0002	0.023	1.17E-05	38.7066353	-89.844859
0.0005	0.0001	0.020	9.87E-06	38.7071106	-89.843382
0.0006	0.0002	0.023	1.16E-05	38.7056108	-89.846306
0.0010	0.0003	0.041	2.04E-05	38.7075676	-89.848343
0.0007	0.0002	0.025	1.27E-05	38.7087693	-89.847799
0.0010	0.0003	0.039	1.96E-05	38.7081754	-89.850903
0.0006	0.0001	0.022	1.09E-05	38.7108293	-89.84948
0.0008	0.0002	0.030	1.52E-05	38.7038426	-89.857503
0.0012	0.0003	0.047	2.35E-05	38.7012435	
0.0006	0.0002	0.023	1.14E-05	38.7017612	-89.841876
0.0008	0.0002	0.032	1.62E-05	38.7065124	-89.840079
0.0007	0.0002	0.026	1.31E-05	38.7052985	-89.839601
0.0004	0.0001	0.017	8.41E-06	38.7043155	-89.839133
0.0007	0.0002	0.028	1.38E-05	38.7299932	-89.817149
0.0004	0.0001	0.017	8.66E-06	38.728827	-89.818094
0.0008	0.0002	0.030	1.48E-05	38.7204886	-89.82162
0.0005	0.0001	0.018	9.06E-06	38.7232198	-89.820954
0.0005	0.0001	0.020	1.00E-05	38.7199397	-89.821271
0.0003	0.0001	0.017	8.25E-06	38.7288708	-89.822477
0.0004	0.0001	0.017	9.75E-06	38.7274536	-89.836523
0.0005	0.0001	0.019	9.75E-06 9.35E-06	38.7147775	-89.841526
0.0003	0.0001	0.019	1.27E-05	38.7146178	-89.840142
0.0007	0.0002	0.023	8.68E-06	38.7155748	-89.838272
0.0004	0.0001	0.017	1.40E-05	38.7155748	-89.84019
0.0007	0.0002	0.028	9.99E-06	38.7164068	-89.841615
0.0005	0.0001	0.020	J.JJE-UD	30.7141932	-03.041013

0.0008	0.0002	0.030	1.51E-05	38.7172625	-89.844167
0.0007	0.0002	0.025	1.27E-05	38.7166715	-89.84132
0.0006	0.0002	0.024	1.22E-05	38.698498	-89.855867
0.0007	0.0002	0.028	1.38E-05	38.6978092	-89.853714
0.0010	0.0003	0.039	1.94E-05	38.699335	-89.854389
0.0006	0.0002	0.024	1.19E-05	38.7008759	-89.853102
0.0006	0.0002	0.023	1.15E-05	38.702373	-89.854899
0.0004	0.0001	0.017	8.72E-06	38.7027511	-89.853215
0.0008	0.0002	0.030	1.49E-05	38.7248462	-89.852711
0.0008	0.0002	0.029	1.47E-05	38.7248528	-89.853946
0.0006	0.0002	0.023	1.17E-05	38.7251434	-89.851433
0.0005	0.0001	0.018	8.76E-06	38.6513071	-89.840921
0.0010	0.0003	0.038	1.90E-05	38.6509157	-89.84045
0.0020	0.0005	0.078	3.89E-05	38.6501115	-89.839325
0.0005	0.0001	0.020	9.91E-06	38.6493396	-89.83841
0.0004	0.0001	0.016	7.85E-06	38.648504	-89.840943
0.0008	0.0002	0.033	1.64E-05	38.6480108	-89.840267
0.0004	0.0001	0.016	8.09E-06	38.6483004	-89.837508
0.0006	0.0002	0.024	1.20E-05	38.6483195	-89.839768
0.0005	0.0001	0.020	1.01E-05	38.6530834	-89.829495
0.0005	0.0001	0.021	1.06E-05	38.6509337	-89.831917
0.0010	0.0003	0.037	1.86E-05	38.6519372	-89.830904
0.0005	0.0001	0.018	9.14E-06	38.6515357	-89.828429
0.0015	0.0004	0.057	2.84E-05	38.649775	-89.830677
0.0004	0.0001	0.016	8.18E-06	38.6488477	-89.830791
0.0017	0.0005	0.066	3.31E-05	38.6499445	-89.828819
0.0004	0.0001	0.017	8.68E-06	38.6505985	-89.827475
0.0005	0.0001	0.018	8.96E-06	38.655226	-89.818594
0.0005	0.0001	0.019	9.48E-06	38.6549808	-89.814972
0.0014	0.0004	0.055	2.73E-05	38.6526494	-89.814667
0.0007	0.0002	0.028	1.40E-05	38.6549026	
0.0016	0.0004	0.061	3.04E-05	38.6539752	-89.812665
0.0005	0.0001	0.021	1.04E-05	38.6552253	-89.812177
0.0004	0.0001	0.016	8.01E-06	38.6827629	-89.840799
0.0004	0.0001	0.017	8.74E-06	38.6708562	-89.823751
0.0005	0.0001	0.018	9.21E-06	38.6634655	-89.827227
0.0008	0.0002	0.032	1.60E-05	38.6668656	-89.827036
0.0012	0.0003	0.048	2.38E-05	38.6582256	-89.825909
0.0004	0.0001	0.017	8.71E-06	38.6577389	-89.827225
0.0007	0.0002	0.028	1.38E-05	38.6578841	-89.824265
0.0005	0.0001	0.019	9.54E-06	38.6620686	-89.819846
0.0005	0.0001	0.018	8.78E-06	38.6600246	-89.821655
0.0015	0.0004	0.057	2.87E-05	38.6593515	-89.819884
0.0005	0.0001	0.020	9.93E-06	38.6593276 38.6568773	-89.82183 -89.819439
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0.0008 0.0005	0.0002 0.0001	0.030 0.018	1.51E-05 9.07E-06	38.6596346	-89.822844 -89.822716
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0.0015	0.0004	0.057	2.84E-05	38.6621886	-89.806254
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0.0005	0.0001	0.020	1.02E-05	38.6847183	-89.85253
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0.0005	0.0001	0.020	1.01E-05	38.6575539	-89.856676
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0.0013	0.0003	0.049	2.47E-05	38.6751964	-89.812883
0.0005	0.0001	0.018	9.05E-06	38.6729226	-89.814895
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0.0013	0.0003	0.049	2.47E-05	38.6752132	-89.81935
0.0007	0.0002	0.028	1.38E-05	38.674519	-89.818329
0.0009	0.0002	0.033	1.67E-05	38.6749908	-89.817642
0.0006	0.0002	0.023	1.13E-05	38.6713974	-89.8188
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0.0006	0.0002	0.023	1.17E-05	38.7154711	-89.750916
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0.0010	0.0003	0.038	1.90E-05	38.7239987	-89.744564
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0.0006	0.0002	0.024	1.19E-05	38.7202238	-89.750511
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0.0005	0.0001	0.018	9.08E-06	38.7244403	-89.74589
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0.0005	0.0001	0.021	1.03E-05	38.7191238	-89.736063
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0.0004	0.0001	0.017	8.52E-06	38.69336	-89.80104
0.0008	0.0002	0.032	1.58E-05	38.6820354	-89.808077
0.0005	0.0001	0.020	1.01E-05	38.6996749	-89.784145
0.0006	0.0002	0.024	1.21E-05	38.7021193	-89.779518
0.0005	0.0001	0.018	8.93E-06	38.7003155	-89.778188
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0.0004	0.0001	0.017	1.57E-05	38.696271	-89.769412
0.0008	0.0002	0.031	7.92E-06	38.6973846	-89.769412
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0.0005	0.0001	0.019	9.42E-06	38.6990336	-89.76434
0.0004	0.0001	0.016	8.23E-06	38.6893891	-89.773326
0.0011	0.0003	0.044	2.22E-05	38.6877808	-89.773513
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0.0008	0.0002	0.033	1.64E-05	38.6861002	-89.776524
0.0006	0.0002	0.022	1.10E-05	38.6880856	-89.775858
0.0005	0.0001	0.018	9.06E-06	38.7110836	-89.749917
0.0006	0.0002	0.025	1.24E-05	38.7040398	-89.740962
0.0022	0.0006	0.087	4.37E-05	38.7044687	-89.739167
0.0017	0.0005	0.067	3.36E-05	38.7041512	-89.738511
0.0007	0.0002	0.028	1.40E-05	38.7118634	-89.741424
0.0004	0.0001	0.017	8.53E-06	38.7097322	-89.731882
0.0005	0.0001	0.021	1.04E-05	38.7090555	-89.731632
0.0004	0.0001	0.016	7.88E-06	38.7112402	-89.734503
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0.0005	0.0001	0.021	1.05E-05	38.700665	-89.762576
0.0006	0.0002	0.025	1.25E-05	38.7048331	-89.760304
0.0004	0.0001	0.017	8.57E-06	38.7017205	-89.762487
0.0004	0.0001	0.016	7.86E-06	38.7061252	-89.761193
0.0004	0.0001	0.016	8.22E-06	38.7061094	-89.757534
0.0005	0.0001	0.021	1.04E-05	38.7054959	-89.758457

0.0004	0.0001	0.016	7.83E-06	38.7040769	-89.75826
0.0004	0.0001	0.016	8.10E-06	38.7012415	-89.756406
0.0004	0.0001	0.016	7.90E-06	38.7036062	-89.755266
0.0005	0.0001	0.018	8.82E-06	38.6926428	-89.749337
0.0004	0.0001	0.017	8.41E-06	38.6884954	-89.74975
0.0008	0.0002	0.032	1.60E-05	38.6870442	-89.750946
0.0005	0.0001	0.021	1.06E-05	38.6864045	-89.75
0.0005	0.0001	0.021	1.05E-05	38.6893282	-89.742208
0.0007	0.0002	0.027	1.34E-05	38.6759333	-89.805829
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0.0014	0.0004	0.055	2.73E-05	38.6760423	-89.798588
0.0004	0.0001	0.017	8.28E-06	38.6760512	-89.803402
0.0005	0.0001	0.020	9.99E-06	38.6747056	-89.804619
0.0015	0.0004	0.057	2.84E-05	38.6756352	-89.801271
0.0006	0.0002	0.023	1.13E-05	38.6747487	-89.801439
0.0008	0.0002	0.023	1.60E-05	38.668309	-89.813159
0.0005	0.0002	0.052	2.84E-05	38.6621886	-89.806254
0.0015	0.0004	0.037	9.82E-06	38.6837435	-89.795309
0.0006	0.0001	0.020	1.09E-05	38.6819216	-89.801373
0.0008	0.0002	0.022	4.20E-05	38.6828808	-89.79878
0.0009	0.0002	0.034	1.72E-05	38.6796915	-89.792182
0.0006	0.0002	0.023	1.17E-05	38.6797845	-89.794789
0.0005	0.0001	0.020	1.00E-05	38.679829	-89.796681
0.0005	0.0001	0.019	9.28E-06	38.679145	-89.784882
0.0017	0.0004	0.065	3.26E-05	38.6800025	-89.785839
0.0008	0.0002	0.031	1.54E-05	38.6808214	-89.797706
0.0010	0.0003	0.040	2.02E-05	38.6820358	-89.796063
0.0011	0.0003	0.042	2.10E-05	38.6836658	-89.801602
0.0004	0.0001	0.017	8.32E-06	38.6842222	-89.800801
0.0006	0.0001	0.021	1.07E-05	38.6780984	-89.790591
0.0018	0.0005	0.071	3.53E-05	38.6781961	-89.788635
0.0005	0.0001	0.019	9.60E-06	38.6812861	-89.780147
0.0007	0.0002	0.027	1.36E-05	38.6830999	-89.780107
0.0005	0.0001	0.021	1.03E-05	38.6838893	-89.792589
0.0005	0.0001	0.019	9.53E-06	38.6829761	-89.782899
0.0007	0.0002	0.027	1.33E-05	38.6834396	-89.783706
0.0004	0.0001	0.016	8.20E-06	38.6839828	-89.798232
0.0009	0.0002	0.033	1.67E-05	38.6827533	-89.794292
0.0006	0.0002	0.023	1.13E-05	38.6813565	-89.786739
0.0011	0.0003	0.041	2.05E-05	38.6820587	-89.778622
0.0009	0.0002	0.036	1.80E-05	38.6831429	-89.777617
0.0006	0.0002	0.023	1.16E-05	38.6777248	-89.784869
0.0012	0.0003	0.047	2.37E-05	38.678926	-89.783708
0.0010	0.0003	0.038	1.88E-05	38.679905	-89.782158
0.0005	0.0001	0.021	1.06E-05	38.6813463	-89.789012
0.0017	0.0004	0.065	3.25E-05	38.6807099	-89.791877
0.0007	0.0002	0.027	1.33E-05	38.684018	-89.791515

0.0006	0.0001	0.022	1.08E-05	38.6832627	-89.785976
0.0009	0.0002	0.034	1.68E-05	38.6840376	-89.780026
0.0004	0.0001	0.016	8.04E-06	38.6792327	-89.781657
0.0013	0.0004	0.051	2.57E-05	38.6821357	-89.78946
0.0005	0.0001	0.019	9.47E-06	38.6828453	-89.79151
0.0008	0.0002	0.029	1.46E-05	38.6776286	-89.782067
0.0006	0.0002	0.024	1.19E-05	38.6841998	-89.775161
0.0005	0.0001	0.018	8.87E-06	38.6835707	-89.776536
0.0007	0.0002	0.029	1.45E-05	38.6828821	-89.774864
0.0005	0.0001	0.020	1.00E-05	38.6829945	-89.772842
0.0005	0.0001	0.021	1.03E-05	38.6817599	-89.775577
0.0005	0.0001	0.021	9.81E-06	38.6842828	-89.770779
0.0008	0.0001	0.032	1.58E-05	38.6811446	-89.775887
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0.0007	0.0002	0.024	1.31E-05	38.6799533	-89.776046
0.0007	0.0002	0.028	2.90E-05	38.6806339	-89.773276
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0.0006	0.0002	0.023	1.15E-05	38.6815563	-89.768351
0.0011	0.0003	0.042	2.08E-05	38.6788642	-89.774178
0.0004	0.0001	0.016	8.04E-06	38.6799435	-89.772385
0.0009	0.0002	0.034	1.68E-05	38.679325	-89.798901
0.0012	0.0003	0.047	2.34E-05	38.6782954	-89.796626
0.0027	0.0007	0.105	5.26E-05	38.6773476	-89.793407
0.0006	0.0002	0.025	1.25E-05	38.6767637	-89.791023
0.0012	0.0003	0.046	2.28E-05	38.6764339	-89.795355
0.0019	0.0005	0.075	3.75E-05	38.6749374	-89.796896
0.0009	0.0002	0.036	1.80E-05	38.6723271	-89.80354
0.0004	0.0001	0.016	7.91E-06	38.6736544	-89.801304
0.0006	0.0002	0.022	1.12E-05	38.6709188	-89.799842
0.0013	0.0003	0.049	2.47E-05	38.6713793	-89.803394
0.0006	0.0002	0.022	1.10E-05	38.6708535	-89.795909
0.0009	0.0002	0.035	1.76E-05	38.6709915	-89.803737
0.0006	0.0002	0.025	1.26E-05	38.6705178	-89.804053
0.0013	0.0003	0.049	2.44E-05	38.6859153	-89.742951
0.0007	0.0002	0.026	1.28E-05	38.6911103	-89.814567
0.0007	0.0002	0.027	1.34E-05	38.6877735	-89.767089
0.0006	0.0002	0.024	1.22E-05	38.6859536	-89.766894
0.0006	0.0002	0.022	1.12E-05	38.6876665	-89.763393
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0.0005	0.0001	0.019	9.49E-06	38.6846205	-89.760398
0.0011	0.0003	0.045	2.23E-05	38.6855767	-89.761145
0.0013	0.0004	0.051	2.55E-05	38.6854047	-89.759511
0.0006	0.0002	0.024	1.21E-05	38.6938834	-89.79472
0.0004	0.0001	0.017	8.57E-06	38.6940783	-89.793887
0.0008	0.0002	0.032	1.58E-05	38.6933624	-89.792297
0.0005	0.0001	0.018	9.00E-06	38.6942232	-89.791444

0.0005	0.0001	0.020	9.86E-06	38.7017934	-89.74889
0.0009	0.0002	0.036	1.78E-05	38.7000714	-89.752127
0.0010	0.0003	0.040	1.99E-05	38.7002314	-89.749614
0.0012	0.0003	0.046	2.32E-05	38.7001985	-89.750699
0.0010	0.0003	0.038	1.88E-05	38.6985403	-89.77412
0.0006	0.0001	0.022	1.08E-05	38.6977799	-89.774489
0.0007	0.0002	0.029	1.44E-05	38.6693482	-89.805503
0.0014	0.0004	0.056	2.79E-05	38.6685728	-89.805011
0.0012	0.0003	0.048	2.42E-05	38.6667408	-89.80426
0.0004	0.0001	0.017	8.38E-06	38.6698479	-89.800332
0.0005	0.0001	0.018	9.11E-06	38.6674728	-89.806241
0.0005	0.0001	0.019	9.67E-06	38.6671687	-89.805886
0.0009	0.0002	0.033	1.67E-05	38.6805707	-89.779996
0.0015	0.0004	0.058	2.90E-05	38.6789967	-89.780018
0.0007	0.0002	0.029	1.43E-05	38.6796294	-89.778104
0.0006	0.0001	0.022	1.08E-05	38.6803509	-89.777128
0.0013	0.0004	0.052	2.60E-05	38.6773282	-89.779901
0.0006		0.023	1.15E-05	38.6785934	-89.777252
0.0009	0.0002	0.034	1.72E-05	38.6762704	-89.779606
0.0004	0.0001	0.016	7.84E-06	38.6884868	-89.762844
0.0005	0.0001	0.019	9.50E-06	38.6910889	-89.761265
0.0005	0.0001	0.018	8.93E-06	38.693718	-89.758575
0.0004	0.0001	0.017	8.35E-06	38.6937487	-89.757134
0.0006		0.023	1.14E-05	38.6953673	-89.760794
0.0005	0.0001	0.019	9.26E-06	38.7081655	-89.750544
0.0007	0.0002	0.028	1.42E-05	38.7074342	-89.750867
0.0005	0.0001	0.018	9.23E-06	38.7044014	-89.751859
0.0004	0.0001	0.016	8.08E-06	38.7041735	-89.751049
0.0006	0.0002	0.025	1.26E-05	38.6911224	-89.790725
0.0009	0.0002	0.036	1.80E-05	38.6903177	-89.789178
0.0013	0.0004	0.052	2.60E-05	38.6894086	-89.786646
0.0005	0.0001	0.021	1.05E-05	38.6800108	-89.807736
0.0008	0.0002	0.031	1.54E-05	38.67956	-89.806257
0.0004	0.0001	0.017	8.37E-06	38.6806394	-89.805242
0.0006	0.0002	0.025	1.25E-05	38.6714617	-89.805298
0.0006	0.0002	0.023	1.16E-05	38.6708248	-89.805032
0.0009	0.0002	0.036	1.79E-05	38.6774625	-89.807883
0.0004	0.0001	0.017	8.58E-06	38.6740392	-89.808675
0.0008	0.0002	0.030	1.52E-05	38.6752434	-89.808348
0.0004	0.0001	0.016	8.01E-06	38.6768959	-89.809047
0.0005	0.0001	0.018	9.23E-06	38.7286278	-89.720643
0.0009	0.0003	0.037	1.84E-05	38.6867497	-89.747855
0.0006	0.0002	0.024	1.21E-05	38.6984518	-89.744239
0.0006	0.0002	0.024	1.19E-05	38.696653	-89.744117
0.0006	0.0002	0.023	1.17E-05	38.7071027	-89.746866
0.0009	0.0002	0.033	1.66E-05	38.711534	-89.747067
0.0005	0.0001	0.019	9.58E-06	38.7055632	-89.766148

0.0006	0.0002	0.023	1.13E-05	38.6980557	-89.813705
0.0015	0.0004	0.060	3.00E-05	38.6984381	-89.811542
0.0005	0.0001	0.021	1.03E-05	38.6855102	-89.818695
0.0010	0.0003	0.037	1.85E-05	38.6853741	-89.820978
0.0006	0.0002	0.025	1.23E-05	38.7115376	-89.764717
0.0006	0.0002	0.024	1.19E-05	38.6787119	-89.8213
0.0006	0.0001	0.022	1.08E-05	38.6802803	-89.81486
0.0004	0.0001	0.017	8.71E-06	38.678534	-89.812995
0.0019	0.0005	0.075	3.75E-05	38.6794246	-89.819738
0.0005	0.0001	0.019	9.30E-06	38.6806842	-89.817982
0.0010	0.0003	0.038	1.92E-05	38.6803303	-89.816349
0.0006	0.0002	0.023	1.13E-05	38.6833801	-89.813465
0.0006	0.0002	0.022	1.12E-05	38.6841179	-89.813784
0.0006	0.0002	0.024	1.19E-05	38.6818799	-89.813482
0.0004	0.0001	0.016	7.83E-06	38.6841724	-89.815036
0.0005	0.0001	0.020	9.76E-06	38.6975141	-89.779508
0.0004	0.0001	0.017	8.36E-06	38.6954563	-89.781139
0.0005	0.0001	0.018	8.93E-06	38.6562748	-89.866586
0.0004	0.0001	0.016	7.91E-06	38.6562391	-89.862465
0.0004	0.0001	0.017	8.27E-06	38.6592387	-89.862147
0.0004	0.0001	0.017	8.50E-06	38.6578002	-89.865708
0.0008	0.0002	0.031	1.55E-05	38.6574874	-89.864346
0.0014	0.0004	0.054	2.70E-05	38.6599967	-89.863231
0.0007	0.0002	0.026	1.32E-05	38.6590197	-89.865415
0.0010	0.0003	0.039	1.96E-05	38.6604842	-89.865256
0.0008	0.0002	0.031	1.56E-05	38.6638226	-89.864647
0.0006	0.0002	0.024	1.22E-05	38.6628623	-89.864443
0.0005	0.0001	0.019	9.52E-06	38.6619631	-89.918259
0.0004	0.0001	0.017	8.61E-06	38.670203	-89.853869
0.0007	0.0002	0.028	1.40E-05	38.6692963	-89.848081
0.0007	0.0002	0.027	1.37E-05	38.6658422	-89.849386
0.0005	0.0001	0.020	9.94E-06	38.6669324	-89.847671
0.0010	0.0003	0.038	1.92E-05	38.6648648	-89.852033
0.0006	0.0002	0.025	1.25E-05	38.6656516	-89.911349
0.0006	0.0002	0.024	1.22E-05	38.6672919	-89.91239
0.0008	0.0002	0.031	1.57E-05	38.7124778	-89.892932
0.0007	0.0002	0.028	1.39E-05	38.7141924	-89.89347
0.0004	0.0001	0.017	8.58E-06	38.717963	-89.900719
0.0004	0.0001	0.017	8.25E-06	38.7184113	-89.902535
0.0011	0.0003	0.044	2.22E-05	38.714505	-89.897552
0.0004	0.0001	0.018	8.75E-06	38.7107495	-89.900891
0.0005	0.0001	0.020	1.02E-05	38.7128869	-89.903314
0.0005	0.0001	0.019	9.35E-06	38.706091	-89.876332
0.0007	0.0002	0.025	1.27E-05	38.7063097	-89.878359
0.0010	0.0003	0.040	1.98E-05	38.7064541	-89.879759
0.0007	0.0002	0.026	1.28E-05	38.708426	-89.882527
0.0004	0.0001	0.016	7.92E-06	38.7074967	-89.888446
			'		

0.0006	0.0002	0.022	1.11E-05	38.7064929	-89.888133
0.0006	0.0002	0.022	1.10E-05	38.7032417	-89.87942
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0.0004	0.0001	0.016	8.04E-06	38.6980764	-89.903642
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0.0006	0.0002	0.023	1.16E-05	38.6955046	-89.907649
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0.0006	0.0001	0.022	1.08E-05	38.6953078	-89.906785
0.0005	0.0001	0.020	1.02E-05	38.6943835	-89.908438
0.0008	0.0002	0.031	1.55E-05	38.6845578	-89.889684
0.0005	0.0001	0.019	9.65E-06	38.6823913	-89.888727
0.0005	0.0001	0.019	9.29E-06	38.6853169	-89.88673
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0.0007	0.0002	0.028	1.39E-05	38.6858962	-89.885203
0.0006	0.0002	0.024	1.21E-05	38.688439	-89.889331
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0.0005	0.0001	0.018	8.84E-06	38.6928095	-89.886803
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0.0005	0.0001	0.020	9.85E-06	38.6880486	-89.888502
0.0006	0.0002	0.023	1.14E-05	38.7078851	-89.865026
0.0009	0.0002	0.034	1.70E-05	38.7028744	-89.86479
0.0006	0.0002	0.022	1.12E-05	38.7040958	-89.863349
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0.0007	0.0002	0.029	1.44E-05	38.6707936	-89.892149
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0.0007	0.0002	0.027	1.34E-05		-89.903959
0.0006	0.0002	0.023	1.17E-05	38.6730898	-89.867162
0.0004	0.0001	0.016	8.21E-06	38.6745476	-89.869309
0.0007	0.0002	0.029	1.43E-05	38.6737507	-89.867379
0.0004	0.0001	0.017	8.59E-06	38.6749722	-89.867387
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0.0006	0.0002	0.022	1.12E-05	38.6767158	-89.860978
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0.0011	0.0003	0.041	2.06E-05	38.6771218	-89.864543
0.0004	0.0001	0.017	8.42E-06	38.6755708	-89.862305
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0.0007	0.0002	0.026	1.30E-05	38.6738343	-89.862434
0.0012	0.0003	0.047	2.34E-05	38.6738322	-89.864881
0.0005	0.0001	0.019	9.35E-06	38.674583	-89.865612
0.0005	0.0001	0.021	1.05E-05	38.6761032	-89.848458
0.0009	0.0002	0.034	1.69E-05	38.6762058	-89.852217
0.0005	0.0001	0.018	9.00E-06	38.6746093	-89.852902

0.0005	0.0001	0.019	9.67E-06	38.676097	-89.854041
0.0005	0.0001	0.020	9.87E-06	38.6649102	-89.863607
0.0006	0.0002	0.022	1.11E-05	38.6645203	-89.86607
0.0005	0.0001	0.018	9.06E-06	38.66599	-89.866367
0.0011	0.0003	0.042	2.12E-05	38.664789	-89.868074
0.0009	0.0002	0.035	1.76E-05	38.6854586	-89.857535
0.0014	0.0004	0.054	2.69E-05	38.683821	-89.857751
0.0006	0.0002	0.023	1.13E-05	38.6810798	-89.860538
0.0007	0.0002	0.028	1.42E-05	38.6861543	-89.860018
0.0006	0.0002	0.023	1.17E-05	38.680702	-89.857337
0.0011	0.0003	0.044	2.18E-05	38.6837312	-89.8595
0.0007	0.0002	0.026	1.32E-05	38.6845465	-89.860702
0.0010	0.0003	0.041	2.04E-05	38.6852367	-89.860168
0.0010	0.0003	0.041	2.04E-05	38.6816235	-89.860203
0.0010	0.0004	0.053	2.65E-05	38.6843923	-89.863114
0.0014	0.0004	0.040	2.02E-05	38.6860216	-89.863096
0.0010	0.0003	0.040	1.55E-05	38.6850916	-89.865503
0.0008	0.0002	0.031	1.40E-05	38.685876	-89.865442
0.0007	0.0002	0.028	7.92E-06	38.6863466	-89.864975
0.0004	0.0001	0.016	8.32E-06		-89.864312
				38.6846204	
0.0005	0.0001	0.020	1.02E-05	38.6996577	-89.889652
0.0007	0.0002	0.028	1.38E-05	38.6999935	-89.88559
0.0006	0.0002	0.024	1.22E-05	38.6999758	-89.886619
0.0007	0.0002	0.026	1.28E-05	38.6615412	-89.857656
0.0011	0.0003	0.043	2.16E-05	38.6633145	-89.859887
0.0004	0.0001	0.015	7.69E-06	38.6635956	-89.860145
0.0015	0.0004	0.058	2.91E-05	38.6617114	-89.851194
0.0006	0.0002	0.022	1.11E-05	38.6596791	-89.853037
0.0004	0.0001	0.017	8.60E-06	38.6611268	-89.852757
0.0005	0.0001	0.020	9.81E-06	38.6600785	-89.855558
0.0005	0.0001	0.021	1.06E-05	38.6587264	-89.856087
0.0005	0.0001	0.020	1.01E-05	38.6575539	-89.856676
0.0006	0.0002	0.023	1.14E-05	38.6701717	-89.88378
0.0022	0.0006	0.086	4.29E-05	38.6742237	-89.883576
0.0005	0.0001	0.021	1.06E-05	38.6717143	-89.883548
0.0004	0.0001	0.017	8.33E-06	38.6887154	-89.867011
0.0004	0.0001	0.017	8.26E-06	38.6903546	-89.870173
0.0010	0.0003	0.041	2.04E-05	38.6894267	-89.86759
0.0014	0.0004	0.056	2.79E-05	38.6908828	-89.869294
0.0007	0.0002	0.027	1.35E-05	38.6876291	-89.869587
0.0018	0.0005	0.071	3.53E-05	38.6883506	-89.871121
0.0007	0.0002	0.026	1.29E-05	38.6924075	-89.869204
0.0004	0.0001	0.016	7.84E-06	38.6937693	-89.867758
0.0007	0.0002	0.026	1.29E-05	38.6911387	-89.860284
0.0007	0.0002	0.025	1.27E-05	38.6908672	-89.861799
0.0010	0.0003	0.040	2.01E-05	38.6923685	-89.861496
0.0006	0.0001	0.022	1.09E-05	38.6909705	-89.863063

	0.0008	0.0002	0.030	1.52E-05	38.6910085	-89.864277
	0.0011	0.0003	0.044	2.19E-05	38.6935155	-89.86491
	0.0007	0.0002	0.026	1.29E-05	38.682212	-89.912222
	0.0008	0.0002	0.032	1.62E-05	38.6838888	-89.910524
	0.0004	0.0001	0.017	8.72E-06	38.6802908	-89.912268
	0.0006	0.0001	0.022	1.08E-05	38.6802655	-89.9115
	0.0006	0.0002	0.022	1.12E-05	38.6828626	-89.916526
	0.0007	0.0002	0.027	1.37E-05	38.6809315	-89.915516
	0.0006	0.0002	0.023	1.13E-05	38.6852238	-89.911132
	0.0005	0.0001	0.018	8.91E-06	38.6829608	-89.91494
	0.0004	0.0001	0.016	8.14E-06	38.6872365	-89.909848
	0.0004	0.0001	0.017	8.36E-06	38.6881067	-89.856933
	0.0006	0.0002	0.024	1.19E-05	38.6898055	-89.857782
	0.0006	0.0002	0.023	1.14E-05	38.6930497	-89.859827
	0.0015	0.0004	0.057	2.87E-05	38.692441	-89.85859
	0.0015	0.0001	0.019	9.60E-06	38.6925601	-89.857348
	0.0003	0.0001	0.019	4.02E-05	38.6878848	-89.859495
	0.0021	0.0006	0.083	4.02L-05 4.17E-05	38.688797	-89.861706
	0.0021	0.0003	0.046	4.17L-05 2.28E-05	38.6894861	-89.861163
	0.0012	0.0003	0.021	1.03E-05	38.7043303	-89.90138
	0.0003	0.0001	0.039	1.03E-03	38.7090886	-89.903177
	0.0010	0.0003	0.039	1.97E-05	38.7021674	-89.867091
	0.0008	0.0002	0.032 0.027	1.59E-05	38.7022226 38.7033524	-89.868902
	0.0007	0.0002		1.37E-05		-89.872739
	0.0006	0.0002	0.022	1.12E-05	38.7021932	-89.87293
472	0.0008	0.0002	0.032	1.60E-05	38.7040066	-89.872585
473	0.0108	0.00206	0.6179	0.0003	39.0928296	-89.71465
812	0.0186	0.00353	1.0607	0.0005	39.0934027	-89.714255
538	0.0123	0.00234	0.7033	0.0004	39.0915818	-89.714236
1275	0.0291	0.00554	1.6650	0.0008	39.0927748	-89.713556
84	0.0019	0.00036	0.1091	0.0001	39.0909434	-89.713537
238	0.0054	0.00103	0.3106	0.0002	39.0911854	-89.713422
77	0.0018	0.00033	0.1000	0.0001	39.0907825	-89.713345
2373	0.0542	0.01031	3.0993	0.0015	39.0918093	-89.718028
320	0.0073	0.00139	0.4182	0.0002	39.0887881	-89.71759
97	0.0022	0.00042	0.1273	0.0001	39.0872732	-89.708957
306	0.0070	0.00133	0.3999	0.0002	39.0872981	-89.713771
231	0.0053	0.00100	0.3013	0.0002	39.0870936	-89.718827
94	0.0021	0.00041	0.1221	0.0001	39.0869976	-89.71854
1756	0.0401	0.00763	2.2938	0.0011	39.0862503	-89.715769
1235	0.0282	0.00537	1.6127	0.0008	39.0871664	-89.707558
847	0.0194	0.00368	1.1060	0.0006	39.0854359	-89.707066
153	0.0035	0.00067	0.2000	0.0001	39.0857149	-89.713086
895	0.0205	0.00389	1.1689	0.0006	39.0851592	-89.706837
1808	0.0413	0.00786	2.3618	0.0012	39.0852266	-89.716839
882	0.0202	0.00383	1.1523	0.0006	39.0820706	-89.709418
253	0.0058	0.00110	0.3303	0.0002	39.081159	-89.713483

548	0.0125	0.00238	0.7154	0.0004	39.0812001	-89.708265
110	0.0025	0.00048	0.1434	0.0001	39.0808783	-89.709252
870	0.0199	0.00378	1.1359	0.0006	39.0819269	-89.70657
330	0.0075	0.00143	0.4307	0.0002	39.0805857	-89.711374
542	0.0124	0.00236	0.7077	0.0004	39.0810079	-89.710064
132	0.0030	0.00057	0.1727	0.0001	39.0804457	-89.710965
1810	0.0414	0.00787	2.3646	0.0012	39.0821815	-89.705275
1187	0.0271	0.00516	1.5511	0.0008	39.0798425	-89.724548
822	0.0188	0.00357	1.0738	0.0005	39.077671	-89.712177
1571	0.0359	0.00683	2.0522	0.0010	39.0773091	-89.71383
35	0.0008	0.00015	0.0455	0.0000	39.0769526	-89.711196
157	0.0036	0.00068	0.2057	0.0001	39.0761098	-89.699369
662	0.0151	0.00288	0.8646	0.0004	39.0756226	-89.710755
1072	0.0245	0.00466	1.3998	0.0007	39.0758062	-89.705681
3522	0.0805	0.01531	4.6008	0.0023	39.0792809	-89.704994
2000	0.0457	0.00870	2.6131	0.0023	39.0770269	-89.704891
414	0.0095	0.00180	0.5408	0.0013	39.0741845	-89.704239
490	0.0112	0.00213	0.6402	0.0003	39.0741845	-89.703987
172	0.0039	0.00215	0.2250	0.0003	39.07351	-89.704639
84	0.0019	0.00075	0.1091	0.0001	39.0725108	-89.704426
139	0.0032	0.00061	0.1818	0.0001	39.0723339	-89.71057
217	0.0050	0.00094	0.2831	0.0001	39.072231	-89.712455
311	0.0071	0.00034	0.4060	0.0001	39.0724383	-89.712501
310	0.0071	0.00135	0.4050	0.0002	39.0724383	-89.711539
697	0.0159	0.00133	0.9111	0.0002	39.0729541	-89.715829
577	0.0133	0.00303	0.7531	0.0003	39.0714079	-89.710423
521	0.0132	0.00231	0.6808	0.0004	39.0714034	-89.710423
108	0.0015	0.00227	0.1414	0.0003	39.0702014	-89.707324
615	0.0140	0.00047	0.8027	0.0001	39.0699381	-89.709936
1083	0.0248	0.00207	1.4147	0.0004	39.0687715	-89.704224
143	0.0248	0.00471	0.1873	0.0007	39.0680908	
1921	0.0439	0.00002	2.5094	0.0001	39.0695599	-89.711777
758	0.0439	0.00833	0.9904	0.0013	39.0678753	-89.70465
365	0.0173	0.00330	0.4771	0.0003	39.06689	-89.710866
45	0.0083	0.00139		0.0002	39.0661172	-89.715002
		0.00020	0.0594	0.0006	39.0659564	-89.713002
958 949	0.0219		1.2509	0.0006		-89.706943
	0.0217	0.00412	1.2394		39.0650012 39.0640725	-89.714519
636	0.0145	0.00277	0.8308	0.0004		
195	0.0045	0.00085	0.2546	0.0001	39.0633261	-89.722671
610	0.0139	0.00265	0.7969	0.0004	39.0626347	-89.706934
619	0.0142	0.00269	0.8091	0.0004	39.0627878	-89.715824
995	0.0228	0.00433	1.3003	0.0007	39.0621649	-89.714527
635	0.0145	0.00276	0.8294	0.0004	39.0617735	-89.721755
878	0.0201	0.00382	1.1473	0.0006	39.0621379	-89.721634
690	0.0158	0.00300	0.9013	0.0005	39.0610137	-89.704925
188	0.0043	0.00082	0.2455	0.0001	39.0604931	-89.705427
116	0.0027	0.00051	0.1521	0.0001	39.0607741	-89.721697

1028	0.0235	0.00447	1.3433	0.0007	39.0620447	-89.721569
55	0.0013	0.00024	0.0723	0.0000	39.0600986	-89.708428
202	0.0046	0.00088	0.2636	0.0001	39.0604321	-89.721392
55	0.0013	0.00024	0.0723	0.0000	39.0598362	-89.708049
317	0.0072	0.00138	0.4135	0.0002	39.059993	-89.705996
550	0.0126	0.00239	0.7182	0.0004	39.0602766	-89.719718
795	0.0182	0.00345	1.0381	0.0005	39.0596437	-89.719076
446	0.0102	0.00194	0.5831	0.0003	39.0595809	-89.716859
615	0.0141	0.00267	0.8035	0.0004	39.0602393	-89.727618
73	0.0017	0.00032	0.0953	0.0000	39.0585907	-89.708619
7	0.0002	0.00003	0.0091	0.0000	39.0584205	-89.709527
77	0.0018	0.00033	0.1000	0.0001	39.0585044	-89.709627
463	0.0106	0.00201	0.6050	0.0003	39.0592528	-89.720806
42	0.0010	0.00018	0.0545	0.0000	39.0586652	-89.720789
346	0.0079	0.00151	0.4523	0.0002	39.0591205	-89.726002
1159	0.0265	0.00131	1.5143	0.0002	39.0601139	-89.721
455	0.0104	0.00304	0.5948	0.0008	39.0584502	-89.710336
127	0.0029	0.00138	0.1659	0.0003	39.0581332	-89.709581
353	0.0081	0.00153	0.4607	0.0002	39.057228	-89.705686
193	0.0044	0.00084	0.2527	0.0001	39.0573528	-89.721207
783	0.0179	0.00340	1.0226	0.0005	39.0582674	-89.730149
403	0.0092	0.00175	0.5263	0.0003	39.0565848	-89.705458
399	0.0091	0.00173	0.5212	0.0003	39.0565583	-89.701511
720	0.0164	0.00313	0.9399	0.0005	39.0567788	-89.700877
42	0.0010	0.00018	0.0545	0.0000	39.056191	-89.721216
196	0.0045	0.00085	0.2554	0.0001	39.0560001	-89.725523
70	0.0016	0.00030	0.0916	0.0000	39.0558834	-89.732341
509	0.0116	0.00221	0.6654	0.0003	39.0555354	-89.702193
80	0.0018	0.00035	0.1049	0.0001	39.0558181	-89.732111
1000	0.0229	0.00435	1.3069	0.0007	39.0561688	-89.733837
36	0.0008	0.00015	0.0466	0.0000	39.055721	-89.735422
59	0.0014	0.00026	0.0776	0.0000	39.0555582	-89.735538
514	0.0117	0.00223	0.6710	0.0003	39.0546154	-89.707573
448	0.0102	0.00195	0.5855	0.0003	39.0548972	-89.706095
1126	0.0257	0.00490	1.4709	0.0007	39.056357	-89.72777
590	0.0135	0.00256	0.7704	0.0004	39.0543468	-89.707633
322	0.0074	0.00140	0.4204	0.0002	39.0550584	-89.731355
73	0.0017	0.00032	0.0958	0.0000	39.0545753	-89.731823
460	0.0105	0.00200	0.6004	0.0003	39.0543629	-89.729203
760	0.0174	0.00331	0.9933	0.0005	39.0534477	-89.702375
928	0.0212	0.00403	1.2121	0.0006	39.0535731	-89.696891
208	0.0047	0.00090	0.2712	0.0001	39.0527941	-89.695758
454	0.0104	0.00197	0.5933	0.0003	39.05263	-89.704278
1624	0.0371	0.00706	2.1219	0.0011	39.0540377	-89.715445
423	0.0097	0.00184	0.5527	0.0003	39.0524735	-89.702172
256	0.0057	0.00134	0.3341	0.0003	39.0522506	-89.702336
49	0.0038	0.00111	0.0636	0.0002	39.052215	-89.702330
43	0.0011	0.00021	0.0030	0.0000	33.032213	-05./11/51

818	0.0187	0.00355	1.0679	0.0005	39.0532869	-89.71168
235	0.0054	0.00102	0.3066	0.0002	39.0520741	-89.703037
348	0.0080	0.00151	0.4546	0.0002	39.0518164	-89.711315
1084	0.0248	0.00471	1.4164	0.0007	39.0529534	-89.710829
704	0.0161	0.00306	0.9203	0.0005	39.0518483	-89.69667
57	0.0013	0.00025	0.0738	0.0000	39.0504825	-89.703806
480	0.0110	0.00209	0.6267	0.0003	39.0510835	-89.703707
41	0.0009	0.00018	0.0530	0.0000	39.0503705	-89.703739
1078	0.0247	0.00469	1.4087	0.0007	39.0515907	-89.730572
400	0.0091	0.00174	0.5223	0.0003	39.0502546	-89.696953
367	0.0084	0.00159	0.4788	0.0002	39.0501892	-89.696852
341	0.0078	0.00148	0.4459	0.0002	39.0508323	-89.729553
420	0.0076	0.00148	0.5480	0.0002	39.0502305	-89.697058
483	0.0111	0.00132	0.6316	0.0003	39.0506266	-89.730885
188	0.0043	0.00210	0.2455	0.0003	39.0504271	-89.730277
	0.0100	0.00082		0.0001	39.0495543	
438			0.5726		39.0495543	-89.712071
356	0.0081	0.00155	0.4649	0.0002		-89.711863
230	0.0053	0.00100	0.3000	0.0002	39.0493017	-89.711025
908	0.0208	0.00395	1.1858	0.0006	39.050314	-89.71064
915	0.0209	0.00398	1.1949	0.0006	39.0503216	-89.71057
180	0.0041	0.00078	0.2355	0.0001	39.0488601	-89.701761
395	0.0090	0.00172	0.5162	0.0003	39.0491262	-89.710026
54	0.0012	0.00023	0.0701	0.0000	39.0485773	-89.710567
194	0.0044	0.00084	0.2530	0.0001	39.0479569	-89.694341
98	0.0022	0.00043	0.1279	0.0001	39.0478821	-89.694152
226	0.0052	0.00098	0.2953	0.0001	39.0485731	-89.7236
220	0.0050	0.00096	0.2871	0.0001	39.0474518	-89.691989
1384	0.0316	0.00602	1.8074	0.0009	39.0490192	-89.691708
245	0.0056	0.00106	0.3195	0.0002	39.04743	-89.694114
598	0.0137	0.00260	0.7813	0.0004	39.0477515	-89.690381
579	0.0132	0.00252	0.7565	0.0004	39.0486441	-89.737198
292	0.0067	0.00127	0.3818	0.0002	39.0469629	-89.689378
367	0.0084	0.00159	0.4788	0.0002	39.0473086	-89.699135
197	0.0045	0.00086	0.2576	0.0001	39.0468791	-89.691634
223	0.0051	0.00097	0.2908	0.0001	39.0469445	-89.704864
267	0.0061	0.00116	0.3492	0.0002	39.0468452	-89.691809
42	0.0010	0.00018	0.0545	0.0000	39.0471588	-89.716228
111	0.0025	0.00048	0.1455	0.0001	39.0464848	-89.690145
59	0.0014	0.00026	0.0771	0.0000	39.046601	-89.69896
339	0.0077	0.00147	0.4425	0.0002	39.046527	-89.693472
175	0.0040	0.00076	0.2281	0.0001	39.0474634	-89.735032
1483	0.0339	0.00645	1.9374	0.0011	39.0492575	-89.73495
432	0.0099	0.00043	0.5650	0.0010	39.0492373	-89.716993
432 376	0.0099	0.00163	0.4909	0.0003	39.0470714	-89.734578
452	0.0103	0.00197	0.5909	0.0003	39.0468002	-89.734396
91	0.0021	0.00040	0.1193	0.0001	39.046204	-89.733885
39	0.0009	0.00017	0.0514	0.0000	39.0456802	-89.717457

745	0.0170	0.00324	0.9737	0.0005	39.045915	-89.728636
728	0.0167	0.00317	0.9515	0.0005	39.0460886	-89.737678
390	0.0089	0.00170	0.5099	0.0003	39.0459952	-89.734361
420	0.0096	0.00183	0.5489	0.0003	39.0453401	-89.692746
618	0.0141	0.00269	0.8079	0.0004	39.0446182	-89.688659
380	0.0087	0.00165	0.4970	0.0002	39.0461826	-89.73218
168	0.0038	0.00073	0.2188	0.0001	39.0453805	-89.73414
309	0.0071	0.00134	0.4038	0.0002	39.0456036	-89.73351
395	0.0090	0.00172	0.5164	0.0003	39.0442185	-89.682897
348	0.0080	0.00151	0.4543	0.0002	39.0441484	-89.682613
388	0.0089	0.00169	0.5072	0.0003	39.0449038	-89.708396
666	0.0152	0.00289	0.8696	0.0004	39.0446577	-89.693436
161	0.0037	0.00070	0.2099	0.0001	39.0451101	-89.733962
56	0.0013	0.00024	0.0727	0.0000	39.0436296	-89.694264
894	0.0204	0.00388	1.1672	0.0006	39.0445208	-89.713349
182	0.0042	0.00079	0.2377	0.0001	39.0428323	-89.691418
726	0.0166	0.00316	0.9481	0.0005	39.044125	-89.739929
1561	0.0357	0.00679	2.0398	0.0010	39.045696	-89.739534
77	0.0018	0.00033	0.1000	0.0001	39.0423708	-89.683069
538	0.0123	0.00234	0.7027	0.0004	39.0430315	-89.682943
105	0.0024	0.00046	0.1375	0.0001	39.0425186	-89.692056
125	0.0029	0.00054	0.1636	0.0001	39.0424573	-89.71149
111	0.0025	0.00048	0.1455	0.0001	39.0424267	-89.710885
400	0.0091	0.00174	0.5226	0.0003	39.0419595	-89.689122
504	0.0115	0.00219	0.6587	0.0003	39.0418244	-89.688877
478	0.0109	0.00208	0.6245	0.0003	39.0420112	-89.700541
257	0.0059	0.00112	0.3358	0.0002	39.041947	-89.700184
51	0.0012	0.00022	0.0669	0.0000	39.0415972	-89.692647
293	0.0067	0.00128	0.3833	0.0002	39.0417866	-89.699294
647	0.0148	0.00281	0.8458	0.0004	39.0413784	-89.690661
383	0.0088	0.00166	0.5000	0.0003	39.0411613	-89.683299
584	0.0133	0.00254	0.7626	0.0004	39.0415648	-89.682769
489	0.0112	0.00213	0.6394	0.0003	39.0420479	-89.706831
390	0.0089	0.00169	0.5091	0.0003	39.0422043	-89.732658
137	0.0031	0.00060	0.1789	0.0001	39.040599	-89.682814
174	0.0040	0.00076	0.2270	0.0001	39.040642	-89.682742
129	0.0029	0.00056	0.1681	0.0001	39.0404628	-89.683068
437	0.0100	0.00190	0.5703	0.0003	39.0424143	-89.737892
925	0.0212	0.00402	1.2085	0.0006	39.0429433	-89.738289
208	0.0048	0.00091	0.2723	0.0001	39.0415369	-89.723835
792	0.0181	0.00344	1.0341	0.0005	39.0402019	-89.681583
314	0.0072	0.00136	0.4101	0.0002	39.0398928	-89.691634
164	0.0037	0.00071	0.2137	0.0001	39.0406467	-89.723904
456	0.0104	0.00198	0.5951	0.0003	39.0406775	-89.731256
391	0.0089	0.00170	0.5113	0.0003	39.0406477	-89.736821
512	0.0117	0.00222	0.6682	0.0003	39.0391107	-89.69222
302	0.0069	0.00131	0.3947	0.0002	39.0402342	-89.730016

281	0.0064	0.00122	0.3667	0.0002	39.0398315	-89.712513
97	0.0022	0.00042	0.1273	0.0001	39.0394203	-89.70827
648	0.0148	0.00282	0.8465	0.0004	39.0391326	-89.699835
620	0.0142	0.00269	0.8096	0.0004	39.0397608	-89.714907
334	0.0076	0.00145	0.4364	0.0002	39.039863	-89.735885
36	0.0008	0.00015	0.0466	0.0000	39.0380362	-89.682664
625	0.0143	0.00272	0.8159	0.0004	39.0397479	-89.727833
51	0.0012	0.00022	0.0669	0.0000	39.0386485	-89.714508
1090	0.0249	0.00474	1.4241	0.0007	39.0389589	-89.733049
97	0.0022	0.00042	0.1273	0.0001	39.0388755	-89.727215
252	0.0058	0.00110	0.3295	0.0002	39.038645	-89.722459
310	0.0071	0.00135	0.4053	0.0002	39.0389005	-89.736735
1523	0.0348	0.00662	1.9899	0.0010	39.0387869	-89.732699
51	0.0012	0.00022	0.0669	0.0000	39.0369615	-89.682676
1500	0.0343	0.00652	1.9592	0.0010	39.0383242	-89.732583
368	0.0084	0.00160	0.4807	0.0002	39.0367993	-89.683621
56	0.0013	0.00024	0.0727	0.0002	39.037767	-89.731511
1278	0.0292	0.00556	1.6694	0.0008	39.0385467	-89.703528
97	0.0022	0.000330	0.1273	0.0001	39.0361992	-89.676817
209	0.0022	0.00042	0.1273	0.0001	39.0301992	-89.726473
292	0.0048	0.00031	0.3808	0.0001	39.0370923	-89.678259
389	0.0089	0.00127	0.5081	0.0002	39.0366237	-89.678183
263	0.0060	0.00114	0.3432	0.0002	39.0377417	-89.735891
1867	0.0427	0.00812	2.4394	0.0012	39.0380059	-89.739321
285	0.0065	0.00124	0.3729	0.0002	39.0367187	-89.708626
465	0.0106	0.00202	0.6075	0.0003	39.0371642	-89.729893
136	0.0031	0.00059	0.1783	0.0001	39.0361508	-89.693625
286	0.0065	0.00125	0.3742	0.0002	39.035533	-89.68281
241	0.0055	0.00105	0.3150	0.0002	39.0356808	-89.678297
249	0.0057	0.00108	0.3257	0.0002	39.0356677	-89.678228
173	0.0040	0.00075	0.2257	0.0001	39.036682	-89.728692
250	0.0057	0.00109	0.3264	0.0002	39.0363954	-89.716276
111	0.0025	0.00048	0.1455	0.0001	39.0344805	-89.691849
247	0.0056	0.00107	0.3228	0.0002	39.0340489	-89.683129
544	0.0124	0.00236	0.7104	0.0004	39.0358448	-89.729918
35	0.0008	0.00015	0.0455	0.0000	39.0338097	-89.679017
650	0.0149	0.00283	0.8491	0.0004	39.0346659	-89.678933
292	0.0067	0.00127	0.3818	0.0002	39.0351048	-89.727667
338	0.0077	0.00147	0.4421	0.0002	39.0340313	-89.68527
818	0.0187	0.00356	1.0689	0.0005	39.0346208	-89.688707
498	0.0114	0.00216	0.6503	0.0003	39.0343229	-89.688097
267	0.0061	0.00116	0.3487	0.0002	39.03498	-89.740513
722	0.0165	0.00314	0.9430	0.0005	39.0355791	-89.740975
186	0.0043	0.00081	0.2432	0.0001	39.0334441	-89.688242
42	0.0010	0.00018	0.0545	0.0000	39.0326977	-89.684778
654	0.0150	0.00284	0.8546	0.0004	39.0331173	-89.678192
1329	0.0304	0.00578	1.7355	0.0009	39.0342812	-89.677323

785	0.0179	0.00341	1.0251	0.0005	39.0327003	-89.68298
63	0.0014	0.00027	0.0818	0.0000	39.0314136	-89.686891
376	0.0086	0.00163	0.4906	0.0002	39.0314414	-89.686208
1006	0.0230	0.00437	1.3143	0.0007	39.0340126	-89.738804
668	0.0153	0.00290	0.8723	0.0004	39.0336505	-89.738475
346	0.0079	0.00150	0.4521	0.0002	39.0311156	-89.686335
1331	0.0304	0.00579	1.7389	0.0009	39.0336841	-89.73557
1456	0.0333	0.00633	1.9025	0.0010	39.0338965	-89.735422
7	0.0002	0.00003	0.0091	0.0000	39.0320251	-89.734661
42	0.0010	0.00018	0.0545	0.0000	39.0320741	-89.734719
513	0.0117	0.00223	0.6701	0.0003	39.0327355	-89.734637
223	0.0051	0.00097	0.2918	0.0001	39.030827	-89.691192
198	0.0045	0.00086	0.2585	0.0001	39.0319186	-89.734969
41	0.0009	0.00018	0.0530	0.0000	39.0313082	-89.720463
176	0.0040	0.00076	0.2295	0.0001	39.031495	-89.720238
1521	0.0348	0.00661	1.9866	0.0010	39.0317449	-89.682706
414	0.0095	0.00180	0.5403	0.0003	39.0321985	-89.738438
1873	0.0428	0.00814	2.4462	0.0012	39.0303565	-89.723167
283	0.0065	0.00123	0.3694	0.0002	39.0293253	-89.69336
1301	0.0298	0.00566	1.6999	0.0008	39.0315647	-89.730359
237	0.0054	0.00103	0.3098	0.0002	39.0304124	-89.728993
482	0.0110	0.00210	0.6303	0.0003	39.0284842	-89.686753
146	0.0033	0.00064	0.1909	0.0001	39.0283172	-89.687763
153	0.0035	0.00067	0.2000	0.0001	39.0277638	-89.688023
70	0.0016	0.00030	0.0909	0.0000	39.0282826	-89.729159
732	0.0167	0.00318	0.9566	0.0005	39.0292152	-89.728978
899	0.0206	0.00391	1.1747	0.0006	39.0289619	-89.725088
511	0.0117	0.00222	0.6681	0.0003	39.0282923	-89.719809
299	0.0068	0.00130	0.3909	0.0002	39.0281919	-89.719488
1254	0.0287	0.00545	1.6378	0.0008	39.0279266	-89.685643
483	0.0111	0.00210	0.6314	0.0003	39.0275372	
313	0.0072	0.00136	0.4091	0.0003	39.0275509	-89.71737
77	0.0018	0.00033	0.1000	0.0001	39.0271868	-89.717872
239	0.0055	0.00104	0.3121	0.0001	39.0259727	-89.691549
111	0.0025	0.00101	0.1455	0.0001	39.0257339	-89.693124
398	0.0023	0.00173	0.5201	0.0001	39.0258166	-89.713413
645	0.0148	0.00281	0.8430	0.0003	39.0257082	-89.698086
42	0.0010	0.00018	0.0545	0.0000	39.024963	-89.69879
56	0.0013	0.00014	0.0727	0.0000	39.0253205	-89.730976
559	0.0128	0.00243	0.7296	0.0004	39.0240897	-89.691256
968	0.0221	0.00243	1.2639	0.0004	39.0238765	-89.690065
146	0.0033	0.000421	0.1909	0.0001	39.023268	-89.691706
35	0.0008	0.00004	0.1909	0.0001	39.023208	-89.692118
34	0.0008	0.00015	0.0450	0.0000	39.0229348	-89.692102
48	0.0008	0.00013	0.0430	0.0000	39.0228823	-89.6922
475	0.011	0.00021	0.6207	0.0003	39.02288226	-89.691011
475 456				0.0003		
450	0.0104	0.00198	0.5951	0.0003	39.023257	-89.692702

326	0.0075	0.00142	0.4261	0.0002	39.0238975	-89.720423
652	0.0149	0.00283	0.8518	0.0004	39.0226518	-89.690708
139	0.0032	0.00060	0.1814	0.0001	39.022976	-89.729283
306	0.0070	0.00133	0.4000	0.0002	39.0220484	-89.70892
418	0.0096	0.00182	0.5464	0.0003	39.0225302	-89.717576
104	0.0024	0.00045	0.1364	0.0001	39.0220542	-89.717468
748	0.0171	0.00325	0.9765	0.0005	39.0227475	-89.717878
125	0.0029	0.00054	0.1636	0.0001	39.0218396	-89.717764
664	0.0152	0.00289	0.8679	0.0004	39.0225814	-89.717955
28	0.0006	0.00012	0.0364	0.0000	39.0216965	-89.717961
54	0.0012	0.00023	0.0701	0.0000	39.0210075	-89.69695
239	0.0055	0.00104	0.3121	0.0002	39.0212337	-89.699136
175	0.0040	0.00076	0.2290	0.0001	39.0207042	-89.693488
613	0.0140	0.00267	0.8014	0.0001	39.0205809	-89.692175
583	0.0133	0.00257	0.7609	0.0004	39.0214384	-89.712188
344	0.0133	0.00233	0.4489	0.0004	39.0212115	-89.718053
42	0.0079	0.00143	0.0545	0.0002	39.0212113	-89.718033
489	0.0010	0.00018	0.6385	0.0003	39.0202606	-89.711156
					39.0202000	
1308	0.0299	0.00569	1.7088	0.0009		-89.691191
136	0.0031	0.00059	0.1783	0.0001	39.0200704	-89.71821
1281	0.0293	0.00557	1.6739	0.0008	39.0194917	-89.728973
812	0.0186	0.00353	1.0602	0.0005	39.0185604	-89.725568
207	0.0047	0.00090	0.2700	0.0001	39.0178912	-89.725793
84	0.0019	0.00036	0.1093	0.0001	39.017867	-89.724937
90	0.0021	0.00039	0.1182	0.0001	39.0179474	-89.724674
308	0.0070	0.00134	0.4028	0.0002	39.0177366	-89.719366
1005	0.0230	0.00437	1.3128	0.0007	39.01813	-89.717305
121	0.0028	0.00053	0.1585	0.0001	39.0178141	-89.724977
28	0.0006	0.00012	0.0364	0.0000	39.0176667	-89.718806
677	0.0155	0.00294	0.8838	0.0004	39.0177964	-89.711802
331	0.0076	0.00144	0.4327		39.0171732	
352	0.0080	0.00153	0.4595	0.0002	39.0175861	-89.718175
170	0.0039	0.00074	0.2221	0.0001	39.0168237	-89.710986
732	0.0167	0.00318	0.9557	0.0005	39.0168789	-89.718358
656	0.0150	0.00285	0.8570	0.0004	39.015939	-89.723652
550	0.0126	0.00239	0.7183	0.0004	39.0149774	-89.711636
1704	0.0390	0.00741	2.2259	0.0011	39.0148961	-89.6895
1198	0.0274	0.00521	1.5655	0.0008	39.0147946	-89.689579
1934	0.0442	0.00841	2.5261	0.0013	39.0165589	-89.728379
1627	0.0372	0.00707	2.1254	0.0011	39.0147246	-89.729406
84	0.0019	0.00036	0.1093	0.0001	39.0140456	-89.726465
118	0.0027	0.00051	0.1546	0.0001	39.0141603	-89.726459
686	0.0157	0.00298	0.8967	0.0004	39.0139276	-89.725158
136	0.0031	0.00059	0.1783	0.0001	39.0135748	-89.714997
154	0.0035	0.00067	0.2018	0.0001	39.0124672	-89.724163
83	0.0019	0.00036	0.1086	0.0001	39.0116868	-89.723811
243	0.0056	0.00106	0.3175	0.0002	39.0099361	-89.725447

75	0.0017	0.00033	0.0984	0.0000	39.0091327	-89.718335
514	0.0117	0.00223	0.6709	0.0003	39.0054973	-89.727024
89	0.0020	0.00039	0.1157	0.0001	38.998821	-89.699417
51	0.0012	0.00022	0.0669	0.0000	38.9988062	-89.7008
609	0.0139	0.00265	0.7951	0.0004	38.9987192	-89.699917
184	0.0042	0.00080	0.2408	0.0001	38.9938999	-89.703129
71	0.0016	0.00031	0.0927	0.0000	38.9930867	-89.694593
1523	0.0348	0.00662	1.9895	0.0010	38.9940414	-89.697307
1003	0.0229	0.00436	1.3098	0.0007	38.993282	-89.696524
194	0.0044	0.00084	0.2536	0.0001	38.991878	-89.699501
259	0.0059	0.00113	0.3388	0.0002	38.9891381	-89.701985
1124	0.0257	0.00489	1.4681	0.0007	38.9880167	-89.70031
886	0.0203	0.00385	1.1576	0.0006	38.9941187	-89.688589
585	0.0134	0.00254	0.7647	0.0004	38.9932288	-89.688506
36	0.0008	0.00015	0.0466	0.0000	38.9919714	-89.69403
45	0.0010	0.00020	0.0594	0.0000	38.9919861	-89.693987
918	0.0210	0.00399	1.1997	0.0006	38.9923009	-89.686605
402	0.0092	0.00175	0.5254	0.0003	38.9911405	-89.685954
100	0.0023	0.00173	0.1312	0.0003	38.9906673	-89.694567
71	0.0016	0.00031	0.0927	0.0000	38.990113	-89.694559
169	0.0010	0.00031	0.2204	0.0001	38.9899108	-89.687509
40	0.0009	0.00073	0.0519	0.0001	38.9896009	-89.684023
290	0.0066	0.00017	0.3791	0.0000	38.9896065	-89.68874
200	0.0046	0.00120	0.2607	0.0002	38.9893078	-89.6933
558	0.0128	0.00087	0.7294	0.0001	38.9895215	-89.698432
					38.9893535	-89.694151
716	0.0164	0.00311 0.00019	0.9352	0.0005 0.0000	38.9881498	
44	0.0010		0.0579		38.9883986	-89.6806
220	0.0050	0.00096	0.2871	0.0001		-89.680476
443	0.0101	0.00193	0.5791	0.0003	38.9874733	-89.689081
1198	0.0274	0.00521	1.5655	0.0008	38.9879455	-89.683717
40	0.0009	0.00017	0.0519	0.0000	38.9864542	-89.69023
1124	0.0257	0.00489	1.4681	0.0007	38.9880167	-89.70031
1200	0.0274	0.00522	1.5671	0.0008	38.9871506	-89.683076
706	0.0161	0.00307	0.9218	0.0005	38.9866276	-89.698054
118	0.0027	0.00051	0.1543	0.0001	38.9856832	-89.68365
98	0.0023	0.00043	0.1286	0.0001	38.9852774	-89.683634
183	0.0042	0.00080	0.2392	0.0001	38.9856871	-89.702512
1062	0.0243	0.00462	1.3872	0.0007	38.9858258	-89.703346
108	0.0025	0.00047	0.1414	0.0001	38.9848851	-89.683618
213	0.0049	0.00093	0.2784	0.0001	38.9849059	-89.682457
1945	0.0445	0.00846	2.5407	0.0013	38.9855588	-89.680379
560	0.0128	0.00243	0.7316	0.0004	38.9849087	-89.690334
431	0.0098	0.00187	0.5625	0.0003	38.9850495	-89.702087
743	0.0170	0.00323	0.9701	0.0005	38.9850436	-89.694797
55	0.0013	0.00024	0.0723	0.0000	38.9840812	-89.699018
43	0.0010	0.00019	0.0568	0.0000	38.9840903	-89.70219
232	0.0053	0.00101	0.3024	0.0002	38.9838463	-89.69444

51	0.0012	0.00022	0.0669	0.0000	38.9838328	-89.702638
51	0.0012	0.00022	0.0669	0.0000	38.9838176	-89.703054
71	0.0016	0.00031	0.0927	0.0000	38.9838004	-89.703401
783	0.0179	0.00341	1.0234	0.0005	38.9837681	-89.682855
1341	0.0307	0.00583	1.7523	0.0009	38.9832185	-89.685508
48	0.0011	0.00021	0.0621	0.0000	38.9814739	-89.683072
429	0.0098	0.00186	0.5600	0.0003	38.9806484	-89.682888
602	0.0138	0.00262	0.7868	0.0004	38.9813921	-89.693753
702	0.0161	0.00305	0.9172	0.0005	38.9811145	-89.694486
136	0.0031	0.00059	0.1771	0.0001	38.9805829	-89.693513
1332	0.0305	0.00579	1.7400	0.0009	38.9813533	-89.700823
123	0.0028	0.00053	0.1605	0.0001	38.9781679	-89.695068
117	0.0027	0.00051	0.1530	0.0001	38.9770028	-89.684599
791	0.0181	0.00344	1.0331	0.0005	38.9777945	-89.685628
73	0.0017	0.00032	0.0958	0.0000	38.9756247	-89.679337
103	0.0017	0.00032	0.1344	0.0001	38.9755508	-89.707841
433	0.0024	0.00043	0.5653	0.0001	38.9744965	-89.688188
1201	0.0274	0.00188	1.5683	0.0003	38.9736478	-89.677179
402	0.0092	0.00175	0.5250	0.0003	38.973938	-89.681671
69	0.0016	0.00030	0.0905	0.0000	38.9734282	-89.67896
839	0.0192	0.00365	1.0957	0.0005	38.9745614	-89.690332
569	0.0130	0.00247	0.7428	0.0004	38.9727461	-89.679757
40	0.0009	0.00017	0.0519	0.0000	38.9712986	-89.684873
307	0.0070	0.00133	0.4009	0.0002	38.9721648	-89.709386
325	0.0074	0.00141	0.4241	0.0002	38.9692346	-89.688237
299	0.0068	0.00130	0.3904	0.0002	38.9692103	-89.689278
136	0.0031	0.00059	0.1771	0.0001	38.969189	-89.688573
794	0.0182	0.00345	1.0376	0.0005	38.9670608	-89.6812
1058	0.0242	0.00460	1.3820	0.0007	38.9678067	-89.685163
124	0.0028	0.00054	0.1623	0.0001	38.9657591	-89.724216
827	0.0189	0.00360	1.0803	0.0005	38.9644204	-89.681062
481	0.0110	0.00209	0.6287	0.0003	38.9642812	-89.684614
788	0.0180	0.00343	1.0298	0.0005	38.9636884	-89.683291
574	0.0131	0.00249	0.7496	0.0004	38.9652993	-89.722957
764	0.0175	0.00332	0.9984	0.0005	38.9650889	-89.722117
170	0.0039	0.00074	0.2226	0.0001	38.9637315	-89.688863
370	0.0085	0.00161	0.4831	0.0002	38.9647114	-89.724334
169	0.0039	0.00074	0.2210	0.0001	38.964337	-89.7242
162	0.0037	0.00070	0.2110	0.0001	38.9643275	-89.723105
981	0.0224	0.00427	1.2817	0.0006	38.9645956	-89.721774
78	0.0018	0.00034	0.1018	0.0001	38.9640196	-89.723178
412	0.0094	0.00179	0.5385	0.0003	38.9641308	-89.725468
379	0.0087	0.00165	0.4953	0.0002	38.9639972	-89.724968
142	0.0032	0.00062	0.1856	0.0001	38.9635294	-89.725648
894	0.0204	0.00389	1.1678	0.0001	38.96282	-89.681948
664	0.0152	0.00389	0.8673	0.0004	38.9608901	-89.698999
745	0.0132	0.00289	0.9737	0.0004	38.9595384	-89.685597
743	0.01/0	0.00324	0.3/3/	0.0003	30.333304	03.003337

546	0.0125	0.00237	0.7130	0.0004	38.9599474	-89.689453
375	0.0086	0.00163	0.4904	0.0002	38.9593445	-89.68796
505	0.0115	0.00219	0.6594	0.0003	38.957986	-89.686654
787	0.0180	0.00342	1.0280	0.0005	38.9581851	-89.681437
72	0.0016	0.00031	0.0942	0.0000	38.9571775	-89.681305
204	0.0047	0.00089	0.2667	0.0001	38.9568717	-89.68142
118	0.0027	0.00051	0.1543	0.0001	38.9563514	-89.682354
551	0.0126	0.00239	0.7196	0.0004	38.9580514	-89.731702
382	0.0087	0.00166	0.4984	0.0002	38.9563238	-89.691112
200	0.0046	0.00087	0.2618	0.0001	38.9565117	-89.70519
937	0.0214	0.00407	1.2236	0.0006	38.9569072	-89.704371
380	0.0087	0.00165	0.4962	0.0002	38.9561968	-89.698715
2157	0.0493	0.00938	2.8175	0.0014	38.9573733	-89.696268
952	0.0218	0.00414	1.2436	0.0006	38.9557591	-89.696164
433	0.0099	0.00188	0.5656	0.0003	38.9559062	-89.705832
914	0.0209	0.00397	1.1937	0.0006	38.9565936	-89.701241
59	0.0014	0.00026	0.0771	0.0000	38.95551	-89.699284
616	0.0141	0.00268	0.8043	0.0004	38.9556679	-89.682697
1013	0.0232	0.00441	1.3236	0.0007	38.9543428	-89.69673
398	0.0091	0.00173	0.5194	0.0007	38.9538222	-89.694932
1278	0.0292	0.00175	1.6688	0.0003	38.9536725	-89.69312
985	0.0232	0.00333	1.2868	0.0006	38.9535602	-89.700566
240	0.0055	0.00428	0.3131	0.0000	39.042428	-89.746227
624	0.0143	0.00104	0.8157	0.0002	39.0400284	-89.74278
316	0.0072	0.00271	0.4130	0.0004	39.0397697	-89.742235
1261	0.0288	0.00137	1.6476	0.0002	39.0397097	-89.740667
1933	0.0442	0.00348	2.5251	0.0008	39.0382009	-89.744629
1203	0.0442	0.00523	1.5709	0.0013	39.0382454	-89.746152
7	0.0002	0.00323	0.0091	0.0000	39.0332054	-89.747449
188			0.2455		39.0334012	-89.747682
	0.0043	0.00082 0.00468		0.0001		
1076	0.0246 0.0313	0.00468	1.4057	0.0007	39.0346879 39.0350198	-89.747389
1371			1.7909	0.0009		-89.747201
466	0.0106	0.00202	0.6084	0.0003	39.0326828	-89.746138
176	0.0040	0.00077	0.2301	0.0001	39.0316472	-89.746573
146	0.0033	0.00064	0.1909	0.0001	39.0310877	-89.740841
495	0.0113	0.00215	0.6462	0.0003	39.0316192	-89.740635
391	0.0089	0.00170	0.5103	0.0003	39.0301122	-89.745801
237	0.0054	0.00103	0.3091	0.0002	39.029327	-89.743824
419	0.0096	0.00182	0.5467	0.0003	39.0287426	-89.737684
1754	0.0401	0.00763	2.2911	0.0011	39.0305493	-89.739056
1135	0.0260	0.00494	1.4829	0.0007	39.0297008	-89.739649
111	0.0025	0.00048	0.1455	0.0001	39.028208	-89.741987
188	0.0043	0.00082	0.2455	0.0001	39.0278067	-89.73997
172	0.0039	0.00075	0.2250	0.0001	39.0278541	-89.739734
223	0.0051	0.00097	0.2908	0.0001	39.0277974	-89.739217
511	0.0117	0.00222	0.6670	0.0003	39.027599	-89.738262
374	0.0085	0.00162	0.4879	0.0002	39.0271707	-89.744026

102	0.0023	0.00044	0.1337	0.0001	39.0272479	-89.743238
311	0.0071	0.00135	0.4064	0.0002	39.0273055	-89.739372
400	0.0091	0.00174	0.5221	0.0003	39.0270076	-89.743994
50	0.0011	0.00022	0.0647	0.0000	39.0245876	-89.74031
1381	0.0316	0.00600	1.8038	0.0009	39.0251139	-89.747829
239	0.0055	0.00104	0.3121	0.0002	39.0236492	-89.745812
1905	0.0436	0.00828	2.4890	0.0012	39.0261997	-89.755212
76	0.0017	0.00033	0.0991	0.0000	39.0237119	-89.755614
413	0.0094	0.00180	0.5394	0.0003	39.0242743	-89.755455
162	0.0037	0.00070	0.2113	0.0001	39.0238013	-89.755245
135	0.0031	0.00059	0.1760	0.0001	39.0238048	-89.757335
907	0.0207	0.00394	1.1842	0.0006	39.0243951	-89.759087
657	0.0150	0.00286	0.8587	0.0004	39.0232769	-89.738286
121	0.0028	0.00053	0.1579	0.0001	39.023578	-89.759372
1028	0.0235	0.00447	1.3424	0.0001	39.0232978	-89.737682
277	0.0063	0.00121	0.3621	0.0007	39.022735	-89.739607
1451	0.0332	0.00121	1.8956	0.0002	39.022733	-89.737625
334	0.0076	0.00031	0.4364	0.0003	39.0211803	-89.73555
519	0.0119	0.00226	0.6784	0.0003	39.021211	-89.742802
969	0.0222	0.00421	1.2659	0.0006	39.0214343	-89.74337
1148	0.0263	0.00499	1.4999	0.0007	39.0207593	-89.738021
404	0.0092	0.00175	0.5273	0.0003	39.0195913	-89.739733
473	0.0108	0.00206	0.6177	0.0003	39.0181681	-89.740292
502	0.0115	0.00218	0.6562	0.0003	39.0173432	-89.740518
139	0.0032	0.00061	0.1818	0.0001	39.0144435	-89.750345
626	0.0143	0.00272	0.8182	0.0004	39.014457	-89.734946
320	0.0073	0.00139	0.4182	0.0002	39.0141251	-89.733714
1128	0.0258	0.00490	1.4737	0.0007	39.0144297	-89.758064
230	0.0053	0.00100	0.3000	0.0002	39.014605	-89.756356
759	0.0174	0.00330	0.9916	0.0005	39.0142439	-89.757215
84	0.0019	0.00036	0.1091	0.0001	39.0142904	-89.755981
293	0.0067	0.00127	0.3824	0.0002	39.0141124	-89.755413
569	0.0130	0.00247	0.7427	0.0004	39.0143291	-89.745517
291	0.0066	0.00126	0.3796	0.0002	39.0118485	-89.745984
252	0.0058	0.00109	0.3286	0.0002	39.0111949	-89.735789
88	0.0020	0.00038	0.1151	0.0001	39.0101977	-89.737186
187	0.0043	0.00081	0.2436	0.0001	39.0100779	-89.736828
117	0.0027	0.00051	0.1525	0.0001	39.0105312	-89.750358
376	0.0086	0.00163	0.4910	0.0002	39.0105641	-89.737688
174	0.0040	0.00076	0.2270	0.0001	39.0100949	-89.737433
43	0.0010	0.00019	0.0557	0.0000	39.00979	-89.754958
533	0.0122	0.00232	0.6964	0.0003	39.0103164	-89.755989
171	0.0039	0.00074	0.2228	0.0001	39.0092935	-89.738725
700	0.0160	0.00305	0.9150	0.0005	39.0101557	-89.738539
700	0.0002	0.00003	0.0091	0.0000	39.0096843	-89.754832
28	0.0002	0.00003	0.0364	0.0000	39.0090843	-89.754873
62	0.0004	0.00012	0.0304	0.0000	39.0097193	-89.754757
UΖ	0.0014	0.00027	0.0014	0.0000	33.003/43	-03.734737

307	0.0070	0.00133	0.4004	0.0002	39.0097075	-89.755419
367	0.0084	0.00160	0.4800	0.0002	39.0096498	-89.756254
1444	0.0330	0.00628	1.8867	0.0009	39.0102839	-89.732717
303	0.0069	0.00132	0.3960	0.0002	39.0087801	-89.746969
617	0.0141	0.00268	0.8066	0.0004	39.0087571	-89.755957
277	0.0063	0.00120	0.3618	0.0002	39.0070703	-89.732508
382	0.0087	0.00166	0.4993	0.0002	39.0075538	-89.754478
579	0.0132	0.00252	0.7560	0.0004	39.006215	-89.733045
1157	0.0265	0.00503	1.5116	0.0008	39.0076923	-89.738444
1686	0.0385	0.00733	2.2024	0.0011	39.0078124	-89.737711
571	0.0130	0.00248	0.7454	0.0004	39.0065539	-89.753571
51	0.0012	0.00022	0.0669	0.0000	39.0060551	-89.752378
947	0.0216	0.00412	1.2366	0.0006	39.0067799	-89.758368
39	0.0009	0.00017	0.0514	0.0000	39.0059172	-89.757108
128	0.0029	0.00056	0.1671	0.0001	39.0059033	-89.757577
142	0.0023	0.00062	0.1853	0.0001	39.0058368	-89.764878
270	0.0062	0.00002	0.3525	0.0001	39.0058308	-89.766232
71	0.0016	0.00117	0.0927	0.0002	39.0058203	-89.766964
					39.0053485	-89.773362
124	0.0028	0.00054	0.1623	0.0001		
539	0.0123	0.00234	0.7046	0.0004	39.0053367	-89.762417
383	0.0088	0.00167	0.5006	0.0003	39.0047591	-89.774601
130	0.0030	0.00057	0.1698	0.0001	39.0041511	-89.773347
94	0.0021	0.00041	0.1226	0.0001	39.0033073	-89.753655
1371	0.0313	0.00596	1.7912	0.0009	39.0045221	-89.752583
55	0.0013	0.00024	0.0723	0.0000	39.0038216	-89.773362
1189	0.0272	0.00517	1.5526	0.0008	39.0047806	-89.757559
122	0.0028	0.00053	0.1590	0.0001	39.0032867	-89.757227
257	0.0059	0.00112	0.3355	0.0002	39.0031286	-89.753162
337	0.0077	0.00146	0.4399	0.0002	39.0036767	-89.766824
355	0.0081	0.00154	0.4638	0.0002	39.002403	-89.733073
1362	0.0311	0.00592	1.7789		39.0047712	-89.760399
118	0.0027	0.00051	0.1541	0.0001	39.0030304	-89.769364
437	0.0100	0.00190	0.5709	0.0003	39.0033773	-89.769276
431	0.0098	0.00187	0.5627	0.0003	39.0035377	-89.774986
332	0.0076	0.00144	0.4338	0.0002	39.0028072	-89.757476
787	0.0180	0.00342	1.0283	0.0005	39.0020421	-89.752866
279	0.0064	0.00121	0.3640	0.0002	39.0022115	-89.766933
979	0.0224	0.00426	1.2786	0.0006	39.0020945	-89.768296
1862	0.0426	0.00810	2.4329	0.0012	39.0037235	-89.777281
748	0.0171	0.00325	0.9767	0.0005	39.0029002	-89.776329
7	0.0002	0.00003	0.0091	0.0000	39.0018175	-89.77315
533	0.0122	0.00232	0.6968	0.0003	39.0024354	-89.77309
59	0.0014	0.00026	0.0771	0.0000	39.0018211	-89.773037
168	0.0038	0.00073	0.2188	0.0001	39.0019276	-89.77272
129	0.0030	0.00056	0.1687	0.0001	39.0018119	-89.772706
169	0.0039	0.00074	0.2212	0.0001	39.001451	-89.76266
171	0.0039	0.00074	0.2228	0.0001	39.0005131	-89.735767
1/1	0.0033	0.00074	0.2220	0.0001	33.0003131	03.733707

567	0.0130	0.00247	0.7407	0.0004	39.0011225	-89.735664
707	0.0162	0.00307	0.9237	0.0005	39.0016756	-89.75494
488	0.0112	0.00212	0.6381	0.0003	39.0016142	-89.776371
133	0.0030	0.00058	0.1740	0.0001	39.0010445	-89.776212
180	0.0041	0.00078	0.2355	0.0001	39.0005631	-89.758103
481	0.0110	0.00209	0.6286	0.0003	39.0001028	-89.734843
831	0.0190	0.00361	1.0852	0.0005	39.0008451	-89.777788
1018	0.0233	0.00442	1.3293	0.0007	39.0012214	-89.766276
692	0.0158	0.00301	0.9037	0.0005	38.9990265	-89.735215
111	0.0025	0.00048	0.1450	0.0001	38.99873	-89.751292
637	0.0146	0.00277	0.8318	0.0004	38.9986757	-89.753287
366	0.0084	0.00159	0.4780	0.0002	38.9988113	-89.759113
536	0.0123	0.00233	0.7006	0.0004	38.9980668	-89.731866
182	0.0042	0.00079	0.2377	0.0001	38.9972533	-89.73198
52	0.0012	0.00073	0.0674	0.0001	38.9976066	-89.764697
448	0.012	0.00022	0.5857	0.0003	38.9970703	-89.728819
863	0.0103	0.00193	1.1276	0.0003	38.9966583	-89.734011
				0.0000	38.9969017	
320	0.0073	0.00139	0.4181			-89.764741
593	0.0136	0.00258	0.7744	0.0004	38.9953388	-89.738956
171	0.0039	0.00074	0.2233	0.0001	38.9953705	-89.738283
48	0.0011	0.00021	0.0621	0.0000	38.9942884	-89.733358
273	0.0062	0.00119	0.3565	0.0002	38.9944626	-89.731364
144	0.0033	0.00063	0.1884	0.0001	38.9950073	-89.774168
701	0.0160	0.00305	0.9152	0.0005	38.9942946	-89.774722
1241	0.0284	0.00540	1.6213	0.0008	38.9950607	-89.770821
668	0.0153	0.00291	0.8729	0.0004	38.9944059	-89.770742
1013	0.0232	0.00440	1.3229	0.0007	38.9939061	-89.73842
2110	0.0482	0.00917	2.7558	0.0014	38.9947413	-89.736841
137	0.0031	0.00060	0.1794	0.0001	38.9932039	-89.772202
1002	0.0229	0.00436	1.3092	0.0007	38.9943441	-89.771542
184	0.0042	0.00080	0.2408	0.0001	38.9918896	-89.737369
914	0.0209	0.00397	1.1940	0.0006	38.9926821	-89.734518
50	0.0011	0.00022	0.0647	0.0000	38.9915923	-89.740652
541	0.0124	0.00235	0.7070	0.0004	38.992904	-89.770811
549	0.0126	0.00239	0.7172	0.0004	38.9925109	-89.77169
466	0.0106	0.00202	0.6081	0.0003	38.9924057	-89.767543
211	0.0048	0.00092	0.2756	0.0001	38.9921092	-89.767098
45	0.0010	0.00020	0.0594	0.0000	38.9918146	-89.770652
673	0.0154	0.00293	0.8791	0.0004	38.9914163	-89.766338
317	0.0072	0.00138	0.4142	0.0002	38.9910889	-89.765072
381	0.0087	0.00166	0.4976	0.0002	38.9908347	-89.771328
1365	0.0312	0.00593	1.7826	0.0009	38.9853909	-89.770483
451	0.0103	0.00196	0.5893	0.0003	38.9822178	-89.769761
71	0.0016	0.00031	0.0927	0.0000	38.9816033	-89.769143
848	0.0194	0.00368	1.1072	0.0006	38.9819877	-89.750705
51	0.0012	0.00022	0.0669	0.0000	38.9812244	-89.769126
81	0.0018	0.00035	0.1055	0.0001	38.9808051	-89.76911

77	0.0018	0.00033	0.1007	0.0001	38.9793248	-89.754982
120	0.0027	0.00052	0.1563	0.0001	38.9793212	-89.767754
774	0.0177	0.00337	1.0115	0.0005	38.9792452	-89.75415
318	0.0073	0.00138	0.4155	0.0002	38.9778965	-89.751862
45	0.0010	0.00020	0.0594	0.0000	38.9772978	-89.751869
190	0.0043	0.00082	0.2479	0.0001	38.9741047	-89.753099
66	0.0015	0.00028	0.0856	0.0000	38.9503998	-89.741529
169	0.0039	0.00073	0.2206	0.0001	38.9582248	-89.756387
753	0.0172	0.00327	0.9837	0.0005	38.9589273	-89.756379
777	0.0178	0.00338	1.0154	0.0005	38.9586637	-89.755651
411	0.0094	0.00179	0.5368	0.0003	38.9579147	-89.755624
170	0.0039	0.00074	0.2226	0.0001	38.9575817	-89.748772
178	0.0041	0.00077	0.2319	0.0001	38.9575793	-89.749734
747	0.0171	0.00325	0.9755	0.0005	38.9576401	-89.751057
81	0.0018	0.00035	0.1055	0.0001	38.9564664	-89.750141
1901	0.0435	0.00826	2.4827	0.0012	38.9565936	-89.75314
974	0.0223	0.00423	1.2724	0.0006	38.9533949	-89.70121
1363	0.0312	0.00592	1.7799	0.0009	38.9554965	-89.754496
295	0.0067	0.00128	0.3849	0.0002	38.9542502	-89.758251
274	0.0063	0.00119	0.3574	0.0002	38.9524064	-89.701447
133	0.0030	0.00058	0.1734	0.0001	38.9505618	-89.706239
709	0.0162	0.00308	0.9258	0.0005	38.9499042	-89.691937
349	0.0080	0.00152	0.4554	0.0002	38.9514752	-89.75092
1278	0.0292	0.00555	1.6690	0.0008	38.9501402	-89.699797
165	0.0038	0.00072	0.2153	0.0001	38.9495522	-89.693145
633	0.0145	0.00275	0.8268	0.0004	38.9514828	-89.745352
953	0.0218	0.00414	1.2444	0.0006	38.9506266	-89.744529
1734	0.0396	0.00754	2.2654	0.0011	38.9528255	-89.752724
476	0.0109	0.00207	0.6213	0.0003	38.9508881	-89.753094
962	0.0220	0.00418	1.2567	0.0006	38.9509461	-89.748963
268	0.0061	0.00117	0.3507	0.0002	38.9494722	
44	0.0010	0.00019	0.0579	0.0000	38.9487212	-89.703004
650	0.0149	0.00283	0.8489	0.0004	38.9492586	-89.703585
768	0.0176	0.00334	1.0037	0.0005	38.9487571	-89.699982
595	0.0136	0.00259	0.7777	0.0003	38.948588	-89.702119
777	0.0178	0.00338	1.0148	0.0005	38.9487193	-89.692057
839	0.0192	0.00365	1.0963	0.0005	38.9485341	-89.699884
444	0.0101	0.00193	0.5796	0.0003	38.9500026	-89.759051
299	0.0068	0.00130	0.3910	0.0003	38.949987	-89.758779
1250	0.0286	0.00543	1.6324	0.0008	38.950442	-89.747707
751	0.0172	0.00313	0.9812	0.0005	38.9492974	-89.747369
57	0.0013	0.00327	0.0749	0.0000	38.9479705	-89.707695
747	0.013	0.00025	0.9757	0.0005	38.9484709	-89.693121
169	0.0039	0.00323	0.2210	0.0003	38.9473822	-89.749484
189	0.0033	0.00074	0.2463	0.0001	38.9473504	-89.749027
1062	0.0243	0.00082	1.3872	0.0001	38.9485654	-89.761543
357	0.0243	0.00462	0.4667	0.0007	38.9469783	-89.7488
337	0.0062	0.00133	0.4007	0.0002	30.3403763	-03.7400

618	0.0141	0.00269	0.8070	0.0004	38.9475373	-89.752418
832	0.0190	0.00362	1.0866	0.0005	38.9457996	-89.703707
391	0.0089	0.00170	0.5111	0.0003	38.9455939	-89.702219
954	0.0218	0.00415	1.2460	0.0006	38.9478196	-89.754915
575	0.0132	0.00250	0.7516	0.0004	38.9473484	-89.756911
457	0.0105	0.00199	0.5975	0.0003	38.9466529	-89.745069
1272	0.0291	0.00553	1.6616	0.0008	38.9465962	-89.742702
99	0.0023	0.00043	0.1295	0.0001	38.9462822	-89.744689
896	0.0205	0.00390	1.1704	0.0006	38.946029	-89.743571
366	0.0084	0.00159	0.4775	0.0002	38.945277	-89.708545
1201	0.0275	0.00522	1.5695	0.0008	38.9441589	-89.701538
486	0.0111	0.00211	0.6343	0.0003	38.945724	-89.745165
1845	0.0422	0.00802	2.4103	0.0012	38.9440231	-89.705465
579	0.0132	0.00252	0.7563	0.0004	38.9433571	-89.744661
10	0.0002	0.00004	0.0129	0.0000	38.942963	-89.745066
329	0.0075	0.00143	0.4294	0.0002	38.9430285	-89.744511
68	0.0016	0.00030	0.0889	0.0000	38.942958	-89.745199
105	0.0024	0.00046	0.1370	0.0001	38.9428392	-89.744985
306	0.0070	0.00133	0.3998	0.0002	38.942759	-89.744537
770	0.0176	0.00335	1.0052	0.0005	38.9419001	-89.711195
434	0.0099	0.00189	0.5669	0.0003	38.9422198	-89.744965
840	0.0192	0.00365	1.0975	0.0005	38.9422657	-89.755739
181	0.0041	0.00079	0.2361	0.0001	38.9401682	-89.705716
938	0.0214	0.00408	1.2250	0.0006	38.9399973	-89.70421
75	0.0017	0.00033	0.0984	0.0000	38.939774	-89.70341
210	0.0048	0.00091	0.2745	0.0001	38.9397646	-89.702812
165	0.0038	0.00072	0.2153	0.0001	38.939848	-89.7055
182	0.0042	0.00079	0.2377	0.0001	38.9389877	-89.717063
483	0.0110	0.00210	0.6310	0.0003	38.9399447	-89.744993
1043	0.0238	0.00454	1.3627	0.0007	38.9386368	-89.715927
1397	0.0319	0.00608	1.8254	0.0009	38.9387511	-89.712472
2694	0.0616	0.01171	3.5190	0.0018	38.9369777	-89.708696
625	0.0143	0.00272	0.8168	0.0004	38.937015	-89.716787
360	0.0082	0.00156	0.4700	0.0002	38.9360203	-89.720678
87	0.0020	0.00038	0.1140	0.0001	38.9356588	-89.712128
2674	0.0611	0.01162	3.4928	0.0017	38.9345617	-89.708467
216	0.0049	0.00094	0.2827	0.0001	38.935394	-89.745446
327	0.0075	0.00142	0.4272	0.0002	38.9353189	-89.745119
39	0.0009	0.00017	0.0514	0.0000	38.9342814	-89.720827
648	0.0148	0.00282	0.8469	0.0004	38.9346029	-89.719774
542	0.0124	0.00235	0.7074	0.0004	38.9350025	-89.746452
458	0.0105	0.00199	0.5988	0.0003	38.9328942	-89.708101
139	0.0032	0.00061	0.1818	0.0001	38.9332536	-89.726064
950	0.0217	0.00413	1.2409	0.0006	38.9326724	-89.707374
34	0.0008	0.00015	0.0439	0.0000	38.9325157	-89.714633
504	0.0115	0.00219	0.6580	0.0003	38.9334252	-89.748441
434	0.0099	0.00189	0.5666	0.0003	38.9329474	-89.717169

430	0.0098	0.00187	0.5620	0.0003	38.9324084	-89.709201
394	0.0090	0.00171	0.5148	0.0003	38.9321531	-89.711116
959	0.0219	0.00417	1.2521	0.0006	38.9310517	-89.707933
61	0.0014	0.00027	0.0798	0.0000	38.9308659	-89.706145
749	0.0171	0.00326	0.9785	0.0005	38.9307996	-89.704762
339	0.0077	0.00147	0.4425	0.0002	38.9308773	-89.710358
822	0.0188	0.00358	1.0744	0.0005	38.931024	-89.713728
739	0.0169	0.00321	0.9648	0.0005	38.9311537	-89.743444
159	0.0036	0.00069	0.2082	0.0001	38.9299759	-89.746197
1542	0.0352	0.00670	2.0141	0.0010	38.9316981	-89.745433
761	0.0174	0.00331	0.9942	0.0005	38.9301676	-89.747169
108	0.0025	0.00047	0.1408	0.0001	38.9296682	-89.746141
39	0.0009	0.00017	0.0503	0.0000	38.9285169	-89.708436
322	0.0074	0.00140	0.4201	0.0002	38.9285122	-89.707962
93	0.0021	0.00040	0.1210	0.0001	38.9283439	-89.70842
252	0.0058	0.00110	0.3292	0.0002	38.9282165	-89.708018
158	0.0036	0.00069	0.2066	0.0001	38.9275073	-89.713787
1750	0.0400	0.00761	2.2858	0.0011	38.9282597	-89.711448
218	0.0050	0.00095	0.2853	0.0001	38.9271929	-89.712903
44	0.0010	0.00019	0.0579	0.0000	38.9270443	-89.712667
1445	0.0330	0.00628	1.8882	0.0009	38.927055	-89.7103
610	0.0139	0.00265	0.7964	0.0004	38.9265998	-89.715144
1269	0.0290	0.00552	1.6582	0.0008	38.9245492	-89.710207
850	0.0194	0.00370	1.1104	0.0006	38.9245433	-89.713818
317	0.0072	0.00138	0.4135	0.0002	38.9242026	-89.707639
362	0.0083	0.00158	0.4733	0.0002	38.924059	-89.712375
488	0.0111	0.00212	0.6370	0.0003	38.9238891	-89.707599
73	0.0017	0.00032	0.0958	0.0000	38.9247288	-89.752097
440	0.0100	0.00191	0.5742	0.0003	38.9241236	-89.717059
357	0.0082	0.00155	0.4660	0.0002	38.9240234	-89.715361
1162	0.0266	0.00505	1.5178	0.0008	38.9232354	-89.754745
439	0.0100	0.00191	0.5738	0.0003	38.9226562	-89.752395
71	0.0016	0.00031	0.0931	0.0000	38.9212282	-89.721782
783	0.0179	0.00340	1.0225	0.0005	38.9212592	-89.720601
92	0.0021	0.00040	0.1204	0.0001	38.9208902	-89.715379
802	0.0183	0.00349	1.0475	0.0005	38.9210107	-89.714087
101	0.0023	0.00044	0.1317	0.0001	38.9207262	-89.715494
148	0.0034	0.00064	0.1929	0.0001	38.9206965	-89.715399
508	0.0116	0.00221	0.6640	0.0003	38.9206734	-89.716495
197	0.0045	0.00085	0.2568	0.0001	38.9207448	-89.72175
315	0.0072	0.00137	0.4120	0.0002	38.9216605	-89.758913
418	0.0095	0.00182	0.5456	0.0003	38.9206684	-89.714407
1075	0.0246	0.00467	1.4044	0.0007	38.9206757	-89.713288
194	0.0044	0.00084	0.2532	0.0001	38.9204003	-89.723352
583	0.0133	0.00254	0.7618	0.0004	38.9207681	-89.753502
84	0.0019	0.00036	0.1091	0.0001	38.9188686	-89.717178
1853	0.0424	0.00805	2.4202	0.0012	38.9199758	-89.710502

841	0.0192	0.00366	1.0983	0.0005	38.9180227	-89.722829
1151	0.0263	0.00501	1.5040	0.0008	38.9181698	-89.720662
89	0.0020	0.00039	0.1157	0.0001	38.9173315	-89.719688
226	0.0052	0.00098	0.2957	0.0001	38.9173211	-89.720277
138	0.0032	0.00060	0.1800	0.0001	38.917322	-89.721262
41	0.0009	0.00018	0.0541	0.0000	38.9173113	-89.720886
208	0.0048	0.00090	0.2718	0.0001	38.9157789	-89.714897
282	0.0064	0.00123	0.3684	0.0002	38.9151582	-89.719684
304	0.0069	0.00132	0.3968	0.0002	38.9149459	-89.725518
210	0.0048	0.00091	0.2740	0.0001	38.9143667	-89.732426
1164	0.0266	0.00506	1.5199	0.0008	38.913645	-89.724278
754	0.0172	0.00328	0.9848	0.0005	38.9135154	-89.725233
673	0.0154	0.00292	0.8789	0.0004	38.9136392	-89.728056
7	0.0002	0.00003	0.0091	0.0000	38.9117421	-89.726319
1674	0.0383	0.00728	2.1866	0.0011	38.9119859	-89.723705
2261	0.0517	0.00983	2.9534	0.0015	38.9114287	-89.723112
1235	0.0282	0.00537	1.6136	0.0008	38.9122375	-89.730949
1275	0.0292	0.00554	1.6659	0.0008	38.9122757	-89.757833
2080	0.0476	0.00904	2.7173	0.0014	38.9101654	-89.723359
431	0.0099	0.00188	0.5636	0.0003	38.9104466	-89.72566
61	0.0014	0.00100	0.0798	0.0000	38.9100041	-89.725304
464	0.0106	0.00027	0.6066	0.0003	38.909997	-89.736566
153	0.0100	0.00202	0.1996	0.0003	38.9103295	-89.757125
349	0.0033	0.00050	0.4565	0.0001	38.9093423	-89.736849
155	0.0036	0.00132	0.2029	0.0002	38.9093423	-89.736074
	0.0036					
177	0.0041	0.00077 0.00326	0.2317	0.0001	38.90902 38.9090212	-89.736097
749			0.9787	0.0005		-89.736463
436	0.0100	0.00189	0.5694	0.0003	38.9087885	-89.761167
184	0.0042	0.00080	0.2408	0.0001	38.9085657	-89.76364
309	0.0071	0.00134	0.4035	0.0002	38.9087045	-89.766076
133	0.0030	0.00058	0.1734	0.0001		-89.739578
61	0.0014	0.00027	0.0798	0.0000	38.90719	-89.738038
99	0.0023	0.00043	0.1290	0.0001	38.907034	-89.737875
93	0.0021	0.00040	0.1215	0.0001	38.9064415	-89.744278
216	0.0049	0.00094	0.2820	0.0001	38.9061605	-89.759765
611	0.0140	0.00266	0.7981	0.0004	38.9050185	-89.734437
626	0.0143	0.00272	0.8172	0.0004	38.9048126	-89.734592
525	0.0120	0.00228	0.6855	0.0003	38.9040291	-89.739618
415	0.0095	0.00181	0.5424	0.0003	38.9044265	-89.761946
278	0.0063	0.00121	0.3627	0.0002	38.9035037	-89.763685
948	0.0217	0.00412	1.2389	0.0006	38.9041175	-89.767093
129	0.0029	0.00056	0.1681	0.0001	38.9025451	-89.749486
2352	0.0538	0.01022	3.0718	0.0015	38.9025838	-89.742045
230	0.0053	0.00100	0.3004	0.0002	38.9008865	-89.743198
835	0.0191	0.00363	1.0905	0.0005	38.9008897	-89.741384
163	0.0037	0.00071	0.2124	0.0001	38.9008473	-89.743727
1096	0.0251	0.00477	1.4320	0.0007	38.9006937	-89.74114

118	0.0027	0.00051	0.1536	0.0001	38.8985029	-89.739577
298	0.0068	0.00129	0.3891	0.0002	38.8985569	-89.739151
1194	0.0273	0.00519	1.5594	0.0008	38.8996822	-89.749137
1470	0.0336	0.00639	1.9204	0.0010	38.8980152	-89.746817
366	0.0084	0.00159	0.4785	0.0002	38.8979157	-89.739497
177	0.0040	0.00077	0.2312	0.0001	38.8974875	-89.739338
696	0.0159	0.00303	0.9094	0.0005	38.8977664	-89.744691
363	0.0083	0.00158	0.4744	0.0002	38.8972224	-89.744565
436	0.0100	0.00189	0.5694	0.0003	38.8973403	-89.7401
90	0.0021	0.00039	0.1177	0.0001	38.896994	-89.740277
1705	0.0390	0.00741	2.2274	0.0011	38.8970158	-89.74298
1430	0.0327	0.00622	1.8686	0.0009	38.8960682	-89.743472
642	0.0147	0.00279	0.8385	0.0004	38.8973998	-89.781599
266	0.0061	0.00115	0.3470	0.0002	38.8948013	-89.742865
1142	0.0261	0.00497	1.4919	0.0007	38.8952729	-89.741924
1452	0.0332	0.00437	1.8961	0.0007	38.8940189	-89.747586
1701	0.0332	0.00031	2.2224	0.0003	38.8923799	-89.743239
167	0.0389	0.00740	0.2186	0.0011	38.8882575	-89.769023
					38.8882644	-89.771215
61	0.0014	0.00027	0.0798	0.0000		
5	0.0001	0.00002	0.0064	0.0000	38.8882264	-89.771549
76	0.0017	0.00033	0.0995	0.0000	38.8881375	-89.771553
259	0.0059	0.00113	0.3386	0.0002	38.8879851	-89.769734
511	0.0117	0.00222	0.6671	0.0003	38.8875682	-89.768787
372	0.0085	0.00162	0.4857	0.0002	38.8872035	-89.769486
61	0.0014	0.00027	0.0798	0.0000	38.8846769	-89.768549
1526	0.0349	0.00663	1.9933	0.0010	38.8864758	-89.771905
1087	0.0249	0.00473	1.4203	0.0007	39.0066184	-89.779573
178	0.0041	0.00077	0.2319	0.0001	39.0032128	-89.780836
303	0.0069	0.00132	0.3960	0.0002	39.0023919	-89.780512
1862	0.0426	0.00810	2.4329	0.0012	39.0037235	-89.777281
1371	0.0313	0.00596	1.7905	0.0009	39.0021692	-89.778757
831	0.0190	0.00361	1.0852	0.0005	39.0008451	-89.777788
1102	0.0252	0.00479	1.4396	0.0007	39.0014569	-89.780119
698	0.0160	0.00303	0.9116	0.0005	38.9993115	-89.780771
89	0.0020	0.00039	0.1166	0.0001	38.9985717	-89.777386
152	0.0035	0.00066	0.1986	0.0001	38.9982708	-89.77732
2462	0.0563	0.01071	3.2166	0.0016	38.9959227	-89.781963
192	0.0044	0.00084	0.2514	0.0001	38.9942795	-89.77853
701	0.0160	0.00305	0.9152	0.0005	38.9942946	-89.774722
107	0.0024	0.00046	0.1397	0.0001	38.9934711	-89.778688
832	0.0190	0.00362	1.0870	0.0005	38.9937729	-89.784867
2561	0.0136	0.00302	3.3456	0.0003	38.9952405	-89.783206
798	0.0182	0.00347	1.0425	0.0017	38.9932154	-89.779854
388	0.0182	0.00347	0.5068	0.0003	38.9920337	-89.778244
					38.9933274	
1423	0.0325	0.00618	1.8582	0.0009		-89.785506
714	0.0163	0.00310	0.9328	0.0005	38.9921926	-89.784776
650	0.0149	0.00283	0.8496	0.0004	38.9922677	-89.789124

1458	0.0333	0.00634	1.9040	0.0010	38.9929085	-89.786076
201	0.0046	0.00087	0.2625	0.0001	38.991354	-89.786084
909	0.0208	0.00395	1.1870	0.0006	38.9907087	-89.779666
141	0.0032	0.00061	0.1840	0.0001	38.9897753	-89.778022
271	0.0062	0.00118	0.3543	0.0002	38.9881617	-89.777646
1820	0.0416	0.00791	2.3780	0.0012	38.9875655	-89.779579
362	0.0083	0.00157	0.4729	0.0002	38.9872904	-89.784065
63	0.0014	0.00027	0.0818	0.0000	38.9873357	-89.783504
186	0.0042	0.00081	0.2425	0.0001	38.9871899	-89.776646
89	0.0020	0.00039	0.1157	0.0001	38.9869685	-89.787078
89	0.0020	0.00039	0.1157	0.0001	38.9869817	-89.788532
44	0.0010	0.00019	0.0579	0.0000	38.986918	-89.788916
62	0.0014	0.00027	0.0814	0.0000	38.9868768	-89.78882
152	0.0035	0.00066	0.1980	0.0001	38.986707	-89.78909
73	0.0017	0.00032	0.0958	0.0000	38.9865103	-89.789207
333	0.0017	0.00032	0.4347	0.0000	38.9856244	-89.798255
1221	0.0279	0.00143	1.5952	0.0002	38.9859406	-89.797132
1015	0.0232	0.00441	1.3260	0.0007	38.9850413	-89.779949
521	0.0119	0.00226	0.6799	0.0003	38.9843272	-89.781483
1250	0.0286	0.00544	1.6334	0.0008	38.9857517	-89.783048
190	0.0043	0.00082	0.2477	0.0001	38.9843523	-89.79372
664	0.0152	0.00289	0.8676	0.0004	38.9848775	-89.793311
306	0.0070	0.00133	0.3998	0.0002	38.9845073	-89.796784
202	0.0046	0.00088	0.2640	0.0001	38.983875	-89.783696
97	0.0022	0.00042	0.1273	0.0001	38.9839563	-89.783215
57	0.0013	0.00025	0.0738	0.0000	38.9838123	-89.783413
1560	0.0357	0.00678	2.0382	0.0010	38.9854857	-89.795475
1152	0.0263	0.00501	1.5049	0.0008	38.9839553	-89.773745
604	0.0138	0.00262	0.7884	0.0004	38.983994	-89.789152
7	0.0002	0.00003	0.0091	0.0000	38.9832476	-89.788606
755	0.0173	0.00328	0.9863	0.0005	38.9842165	-89.788346
381	0.0087	0.00166	0.4981	0.0002	38.9832355	-89.787927
546	0.0125	0.00237	0.7134	0.0004	38.9834675	-89.79347
192	0.0044	0.00083	0.2507	0.0001	38.9833287	-89.792273
677	0.0155	0.00294	0.8838	0.0004	38.9833435	-89.793785
380	0.0087	0.00165	0.4962	0.0002	38.9829498	-89.773255
1313	0.0300	0.00571	1.7154	0.0009	38.9849238	-89.800121
1513	0.0346	0.00658	1.9759	0.0010	38.9839203	-89.799018
451	0.0103	0.00196	0.5893	0.0003	38.9822178	-89.769761
827	0.0189	0.00359	1.0798	0.0005	38.9829853	-89.783026
582	0.0133	0.00253	0.7602	0.0004	38.9826639	-89.800743
1609	0.0368	0.00699	2.1017	0.0011	38.9828374	-89.790206
1186	0.0271	0.00516	1.5490	0.0008	38.9828607	-89.780512
81	0.0271	0.00310	0.1055	0.0008	38.9808051	-89.76911
289		0.00033		0.0001	38.9814923	-89.800154
	0.0066		0.3773		38.9825513	
1649	0.0377	0.00717	2.1535	0.0011		-89.797568
602	0.0138	0.00261	0.7857	0.0004	38.9806815	-89.787827

1390	0.0318	0.00604	1.8162	0.0009	38.9802896	-89.789874
39	0.0009	0.00017	0.0503	0.0000	38.9794805	-89.772841
41	0.0009	0.00018	0.0530	0.0000	38.979439	-89.772806
184	0.0042	0.00080	0.2399	0.0001	38.9796218	-89.783325
195	0.0045	0.00085	0.2547	0.0001	38.9792849	-89.768037
120	0.0027	0.00052	0.1563	0.0001	38.9793212	-89.767754
523	0.0120	0.00227	0.6829	0.0003	38.9799262	-89.786712
65	0.0015	0.00028	0.0851	0.0000	38.9798381	-89.79799
59	0.0014	0.00026	0.0771	0.0000	38.9791969	-89.791897
457	0.0105	0.00199	0.5975	0.0003	38.9791874	-89.773442
495	0.0113	0.00215	0.6460	0.0003	38.9794409	-89.782849
541	0.0124	0.00235	0.7072	0.0004	38.9796592	-89.799176
267	0.0061	0.00116	0.3494	0.0002	38.9787862	-89.786628
476	0.0109	0.00207	0.6214	0.0003	38.9789	-89.787446
100	0.0023	0.00043	0.1306	0.0001	38.9782562	-89.787513
147	0.0034	0.00064	0.1916	0.0001	38.978147	-89.787216
175	0.0040	0.00076	0.2281	0.0001	38.9779785	-89.787417
106	0.0040	0.00076	0.1381	0.0001	38.977967	-89.787003
701	0.0160	0.00305	0.9161	0.0001	38.9780193	-89.7733
5	0.0001	0.00303	0.0064	0.0003	38.9769107	-89.767695
1051	0.0240	0.00002	1.3733	0.0007	38.9781084	-89.767678
622	0.0240	0.00437	0.8126	0.0007	38.9774189	-89.767221
196	0.0045	0.00085	0.2559	0.0001	38.9777548	-89.800124
276	0.0063	0.00120	0.3601	0.0002	38.9771078	-89.779962
994	0.0227	0.00432	1.2982	0.0006	38.9763608	-89.775859
187	0.0043	0.00081	0.2443	0.0001	38.9762773	-89.76897
355	0.0081	0.00155	0.4643	0.0002	38.9766272	-89.787843
581	0.0133	0.00253	0.7591	0.0004	38.9765348	-89.772314
117	0.0027	0.00051	0.1525	0.0001	38.9760743	-89.783451
280	0.0064	0.00122	0.3658	0.0002	38.9763321	-89.78292
1057	0.0242	0.00459	1.3802	0.0007	38.9775509	-89.791936
633	0.0145	0.00275	0.8265	0.0004	38.976827	-89.797377
745	0.0170	0.00324	0.9729	0.0005	38.9768579	-89.795845
382	0.0087	0.00166	0.4993	0.0002	38.9752504	-89.772306
190	0.0043	0.00083	0.2483	0.0001	38.974211	-89.774638
594	0.0136	0.00258	0.7759	0.0004	38.9716895	-89.781849
397	0.0091	0.00173	0.5190	0.0003	38.9723445	-89.797276
213	0.0049	0.00092	0.2778	0.0001	38.9722074	-89.796966
642	0.0147	0.00279	0.8380	0.0004	38.9711223	-89.787439
1425	0.0326	0.00619	1.8608	0.0009	38.9706432	-89.789606
102	0.0023	0.00044	0.1333	0.0001	38.9699193	-89.787861
603	0.0138	0.00262	0.7881	0.0004	38.9699133	-89.788949
744	0.0170	0.00323	0.9716	0.0005	38.9701489	-89.766895
138	0.0032	0.00060	0.1803	0.0001	38.9692683	-89.766728
1285	0.0294	0.00559	1.6788	0.0008	38.9711196	-89.799947
109	0.0025	0.00048	0.1430	0.0001	38.9690013	-89.766947
146	0.0033	0.00064	0.1911	0.0001	38.9690559	-89.778489

211	0.0048	0.00092	0.2762	0.0001	38.9690304	-89.788413
1412	0.0323	0.00614	1.8442	0.0009	38.9705549	-89.797414
1051	0.0240	0.00457	1.3729	0.0007	38.9700837	-89.79764
483	0.0110	0.00210	0.6314	0.0003	38.9687261	-89.783696
88	0.0020	0.00038	0.1146	0.0001	38.968748	-89.784927
88	0.0020	0.00038	0.1146	0.0001	38.9687403	-89.784647
5	0.0001	0.00002	0.0064	0.0000	38.9689072	-89.796793
123	0.0028	0.00053	0.1605	0.0001	38.9689991	-89.796941
739	0.0169	0.00321	0.9655	0.0005	38.9697709	-89.796754
49	0.0011	0.00021	0.0643	0.0000	38.9687831	-89.792055
1494	0.0342	0.00649	1.9514	0.0010	38.9694877	-89.798809
324	0.0074	0.00141	0.4230	0.0002	38.9682471	-89.777584
316	0.0072	0.00138	0.4133	0.0002	38.96727	-89.776459
586	0.0134	0.00255	0.7655	0.0004	38.9679239	-89.78479
351	0.0080	0.00152	0.4581	0.0004	38.9669035	-89.788588
138	0.0032	0.00132	0.1809	0.0002	38.966658	-89.796674
271	0.0032	0.000118	0.3543	0.0001	38.9668001	-89.800523
271		0.00118		0.0002	38.9659553	-89.774857
	0.0062		0.3521		38.9657511	
273	0.0062	0.00119	0.3563	0.0002		-89.776303
59 570	0.0014	0.00026	0.0776	0.0000	38.9650906	-89.784603
579	0.0132	0.00252	0.7567	0.0004	38.9650883	-89.77521
598	0.0137	0.00260	0.7815	0.0004	38.9655106	-89.795803
98	0.0022	0.00043	0.1279	0.0001	38.9650542	-89.795443
864	0.0198	0.00376	1.1292	0.0006	38.9649834	-89.777037
1088	0.0249	0.00473	1.4216	0.0007	38.9659067	-89.792289
1539	0.0352	0.00669	2.0107	0.0010	38.9666869	-89.791942
221	0.0050	0.00096	0.2884	0.0001	38.9645458	-89.78933
879	0.0201	0.00382	1.1478	0.0006	38.9652062	-89.789057
1217	0.0278	0.00529	1.5896	0.0008	38.9633352	-89.775427
150	0.0034	0.00065	0.1953	0.0001	38.9629164	-89.788798
774	0.0177	0.00337	1.0115	0.0005	38.9635358	-89.788965
984	0.0225	0.00428	1.2858	0.0006	38.9635342	-89.797584
930	0.0213	0.00404	1.2143	0.0006	38.9637772	-89.796781
1427	0.0326	0.00620	1.8637	0.0009	38.9620608	-89.775816
306	0.0070	0.00133	0.3998	0.0002	38.962569	-89.788209
1429	0.0327	0.00621	1.8667	0.0009	38.9632357	-89.794896
1733	0.0396	0.00753	2.2638	0.0011	38.9636805	-89.782766
100	0.0023	0.00044	0.1312	0.0001	38.9614939	-89.783544
235	0.0054	0.00102	0.3064	0.0002	38.9615263	-89.785401
71	0.0016	0.00031	0.0927	0.0000	38.9614962	-89.784599
740	0.0169	0.00322	0.9662	0.0005	38.9622258	-89.787361
602	0.0138	0.00262	0.7864	0.0004	38.9620576	-89.796867
70	0.0016	0.00030	0.0909	0.0000	38.9617139	-89.800301
166	0.0038	0.00072	0.2168	0.0001	38.9575911	-89.773401
264	0.0060	0.00115	0.3454	0.0002	38.9578672	-89.793738
142	0.0033	0.00062	0.1858	0.0001	38.95798	-89.799165
556	0.0127	0.00242	0.7261	0.0001	38.957435	-89.792654
330	0.0127	0.00272	0.7201	5.5004	30.337733	03.732034

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281	0.0064	0.00122	0.3673	0.0002	38.9576727	-89.792035
618	0.0141	0.00268	0.8067	0.0004	38.957813	-89.796496
605	0.0138	0.00263	0.7900	0.0004	38.9572879	-89.795629
1503	0.0344	0.00654	1.9637	0.0010	38.9569091	-89.775847
833	0.0190	0.00362	1.0884	0.0005	38.9556816	-89.787753
609	0.0139	0.00265	0.7954	0.0004	38.9557653	-89.785764
572	0.0131	0.00249	0.7478	0.0004	38.9553792	-89.775672
319	0.0073	0.00139	0.4166	0.0002	38.9550484	-89.787
667	0.0152	0.00290	0.8711	0.0004	38.9547453	-89.773968
1665	0.0381	0.00724	2.1745	0.0011	38.956304	-89.797845
1022	0.0234	0.00445	1.3357	0.0007	38.955695	-89.796528
390	0.0089	0.00170	0.5095	0.0003	38.9545758	-89.796227
361	0.0083	0.00157	0.4718	0.0002	38.9543111	-89.799402
3479	0.0795	0.01512	4.5443	0.0023	38.9563025	-89.790819
125	0.0029	0.00054	0.1636	0.0001	38.9522336	-89.791695
1962	0.0448	0.00853	2.5624	0.0013	38.9546699	-89.792
413	0.0095	0.00180	0.5401	0.0003	38.9518711	-89.792659
206	0.0047	0.00089	0.2687	0.0001	38.9512454	-89.796497
1200	0.0274	0.00522	1.5672	0.0008	38.952021	-89.785751
202	0.0046	0.00322	0.2645	0.0001	38.9505946	-89.786178
449	0.0103	0.00085	0.5868	0.0001	38.9505645	-89.785091
229	0.0052	0.00133	0.2988	0.0003	38.9506095	-89.786915
					38.951563	-89.797505
691	0.0158	0.00300	0.9020	0.0005		
912	0.0208	0.00396	1.1907	0.0006	38.9507031	-89.798961
222	0.0051	0.00096	0.2897	0.0001	38.950604	-89.797171
1062	0.0243	0.00462	1.3872	0.0007	38.9485654	-89.761543
102	0.0023	0.00044	0.1328	0.0001	38.9475832	-89.760722
753	0.0172	0.00327	0.9833	0.0005	38.9490352	-89.799903
102	0.0023	0.00044	0.1333	0.0001	38.948316	-89.799567
42	0.0010	0.00018	0.0545	0.0000	38.9467956	-89.759374
275	0.0063	0.00120	0.3598	0.0002	38.9471108	-89.760744
576	0.0132	0.00251	0.7528	0.0004	38.9478694	-89.798688
995	0.0227	0.00432	1.2993	0.0006	38.9478324	-89.786343
261	0.0060	0.00113	0.3410	0.0002	38.9473207	-89.78496
429	0.0098	0.00186	0.5602	0.0003	38.9448083	-89.760434
1188	0.0272	0.00516	1.5517	0.0008	38.9447653	-89.761831
129	0.0029	0.00056	0.1681	0.0001	38.9440745	-89.760363
221	0.0050	0.00096	0.2884	0.0001	38.9438574	-89.760614
38	0.0009	0.00016	0.0492	0.0000	38.9439008	-89.777565
79	0.0018	0.00034	0.1029	0.0001	38.9432665	-89.764137
1448	0.0331	0.00630	1.8919	0.0009	38.9448205	-89.75936
440	0.0101	0.00191	0.5753	0.0003	38.9434187	-89.760047
111	0.0025	0.00048	0.1450	0.0001	38.9426679	-89.759703
1736	0.0397	0.00755	2.2681	0.0011	38.9450358	-89.794705
120	0.0027	0.00052	0.1569	0.0001	38.9424261	-89.764141
1563	0.0357	0.00680	2.0417	0.0010	38.944177	-89.785187
465	0.0106	0.00202	0.6070	0.0003	38.9418193	-89.759622
	5.5250	2.20202	5.557.5	3.0000		

57	0.0013	0.00025	0.0749	0.0000	38.9409617	-89.782618
512	0.0117	0.00223	0.6686	0.0003	38.9394131	-89.762113
219	0.0050	0.00095	0.2860	0.0001	38.9396809	-89.789272
161	0.0037	0.00070	0.2097	0.0001	38.9393968	-89.782342
823	0.0188	0.00358	1.0745	0.0005	38.9379912	-89.782523
882	0.0202	0.00383	1.1516	0.0006	38.9384156	-89.79045
188	0.0043	0.00082	0.2457	0.0001	38.9371478	-89.791643
1022	0.0234	0.00444	1.3346	0.0007	38.93668	-89.782504
159	0.0036	0.00069	0.2071	0.0001	38.9358523	-89.789381
228	0.0052	0.00099	0.2975	0.0001	38.9342841	-89.779813
347	0.0079	0.00151	0.4527	0.0002	38.9340504	-89.788938
79	0.0018	0.00034	0.1033	0.0001	38.9333955	-89.778336
1415	0.0324	0.00615	1.8490	0.0009	38.9345077	-89.786656
664	0.0152	0.00289	0.8678	0.0003	38.9331888	-89.788076
59	0.0014	0.0026	0.0776	0.0004	38.9320547	-89.767591
	0.0014	0.00020	0.1825	0.0000	38.9320347	-89.764531
140		0.00051			38.9319842	-89.764274
120	0.0027		0.1563	0.0001		
303	0.0069	0.00132	0.3957	0.0002	38.9315188	-89.764257
734	0.0168	0.00319	0.9591	0.0005	38.9324564	-89.78505
472	0.0108	0.00205	0.6168	0.0003	38.930872	-89.764984
262	0.0060	0.00114	0.3419	0.0002	38.9315222	-89.791549
70	0.0016	0.00030	0.0909	0.0000	38.930147	-89.764181
229	0.0052	0.00099	0.2986	0.0001	38.930715	-89.782988
78	0.0018	0.00034	0.1018	0.0001	38.9304279	-89.783041
541	0.0124	0.00235	0.7073	0.0004	38.930649	-89.784765
400	0.0092	0.00174	0.5230	0.0003	38.9300064	-89.783459
406	0.0093	0.00176	0.5299	0.0003	38.9293777	-89.78889
327	0.0075	0.00142	0.4266	0.0002	38.9287886	-89.783242
1066	0.0244	0.00463	1.3923	0.0007	38.9273407	-89.790637
414	0.0095	0.00180	0.5405	0.0003	38.9255195	-89.785931
103	0.0023	0.00045	0.1339	0.0001	38.9236935	-89.75925
315	0.0072	0.00137	0.4120	0.0002	38.9216605	-89.758913
490	0.0112	0.00213	0.6399	0.0003	38.9219192	-89.769428
1104	0.0252	0.00480	1.4427	0.0007	38.9166013	-89.770647
173	0.0040	0.00075	0.2259	0.0001	38.9159088	-89.769182
201	0.0046	0.00087	0.2627	0.0001	38.9152794	-89.770173
349	0.0080	0.00152	0.4559	0.0002	38.9154613	-89.769608
779	0.0178	0.00339	1.0181	0.0005	38.9146907	-89.767169
446	0.0102	0.00194	0.5824	0.0003	38.9145809	-89.770181
328	0.0075	0.00142	0.4279	0.0002	38.9079781	-89.770421
911	0.0208	0.00396	1.1905	0.0006	38.9078136	-89.778513
384	0.0088	0.00167	0.5015	0.0003	38.9069202	-89.779514
1091	0.0249	0.00474	1.4255	0.0003	38.9054221	-89.771094
948	0.0243	0.00474	1.2389	0.0007	38.9041175	-89.767093
146	0.0033	0.00412	0.1911	0.0000	38.9031333	-89.771496
207	0.0033	0.00064	0.1911	0.0001	38.9800644	-89.803639
102	0.0023	0.00044	0.1328	0.0001	38.9798214	-89.803424

1545	0.0353	0.00671	2.0176	0.0010	38.9783263	-89.803552
453	0.0104	0.00197	0.5920	0.0003	38.9765146	-89.803072
338	0.0077	0.00147	0.4421	0.0002	38.9763575	-89.804096
111	0.0025	0.00048	0.1445	0.0001	38.9729093	-89.805129
245	0.0056	0.00107	0.3206	0.0002	38.9730617	-89.804793
1208	0.0276	0.00525	1.5784	0.0008	38.9723502	-89.804067
1553	0.0355	0.00675	2.0284	0.0010	38.9729924	-89.803651
152	0.0035	0.00066	0.1980	0.0001	38.9689943	-89.801859
71	0.0016	0.00031	0.0931	0.0000	38.9689926	-89.804422
850	0.0194	0.00369	1.1097	0.0006	38.970043	-89.803682
242	0.0055	0.00105	0.3159	0.0002	38.9689258	-89.803355
271	0.0062	0.00118	0.3545	0.0002	38.9688768	-89.801486
163	0.0037	0.00071	0.2126	0.0001	38.9688944	-89.80409
14	0.0003	0.00006	0.0182	0.0000	38.9688996	-89.803786
540	0.0123	0.00235	0.7049	0.0004	38.9688878	-89.802869
273	0.0062	0.00119	0.3570	0.0002	38.9682022	-89.804467
36	0.0008	0.00015	0.0466	0.0000	38.9666367	-89.803343
341	0.0078	0.00148	0.4460	0.0002	38.9652472	-89.804135
235	0.0054	0.00143	0.3068	0.0002	38.965071	-89.803061
36	0.0008	0.00102	0.0466	0.0002	38.9648256	-89.805725
511	0.0117	0.00222	0.6677	0.0003	38.9638856	-89.805758
148	0.0034	0.00222	0.1929	0.0003	38.9624511	-89.813509
505	0.0116	0.00004	0.6602	0.0001	38.9626646	-89.805814
	0.0116	0.00220	1.0589	0.0005	38.9615733	-89.802227
811						
777 276	0.0178	0.00338	1.0150	0.0005	38.9615916	-89.804854
276	0.0063	0.00120	0.3607	0.0002	38.9613039	-89.806622
112	0.0026	0.00049	0.1461	0.0001	38.9611106	-89.806424
446	0.0102	0.00194	0.5829	0.0003	38.9611786	-89.80955
485	0.0111	0.00211	0.6330	0.0003	38.9611006	-89.809154
989	0.0226	0.00430	1.2921	0.0006	38.9611059	-89.814469
1016	0.0232	0.00442	1.3268	0.0007	38.9610816	-89.814297
59	0.0014	0.00026	0.0776	0.0000	38.9590059	-89.803569
1125	0.0257	0.00489	1.4702	0.0007	38.9593449	-89.809529
621	0.0142	0.00270	0.8109	0.0004	38.9590638	-89.808691
418	0.0095	0.00182	0.5456	0.0003	38.9586075	-89.812331
1742	0.0398	0.00757	2.2758	0.0011	38.9597259	-89.811485
180	0.0041	0.00078	0.2350	0.0001	38.9578702	-89.804167
1468	0.0336	0.00638	1.9183	0.0010	38.9583757	-89.816417
1009	0.0231	0.00439	1.3186	0.0007	38.9562325	-89.81448
2674	0.0611	0.01163	3.4933	0.0017	38.9575304	-89.80653
5	0.0001	0.00002	0.0064	0.0000	38.9545766	-89.810435
465	0.0106	0.00202	0.6072	0.0003	38.9551658	-89.810443
776	0.0177	0.00337	1.0132	0.0005	38.9547663	-89.805053
1812	0.0414	0.00788	2.3675	0.0012	38.9557302	-89.812205
645	0.0147	0.00280	0.8423	0.0004	38.9546531	-89.809765
59	0.0014	0.00026	0.0776	0.0000	38.9545604	-89.814624
233	0.0053	0.00101	0.3044	0.0002	38.9546951	-89.821536

04.0	0.0407	0.00355	4.0004	0.0005	20.05.4204	00 011025
818	0.0187	0.00355	1.0681	0.0005	38.954381	-89.811925
1248	0.0285	0.00542	1.6296	0.0008	38.9520378	-89.805524
1124	0.0257	0.00489	1.4689	0.0007	38.951761	-89.813192
36	0.0008	0.00015	0.0466	0.0000	38.9508827	-89.80777
401	0.0092	0.00174	0.5235	0.0003	38.9510857	-89.812975
1961	0.0448	0.00853	2.5617	0.0013	38.9523577	-89.821958
916	0.0209	0.00398	1.1966	0.0006	38.9503845	-89.811808
731	0.0167	0.00318	0.9542	0.0005	38.9491278	-89.812535
872	0.0199	0.00379	1.1391	0.0006	38.9478493	-89.811248
2434	0.0556	0.01058	3.1794	0.0016	38.9495465	-89.804172
1640	0.0375	0.00713	2.1426	0.0011	38.9482447	-89.803174
735	0.0168	0.00320	0.9600	0.0005	38.9484815	-89.822332
73	0.0017	0.00032	0.0958	0.0000	38.9473944	-89.820848
1604	0.0367	0.00697	2.0958	0.0010	38.9490853	-89.819299
425	0.0097	0.00185	0.5549	0.0003	38.9472431	-89.818704
389	0.0089	0.00169	0.5088	0.0003	38.9472541	-89.820092
138	0.0032	0.00060	0.1800	0.0001	38.9472743	-89.823793
41	0.0009	0.00018	0.0541	0.0000	38.9472631	-89.823382
226	0.0052	0.00098	0.2957	0.0001	38.9472705	-89.824641
226	0.0052	0.00098	0.2957	0.0001	38.9472671	-89.825506
2202	0.0503	0.00957	2.8761	0.0014	38.9459297	-89.821134
429	0.0098	0.00187	0.5609	0.0003	38.9450119	-89.811546
337	0.0077	0.00147	0.4407	0.0002	38.9449619	-89.823234
617	0.0141	0.00268	0.8063	0.0004	38.9447631	-89.813631
731	0.0167	0.00318	0.9553	0.0005	38.945358	-89.813196
138	0.0032	0.00060	0.1800	0.0001	38.9448141	-89.825737
260	0.0059	0.00113	0.3394	0.0002	38.944338	-89.812565
473	0.0108	0.00206	0.6185	0.0003	38.9444858	-89.823613
244	0.0056	0.00106	0.3190	0.0002	38.9439203	-89.81284
215	0.0049	0.00093	0.2805	0.0001	38.9437773	-89.813538
826	0.0189	0.00359	1.0792	0.0005	38.9441884	-89.809811
536	0.0122	0.00233	0.7000	0.0003	38.9434059	-89.813845
870	0.0199	0.00378	1.1361	0.0006	38.9419583	-89.809928
645	0.0147	0.00280	0.8425	0.0004	38.9414931	-89.825937
587	0.0134	0.00255	0.7666	0.0004	38.9417855	-89.823017
255	0.0058	0.00111	0.3334	0.0002	38.9407543	-89.811579
81	0.0018	0.00035	0.1055	0.0001	38.9408319	-89.823025
69	0.0016	0.00030	0.0900	0.0000	38.9397668	-89.808227
177	0.0041	0.00077	0.2314	0.0001	38.9397725	-89.809421
41	0.0009	0.00018	0.0541	0.0000	38.9397612	-89.80901
41	0.0009	0.00018	0.0541	0.0000	38.9397565	-89.808837
1122	0.0257	0.00488	1.4662	0.0007	38.9403109	-89.824802
36	0.0008	0.00015	0.0466	0.0000	38.9397504	-89.810366
152	0.0035	0.00066	0.1980	0.0001	38.9395633	-89.805711
374	0.0085	0.00162	0.4880	0.0002	38.9395491	-89.80621
111	0.0025	0.00048	0.1450	0.0001	38.9399935	-89.827855
1128	0.0258	0.00490	1.4737	0.0007	38.9406048	-89.815278

204	0.0050	0.004.00	0.2074	0.0000	20 0200546	00 04 44 60
304	0.0069	0.00132	0.3971	0.0002	38.9390546	-89.814163
610	0.0139	0.00265	0.7968	0.0004	38.9396237	-89.828722
321	0.0073	0.00139	0.4190	0.0002	38.9392857	-89.829451
1251	0.0286	0.00544	1.6336	0.0008	38.9386816	-89.815993
392	0.0090	0.00171	0.5126	0.0003	38.9386083	-89.814263
1025	0.0234	0.00446	1.3395	0.0007	38.9385932	-89.80212
246	0.0056	0.00107	0.3214	0.0002	38.9374022	-89.802831
383	0.0087	0.00166	0.4999	0.0002	38.9373093	-89.805346
1202	0.0275	0.00523	1.5702	0.0008	38.9382828	-89.805353
957	0.0219	0.00416	1.2499	0.0006	38.9378488	-89.827789
497	0.0114	0.00216	0.6492	0.0003	38.9370353	-89.809734
965	0.0221	0.00420	1.2610	0.0006	38.9376556	-89.823024
102	0.0023	0.00044	0.1333	0.0001	38.9364171	-89.822117
617	0.0141	0.00268	0.8063	0.0004	38.9364801	-89.821098
647	0.0148	0.00281	0.8449	0.0004	38.936348	-89.804817
249	0.0057	0.00108	0.3248	0.0002	38.9360226	-89.822779
334	0.0076	0.00145	0.4368	0.0002	38.9360917	-89.822384
684	0.0156	0.00298	0.8940	0.0004	38.9346228	-89.805681
564	0.0129	0.00245	0.7373	0.0004	38.9342073	-89.803702
1230	0.0281	0.00535	1.6061	0.0008	38.9346563	-89.808145
58	0.0013	0.00025	0.0760	0.0000	38.9339406	-89.820911
1077	0.0246	0.00468	1.4064	0.0007	38.9346459	-89.819385
1064	0.0243	0.00462	1.3895	0.0007	38.934539	-89.8224
36	0.0008	0.00015	0.0466	0.0007	38.9332715	-89.822456
67	0.0015	0.00019	0.0878	0.0000	38.9330618	-89.822912
640	0.013	0.00023	0.8357	0.0004	38.9334273	-89.821775
		0.00278			38.9332155	-89.817523
510	0.0116	0.00222	0.6656	0.0003		-89.814026
41	0.0009		0.0541	0.0000	38.9326832	
179	0.0041	0.00078	0.2341	0.0001	38.932733	-89.816826
528	0.0121	0.00229	0.6894	0.0003	38.9327132	-89.815122
652	0.0149	0.00283	0.8513	0.0004	38.9328915	
209	0.0048	0.00091	0.2731	0.0001	38.9324004	-89.806685
101	0.0023	0.00044	0.1317	0.0001	38.932922	-89.829662
1340	0.0306	0.00583	1.7510	0.0009	38.9339283	-89.828474
41	0.0009	0.00018	0.0541	0.0000	38.9329054	-89.830044
336	0.0077	0.00146	0.4390	0.0002	38.9315384	-89.806726
491	0.0112	0.00213	0.6414	0.0003	38.931238	-89.814542
70	0.0016	0.00030	0.0916	0.0000	38.9312328	-89.8138
93	0.0021	0.00041	0.1220	0.0001	38.930822	-89.822889
343	0.0078	0.00149	0.4481	0.0002	38.9311393	-89.820435
103	0.0024	0.00045	0.1350	0.0001	38.9307458	-89.820249
667	0.0153	0.00290	0.8719	0.0004	38.9307547	-89.821561
142	0.0032	0.00062	0.1853	0.0001	38.930637	-89.82784
49	0.0011	0.00021	0.0643	0.0000	38.9305135	-89.832517
471	0.0108	0.00205	0.6149	0.0003	38.9305014	-89.813798
996	0.0228	0.00433	1.3007	0.0007	38.9299125	-89.815483
258	0.0059	0.00112	0.3366	0.0002	38.9295654	-89.80678

900	0.0206	0.00391	1.1757	0.0006	38.9304474	-89.830478
34	0.0008	0.00015	0.0450	0.0000	38.929777	-89.832515
442	0.0101	0.00192	0.5769	0.0003	38.9297695	-89.831992
261	0.0060	0.00113	0.3408	0.0002	38.9296823	-89.831023
409	0.0094	0.00178	0.5345	0.0003	38.92936	-89.81378
498	0.0114	0.00217	0.6508	0.0003	38.9287839	-89.814734
167	0.0038	0.00073	0.2186	0.0001	38.9292408	-89.834407
716	0.0164	0.00311	0.9352	0.0005	38.9284649	-89.808038
614	0.0140	0.00267	0.8016	0.0004	38.928541	-89.82165
194	0.0044	0.00084	0.2536	0.0001	38.9290287	-89.836043
1066	0.0244	0.00463	1.3926	0.0007	38.9288982	-89.811567
197	0.0045	0.00086	0.2574	0.0001	38.928054	-89.81083
558	0.0128	0.00243	0.7295	0.0004	38.9289863	-89.83255
266	0.0061	0.00116	0.3472	0.0002	38.9273803	-89.82305
417	0.0095	0.00110	0.5443	0.0002	38.9273983	-89.810962
71	0.0033	0.00031	0.0927	0.0000	38.9267799	-89.810747
1026	0.0234	0.00031	1.3399	0.0007	38.9266978	-89.815533
165	0.0038	0.00440	0.2151	0.0007	38.925686	-89.803991
141	0.0032	0.00061	0.1840	0.0001	38.9257558	-89.809622
132	0.0030	0.00058	0.1729	0.0001	38.9251983	-89.796257
44	0.0010	0.00019	0.0579	0.0000	38.9251971	-89.794142
569	0.0130	0.00247	0.7433	0.0004	38.9251631	-89.795115
217	0.0050	0.00094	0.2831	0.0001	38.9257428	-89.821857
599	0.0137	0.00260	0.7823	0.0004	38.9254683	-89.820963
91	0.0021	0.00039	0.1184	0.0001	38.9254955	-89.822945
176	0.0040	0.00077	0.2303	0.0001	38.9255056	-89.822324
1745	0.0399	0.00759	2.2801	0.0011	38.9269953	-89.826578
183	0.0042	0.00080	0.2397	0.0001	38.9251972	-89.814144
45	0.0010	0.00019	0.0583	0.0000	38.9249627	-89.813956
352	0.0081	0.00153	0.4603	0.0002	38.9247122	-89.79404
302	0.0069	0.00131	0.3944		38.9246798	-89.79382
295	0.0067	0.00128	0.3849	0.0002	38.9247933	-89.801322
522	0.0119	0.00227	0.6813	0.0003	38.9248374	-89.814707
220	0.0050	0.00096	0.2873	0.0001	38.9237763	-89.802647
436	0.0100	0.00190	0.5700	0.0003	38.9238838	-89.794108
393	0.0090	0.00171	0.5133	0.0003	38.9231467	-89.797798
1179	0.0269	0.00512	1.5398	0.0008	38.9236964	-89.7958
77	0.0018	0.00033	0.1000	0.0001	38.9228042	-89.797528
509	0.0116	0.00221	0.6649	0.0003	38.9228496	-89.792034
160	0.0037	0.00070	0.2093	0.0001	38.9223493	-89.794022
1499	0.0343	0.00652	1.9577	0.0010	38.9239546	-89.792226
59	0.0014	0.00026	0.0776	0.0000	38.922343	-89.802612
202	0.0046	0.00088	0.2643	0.0001	38.9220868	-89.79151
201	0.0046	0.00087	0.2623	0.0001	38.9220848	-89.791207
603	0.0138	0.00262	0.7879	0.0004	38.9219138	-89.806657
865	0.0198	0.00376	1.1301	0.0006	38.9214958	-89.794432
39	0.0009	0.00017	0.0503	0.0000	38.9218816	-89.818601

65	0.0015	0.00028	0.0851	0.0000	38.9218718	-89.817125
166	0.0038	0.00072	0.2175	0.0001	38.9218011	-89.818303
288	0.0066	0.00125	0.3760	0.0002	38.9220765	-89.821164
148	0.0034	0.00064	0.1933	0.0001	38.9218752	-89.825948
42	0.0010	0.00018	0.0545	0.0000	38.9219851	-89.83691
96	0.0022	0.00042	0.1253	0.0001	38.9219776	-89.836635
68	0.0016	0.00030	0.0889	0.0000	38.9219979	-89.836389
956	0.0218	0.00415	1.2482	0.0006	38.9218799	-89.819651
34	0.0008	0.00015	0.0439	0.0000	38.921254	-89.837006
345	0.0079	0.00150	0.4507	0.0002	38.92159	-89.836739
767	0.0175	0.00333	1.0014	0.0005	38.9208694	-89.791399
684	0.0156	0.00298	0.8940	0.0004	38.9203945	-89.813173
510	0.0116	0.00222	0.6656	0.0003	38.9196457	-89.792574
761	0.0174	0.00331	0.9946	0.0005	38.9196809	-89.790988
660	0.0151	0.00287	0.8620	0.0004	38.9194148	-89.796231
75	0.0017	0.00033	0.0984	0.0000	38.9191309	-89.79912
1692	0.0387	0.00736	2.2104	0.0011	38.9188745	-89.804503
425	0.0097	0.00185	0.5553	0.0003	38.9199897	-89.829719
118	0.0027	0.00051	0.1536	0.0001	38.9194336	-89.829566
559	0.0128	0.00243	0.7303	0.0004	38.9193961	-89.810288
1210	0.0277	0.00526	1.5809	0.0008	38.9202676	-89.818719
259	0.0059	0.00113	0.3383	0.0002	38.9178369	-89.788185
1108	0.0253	0.00482	1.4476	0.0007	38.919949	-89.83381
838	0.0191	0.00364	1.0941	0.0005	38.9196787	-89.832952
60	0.0014	0.00026	0.0787	0.0000	38.9188091	-89.833072
912	0.0209	0.00397	1.1919	0.0006	38.9191842	-89.831864
947	0.0216	0.00412	1.2369	0.0006	38.9191811	-89.831209
184	0.0042	0.00080	0.2399	0.0001	38.9176228	-89.800987
930	0.0213	0.00404	1.2150	0.0006	38.9181765	-89.807359
246	0.0056	0.00107	0.3214	0.0002	38.9179851	-89.832936
102	0.0023	0.00044	0.1328	0.0001	38.9159233	-89.806991
370	0.0085	0.00161	0.4831	0.0002	38.9158495	-89.806272
1113	0.0255	0.00484	1.4544	0.0007	38.9165143	-89.797474
407	0.0093	0.00177	0.5321	0.0003	38.9163702	-89.822007
476	0.0109	0.00207	0.6214	0.0003	38.9155881	-89.807475
327	0.0075	0.00142	0.4274	0.0002	38.9162144	-89.823398
119	0.0027	0.00052	0.1552	0.0001	38.9153032	-89.805715
81	0.0019	0.00035	0.1060	0.0001	38.9148711	-89.813945
280	0.0064	0.00122	0.3653	0.0002	38.9151025	-89.831992
130	0.0030	0.00056	0.1696	0.0001	38.91416	-89.810726
352	0.0080	0.00153	0.4592	0.0002	38.9140134	-89.811249
1005	0.0230	0.00437	1.3124	0.0007	38.9152518	-89.82818
38	0.0009	0.00016	0.0492	0.0007	38.9139851	-89.820216
43	0.0010	0.00019	0.0568	0.0000	38.9125912	-89.820491
643	0.0147	0.00279	0.8396	0.0004	38.9119357	-89.810384
1443	0.0330	0.00273	1.8850	0.0004	38.9126766	-89.810469
1855	0.0424	0.00806	2.4228	0.0003	38.9135181	-89.814144
1000	0.0424	0.00000	2.4220	0.0012	20.2122101	05.014144

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1448	0.0331	0.00629	1.8909	0.0009	38.9127334	-89.813867
320	0.0073	0.00139	0.4186	0.0002	38.9111965	-89.815251
41	0.0009	0.00018	0.0541	0.0000	38.9106934	-89.807075
436	0.0100	0.00190	0.5699	0.0003	38.9108107	-89.814691
1478	0.0338	0.00643	1.9311	0.0010	38.9111668	-89.808991
215	0.0049	0.00093	0.2805	0.0001	38.9111961	-89.824932
409	0.0093	0.00178	0.5336	0.0003	38.9112312	-89.824124
1021	0.0234	0.00444	1.3344	0.0007	38.9106137	-89.809178
873	0.0200	0.00380	1.1408	0.0006	38.9113821	-89.825923
128	0.0029	0.00056	0.1671	0.0001	38.9102648	-89.80073
109	0.0025	0.00047	0.1419	0.0001	38.9097784	-89.800717
251	0.0057	0.00109	0.3281	0.0002	38.9095722	-89.796196
641	0.0147	0.00103	0.8375	0.0004	38.9100237	-89.805549
152	0.0035	0.00275	0.1991	0.0004	38.9083891	-89.793474
824	0.0033	0.00358	1.0766	0.0001	38.9094562	-89.803568
	0.0188	0.00338		0.0003	38.9098636	-89.829665
1011			1.3200			
387	0.0088	0.00168	0.5051	0.0003	38.9088932	-89.8258
193	0.0044	0.00084	0.2525	0.0001	38.9084372	-89.826184
82	0.0019	0.00036	0.1071	0.0001	38.9083569	-89.825997
817	0.0187	0.00355	1.0668	0.0005	38.9076891	-89.801685
199	0.0046	0.00087	0.2605	0.0001	38.9081348	-89.826275
263	0.0060	0.00114	0.3436	0.0002	38.9078609	-89.813151
91	0.0021	0.00039	0.1184	0.0001	38.9072763	-89.813039
1738	0.0397	0.00756	2.2706	0.0011	38.9086871	-89.808303
535	0.0122	0.00233	0.6994	0.0003	38.9068825	-89.806472
1224	0.0280	0.00532	1.5995	0.0008	38.9069353	-89.809376
512	0.0117	0.00222	0.6682	0.0003	38.9069623	-89.812327
1067	0.0244	0.00464	1.3938	0.0007	38.9076874	-89.799497
275	0.0063	0.00120	0.3592	0.0002	38.9070094	-89.818431
1135	0.0259	0.00493	1.4826	0.0007	38.9065314	-89.80024
551	0.0126	0.00240	0.7197	0.0004	38.9054312	-89.803317
412	0.0094	0.00179	0.5379	0.0003	38.9049602	-89.806129
1003	0.0229	0.00436	1.3103	0.0007	38.905794	-89.797201
1274	0.0291	0.00554	1.6648	0.0008	38.9052235	-89.798331
313	0.0072	0.00136	0.4088	0.0002	38.9042186	-89.796591
970	0.0222	0.00422	1.2673	0.0006	38.9043884	-89.807329
273	0.0062	0.00119	0.3570	0.0002	38.9037888	-89.817311
689	0.0157	0.00299	0.8996	0.0004	38.9041238	-89.811347
716	0.0164	0.00311	0.9356	0.0005	38.9024386	-89.803422
469	0.0107	0.00204	0.6132	0.0003	38.9025969	-89.800694
326	0.0074	0.00142	0.4252	0.0002	38.9010848	-89.804974
202	0.0046	0.000142	0.2638	0.0002	38.9007707	-89.804696
405	0.0093	0.00176	0.5292	0.0001	38.9006947	-89.800053
511	0.0117	0.00170	0.6672	0.0003	38.9000947	-89.799329
7				0.0003	38.8996901	-89.800695
	0.0002	0.00003	0.0091			
824	0.0188	0.00358	1.0767	0.0005	38.9008063	-89.800705
237	0.0054	0.00103	0.3091	0.0002	38.8999179	-89.800382

668	0.0153	0.00290	0.8725	0.0004	38.8981433	-89.804679
92	0.0021	0.00040	0.1199	0.0001	38.8975747	-89.803934
624	0.0143	0.00271	0.8157	0.0004	38.8967203	-89.803617
61	0.0014	0.00027	0.0798	0.0000	38.8926304	-89.786527
104	0.0024	0.00045	0.1364	0.0001	38.8925334	-89.786198
50	0.0012	0.00022	0.0658	0.0000	38.8924977	-89.78607
830	0.0190	0.00361	1.0837	0.0005	38.8913677	-89.786275
375	0.0086	0.00163	0.4902	0.0002	38.8903407	-89.786055
1163	0.0266	0.00506	1.5194	0.0008	38.8897295	-89.787958
903	0.0206	0.00393	1.1799	0.0006	38.8895027	-89.789865
972	0.0222	0.00423	1.2703	0.0006	38.8887153	-89.787635
343	0.0078	0.00149	0.4474	0.0002	38.8861026	-89.801375
226	0.0052	0.00098	0.2949	0.0001	38.8860196	-89.807704
70	0.0016	0.00030	0.0909	0.0000	38.8856475	-89.807714
196	0.0015	0.00085	0.2554	0.0001	38.8841073	-89.803979
59	0.0043	0.00085	0.2334	0.0001	38.8838555	-89.806428
		0.00026		0.0000		-89.800686
354	0.0081		0.4629		38.882738	
1338	0.0306	0.00582	1.7475	0.0009	38.8822503	-89.779115
134	0.0031	0.00058	0.1751	0.0001	38.8792295	-89.779833
127	0.0029	0.00055	0.1654	0.0001	38.8789622	-89.780042
965	0.0221	0.00419	1.2602	0.0006	38.8771355	-89.781067
165	0.0038	0.00072	0.2153	0.0001	38.8743531	-89.781957
255	0.0058	0.00111	0.3332	0.0002	38.8741684	-89.781519
106	0.0024	0.00046	0.1386	0.0001	38.8740929	-89.782108
61	0.0014	0.00027	0.0798	0.0000	38.8737988	-89.783788
103	0.0024	0.00045	0.1344	0.0001	38.8737814	-89.782945
36	0.0008	0.00016	0.0477	0.0000	38.8737969	-89.784695
44	0.0010	0.00019	0.0579	0.0000	38.873793	-89.784554
65	0.0015	0.00028	0.0851	0.0000	38.8737634	-89.783485
846	0.0193	0.00368	1.1048	0.0006	38.8736365	-89.783374
231	0.0053	0.00100	0.3013	0.0002	38.8728226	-89.789066
704	0.0161	0.00306	0.9199	0.0005	38.8726468	-89.788058
1030	0.0236	0.00448	1.3460	0.0007	38.8726522	-89.801001
1022	0.0234	0.00444	1.3344	0.0007	38.8716366	-89.789641
2000	0.0457	0.00869	2.6125	0.0013	38.8697003	-89.788231
1142	0.0261	0.00496	1.4912	0.0007	38.8696373	-89.789762
1176	0.0269	0.00511	1.5359	0.0008	38.9451157	-89.69506
48	0.0011	0.00021	0.0621	0.0000	38.9441169	-89.694256
96	0.0022	0.00042	0.1257	0.0001	38.9417538	-89.696641
1432	0.0327	0.00622	1.8701	0.0009	38.9432418	-89.696742
1040	0.0238	0.00452	1.3587	0.0007	38.9403113	-89.696499
119	0.0027	0.00052	0.1552	0.0001	38.9370564	-89.693536
50	0.0027	0.00032	0.0647	0.0001	38.9368507	-89.693693
206	0.0011	0.00022	0.2694	0.0000	38.9366581	-89.694592
207	0.0047	0.00090	0.2698	0.0001	38.9365392	-89.694266
43	0.0010	0.00019	0.0568	0.0000	38.9360316	-89.697407
97	0.0022	0.00042	0.1268	0.0001	38.9360662	-89.696513

346	0.0079	0.00150	0.4516	0.0002	38.9361525	-89.694978
277	0.0063	0.00121	0.3623	0.0002	38.9360841	-89.69884
261	0.0060	0.00113	0.3403	0.0002	38.9348125	-89.700796
955	0.0218	0.00415	1.2480	0.0006	38.9357699	-89.700424
1057	0.0242	0.00460	1.3810	0.0007	38.9349166	-89.701524
128	0.0029	0.00056	0.1671	0.0001	38.9344713	-89.700507
325	0.0074	0.00141	0.4247	0.0002	38.9337811	-89.698947
578	0.0132	0.00251	0.7553	0.0004	38.9335357	-89.700516
217	0.0050	0.00094	0.2829	0.0001	38.9328905	-89.697189
800	0.0183	0.00348	1.0455	0.0005	38.9307854	-89.704418
866	0.0198	0.00377	1.1317	0.0006	38.9314851	-89.698065
1149	0.0263	0.00500	1.5015	0.0008	38.9311058	-89.697151
300	0.0069	0.00130	0.3920	0.0002	38.9292844	-89.694399
384	0.0088	0.00167	0.5010	0.0003	38.9283542	-89.698783
443	0.0101	0.00193	0.5786	0.0003	38.9285604	-89.701577
321	0.0073	0.00140	0.4195	0.0002	38.9265499	-89.697072
39	0.0009	0.00017	0.0514	0.0000	38.9250031	-89.687367
118	0.0027	0.00051	0.1543	0.0001	38.9249899	-89.687852
157	0.0036	0.00068	0.2057	0.0001	38.9249787	-89.688406
355	0.0081	0.00154	0.4642	0.0002	38.9254714	-89.693659
366	0.0084	0.00159	0.4786	0.0002	38.924923	-89.686921
51	0.0012	0.00022	0.0669	0.0000	38.9248215	-89.692371
205	0.0047	0.00089	0.2678	0.0001	38.924818	-89.693195
904	0.0207	0.00393	1.1811	0.0006	38.924523	-89.685343
206	0.0047	0.00090	0.2696	0.0001	38.9246914	-89.687613
79	0.0018	0.00034	0.1033	0.0001	38.9249238	-89.703912
195	0.0045	0.00085	0.2549	0.0001	38.9245679	-89.692006
1242	0.0284	0.00540	1.6227	0.0008	38.924019	-89.703413
189	0.0043	0.00082	0.2463	0.0001	38.9231626	-89.704355
403	0.0092	0.00175	0.5268	0.0003	38.9227086	-89.697973
1328	0.0304	0.00577	1.7348	0.0009	38.9232701	-89.686081
645	0.0147	0.00280	0.8428	0.0004	38.9224816	-89.705218
1550	0.0354	0.00674	2.0245	0.0010	38.9204041	-89.704288
169	0.0039	0.00073	0.2204	0.0001	38.9197575	-89.697562
846	0.0193	0.00368	1.1052	0.0006	38.9201196	-89.68919
264	0.0060	0.00115	0.3443	0.0002	38.9193606	-89.689461
125	0.0029	0.00055	0.1638	0.0001	38.9193785	-89.690086
1591	0.0364	0.00692	2.0781	0.0010	38.9196817	-89.695038
351	0.0080	0.00153	0.4583	0.0002	38.9183874	-89.697038
749	0.0171	0.00326	0.9784	0.0005	38.9180423	-89.695356
676	0.0155	0.00294	0.8836	0.0004	38.9185388	-89.68509
66	0.0015	0.00028	0.0856	0.0000	38.9176688	-89.691595
870	0.0199	0.00378	1.1369	0.0006	38.9182375	-89.699591
382	0.0087	0.00166	0.4986	0.0002	38.9178855	-89.702452
123	0.0028	0.00054	0.1612	0.0001	38.9173837	-89.702609
372	0.0085	0.00162	0.4857	0.0002	38.9174146	-89.701794
420	0.0096	0.00183	0.5485	0.0003	38.9171395	-89.690808
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418	0.0096	0.00182	0.5463	0.0003	38.9169555	-89.691737
114	0.0026	0.00049	0.1483	0.0001	38.9159937	-89.696494
1228	0.0281	0.00534	1.6036	0.0008	38.9163461	-89.698432
48	0.0011	0.00021	0.0621	0.0000	38.9159354	-89.700479
41	0.0009	0.00018	0.0541	0.0000	38.9157189	-89.700512
48	0.0011	0.00021	0.0621	0.0000	38.9156029	-89.70047
1768	0.0404	0.00769	2.3100	0.0012	38.9144115	-89.695902
283	0.0065	0.00123	0.3698	0.0002	38.9143246	-89.7049
1489	0.0340	0.00647	1.9449	0.0010	38.9141207	-89.709476
1094	0.0250	0.00476	1.4295	0.0007	38.9112369	-89.709883
268	0.0061	0.00117	0.3507	0.0002	38.9106862	-89.707535
357	0.0082	0.00155	0.4669	0.0002	38.9104346	-89.713801
1480	0.0338	0.00643	1.9335	0.0010	38.9115536	-89.704233
420	0.0096	0.00183	0.5489	0.0003	38.9100076	-89.716426
387	0.0088	0.00168	0.5053	0.0003	38.9096369	-89.703943
208	0.0048	0.00100	0.2718	0.0001	38.909586	-89.704731
270	0.0062	0.00030	0.3532	0.0001	38.9093295	-89.705437
877	0.0201	0.00118	1.1458	0.0002	38.9094602	-89.718349
				0.0003	38.9093349	
493 655	0.0113	0.00214	0.6445			-89.704439
655	0.0150	0.00285	0.8563	0.0004	38.9088548	-89.709383
506	0.0116	0.00220	0.6616	0.0003	38.9084134	-89.707441
436	0.0100	0.00189	0.5689	0.0003	38.9084076	-89.712299
188	0.0043	0.00082	0.2461	0.0001	38.907831	-89.71952
759	0.0173	0.00330	0.9910	0.0005	38.9066255	-89.709266
85	0.0019	0.00037	0.1113	0.0001	38.9062487	-89.718798
374	0.0086	0.00163	0.4891	0.0002	38.9063751	-89.723274
914	0.0209	0.00397	1.1941	0.0006	38.9068303	-89.717975
854	0.0195	0.00371	1.1159	0.0006	38.8961408	-89.725212
90	0.0021	0.00039	0.1173	0.0001	38.8954078	-89.726323
1034	0.0236	0.00450	1.3508	0.0007	38.8954352	-89.724419
728	0.0166	0.00316	0.9506	0.0005	38.8950573	-89.721942
1177	0.0269	0.00512	1.5378	0.0008	38.8943578	-89.720191
400	0.0091	0.00174	0.5219	0.0003	38.8942185	-89.725169
38	0.0009	0.00016	0.0492	0.0000	38.8938464	-89.721889
523	0.0120	0.00228	0.6837	0.0003	38.8933946	-89.722019
429	0.0098	0.00186	0.5602	0.0003	38.8925628	-89.724581
58	0.0013	0.00025	0.0760	0.0000	38.8919275	-89.724575
1419	0.0324	0.00617	1.8535	0.0009	38.8936599	-89.737087
317	0.0073	0.00138	0.4144	0.0002	38.8919199	-89.725051
1082	0.0247	0.00470	1.4133	0.0007	38.8931863	-89.743019
204	0.0047	0.00089	0.2665	0.0001	38.890899	-89.74185
629	0.0144	0.00273	0.8212	0.0004	38.8909236	-89.739804
130	0.0030	0.00057	0.1703	0.0001	38.8896244	-89.74294
319	0.0073	0.00139	0.4168	0.0002	38.8845613	-89.759709
131	0.0030	0.00057	0.1707	0.0001	38.8843104	-89.759649
116	0.0027	0.00051	0.1521	0.0001	38.8840853	-89.763559
226	0.0052	0.00098	0.2953	0.0001	38.8839937	-89.760335
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167	0.0038	0.00073	0.2186	0.0001	38.8834793	-89.763552
219	0.0050	0.00095	0.2860	0.0001	38.8827367	-89.735855
184	0.0042	0.00080	0.2399	0.0001	38.8821959	-89.735845
916	0.0210	0.00398	1.1971	0.0006	38.8834888	-89.772818
48	0.0011	0.00021	0.0621	0.0000	38.8822885	-89.77286
793	0.0181	0.00345	1.0353	0.0005	38.8827884	-89.774114
41	0.0009	0.00018	0.0541	0.0000	38.8800659	-89.735839
437	0.0100	0.00190	0.5711	0.0003	38.8807065	-89.769762
116	0.0027	0.00050	0.1514	0.0001	38.8799061	-89.755553
290	0.0066	0.00126	0.3794	0.0002	38.8797679	-89.756065
505	0.0116	0.00220	0.6603	0.0003	38.8803716	-89.774446
81	0.0019	0.00035	0.1060	0.0001	38.8794866	-89.758675
270	0.0062	0.00117	0.3523	0.0002	38.8795383	-89.755848
158	0.0036	0.00069	0.2060	0.0001	38.8798106	-89.771033
1088	0.0249	0.00473	1.4209	0.0007	38.8793995	-89.769264
1400	0.0320	0.00609	1.8288	0.0009	38.8791233	-89.7373
121	0.0028	0.00053	0.1585	0.0001	38.8783395	-89.738769
398	0.0091	0.00173	0.5201	0.0003	38.8793499	-89.77429
381	0.0087	0.00166	0.4979	0.0002	38.879077	-89.773507
1113	0.0254	0.00484	1.4542	0.0007	38.8790203	-89.741315
323	0.0074	0.00140	0.4219	0.0002	38.8779843	-89.741973
353	0.0081	0.00154	0.4616	0.0002	38.8791767	-89.770835
210	0.0048	0.00091	0.2747	0.0001	38.8787503	-89.770361
82	0.0019	0.00036	0.1075	0.0001	38.8779743	-89.742537
326	0.0074	0.00142	0.4255	0.0002	38.8780216	-89.739209
805	0.0184	0.00350	1.0511	0.0005	38.8782746	-89.769913
775	0.0177	0.00337	1.0118	0.0005	38.8773719	-89.760148
191	0.0044	0.00083	0.2496	0.0001	38.8774382	-89.77469
52	0.0012	0.00022	0.0674	0.0000	38.8768952	-89.761349
374	0.0086	0.00163	0.4886	0.0002	38.8765987	-89.7446
1180	0.0270	0.00513	1.5409	0.0008	38.8768216	-89.73803
279	0.0064	0.00121	0.3640	0.0002	38.875987	-89.774983
133	0.0030	0.00058	0.1736	0.0001	38.8755209	-89.756549
746	0.0170	0.00324	0.9740	0.0005	38.8757969	-89.755545
103	0.0024	0.00045	0.1348	0.0001	38.8754911	-89.762704
245	0.0056	0.00107	0.3206	0.0002	38.8745557	-89.741135
143	0.0033	0.00062	0.1862	0.0001	38.8749989	-89.760359
280	0.0064	0.00122	0.3662	0.0002	38.8749888	-89.756608
676	0.0155	0.00294	0.8835	0.0004	38.8748777	-89.755534
96	0.0022	0.00042	0.1253	0.0001	38.8745301	-89.756664
719	0.0164	0.00313	0.9398	0.0005	38.8738916	-89.739622
1145	0.0262	0.00498	1.4962	0.0007	38.8735377	-89.738568
334	0.0076	0.00145	0.4357	0.0002	38.8738824	-89.741872
471	0.0108	0.00205	0.6149	0.0003	38.8735335	-89.741307
832	0.0190	0.00362	1.0873	0.0005	38.8735146	-89.743525
366	0.0084	0.00159	0.4775	0.0002	38.8742137	-89.758569
175	0.0040	0.00076	0.2292	0.0001	38.8737712	-89.775969

499	0.0114	0.00217	0.6523	0.0003	38.8728504	-89.744398
172	0.0039	0.00075	0.2244	0.0001	38.8736435	-89.775261
901	0.0206	0.00392	1.1766	0.0006	38.8726408	-89.742239
473	0.0108	0.00206	0.6183	0.0003	38.8725634	-89.744298
723	0.0165	0.00314	0.9449	0.0005	38.87345	-89.750866
599	0.0137	0.00260	0.7824	0.0004	38.8722036	-89.742944
169	0.0039	0.00074	0.2212	0.0001	38.8721559	-89.745086
61	0.0014	0.00027	0.0803	0.0000	38.8725069	-89.777153
46	0.0011	0.00020	0.0605	0.0000	38.8716219	-89.745076
772	0.0176	0.00335	1.0081	0.0005	38.8716142	-89.743855
801	0.0183	0.00348	1.0465	0.0005	38.8725994	-89.758929
109	0.0025	0.00047	0.1419	0.0001	38.8722654	-89.777233
113	0.0026	0.00049	0.1479	0.0001	38.8714031	-89.745086
96	0.0022	0.00042	0.1248	0.0001	38.8709866	-89.74507
291	0.0067	0.00127	0.3802	0.0002	38.8708695	-89.744608
113	0.0026	0.00049	0.1479	0.0001	38.8707004	-89.745083
223	0.0051	0.00097	0.2908	0.0001	38.8699746	-89.745082
105	0.0024	0.00046	0.1370	0.0001	38.8705186	-89.777287
659	0.0151	0.00287	0.8611	0.0004	38.870551	-89.773315
325	0.0074	0.00141	0.4241	0.0002	38.8699288	-89.752275
435	0.0100	0.00189	0.5686	0.0003	38.8694965	-89.751553
123	0.0028	0.00054	0.1612	0.0001	38.8702248	-89.777152
40	0.0009	0.00017	0.0519	0.0000	38.869777	-89.777071
1866	0.0427	0.00811	2.4372	0.0012	38.8711847	-89.746837
150	0.0034	0.00065	0.1953	0.0001	38.8689093	-89.746463
2000	0.0457	0.00869	2.6125	0.0013	38.8697003	-89.788231
147	0.0034	0.00064	0.1918	0.0001	38.8686903	-89.746236
152	0.0035	0.00066	0.1986	0.0001	38.8695194	-89.777011
1142	0.0261	0.00496	1.4912	0.0007	38.8696373	-89.789762
1157	0.0265	0.00503	1.5117	0.0008	38.8679568	-89.752237
150	0.0034	0.00065	0.1964	0.0001	38.8663986	-89.747011
198	0.0045	0.00086	0.2590	0.0001	38.8660744	-89.763046
678	0.0155	0.00295	0.8862	0.0004	38.8658558	-89.768579
98	0.0022	0.00042	0.1275	0.0001	38.8653716	-89.769353
353	0.0081	0.00154	0.4614	0.0002	38.865309	-89.770047
235	0.0054	0.00102	0.3073	0.0002	38.8646904	-89.763326
202	0.0046	0.00088	0.2638	0.0001	38.863963	-89.755048
101	0.0023	0.00044	0.1321	0.0001	38.8635186	-89.748596
5	0.0001	0.00002	0.0064	0.0000	38.863074	-89.750202
434	0.0099	0.00189	0.5674	0.0003	38.8635583	-89.750525
422	0.0096	0.00184	0.5514	0.0003	38.863538	-89.749835
448	0.0102	0.00195	0.5848	0.0003	38.8633837	-89.770755
59	0.0014	0.00026	0.0771	0.0000	38.862916	-89.754461
152	0.0035	0.00066	0.1986	0.0001	38.8628772	-89.754704
215	0.0049	0.00094	0.2811	0.0001	38.8627394	-89.752198
61	0.0014	0.00027	0.0803	0.0000	38.8627826	-89.780254
124	0.0028	0.00054	0.1623	0.0001	38.862278	-89.763857

625	0.0143	0.00272	0.8163	0.0004	38.862425	-89.751579
1512	0.0346	0.00657	1.9755	0.0010	38.8636268	-89.765525
912	0.0209	0.00397	1.1915	0.0006	38.861394	-89.77872
96	0.0022	0.00042	0.1253	0.0001	38.8588684	-89.761904
120	0.0027	0.00052	0.1568	0.0001	38.8587835	-89.761809
759	0.0173	0.00330	0.9913	0.0005	38.8580006	-89.762808
525	0.0120	0.00228	0.6855	0.0003	38.8571914	-89.762592
140	0.0032	0.00061	0.1827	0.0001	38.8570153	-89.763716
267	0.0061	0.00116	0.3488	0.0002	38.8571076	-89.767044
1241	0.0284	0.00539	1.6207	0.0008	38.8578194	-89.756144
868	0.0198	0.00377	1.1342	0.0006	38.8564826	-89.755864
440	0.0101	0.00191	0.5753	0.0003	38.856642	-89.768006
586	0.0134	0.00255	0.7660	0.0004	38.8561472	-89.767557
515	0.013	0.00233	0.6727	0.0003	38.8553771	-89.763203
247	0.0016	0.00107	0.3222	0.0003	38.8545819	-89.771718
529	0.0030	0.00107	0.6915	0.0002	38.8545169	-89.770667
373	0.0121	0.00230	0.4871	0.0003	38.8542204	-89.756637
1456				0.0002	38.8539808	
	0.0333	0.00633	1.9019			-89.759181
244	0.0056	0.00106	0.3186	0.0002	38.8541246	-89.761289
347	0.0079	0.00151	0.4529	0.0002	38.8539667	-89.771182
366	0.0084	0.00159	0.4777	0.0002	38.8532883	-89.7568
891	0.0204	0.00387	1.1638	0.0006	38.8530594	-89.760159
810	0.0185	0.00352	1.0581	0.0005	38.852792	-89.76097
1162	0.0266	0.00505	1.5179	0.0008	38.9131507	-89.837475
43	0.0010	0.00019	0.0557	0.0000	38.9116643	-89.837488
312	0.0071	0.00136	0.4075	0.0002	38.9108383	-89.832495
1011	0.0231	0.00439	1.3200	0.0007	38.9098636	-89.829665
2564	0.0586	0.01115	3.3492	0.0017	38.9099638	-89.835091
216	0.0049	0.00094	0.2825	0.0001	38.9083427	-89.831724
168	0.0038	0.00073	0.2195	0.0001	38.9040348	-89.829779
1804	0.0412	0.00784	2.3569	0.0012	38.9054491	-89.837056
215	0.0049	0.00093	0.2809	0.0001	38.9039819	-89.836574
594	0.0136	0.00258	0.7765	0.0004	38.9039743	-89.834159
145	0.0033	0.00063	0.1889	0.0001	38.9037517	-89.833258
1182	0.0270	0.00514	1.5437	0.0008	38.9047366	-89.835871
431	0.0098	0.00187	0.5625	0.0003	38.9040788	-89.841579
413	0.0094	0.00180	0.5396	0.0003	38.9035935	-89.836162
717	0.0164	0.00312	0.9371	0.0005	38.9035982	-89.83458
139	0.0032	0.00061	0.1820	0.0001	38.903646	-89.841301
642	0.0147	0.00279	0.8381	0.0004	38.9011826	-89.826389
1094	0.0250	0.00476	1.4294	0.0007	38.9012484	-89.834882
43	0.0010	0.00019	0.0557	0.0000	38.9004854	-89.833412
3912	0.0894	0.01701	5.1102	0.0026	38.9041631	-89.83814
560	0.0128	0.00243	0.7316	0.0004	38.9009974	-89.833
276	0.0063	0.00120	0.3601	0.0002	38.9006471	-89.832012
305	0.0070	0.00133	0.3988	0.0002	38.9002254	-89.83379
236	0.0054	0.00103	0.3086	0.0002	38.8997853	-89.824598
			2.222	2.2.2		

87	0.0020	0.00038	0.1135	0.0001	38.899769	-89.824003
77	0.0018	0.00033	0.1007	0.0001	38.8997705	-89.826033
245	0.0056	0.00107	0.3201	0.0002	38.8986767	-89.825566
490	0.0112	0.00213	0.6405	0.0003	38.8987607	-89.828103
190	0.0043	0.00083	0.2485	0.0001	38.8982053	-89.828098
479	0.0110	0.00208	0.6259	0.0003	38.8977765	-89.827194
2307	0.0528	0.01003	3.0142	0.0015	38.9007252	-89.840942
1695	0.0387	0.00737	2.2139	0.0011	38.8993889	-89.841753
314	0.0072	0.00136	0.4101	0.0002	38.8970014	-89.83945
1204	0.0275	0.00523	1.5727	0.0008	38.8979216	-89.842889
561	0.0128	0.00244	0.7329	0.0004	38.8961388	-89.830608
1671	0.0382	0.00726	2.1824	0.0011	38.8943078	-89.829864
214	0.0049	0.00093	0.2798	0.0001	38.8937516	-89.825405
508	0.0116	0.00221	0.6633	0.0003	38.8931475	-89.826959
79	0.0018	0.00035	0.1038	0.0001	38.8926476	-89.824841
311	0.0071	0.00135	0.4057	0.0002	38.8922755	-89.817253
402	0.0092	0.00175	0.5250	0.0003	38.8922161	-89.817888
65	0.0015	0.00028	0.0851	0.0000	38.8910044	-89.814632
277	0.0063	0.00120	0.3614	0.0002	38.8905087	-89.817655
559	0.0128	0.00120	0.7296	0.0002	38.8906501	-89.832625
145	0.0033	0.00243	0.1900	0.0004	38.8905094	-89.831737
370	0.0035	0.00063	0.4838	0.0001	38.8899386	-89.816912
304	0.0083	0.00101	0.4838	0.0002	38.8898883	-89.823611
258	0.0070	0.00132	0.3369	0.0002	38.8899024	-89.814647
397	0.0091	0.00173	0.5186	0.0003	38.8903064	-89.830121
630	0.0144	0.00274	0.8234	0.0004	38.8899316	-89.830925
104	0.0024	0.00045	0.1355	0.0001	38.8898497	-89.829761
266	0.0061	0.00116	0.3471	0.0002	38.8898864	-89.819385
61	0.0014	0.00027	0.0798	0.0000	38.8894435	-89.814667
607	0.0139	0.00264	0.7924	0.0004	38.8894025	-89.818493
932	0.0213	0.00405	1.2179	0.0006	38.8888687	-89.815778
997	0.0228	0.00433	1.3019	0.0007	38.8898564	-89.83258
352	0.0080	0.00153	0.4598	0.0002	38.8877001	-89.817515
348	0.0080	0.00151	0.4549	0.0002	38.887459	-89.828459
398	0.0091	0.00173	0.5197	0.0003	38.8871327	-89.828388
599	0.0137	0.00260	0.7826	0.0004	38.8866328	-89.815607
150	0.0034	0.00065	0.1955	0.0001	38.8865976	-89.836514
59	0.0014	0.00026	0.0776	0.0000	38.8859805	-89.816793
533	0.0122	0.00232	0.6957	0.0003	38.8856779	-89.815715
278	0.0064	0.00121	0.3637	0.0002	38.8859983	-89.825938
676	0.0154	0.00294	0.8828	0.0004	38.8843714	-89.818335
1381	0.0316	0.00601	1.8045	0.0009	38.8857083	-89.823398
293	0.0067	0.00128	0.3833	0.0002	38.8842444	-89.82357
452	0.0103	0.00196	0.5902	0.0003	38.8845148	-89.836931
38	0.0009	0.00016	0.0492	0.0000	38.8837187	-89.824254
1829	0.0418	0.00795	2.3890	0.0012	38.8839467	-89.82751
302	0.0069	0.00131	0.3944	0.0002	38.8838098	-89.823795

54	0.0012	0.00024	0.0712	0.0000	38.8826033	-89.815595
464	0.0106	0.00202	0.6061	0.0003	38.8827546	-89.818507
218	0.0050	0.00095	0.2849	0.0001	38.882531	-89.815279
61	0.0014	0.00027	0.0803	0.0000	38.8831728	-89.838484
473	0.0108	0.00206	0.6177	0.0003	38.8821885	-89.823497
910	0.0208	0.00396	1.1886	0.0006	38.8818349	-89.816506
1037	0.0237	0.00451	1.3550	0.0007	38.881984	-89.836801
50	0.0011	0.00022	0.0647	0.0000	38.8817209	-89.834479
292	0.0011	0.00022	0.3820	0.0002	38.8812036	-89.828904
918	0.0210	0.00399	1.1992	0.0006	38.8809989	-89.827437
1127	0.0258	0.00490	1.4719	0.0007	38.8811252	-89.830113
809	0.0185	0.00352	1.0566	0.0005	38.8805166	-89.816723
180	0.0041	0.00078	0.2350	0.0001	38.8801554	-89.821894
162	0.0037	0.00070	0.2115	0.0001	38.8795149	-89.833159
1290	0.0295	0.00561	1.6854	0.0008	38.8793561	-89.822702
156	0.0036	0.00068	0.2044	0.0001	38.879368	-89.831343
367	0.0084	0.00160	0.4797	0.0002	38.8787097	-89.817847
511	0.0117	0.00222	0.6675	0.0003	38.8787808	-89.809678
215	0.0049	0.00093	0.2805	0.0001	38.878153	-89.809898
204	0.0047	0.00089	0.2665	0.0001	38.8779554	-89.809562
193	0.0044	0.00084	0.2516	0.0001	38.8777076	-89.809886
697	0.0159	0.00303	0.9099	0.0005	38.8773326	-89.808619
261	0.0060	0.00303	0.3403	0.0003	38.8773697	-89.807669
239	0.0055	0.00113	0.3128	0.0002	38.8770394	-89.807209
174	0.0040	0.00076	0.2275	0.0001	38.8774458	-89.830931
79 50	0.0018	0.00034	0.1029	0.0001	38.8764832	-89.805652
59	0.0014	0.00026	0.0776	0.0000	38.8763051	-89.805954
389	0.0089	0.00169	0.5086	0.0003	38.8759666	-89.804966
229	0.0052	0.00100	0.2997	0.0001	38.8754051	-89.823212
761	0.0174	0.00331	0.9942	0.0005	38.8759628	-89.824187
591	0.0135	0.00257	0.7720	0.0004	38.875928	-89.833868
1535	0.0351	0.00667	2.0056	0.0010	38.8757944	-89.826626
1421	0.0325	0.00618	1.8566	0.0009	38.8749633	-89.80837
113	0.0026	0.00049	0.1472	0.0001	38.8743628	-89.821357
205	0.0047	0.00089	0.2683	0.0001	38.8742824	-89.826408
271	0.0062	0.00118	0.3543	0.0002	38.8731858	-89.805644
867	0.0198	0.00377	1.1320	0.0006	38.8735766	-89.813969
429	0.0098	0.00187	0.5609	0.0003	38.8724726	-89.806245
142	0.0033	0.00062	0.1858	0.0001	38.8724066	-89.818613
1455	0.0333	0.00633	1.9008	0.0010	38.8717584	-89.80779
1030	0.0236	0.00448	1.3460	0.0010	38.8726522	-89.801001
		0.00448			38.8718165	-89.801001
624	0.0143		0.8150	0.0004		
906	0.0207	0.00394	1.1839	0.0006	38.8709812	-89.806722
63	0.0014	0.00027	0.0825	0.0000	38.8706788	-89.819664
374	0.0085	0.00162	0.4882	0.0002	38.8710167	-89.823561
129	0.0029	0.00056	0.1681	0.0001	38.8689455	-89.805744
417	0.0095	0.00181	0.5445	0.0003	38.8692182	-89.809897

191	0.0044	0.00083	0.2499	0.0001	38.8692313	-89.826278
620	0.0142	0.00270	0.8099	0.0004	38.8698975	-89.825843
730	0.0167	0.00317	0.9531	0.0005	38.8698614	-89.830615
102	0.0023	0.00044	0.1333	0.0001	38.8690767	-89.830019
202	0.0046	0.00088	0.2645	0.0001	38.8688508	-89.825993
156	0.0036	0.00068	0.2044	0.0001	38.8679011	-89.824825
689	0.0157	0.00299	0.8997	0.0004	38.8676096	-89.835451
54	0.0012	0.00024	0.0712	0.0000	38.867052	-89.834766
78	0.0018	0.00034	0.1018	0.0001	38.8669876	-89.834924
1342	0.0307	0.00583	1.7526	0.0009	38.8682677	-89.834039
7	0.0002	0.00003	0.0091	0.0000	38.8663603	-89.825058
208	0.0048	0.00091	0.2720	0.0001	38.8664305	-89.825401
678	0.0155	0.00295	0.8853	0.0004	38.8669579	-89.825628
1274	0.0291	0.00554	1.6644	0.0008	38.8674701	-89.829722
469	0.0107	0.00204	0.6122	0.0003	38.8665054	-89.822951
461	0.0105	0.00200	0.6019	0.0003	38.8658159	-89.822638
985	0.0225	0.00428	1.2872	0.0006	38.8666372	-89.836266
186	0.0042	0.00081	0.2423	0.0001	38.8658024	-89.823536
690	0.0158	0.00300	0.9011	0.0005	38.865704	-89.806256
193	0.0044	0.00084	0.2527	0.0001	38.8647337	-89.807922
178	0.0041	0.00077	0.2319	0.0001	38.8645861	-89.835063
3111	0.0711	0.01353	4.0644	0.0020	38.8672118	-89.833256
58	0.0013	0.00025	0.0760	0.0000	38.8645133	-89.831855
225	0.0051	0.00098	0.2935	0.0001	38.8643202	-89.834145
415	0.0095	0.00181	0.5427	0.0003	38.8636565	-89.820728
5	0.0001	0.00002	0.0064	0.0000	38.8634643	-89.831833
407	0.0093	0.00177	0.5321	0.0003	38.8639663	-89.831949
290	0.0066	0.00126	0.3789	0.0002	38.8637338	-89.831556
358	0.0082	0.00156	0.4673	0.0002	38.8636169	-89.83439
814	0.0186	0.00354	1.0633	0.0005	38.8631078	-89.825131
912	0.0209	0.00397	1.1915	0.0006	38.861394	-89.77872
52	0.0012	0.00022	0.0674	0.0000	38.860264	-89.781042
67	0.0015	0.00029	0.0878	0.0000	38.8602061	-89.781247
348	0.0080	0.00151	0.4549	0.0002	38.8603969	-89.782055
224	0.0051	0.00097	0.2927	0.0001	38.8599595	-89.781757
45	0.0010	0.00020	0.0594	0.0000	38.8596524	-89.782193
122	0.0028	0.00053	0.1596	0.0001	38.8593602	-89.782275
204	0.0047	0.00089	0.2665	0.0001	38.8590419	-89.784729
234	0.0053	0.00102	0.3055	0.0002	38.8590294	-89.792573
1144	0.0262	0.00497	1.4943	0.0007	38.8604186	-89.832795
994	0.0227	0.00432	1.2988	0.0006	38.8606667	-89.829455
41	0.0009	0.00018	0.0541	0.0000	38.8596753	-89.830397
415	0.0095	0.00181	0.5427	0.0003	38.858839	-89.786938
89	0.0020	0.00039	0.1162	0.0001	38.8582768	-89.784812
1568	0.0358	0.00681	2.0477	0.0010	38.8581588	-89.83326
291	0.0067	0.00126	0.3800	0.0002	38.8572183	-89.793467
613	0.0140	0.00267	0.8008	0.0004	38.8582828	-89.829384

1262	0.0289	0.00549	1.6491	0.0008	38.8579407	-89.826137
408	0.0093	0.00178	0.5335	0.0003	38.8559747	-89.791091
190	0.0043	0.00083	0.2483	0.0001	38.8566562	-89.829197
598	0.0137	0.00260	0.7809	0.0004	38.8555697	-89.830484
1303	0.0298	0.00567	1.7024	0.0009	38.8541428	-89.782752
101	0.0023	0.00044	0.1321	0.0001	38.8530158	-89.801264
2256	0.0516	0.00981	2.9471	0.0015	38.8549128	-89.791271
1470	0.0336	0.00639	1.9206	0.0010	38.8536782	-89.833546
488	0.0112	0.00212	0.6379	0.0003	38.8530448	-89.831338
145	0.0033	0.00063	0.1894	0.0001	38.8524269	-89.831683
345	0.0079	0.00150	0.4503	0.0002	38.85221	-89.832052
272	0.0062	0.00118	0.3554	0.0002	38.8521276	-89.831115
445	0.0102	0.00194	0.5816	0.0003	38.8517079	-89.826584
260	0.0059	0.00113	0.3394	0.0002	38.8517131	-89.825858
691	0.0158	0.00300	0.9023	0.0005	38.8508244	-89.830896
2023	0.0463	0.00880	2.6433	0.0013	38.8510494	-89.802612
902	0.0206	0.00392	1.1785	0.0006	38.8505265	-89.824975
1262	0.0288	0.00549	1.6483	0.0008	38.8503599	-89.822254
39	0.0009	0.00017	0.0503	0.0000	38.8487962	-89.822265
472	0.0108	0.00205	0.6161	0.0003	38.8483403	-89.832962
1176	0.0269	0.00511	1.5367	0.0008	38.8493024	-89.833395
749	0.0171	0.00326	0.9789	0.0005	38.8478949	-89.822534
464	0.0106	0.00202	0.6057	0.0003	38.8475566	-89.828913
458	0.0105	0.00199	0.5977	0.0003	38.8475845	-89.826317
1343	0.0307	0.00584	1.7544	0.0009	38.8470873	-89.83062
162	0.0037	0.00070	0.2115	0.0001	38.8461156	-89.826704
260	0.0060	0.00113	0.3401	0.0002	38.8451067	-89.826859
811	0.0185	0.00352	1.0589	0.0005	38.8456027	-89.827717
541	0.0124	0.00235	0.7068	0.0004	38.8453692	-89.832035
588	0.0134	0.00255	0.7676	0.0004	38.8457125	-89.835706
479	0.0110	0.00208	0.6261	0.0003	38.8440472	
1042	0.0238	0.00453	1.3617	0.0007	38.8438297	-89.811658
560	0.0128	0.00244	0.7320	0.0004	38.8425752	-89.81288
1508	0.0345	0.00656	1.9699	0.0010	38.8425811	-89.809156
476	0.0109	0.00207	0.6214	0.0003	38.8405466	-89.811833
238	0.0054	0.00104	0.3110	0.0002	38.8401682	-89.812819
661	0.0151	0.00287	0.8631	0.0004	38.8394891	-89.811818
431	0.0099	0.00187	0.5631	0.0003	38.8391763	-89.813578
288	0.0066	0.00125	0.3767	0.0002	38.8390695	-89.83158
252	0.0058	0.00109	0.3288	0.0002	38.8387914	-89.831648
787	0.0180	0.00342	1.0278	0.0005	38.8385087	-89.820431
39	0.0009	0.00017	0.0514	0.0000	38.8377305	-89.822488
1481	0.0339	0.00644	1.9350	0.0010	38.839834	-89.830014
564	0.0129	0.00245	0.7372	0.0004	38.8382558	-89.830577
93	0.0021	0.00040	0.1210	0.0001	38.8375746	-89.822512
1292	0.0295	0.00562	1.6883	0.0008	38.832338	-89.82796
1391	0.0318	0.00605	1.8173	0.0009	38.8324746	-89.827403
1001	3.3310	0.0000	1.01,0	5.5555	20.002 17 10	33.027.103

649	0.0148	0.00282	0.8473	0.0004	38.8314046	-89.826814
843	0.0193	0.00366	1.1010	0.0006	38.9180227	-89.843494
668	0.0153	0.00290	0.8726	0.0004	38.9170743	-89.842167
827	0.0189	0.00360	1.0806	0.0005	38.9154727	-89.843895
343	0.0078	0.00149	0.4485	0.0002	38.91451	-89.846872
171	0.0039	0.00074	0.2228	0.0001	38.9145487	-89.846442
290	0.0066	0.00126	0.3789	0.0002	38.9141269	-89.846085
746	0.0170	0.00324	0.9742	0.0005	38.9132301	-89.844641
523	0.0120	0.00227	0.6833	0.0003	38.9120264	-89.846362
171	0.0039	0.00074	0.2233	0.0001	38.9116267	-89.849078
235	0.0054	0.00102	0.3066	0.0002	38.9114122	-89.848729
1686	0.0386	0.00733	2.2030	0.0011	38.9128223	-89.839703
2264	0.0518	0.00984	2.9578	0.0015	38.9128346	-89.837853
179	0.0041	0.00078	0.2334	0.0001	38.9108245	-89.840346
124	0.0028	0.00054	0.1621	0.0001	38.9109725	-89.849601
10	0.0002	0.00004	0.0129	0.0000	38.9108403	-89.84946
259	0.0059	0.00113	0.3383	0.0002	38.9110543	-89.849122
392	0.0090	0.00113	0.5119	0.0003	38.9108625	-89.850105
334	0.0076	0.00176	0.4368	0.0003	38.9104102	-89.849364
187	0.0043	0.000143	0.2446	0.0001	38.9099508	-89.849546
449	0.0103	0.00195	0.5871	0.0001	38.9099075	-89.847259
492	0.0103	0.00133	0.6432	0.0003	38.9097898	-89.848623
198	0.0015	0.00214	0.2585	0.0003	38.9089091	-89.847791
444	0.0101	0.00080	0.5798	0.0001	38.9076983	-89.848206
970	0.0222	0.00133	1.2675	0.0005	38.9073241	-89.846367
268	0.0061	0.00422	0.3501	0.0000	38.9073571	-89.847555
782	0.0179	0.00117	1.0221	0.0002	38.9072686	-89.851295
112	0.0026	0.00340	0.1468	0.0003	38.9063725	-89.852138
295	0.0020	0.00049	0.3849	0.0001	38.9059824	-89.852128
2734	0.0625	0.00128	3.5716	0.0002	38.9057662	-89.845114
			0.4720	0.0018	38.903931	-89.847489
361 270	0.0083	0.00157		0.0002	38.9038814	-89.848621
	0.0062 0.0044	0.00117	0.3521	0.0002	38.9036858	-89.848255
193		0.00084	0.2521			
1420	0.0325	0.00617	1.8543	0.0009 0.0006	38.9031722 38.9018809	-89.847311
844	0.0193	0.00367	1.1024			-89.850444
826	0.0189	0.00359	1.0793	0.0005	38.9008799	-89.851622
615	0.0141	0.00268	0.8039	0.0004	38.8995643	-89.851601
344	0.0079	0.00149	0.4492	0.0002	38.8986128	-89.852014
1033	0.0236	0.00449	1.3495	0.0007	38.8995202	-89.863579
538	0.0123	0.00234	0.7025	0.0004	38.8994438	-89.862674
153	0.0035	0.00066	0.1993	0.0001	38.8985316	-89.862749
540	0.0123	0.00235	0.7055	0.0004	38.8979333	-89.850498
43	0.0010	0.00019	0.0568	0.0000	38.897921	-89.860113
1309	0.0299	0.00569	1.7103	0.0009	38.8980743	-89.858172
2314	0.0529	0.01006	3.0223	0.0015	38.8999715	-89.859434
608	0.0139	0.00264	0.7947	0.0004	38.8973082	-89.846513
1146	0.0262	0.00498	1.4968	0.0007	38.8976032	-89.846028

70	0.0016	0.00030	0.0909	0.0000	38.8965764	-89.851664
58	0.0013	0.00025	0.0760	0.0000	38.8964458	-89.846528
303	0.0069	0.00132	0.3955	0.0002	38.8967046	-89.847583
355	0.0081	0.00154	0.4634	0.0002	38.896747	-89.861819
1021	0.0233	0.00444	1.3337	0.0007	38.8964158	-89.864714
399	0.0091	0.00173	0.5210	0.0003	38.8954591	-89.852369
157	0.0036	0.00068	0.2057	0.0001	38.895683	-89.857099
400	0.0091	0.00174	0.5224	0.0003	38.8948612	-89.851115
817	0.0187	0.00355	1.0669	0.0005	38.8958034	-89.859722
324	0.0074	0.00141	0.4233	0.0002	38.8951179	-89.865414
98	0.0022	0.00042	0.1275	0.0001	38.8940708	-89.855944
568	0.0130	0.00247	0.7424	0.0004	38.8947863	-89.85579
203	0.0046	0.00088	0.2648	0.0001	38.894264	-89.859165
404	0.0092	0.00176	0.5279	0.0003	38.8945315	-89.864862
344	0.0079	0.00170	0.4500	0.0003	38.8943999	-89.857121
371	0.0075	0.00150	0.4851	0.0002	38.8944445	-89.860646
591	0.0135	0.00101	0.7720	0.0002	38.8935876	-89.851077
376	0.0086	0.00257	0.4917	0.0004	38.8931135	-89.857143
208	0.0088	0.00104	0.2718	0.0002	38.8925582	-89.85319
	0.0048	0.00090	0.2718	0.0001	38.8928768	-89.868462
131						
1489	0.0340	0.00647	1.9449	0.0010	38.8933746	-89.866607
1208	0.0276	0.00525	1.5774	0.0008	38.8927654	-89.855102
243	0.0056	0.00106	0.3173	0.0002	38.8914418	-89.848208
64	0.0015	0.00028	0.0836	0.0000	38.8913987	-89.847847
36	0.0008	0.00016	0.0477	0.0000	38.891261	-89.847853
535	0.0122	0.00233	0.6994	0.0003	38.8919014	-89.8573
774	0.0177	0.00336	1.0107	0.0005	38.8915874	-89.858107
1193	0.0273	0.00519	1.5583	0.0008	38.8908809	-89.858909
651	0.0149	0.00283	0.8504	0.0004	38.8904392	-89.848115
246	0.0056	0.00107	0.3210	0.0002	38.8893471	-89.851465
469	0.0107	0.00204	0.6132	0.0003	38.8898916	-89.863959
5	0.0001	0.00002	0.0064	0.0000	38.8892891	-89.866268
1021	0.0233	0.00444	1.3332	0.0007	38.8904951	-89.866665
313	0.0072	0.00136	0.4090	0.0002	38.8892826	-89.865776
445	0.0102	0.00194	0.5818	0.0003	38.8894991	-89.868926
265	0.0061	0.00115	0.3468	0.0002	38.8887283	-89.86547
156	0.0036	0.00068	0.2040	0.0001	38.8877137	-89.854725
293	0.0067	0.00128	0.3831	0.0002	38.8878832	-89.864909
204	0.0047	0.00089	0.2660	0.0001	38.8861294	-89.853094
653	0.0149	0.00284	0.8536	0.0004	38.8859987	-89.857751
200	0.0046	0.00087	0.2616	0.0001	38.8848025	-89.85699
129	0.0029	0.00056	0.1681	0.0001	38.8846444	-89.864299
2221	0.0508	0.00966	2.9012	0.0015	38.8856493	-89.858786
338	0.0077	0.00147	0.4421	0.0002	38.8837318	-89.857591
349	0.0080	0.00152	0.4554	0.0002	38.8832823	-89.862262
513	0.0117	0.00223	0.6700	0.0003	38.8829037	-89.859035
97	0.0022	0.00042	0.1268	0.0001	38.8823046	-89.858587
				'		

69	0.0016	0.00030	0.0900	0.0000	38.8817148	-89.850765
184	0.0042	0.00080	0.2410	0.0001	38.8819062	-89.865836
442	0.0101	0.00192	0.5775	0.0003	38.8822087	-89.865926
1172	0.0268	0.00509	1.5307	0.0008	38.8818169	-89.86353
181	0.0041	0.00079	0.2370	0.0001	38.8815865	-89.857444
631	0.0144	0.00274	0.8238	0.0004	38.8813577	-89.849558
549	0.0126	0.00239	0.7172	0.0004	38.8809724	-89.856763
1508	0.0345	0.00656	1.9701	0.0010	38.8826017	-89.855324
242	0.0055	0.00105	0.3159	0.0002	38.8811113	-89.857465
51	0.0012	0.00022	0.0669	0.0000	38.8800117	-89.852638
65	0.0015	0.00028	0.0851	0.0000	38.8798719	-89.852569
963	0.0220	0.00419	1.2583	0.0006	38.8804511	-89.845358
1173	0.0268	0.00510	1.5321	0.0008	38.8802355	-89.862016
449	0.0103	0.00195	0.5871	0.0003	38.8801538	-89.865183
556	0.0127	0.00242	0.7259	0.0004	38.8797522	-89.867138
987	0.0226	0.00429	1.2897	0.0006	38.8795069	-89.869451
417	0.0095	0.00181	0.5443	0.0003	38.8791293	-89.867489
68	0.0016	0.00030	0.0889	0.0000	38.8779431	-89.837276
92	0.0021	0.00040	0.1199	0.0001	38.878027	-89.837132
1006	0.0230	0.00438	1.3147	0.0007	38.8785029	-89.847103
1006	0.0230	0.00437	1.3142	0.0007	38.8781993	-89.863674
1717	0.0393	0.00747	2.2433	0.0011	38.878302	-89.870487
191	0.0044	0.00083	0.2496	0.0001	38.8776614	-89.837149
34	0.0008	0.00015	0.0450	0.0000	38.8779134	-89.862092
39	0.0009	0.00017	0.0503	0.0000	38.8779373	-89.861977
700	0.0160	0.00304	0.9141	0.0005	38.8772836	-89.838107
236	0.0054	0.00103	0.3088	0.0003	38.8776117	-89.862114
591	0.0135	0.00103	0.7720	0.0002	38.875928	-89.833868
937	0.0214	0.00407	1.2234	0.0006	38.8761477	-89.837181
1049	0.0240	0.00456	1.3704	0.0007	38.8758134	-89.850058
932	0.0213	0.00436	1.2168	0.0007	38.8758869	-89.849121
1814	0.0215	0.00403	2.3697	0.0000	38.8759127	-89.862066
1514	0.0413	0.00789	1.9834	0.0012	38.8762583	-89.84091
68	0.0016	0.00030	0.0894	0.0010	38.8746231	-89.849116
96					38.8744415	-89.840645
761	0.0022 0.0174	0.00042 0.00331	0.1253	0.0001 0.0005	38.8743242	-89.839357
			0.9938			
982	0.0225	0.00427	1.2832	0.0006	38.8743551	-89.842481
88	0.0020	0.00038	0.1146	0.0001	38.8743365	-89.840804
1246	0.0285	0.00542	1.6281	0.0008	38.8744561	-89.851182
1314	0.0300	0.00571	1.7162	0.0009	38.8763531	-89.868012
835	0.0191	0.00363	1.0910	0.0005	38.8748529	-89.868861
215	0.0049	0.00093	0.2805	0.0001	38.8744277	-89.867597
279	0.0064	0.00121	0.3649	0.0002	38.8729283	-89.864202
285	0.0065	0.00124	0.3725	0.0002	38.8721836	-89.841493
650	0.0148	0.00282	0.8485	0.0004	38.8729797	-89.870555
682	0.0156	0.00297	0.8911	0.0004	38.8722885	-89.847136
377	0.0086	0.00164	0.4924	0.0002	38.8717298	-89.846439

782 0.0179 0.00340 1.0214 0.0003 38.8723806 -89.868383 353 0.0081 0.00154 0.4634 0.0002 38.871277 -89.863891 355 0.0081 0.00154 0.4636 0.0002 38.8703797 -89.863891 196 0.0045 0.00085 0.2560 0.0001 38.8703557 89.84061 477 0.0109 0.00207 0.6230 0.0003 38.8703694 -89.840913 1624 0.0371 0.00706 2.1209 0.0011 38.8701209 -89.866767 1008 0.0230 0.00438 1.3162 0.0007 38.8695052 -89.834689 42 0.0010 0.000182 0.5476 0.0003 38.8695052 -89.834932 31342 0.0307 0.00583 1.7526 0.0003 38.869488 -89.84392 2453 0.0561 0.01066 3.2043 0.0016 38.869488 -89.84392 301 0.0400 0.00076 0.2275 0							
155 0.0035 0.00067 0.2022 0.0001 38.8717977 -89.863891 355 0.0081 0.00154 0.4636 0.0002 38.8704399 98.8340167 196 0.0045 0.00085 0.2560 0.0001 38.8703557 98.834016 477 0.0109 0.00207 0.6230 0.0003 38.8700375 89.846889 1008 0.0230 0.00438 1.3162 0.0007 38.862606 89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.862606 89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.862666 89.837012 1043 0.0307 0.00583 1.7526 0.0009 38.866267 79.833031 1342 0.0307 0.00583 1.7526 0.0009 38.866267 79.833031 174 0.0040 0.00076 0.2275 0.0001 38.866367 89.84132 174 0.0040 0.00076 0.2275 0.0001 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
355 0.0081 0.00154 0.4636 0.0002 38.870399 -89.834167 196 0.0045 0.00085 0.2560 0.0001 38.8703557 -89.834016 477 0.0109 0.00207 0.6230 0.0003 38.8703264 -89.840913 1624 0.0371 0.00706 2.1209 0.0011 38.8701209 -89.866767 1008 0.0230 0.00438 1.3162 0.0007 38.8682606 89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.8695052 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.862677 89.834911 1342 0.0307 0.00583 1.7526 0.0009 38.8662677 89.834932 2453 0.0561 0.01066 3.2043 0.0010 38.8674948 89.842336 174 0.0040 0.00076 0.2275 0.0001 38.866138 89.84393 1212 0.0098 0.00186 0.5602 0.	353	0.0081	0.00154	0.4614	0.0002	38.872521	
196 0.0045 0.00085 0.2560 0.0001 38.8703557 -89.834016 477 0.0109 0.0207 0.6230 0.0003 38.8701209 -89.866767 1008 0.0230 0.00438 1.3162 0.0007 38.8702375 -89.846889 42 0.0010 0.00453 1.3621 0.0007 38.8692606 -89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.8692605 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.8682677 -89.834039 2453 0.0561 0.0166 3.2043 0.0016 38.8696488 -89.84392 301 0.0069 0.00131 0.3935 0.0001 38.8674948 -89.841321 174 0.0040 0.00076 0.2275 0.0001 38.866638 -89.841622 429 0.0098 0.00186 0.5602 0.003 38.8666389 -89.81231 1121 0.0256 0.00487 1.4644 0.	155	0.0035	0.00067	0.2022	0.0001	38.8717977	-89.863891
477 0.0109 0.00207 0.6230 0.0003 38.8700964 -89.840913 1624 0.0371 0.00706 2.1209 0.0011 38.8701209 -89.866767 1008 0.0230 0.00438 1.3162 0.0007 38.8762375 -89.846889 42 0.0010 0.00018 0.0545 0.0000 38.866260 -89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.8695052 -89.839688 419 0.0096 0.00182 0.5476 0.0003 38.8674973 -89.834039 2453 0.0561 0.01066 3.2043 0.0016 38.8674948 -89.84332 301 0.0669 0.00131 0.3935 0.0002 38.8674948 -89.84313 174 0.0040 0.00076 0.2275 0.0001 38.8666168 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.8661108 -89.871622 429 0.0098 0.00188 1.6444 <td< td=""><td>355</td><td>0.0081</td><td>0.00154</td><td>0.4636</td><td>0.0002</td><td>38.8704399</td><td>-89.834167</td></td<>	355	0.0081	0.00154	0.4636	0.0002	38.8704399	-89.834167
1624 0.0371 0.00706 2.1209 0.0011 38.8701209 -89.866767 1008 0.0230 0.00438 1.3162 0.0007 38.8702375 -89.846889 42 0.0010 0.00018 0.0545 0.0007 38.8695052 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.834638 419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.834931 2453 0.0561 0.01066 3.2043 0.0016 38.866488 -89.84392 301 0.0069 0.00131 0.3935 0.0002 38.8664488 -89.842336 174 0.0040 0.00076 0.2275 0.0001 38.866516 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866518 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866339 -89.871931 1121 0.0256 0.00487 1.4644 0	196	0.0045	0.00085	0.2560	0.0001	38.8703557	-89.834016
1008 0.0230 0.00438 1.3162 0.0007 38.8702375 -89.846889 42 0.0010 0.00018 0.0545 0.0000 38.8692606 -89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.8695052 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.834039 2453 0.0561 0.01066 3.2043 0.0016 38.8696488 -89.84329 301 0.0069 0.00131 0.3935 0.0002 38.8674948 -89.842379 174 0.0040 0.00076 0.2275 0.0001 38.866339 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.8661108 -89.842379 779 0.0178 0.00339 1.0177 0.0003 38.8661108 -89.842379 1121 0.0256 0.00487 1.4644 0.0007 38.8661108 -89.871931 1121 0.0256 0.00123 0.3696	477	0.0109	0.00207	0.6230	0.0003	38.8700964	-89.840913
42 0.0010 0.00018 0.0545 0.0000 38.8682606 -89.837012 1043 0.0238 0.00453 1.3621 0.0007 38.8695052 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.8349431 1342 0.0307 0.00583 1.7526 0.0009 38.8682677 -89.834039 2453 0.0561 0.01066 3.2043 0.0016 38.8696488 -89.84392 301 0.0069 0.00181 0.3935 0.0002 38.8674948 -89.847162 429 0.0098 0.00186 0.5602 0.0003 38.866108 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.8661108 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.8661108 -89.871931 177 0.0040 0.00077 0.2312 0.0001 38.864581 -89.864383 40 0.0025 0.00390 1.1724 <td< td=""><td>1624</td><td>0.0371</td><td>0.00706</td><td>2.1209</td><td>0.0011</td><td>38.8701209</td><td>-89.866767</td></td<>	1624	0.0371	0.00706	2.1209	0.0011	38.8701209	-89.866767
1043 0.0238 0.00453 1.3621 0.0007 38.8695052 -89.838698 419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.839431 1342 0.0307 0.00583 1.7526 0.0009 38.8662677 -89.834932 301 0.0069 0.00131 0.3935 0.0002 38.8674948 -89.842336 174 0.0040 0.00076 0.2275 0.0001 38.866516 -89.842336 429 0.0098 0.00339 1.0177 0.0003 38.866516 -89.842336 40 0.0009 0.0017 0.0519 0.000 38.8665118 -89.871931 1171 0.0040 0.00077 0.2312 0.0001 38.8661108 -89.842336 40 0.0009 0.0017 0.0519 0.000 38.865281 -89.84392 283 0.0065 0.00123 0.3696 0.0002 38.8649851 -89.863794 4897 0.0205 0.00339 1.1724 0.000	1008	0.0230	0.00438	1.3162	0.0007	38.8702375	-89.846889
419 0.0096 0.00182 0.5476 0.0003 38.8674373 -89.839431 1342 0.0307 0.00583 1.7526 0.0009 38.8682677 -89.834039 2453 0.0561 0.01066 3.2043 0.0016 38.8694848 -89.842336 301 0.0069 0.00131 0.3935 0.0001 38.8673786 -89.842336 174 0.0040 0.00076 0.2275 0.0001 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0005 38.866516 -89.842379 40 0.0009 0.00017 0.0519 0.0000 38.86650831 -89.871941 177 0.0040 0.00077 0.2312 0.0001 38.8648247 -89.863263 897 0.0205 0.00390 1.1724 0.0006 38.864381 -89.871942 541 0.0124 0.00235 0.7073 0.0004 38.864294 -89.86826 541 0.0124 0.00235 0.7073 0.	42	0.0010	0.00018	0.0545	0.0000	38.8682606	-89.837012
1342 0.0307 0.00583 1.7526 0.0009 38.8696488 -89.84392 301 0.0069 0.00131 0.3935 0.0002 38.8674948 -89.84392 174 0.0040 0.00076 0.2275 0.0001 38.8673786 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0005 38.8666339 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.865031 -89.871448 40 0.0009 0.0017 0.0519 0.0001 38.865031 -89.871448 177 0.0040 0.00077 0.2312 0.0001 38.8650831 -89.871448 177 0.0040 0.00077 0.2312 0.0001 38.8652831 -89.8791448 177 0.0040 0.00073 0.3696 0.0002 38.864126 -89.862636 897 0.0205 0.00390 1.1724 0.00	1043	0.0238	0.00453	1.3621	0.0007	38.8695052	-89.838698
2453 0.0561 0.01066 3.2043 0.0016 38.8696488 -89.84392 301 0.0069 0.00131 0.3935 0.0002 38.8674948 -89.842336 174 0.0040 0.00076 0.2275 0.0001 38.866516 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0007 38.8661108 -89.861383 40 0.0009 0.00017 0.0519 0.0000 38.86650831 -89.871941 177 0.0040 0.00077 0.2312 0.0001 38.8648247 -89.863794 283 0.0065 0.00123 0.3696 0.0002 38.8645851 -89.863263 897 0.0205 0.00390 1.1724 0.0006 38.8645851 -89.86684 750 0.0171 0.0023 0.9795 0.0003 38.864914 -89.848124 541 0.0124 0.0023 0.0701 0.000	419	0.0096	0.00182	0.5476	0.0003	38.8674373	-89.839431
301 0.0069 0.00131 0.3935 0.0002 38.8674948 -89.842336 174 0.0040 0.00076 0.2275 0.0001 38.86673786 -89.871622 429 0.0098 0.00386 0.5602 0.0003 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0005 38.866613 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.866108 -89.84333 40 0.0009 0.00017 0.0519 0.0000 38.8650831 -89.871944 177 0.0040 0.00077 0.2312 0.0001 38.8645851 -89.863794 283 0.0065 0.00123 0.3696 0.0002 38.8645851 -89.863263 897 0.0205 0.00390 1.1724 0.0006 38.8645851 -89.841232 541 0.0124 0.00235 0.7073 0.0004 38.863955 -89.86826 54 0.0012 0.0023 0.0701 0.000<	1342	0.0307	0.00583	1.7526	0.0009	38.8682677	-89.834039
174 0.0040 0.00076 0.2275 0.0001 38.8673786 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0005 38.866339 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.8661108 -89.871448 40 0.0009 0.00017 0.0519 0.0000 38.8661081 -89.871448 177 0.0040 0.00077 0.2312 0.0001 38.8648247 -89.863794 283 0.0065 0.00123 0.3696 0.0002 38.8648247 -89.863263 897 0.0205 0.00390 1.1724 0.0006 38.8648247 -89.866263 750 0.0171 0.00325 0.7073 0.0005 38.8648241 -89.866264 54 0.0012 0.00023 0.0701 0.0000 38.8648248 -89.87991 923 0.0211 0.00401 1.2053 0.0	2453	0.0561	0.01066	3.2043	0.0016	38.8696488	-89.84392
174 0.0040 0.00076 0.2275 0.0001 38.8673786 -89.871622 429 0.0098 0.00186 0.5602 0.0003 38.866516 -89.842379 779 0.0178 0.00339 1.0177 0.0005 38.8666108 -89.871931 1121 0.0256 0.00487 1.4644 0.0007 38.8661108 -89.84383 40 0.0009 0.00017 0.0519 0.0000 38.866108 -89.871448 177 0.0040 0.00077 0.2312 0.0001 38.8648247 -89.863794 283 0.0065 0.00123 0.3696 0.0002 38.8648247 -89.863263 897 0.0205 0.00390 1.1724 0.0006 38.864281 -89.863263 897 0.0171 0.00325 0.7073 0.0004 38.864938 -89.865264 -89.864825 54 0.0012 0.00023 0.0701 0.0000 38.8640386 -89.87091 923 0.0211 0.0041 1.2	301	0.0069	0.00131	0.3935	0.0002	38.8674948	-89.842336
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762	0.0174	0.00331	0.9950	0.0005	38.8571458	-89.843105
5	0.0001	0.00002	0.0064	0.0000	38.8562656	-89.851854
311	0.0071	0.00135	0.4064	0.0002	38.8568158	-89.863478
1459	0.0333	0.00634	1.9055	0.0010	38.8581622	-89.86297
360	0.0082	0.00156	0.4702	0.0002	38.8562486	-89.852473
354	0.0081	0.00154	0.4625	0.0002	38.8559363	-89.839973
136	0.0031	0.00059	0.1771	0.0001	38.8562782	-89.863604
99	0.0023	0.00043	0.1290	0.0001	38.8558469	-89.848105
206	0.0047	0.00090	0.2692	0.0001	38.8555595	-89.839038
522	0.0119	0.00227	0.6818	0.0003	38.8558522	-89.852483
218	0.0050	0.00095	0.2842	0.0001	38.8556824	-89.871537
321	0.0073	0.00139	0.4190	0.0002	38.8551452	-89.843606
99	0.0023	0.00043	0.1295	0.0001	38.8544332	-89.841842
177	0.0040	0.00077	0.2312	0.0001	38.8541394	-89.859306
116	0.0027	0.00050	0.1514	0.0001	38.8539712	-89.859447
549	0.0126	0.00239	0.7175	0.0004	38.8536037	-89.864172
175	0.0040	0.00076	0.2286	0.0001	38.8536833	-89.871568
1470	0.0336	0.00639	1.9206	0.0010	38.8536782	-89.833546
361	0.0083	0.00157	0.4722	0.0002	38.8535663	-89.859093
349	0.0080	0.00152	0.4565	0.0002	38.8534138	-89.85872
155	0.0036	0.00068	0.2029	0.0001	38.853461	-89.871402
2101	0.0480	0.00913	2.7439	0.0014	38.8541313	-89.837726
770	0.0176	0.00335	1.0063	0.0005	38.8532954	-89.870209
898	0.0205	0.00390	1.1732	0.0006	38.8523461	-89.838141
174	0.0040	0.00076	0.2279	0.0001	38.8531377	-89.86816
183	0.0042	0.00079	0.2388	0.0001	38.8528844	-89.858986
155	0.0035	0.00067	0.2019	0.0001	38.8528494	-89.868704
233	0.0053	0.00101	0.3046	0.0002	38.852031	-89.840396
539	0.0123	0.00234	0.7035	0.0004	38.85236	-89.869333
624	0.0143	0.00271	0.8146	0.0004	38.8517322	-89.847376
1048	0.0240	0.00456	1.3691		38.8528781	
691	0.0158	0.00300	0.9026	0.0005	38.8523379	-89.87279
1892	0.0432	0.00822	2.4710	0.0012	38.852081	-89.849374
34	0.0008	0.00015	0.0450	0.0000	38.8522118	-89.871872
202	0.0046	0.00088	0.2638	0.0001	38.8511952	-89.865004
390	0.0089	0.00169	0.5090	0.0003	38.8502497	-89.83857
108	0.0025	0.00047	0.1414	0.0001	38.8508292	-89.860942
758	0.0173	0.00330	0.9906	0.0005	38.8511574	-89.845833
246	0.0056	0.00107	0.3210	0.0002	38.8499211	-89.844669
476	0.0109	0.00207	0.6216	0.0003	38.8497468	-89.845921
892	0.0204	0.00388	1.1657	0.0006	38.8499287	-89.85263
730	0.0167	0.00317	0.9533	0.0005	38.8499948	-89.860761
166	0.0038	0.00072	0.2164	0.0001	38.8493075	-89.839201
76	0.0038	0.00072	0.0995	0.0001	38.8496934	-89.871982
44	0.0017	0.00033	0.0579	0.0000	38.8496986	-89.871878
67	0.0015	0.00019	0.0373	0.0000	38.8483011	-89.854314
5	0.0013	0.00023	0.0064	0.0000	38.84845	-89.866913
5	0.0001	0.00002	0.0004	0.0000	30.04043	05.000513

1182	0.0270	0.00514	1.5446	0.0008	38.8486715	-89.868489
154	0.0035	0.00067	0.2007	0.0001	38.8486	-89.867067
61	0.0014	0.00027	0.0803	0.0000	38.8479312	-89.858004
353	0.0081	0.00154	0.4616	0.0002	38.8472013	-89.840759
958	0.0219	0.00416	1.2514	0.0006	38.847935	-89.864854
260	0.0059	0.00113	0.3399	0.0002	38.8479643	-89.863368
410	0.0094	0.00178	0.5354	0.0003	38.8474711	-89.862688
282	0.0064	0.00122	0.3681	0.0002	38.8474373	-89.860936
267	0.0061	0.00116	0.3490	0.0002	38.8469129	-89.848673
1140	0.0261	0.00496	1.4895	0.0007	38.8470967	-89.837909
353	0.0081	0.00153	0.4607	0.0002	38.8472236	-89.858186
7	0.0002	0.00003	0.0091	0.0000	38.8469016	-89.871889
1063	0.0243	0.00462	1.3891	0.0007	38.8482741	-89.871924
885	0.0202	0.00385	1.1566	0.0006	38.8468845	-89.873372
279	0.0064	0.00121	0.3649	0.0002	38.8462953	-89.845382
588	0.0134	0.00255	0.7676	0.0004	38.8457125	-89.835706
701	0.0160	0.00305	0.9152	0.0005	38.8457662	-89.840743
159	0.0036	0.00069	0.2075	0.0001	38.845855	-89.864392
729	0.0167	0.00317	0.9524	0.0005	38.8462522	-89.851437
724	0.0165	0.00315	0.9453	0.0005	38.8460409	-89.847778
1178	0.0269	0.00512	1.5387	0.0008	38.846299	-89.87304
149	0.0034	0.00065	0.1949	0.0001	38.8442445	-89.856182
232	0.0053	0.00101	0.3024	0.0002	38.8436827	-89.839574
320	0.0073	0.00139	0.4181	0.0002	38.8442516	-89.868574
379	0.0087	0.00165	0.4948	0.0002	38.8436867	-89.867338
864	0.0198	0.00376	1.1292	0.0006	38.8431634	-89.856911
944	0.0216	0.00410	1.2325	0.0006	38.8429665	-89.855934
229	0.0052	0.00100	0.2993	0.0001	38.8419745	-89.863305
539	0.0123	0.00234	0.7046	0.0004	38.8423476	-89.86211
1418	0.0324	0.00616	1.8517	0.0009	38.8419216	-89.869619
89	0.0020	0.00039	0.1162	0.0001	38.8401066	-89.836277
350	0.0080	0.00152	0.4576	0.0002	38.8400377	-89.837717
634	0.0145	0.00276	0.8287	0.0004	38.8401673	-89.843476
3134	0.0716	0.01362	4.0937	0.0020	38.8407413	-89.867854
1419	0.0324	0.00617	1.8538	0.0009	38.8557786	-89.790213
124	0.0028	0.00054	0.1616	0.0001	38.8545577	-89.79128
129	0.0029	0.00056	0.1681	0.0001	38.8543806	-89.791462
290	0.0066	0.00126	0.3794	0.0002	38.8543331	-89.791005
400	0.0091	0.00174	0.5219	0.0003	38.8525808	-89.786322
69	0.0016	0.00030	0.0900	0.0000	38.8520413	-89.782408
1526	0.0349	0.00663	1.9931	0.0010	38.853758	-89.782745
230	0.0053	0.00100	0.3004	0.0002	38.8521913	-89.785284
452	0.0103	0.00196	0.5903	0.0003	38.8519689	-89.784674
285	0.0065	0.00124	0.3718	0.0002	38.8519773	-89.785952
69	0.0016	0.00030	0.0905	0.0000	38.8519862	-89.788646
140	0.0032	0.00061	0.1827	0.0001	38.8519678	-89.789517
903	0.0206	0.00392	1.1792	0.0006	38.8532186	-89.791505

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7	0.0002	0.00003	0.0091	0.0000	38.851989	-89.791509
153	0.0035	0.00067	0.2002	0.0001	38.852145	-89.79132
74	0.0017	0.00032	0.0964	0.0000	38.8519919	-89.79137
209	0.0048	0.00091	0.2727	0.0001	38.8519775	-89.790848
94	0.0021	0.00041	0.1221	0.0001	38.8519947	-89.793427
127	0.0029	0.00055	0.1660	0.0001	38.8519853	-89.793089
41	0.0009	0.00018	0.0541	0.0000	38.8518188	-89.788038
118	0.0027	0.00051	0.1543	0.0001	38.8518499	-89.790141
79	0.0018	0.00034	0.1029	0.0001	38.8518534	-89.791247
250	0.0057	0.00109	0.3272	0.0002	38.8514999	-89.787104
1057	0.0242	0.00460	1.3813	0.0007	38.8513534	-89.794328
1294	0.0296	0.00562	1.6898	0.0008	38.8505371	-89.789628
407	0.0093	0.00177	0.5312	0.0003	38.8496366	-89.786334
124	0.0028	0.00054	0.1621	0.0001	38.8488251	-89.784884
51	0.0012	0.00022	0.0669	0.0000	38.8486345	-89.783325
389	0.0089	0.00169	0.5088	0.0003	38.8486558	-89.784097
78	0.0018	0.00034	0.1022	0.0001	38.8488606	-89.796009
68	0.0016	0.00030	0.0894	0.0000	38.8487442	-89.79614
293	0.0067	0.00127	0.3822	0.0002	38.8488809	-89.796478
1148	0.0262	0.00499	1.4992	0.0007	38.8491598	-89.791574
517	0.0118	0.00225	0.6755	0.0003	38.8484278	-89.795493
758	0.0173	0.00329	0.9896	0.0005	38.8492958	-89.800076
513	0.0173	0.00323	0.6706	0.0003	38.8480069	-89.784733
632	0.0117	0.00225	0.8256	0.0003	38.8448469	-89.784159
61	0.0014	0.00273	0.0798	0.0004	38.8445838	-89.785391
81	0.0014	0.00027	0.1055	0.0000	38.8445761	-89.785115
1851	0.0423	0.00033	2.4184	0.0001	38.8454118	-89.785457
41	0.0009	0.00803	0.0541	0.0012	38.8445826	-89.786325
63	0.0015	0.00028	0.0829	0.0000	38.8363519	-89.805169
281	0.0064	0.00122	0.3673	0.0002	38.8369145	-89.814189
208	0.0048	0.00091	0.2720	0.0001	38.8365317	-89.813904
487	0.0111	0.00212	0.6363	0.0003	38.8364675	-89.807626
276	0.0063	0.00120	0.3600	0.0002	38.8376418	-89.858146
527	0.0120	0.00229	0.6882	0.0003	38.8360287	-89.808378
54	0.0012	0.00024	0.0707	0.0000	38.8369458	-89.858142
48	0.0011	0.00021	0.0632	0.0000	38.8368781	-89.858064
439	0.0100	0.00191	0.5733	0.0003	38.8358794	-89.806374
54	0.0012	0.00024	0.0707	0.0000	38.8367973	-89.858148
335	0.0077	0.00146	0.4372	0.0002	38.8350122	-89.808746
383	0.0087	0.00166	0.4999	0.0002	38.835157	-89.815062
744	0.0170	0.00324	0.9724	0.0005	38.8356052	-89.814524
36	0.0008	0.00015	0.0466	0.0000	38.8355622	-89.850489
99	0.0023	0.00043	0.1295	0.0001	38.8354815	-89.850725
141	0.0032	0.00061	0.1836	0.0001	38.8353315	-89.85117
140	0.0032	0.00061	0.1827	0.0001	38.8355642	-89.858168
334	0.0076	0.00145	0.4368	0.0002	38.8342798	-89.814894
559	0.0128	0.00243	0.7302	0.0004	38.8343507	-89.813949

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599	0.0137	0.00260	0.7824	0.0004	38.8343548	-89.815473
24	0.0005	0.00010	0.0310	0.0000	38.8338829	-89.814734
41	0.0009	0.00018	0.0541	0.0000	38.8344565	-89.858182
283	0.0065	0.00123	0.3694	0.0002	38.8335333	-89.814651
650	0.0149	0.00283	0.8489	0.0004	38.8332788	-89.815516
1074	0.0246	0.00467	1.4030	0.0007	38.834287	-89.850526
81	0.0018	0.00035	0.1055	0.0001	38.8341056	-89.858198
79	0.0018	0.00034	0.1033	0.0001	38.8336231	-89.84435
323	0.0074	0.00140	0.4219	0.0002	38.8331309	-89.849752
131	0.0030	0.00057	0.1714	0.0001	38.8330316	-89.84908
230	0.0053	0.00100	0.3009	0.0002	38.8327413	-89.849378
36	0.0008	0.00015	0.0466	0.0000	38.8321491	-89.858188
1547	0.0354	0.00673	2.0210	0.0010	38.8317539	-89.812907
270	0.0062	0.00117	0.3525	0.0010	38.8306315	-89.809433
929	0.0212	0.00117	1.2136	0.0002	38.8306361	-89.806864
39	0.0012	0.00404	0.0514	0.0000	38.83033109	-89.8088
59 51	0.0009	0.00017	0.0669	0.0000	38.830301	-89.808441
41	0.0009	0.00018	0.0530	0.0000	38.8301735	-89.809065
342	0.0078	0.00149	0.4467	0.0002	38.830085	-89.808449
292	0.0067	0.00127	0.3813	0.0002	38.8300738	-89.806074
97	0.0022	0.00042	0.1273	0.0001	38.8308777	-89.847387
59	0.0014	0.00026	0.0776	0.0000	38.8308555	-89.857442
134	0.0031	0.00058	0.1751	0.0001	38.8306098	-89.847401
315	0.0072	0.00137	0.4110	0.0002	38.8297694	-89.809256
412	0.0094	0.00179	0.5379	0.0003	38.8298842	-89.81689
130	0.0030	0.00056	0.1696	0.0001	38.8293011	-89.809428
118	0.0027	0.00051	0.1536	0.0001	38.8289554	-89.818502
323	0.0074	0.00141	0.4223	0.0002	38.8290081	-89.809133
839	0.0192	0.00365	1.0955	0.0005	38.8287171	-89.817305
179	0.0041	0.00078	0.2344	0.0001	38.82874	-89.818563
631	0.0144	0.00275	0.8248	0.0004	38.8289742	-89.827908
344	0.0079	0.00150	0.4496	0.0002	38.8277597	-89.823204
243	0.0056	0.00106	0.3175	0.0002	38.8283892	-89.847877
829	0.0190	0.00360	1.0828	0.0005	38.827571	-89.827549
52	0.0012	0.00022	0.0674	0.0000	38.8279793	-89.849783
229	0.0052	0.00100	0.2991	0.0001	38.8275281	-89.830555
231	0.0053	0.00100	0.3013	0.0002	38.8275666	-89.829987
900	0.0206	0.00391	1.1757	0.0006	38.8273851	-89.813471
595	0.0136	0.00258	0.7766	0.0004	38.8269198	-89.813587
71	0.0016	0.00031	0.0927	0.0000	38.8268892	-89.830913
5	0.0001	0.00002	0.0064	0.0000	38.8268765	-89.831437
78	0.0018	0.00034	0.1018	0.0001	38.8268999	-89.831305
90	0.0021	0.00039	0.1173	0.0001	38.8268519	-89.830536
229	0.0052	0.00099	0.2988	0.0001	38.8270931	-89.830318
327	0.0075	0.00142	0.4270	0.0002	38.8275601	-89.847923
258	0.0059	0.00112	0.3377	0.0002	38.8264775	-89.814517
191	0.0044	0.00083	0.2499	0.0001	38.8267194	-89.831624

472	0.0108	0.00205	0.6168	0.0003	38.8266106	-89.829676
618	0.0141	0.00269	0.8077	0.0004	38.8263416	-89.825704
769	0.0176	0.00334	1.0043	0.0005	38.8261819	-89.827774
1241	0.0284	0.00539	1.6210	0.0008	38.8270509	-89.835498
239	0.0055	0.00104	0.3117	0.0002	38.8256085	-89.836481
1032	0.0236	0.00448	1.3476	0.0007	38.8266109	-89.834515
1534	0.0351	0.00667	2.0041	0.0010	38.8262117	-89.802797
20	0.0005	0.00009	0.0257	0.0000	38.8244919	-89.801615
1029	0.0235	0.00447	1.3441	0.0007	38.82571	-89.801388
84	0.0019	0.00036	0.1093	0.0001	38.824487	-89.801434
415	0.0095	0.00181	0.5427	0.0003	38.8256478	-89.826404
38	0.0009	0.00016	0.0492	0.0000	38.824477	-89.801707
58	0.0013	0.00025	0.0760	0.0000	38.8243722	-89.801724
466	0.0107	0.00203	0.6089	0.0003	38.8248249	-89.812458
180	0.0041	0.00078	0.2345	0.0001	38.8242572	-89.801314
279	0.0064	0.00121	0.3638	0.0002	38.8248383	-89.82596
425	0.0097	0.00185	0.5554	0.0003	38.8243503	-89.804583
68	0.0016	0.00030	0.0889	0.0000	38.8240988	-89.803982
925	0.0212	0.00402	1.2085	0.0006	38.8254561	-89.828451
268	0.0061	0.00402	0.3501	0.0000	38.8248448	-89.82644
1608	0.0368	0.00699	2.1010	0.0002	38.8259946	-89.818788
403	0.0092	0.00033	0.5264	0.00011	38.8238653	-89.814653
403	0.0092	0.00173	0.5242	0.0003	38.8236076	-89.803565
643	0.0092	0.00174	0.8399	0.0003	38.8238104	-89.802406
317	0.0072	0.00138	0.4137	0.0002	38.8239225	-89.818472
381	0.0087	0.00166	0.4982	0.0002	38.8242579	-89.844397
654	0.0150	0.00284	0.8546	0.0004	38.8247852	-89.844026
309	0.0071	0.00134	0.4031	0.0002	38.8237944	-89.849656
998	0.0228	0.00434	1.3039	0.0007	38.8241367	-89.844722
338	0.0077	0.00147	0.4412	0.0002	38.8235873	-89.843735
458	0.0105	0.00199	0.5988	0.0003	38.8223341	-89.795838
698	0.0160	0.00303	0.9119	0.0005	38.8224614	-89.793585
554	0.0127	0.00241	0.7231	0.0004	38.8217133	-89.794929
1044	0.0239	0.00454	1.3632	0.0007	38.8231563	-89.806898
1755	0.0401	0.00763	2.2921	0.0011	38.8241007	-89.806711
577	0.0132	0.00251	0.7540	0.0004	38.8224626	-89.803329
170	0.0039	0.00074	0.2226	0.0001	38.8229781	-89.843693
201	0.0046	0.00087	0.2623	0.0001	38.8230141	-89.843484
364	0.0083	0.00158	0.4753	0.0002	38.8215587	-89.793414
376	0.0086	0.00163	0.4907	0.0002	38.8216726	-89.792518
201	0.0046	0.00087	0.2623	0.0001	38.8213442	-89.801153
1581	0.0361	0.00687	2.0648	0.0010	38.8214233	-89.798483
326	0.0075	0.00142	0.4259	0.0002	38.8210542	-89.79248
778	0.0178	0.00338	1.0161	0.0005	38.8212416	-89.802334
197	0.0045	0.00086	0.2576	0.0001	38.822184	-89.848807
1184	0.0271	0.00515	1.5463	0.0008	38.8230488	-89.84683
525	0.0120	0.00228	0.6857	0.0003	38.82212	-89.843485

100	0.0023	0.00044	0.1312	0.0001	38.8217137	-89.845317
81	0.0018	0.00035	0.1055	0.0001	38.8216718	-89.844767
206	0.0047	0.00089	0.2687	0.0001	38.8217046	-89.842345
1016	0.0232	0.00442	1.3267	0.0007	38.822455	-89.83911
548	0.0125	0.00238	0.7163	0.0004	38.8216474	-89.824889
539	0.0123	0.00234	0.7039	0.0004	38.8212418	-89.824021
432	0.0099	0.00188	0.5640	0.0003	38.8203879	-89.80372
1020	0.0233	0.00443	1.3322	0.0007	38.8207568	-89.805928
36	0.0008	0.00015	0.0466	0.0000	38.8202784	-89.802901
137	0.0031	0.00059	0.1787	0.0001	38.8216143	-89.848625
86	0.0020	0.00038	0.1129	0.0001	38.8209038	-89.824901
237	0.0054	0.00103	0.3099	0.0002	38.8213524	-89.846218
145	0.0033	0.00063	0.1894	0.0001	38.8206824	-89.838899
1428	0.0326	0.00621	1.8651	0.0009	38.8210706	-89.806482
812	0.0186	0.00353	1.0607	0.0005	38.8200209	-89.807667
61	0.0014	0.00033	0.0803	0.0000	38.8193717	-89.801454
1142	0.0261	0.00027	1.4920	0.0007	38.8210144	-89.819148
933	0.0201	0.00437	1.2185	0.0007	38.8199014	-89.817254
149	0.0034	0.00400	0.1949	0.0001	38.8196553	-89.819372
75						
	0.0017	0.00033	0.0984	0.0000	38.8195662	-89.837401
369	0.0084	0.00160	0.4818	0.0002	38.8192256	-89.81972
478	0.0109	0.00208	0.6244	0.0003	38.8190087	-89.81479
395	0.0090	0.00172	0.5162	0.0003	38.8187837	-89.806594
113	0.0026	0.00049	0.1477	0.0001	38.8194713	-89.842797
744	0.0170	0.00323	0.9720	0.0005	38.8179634	-89.809956
56	0.0013	0.00024	0.0727	0.0000	38.8174736	-89.801428
344	0.0079	0.00149	0.4492	0.0002	38.8189031	-89.844426
326	0.0075	0.00142	0.4263	0.0002	38.8186342	-89.849355
1167	0.0267	0.00507	1.5243	0.0008	38.8193559	-89.847173
61	0.0014	0.00027	0.0803	0.0000	38.8183797	-89.842964
256	0.0059	0.00111	0.3350	0.0002	38.8183185	-89.84906
1604	0.0367	0.00697	2.0948	0.0010	38.818505	-89.817532
730	0.0167	0.00317	0.9534	0.0005	38.8169221	-89.809384
408	0.0093	0.00177	0.5330	0.0003	38.8170651	-89.840337
654	0.0150	0.00285	0.8549	0.0004	38.8167511	-89.811289
654	0.0150	0.00284	0.8544	0.0004	38.8167682	-89.813084
702	0.0161	0.00305	0.9176	0.0005	38.8162883	-89.841498
7	0.0002	0.00003	0.0091	0.0000	38.8154467	-89.821373
436	0.0100	0.00190	0.5696	0.0003	38.8156347	-89.820704
2098	0.0480	0.00912	2.7412	0.0014	38.8160821	-89.845935
177	0.0041	0.00077	0.2317	0.0001	38.8159016	-89.842816
897	0.0205	0.00390	1.1713	0.0006	38.8147067	-89.820257
87	0.0020	0.00038	0.1135	0.0001	38.8140041	-89.835752
468	0.0107	0.00203	0.6108	0.0003	38.8139626	-89.836566
569	0.0130	0.00247	0.7434	0.0004	38.8135704	-89.838172
159	0.0036	0.00069	0.2071	0.0001	38.8129176	-89.824929
929	0.0212	0.00404	1.2141	0.0001	38.8137618	-89.84163
525	0.0212	5.55 7 5 7	1.2171	5.5550	30.0137010	03.04103

105	0.0024	0.00046	0.1375	0.0001	38.8127634	-89.82557
383	0.0088	0.00167	0.5009	0.0003	38.813383	-89.837641
307	0.0070	0.00134	0.4013	0.0002	38.8122542	-89.826066
1890	0.0432	0.00822	2.4685	0.0012	38.811385	-89.823314
91	0.0021	0.00040	0.1188	0.0001	38.8252302	-89.869126
41	0.0009	0.00018	0.0541	0.0000	38.8245321	-89.869191
157	0.0036	0.00068	0.2057	0.0001	38.8235082	-89.869201
986	0.0225	0.00429	1.2877	0.0006	38.8231183	-89.867284
71	0.0016	0.00031	0.0931	0.0000	38.8217452	-89.869175
122	0.0028	0.00053	0.1596	0.0001	38.8207083	-89.864384
514	0.0118	0.00224	0.6718	0.0003	38.8210857	-89.867205
234	0.0053	0.00102	0.3055	0.0002	38.8179807	-89.863943
343	0.0078	0.00149	0.4479	0.0002	38.8177345	-89.868931
5	0.0001	0.00002	0.0064	0.0000	38.8173259	-89.864187
34	0.0008	0.00015	0.0450	0.0000	38.8173799	-89.864184
242	0.0055	0.00105	0.3159	0.0002	38.8174307	-89.863815
5	0.0001	0.00002	0.0064	0.0000	38.8177653	-89.882028
202	0.0046	0.00088	0.2640	0.0001	38.8177225	-89.881689
35	0.0008	0.00015	0.0455	0.0000	38.817726	-89.882073
730	0.0167	0.00317	0.9533	0.0005	38.8176232	-89.859931
868	0.0198	0.00377	1.1342	0.0006	38.8167354	-89.858082
361	0.0083	0.00157	0.4722	0.0002	38.8155784	-89.867136
484	0.0111	0.00210	0.6317	0.0003	38.8138837	-89.858903
834	0.0191	0.00363	1.0892	0.0005	38.8139034	-89.857221
293	0.0067	0.00127	0.3824	0.0002	38.8132977	-89.857882
332	0.0076	0.00144	0.4341	0.0002	38.8133734	-89.865691
917	0.0210	0.00399	1.1979	0.0006	38.8126529	-89.808812
783	0.0179	0.00340	1.0228	0.0005	38.812345	-89.808281
980	0.0224	0.00426	1.2799	0.0006	38.8117784	-89.804148
757	0.0173	0.00329	0.9886	0.0005	38.8119313	-89.816612
297	0.0068	0.00129	0.3877	0.0002	38.8119242	-89.81548
77	0.0018	0.00033	0.1007	0.0001	38.811452	-89.809073
59	0.0013	0.00025	0.0765	0.0000	38.8114934	-89.815527
136	0.0031	0.00059	0.1771	0.0001	38.8114397	-89.810282
365	0.0083	0.00159	0.4766	0.0002	38.8113148	-89.809693
557	0.0127	0.00242	0.7272	0.0004	38.8113689	-89.806397
407	0.0093	0.00177	0.5312	0.0003	38.8112743	-89.808424
150	0.0034	0.00065	0.1960	0.0001	38.8112225	-89.807521
282	0.0064	0.00123	0.3683	0.0002	38.8114974	-89.810875
192	0.0044	0.00083	0.2505	0.0001	38.8112934	-89.810618
608	0.0139	0.00264	0.7946	0.0004	38.8109922	-89.804584
746	0.0170	0.00324	0.9740	0.0005	38.8115273	-89.802636
182	0.0042	0.00079	0.2377	0.0001	38.8107633	-89.80331
476	0.0109	0.00207	0.6223	0.0003	38.8106722	-89.802249
200	0.0046	0.00087	0.2616	0.0001	38.8110497	-89.814825
331	0.0076	0.00144	0.4324	0.0002	38.8109089	-89.806988
321	0.0073	0.00139	0.4188	0.0002	38.8108258	-89.812209

378	0.0086	0.00164	0.4931	0.0002	38.8108382	-89.811385
369	0.0084	0.00160	0.4818	0.0002	38.8108199	-89.807794
398	0.0091	0.00173	0.5201	0.0003	38.8106834	-89.810523
138	0.0031	0.00060	0.1798	0.0001	38.8103773	-89.806788
535	0.0122	0.00233	0.6989	0.0003	38.8124791	-89.878599
321	0.0073	0.00140	0.4197	0.0002	38.8103224	-89.802885
542	0.0124	0.00235	0.7075	0.0004	38.8123755	-89.882884
106	0.0024	0.00046	0.1381	0.0001	38.8119803	-89.877651
939	0.0215	0.00408	1.2269	0.0006	38.8121839	-89.880748
150	0.0034	0.00065	0.1953	0.0001	38.8117806	-89.879569
300	0.0068	0.00130	0.3913	0.0002	38.8117867	-89.877217
578	0.0132	0.00251	0.7547	0.0004	38.8116932	-89.878578
314	0.0072	0.00136	0.4101	0.0002	38.8107772	-89.844655
795	0.0182	0.00345	1.0379	0.0005	38.8105468	-89.813831
415	0.0095	0.00181	0.5424	0.0003	38.8101546	-89.812429
562	0.0128	0.00244	0.7337	0.0004	38.811561	-89.882718
225	0.0052	0.00098	0.2944	0.0001	38.8095564	-89.813164
41	0.0009	0.00018	0.0530	0.0000	38.8092647	-89.813037
69	0.0016	0.00030	0.0900	0.0000	38.8104574	-89.85979
963	0.0220	0.00419	1.2584	0.0006	38.8108778	-89.878218
48	0.0011	0.00021	0.0632	0.0000	38.8086181	-89.813735
321	0.0073	0.00140	0.4195	0.0002	38.8089159	-89.813375
1031	0.0236	0.00448	1.3474	0.0007	38.8100607	-89.842123
39	0.0009	0.00017	0.0514	0.0000	38.809301	-89.841051
980	0.0224	0.00426	1.2808	0.0006	38.8095279	-89.84244
575	0.0132	0.00250	0.7516	0.0004	38.8090605	-89.840096
63	0.0014	0.00027	0.0825	0.0000	38.8087103	-89.839204
915	0.0209	0.00398	1.1956	0.0006	38.8095829	-89.839553
381	0.0087	0.00166	0.4977	0.0002	38.8090176	-89.841562
489	0.0112	0.00212	0.6383	0.0003	38.807938	-89.814877
348	0.0080	0.00151	0.4549	0.0002	38.8081867	-89.813945
854	0.0195	0.00371	1.1161	0.0006	38.8097778	-89.857402
271	0.0062	0.00118	0.3536	0.0002	38.8084882	-89.839587
1755	0.0401	0.00763	2.2919	0.0011	38.8085935	-89.80528
157	0.0036	0.00068	0.2057	0.0001	38.8071936	-89.805481
5	0.0001	0.00002	0.0064	0.0000	38.8071379	-89.803454
44	0.0010	0.00019	0.0579	0.0000	38.8071403	-89.80354
39	0.0009	0.00017	0.0503	0.0000	38.8071126	-89.803517
743	0.0170	0.00323	0.9707	0.0005	38.8079712	-89.838363
334	0.0076	0.00145	0.4358	0.0002	38.8065033	-89.803387
264	0.0060	0.00115	0.3452	0.0002	38.8070345	-89.83775
347	0.0079	0.00151	0.4527	0.0002	38.8070457	-89.837126
722	0.0165	0.00314	0.9434	0.0005	38.8073884	-89.837435
386	0.0088	0.00168	0.5037	0.0003	38.8076304	-89.857758
791	0.0181	0.00344	1.0339	0.0005	38.8069045	-89.814802
160	0.0037	0.00070	0.2088	0.0001	38.8060284	-89.815214
336	0.0077	0.00146	0.4383	0.0002	38.8065481	-89.836222

7	0.0003	0.00003	0.0001	0.0000	20 0057641	00 01272
7	0.0002	0.00003	0.0091	0.0000	38.8057641	-89.81272
120 54	0.0027	0.00052	0.1563	0.0001 0.0000	38.8058822 38.8057954	-89.812666 -89.812629
34	0.0012 0.0008	0.00024 0.00015	0.0712 0.0439	0.0000	38.8054824	-89.803058
495	0.0008	0.00015	0.6467	0.0003	38.8056976	-89.814226
		0.00215		0.0003	38.8056236	-89.813262
103	0.0024	0.00045	0.1350	0.0001	38.8067669	-89.848796
219 90	0.0050 0.0021	0.00093	0.2858 0.1177	0.0001	38.8065858	-89.848551
104	0.0021	0.00039	0.1177	0.0001	38.8055238	-89.813318
283	0.0024	0.00043	0.3703	0.0001	38.806803	-89.870156
116	0.0003	0.00123	0.1521	0.0002	38.8066541	-89.870793
961	0.0027	0.00031	1.2557	0.0001	38.8056813	-89.810769
1719	0.0220	0.00418	2.2458	0.0008	38.8072216	-89.818967
486	0.0393	0.00747	0.6352	0.0011	38.8060984	-89.850117
626	0.0111	0.00211	0.8177	0.0003	38.806065	-89.845294
1616	0.0143	0.00272	2.1110	0.0004	38.8054276	-89.838234
411	0.0094	0.00703	0.5368	0.0011	38.8056952	-89.850283
561	0.0128	0.00179	0.7325	0.0003	38.8058414	-89.848837
422	0.0128	0.00244	0.7323	0.0004	38.8052965	-89.849137
817	0.0187	0.00183	1.0673	0.0005	38.8032903	-89.820144
180	0.0041	0.00333	0.2350	0.0003	38.8049134	-89.845493
51	0.0012	0.00078	0.0669	0.0001	38.8045351	-89.845786
729	0.012	0.00022	0.9522	0.0005	38.8042484	-89.812299
34	0.0008	0.00017	0.0439	0.0000	38.8032753	-89.812097
688	0.0157	0.00299	0.8988	0.0004	38.8040693	-89.815412
83	0.0019	0.00233	0.1086	0.0004	38.8041609	-89.845909
388	0.0019	0.00169	0.5075	0.0001	38.8031899	-89.811538
959	0.0219	0.00103	1.2532	0.0006	38.8042006	-89.847858
177	0.0041	0.00077	0.2317	0.0001	38.8037108	-89.846346
416	0.0095	0.00181	0.5432	0.0003	38.8037715	-89.84543
1464	0.0335	0.00637	1.9129		38.8044135	-89.836903
70	0.0016	0.00031	0.0920	0.0000	38.8035692	-89.846692
320	0.0073	0.00139	0.4177	0.0002	38.8028635	-89.812323
532	0.0122	0.00231	0.6948	0.0003	38.8035752	-89.859141
530	0.0121	0.00230	0.6924	0.0003	38.8027224	-89.811615
173	0.0040	0.00075	0.2264	0.0001	38.80233	-89.812554
87	0.0020	0.00038	0.1140	0.0001	38.8027067	-89.851647
48	0.0011	0.00021	0.0621	0.0000	38.802522	-89.85147
475	0.0109	0.00207	0.6210	0.0003	38.8018135	-89.812234
1415	0.0324	0.00615	1.8485	0.0009	38.8032648	-89.84225
828	0.0189	0.00360	1.0819	0.0005	38.8020702	-89.848865
573	0.0131	0.00249	0.7489	0.0004	38.8005919	-89.812293
88	0.0020	0.00038	0.1151	0.0001	38.8004377	-89.834143
165	0.0038	0.00072	0.2157	0.0001	38.8004271	-89.833756
330	0.0076	0.00144	0.4314	0.0002	38.8003674	-89.833546
94	0.0021	0.00041	0.1226	0.0001	38.8001088	-89.832983
1277	0.0292	0.00555	1.6683	0.0008	38.8002899	-89.831408

659	0.0151	0.00286	0.8604	0.0004	38.7993575	-89.834173
204	0.0047	0.00089	0.2665	0.0001	38.8002583	-89.864418
1157	0.0265	0.00503	1.5117	0.0008	38.7998983	-89.827344
444	0.0101	0.00193	0.5798	0.0003	38.7991741	-89.832404
671	0.0153	0.00292	0.8766	0.0004	38.798788	-89.828529
642	0.0147	0.00279	0.8392	0.0004	38.7991357	-89.837475
197	0.0045	0.00086	0.2579	0.0001	38.7984517	-89.836642
519	0.0119	0.00226	0.6777	0.0003	38.7979848	-89.836819
61	0.0014	0.00027	0.0798	0.0000	38.797402	-89.842164
574	0.0131	0.00250	0.7498	0.0004	38.7968882	-89.830036
1124	0.0257	0.00489	1.4683	0.0007	38.7979194	-89.832972
50	0.0011	0.00022	0.0647	0.0000	38.7964488	-89.842215
845	0.0193	0.00367	1.1033	0.0006	38.7962959	-89.841199
42	0.0010	0.00018	0.0545	0.0000	38.7959911	-89.85452
792	0.0181	0.00344	1.0345	0.0005	38.7958588	-89.853485
780	0.0131	0.00344	1.0194	0.0005	38.7942515	-89.850043
38	0.0009	0.00339	0.0492	0.0003	38.7942045	-89.862271
				0.0000	38.806662	-89.888929
130	0.0030	0.00057	0.1698			
303	0.0069	0.00132	0.3962	0.0002	38.8065209	-89.887874
231	0.0053	0.00100	0.3013	0.0002	38.806209	-89.887907
375	0.0086	0.00163	0.4902	0.0002	38.8060333	-89.88718
501	0.0115	0.00218	0.6549	0.0003	38.8058641	-89.885479
901	0.0206	0.00392	1.1769	0.0006	38.8058918	-89.890165
1699	0.0388	0.00739	2.2191	0.0011	38.8060849	-89.879172
209	0.0048	0.00091	0.2725	0.0001	38.8050874	-89.87781
134	0.0031	0.00058	0.1756	0.0001	38.8041563	-89.883671
405	0.0092	0.00176	0.5285	0.0003	38.8044422	-89.882309
919	0.0210	0.00399	1.1998	0.0006	38.8046893	-89.87648
338	0.0077	0.00147	0.4412	0.0002	38.8040651	-89.876034
658	0.0150	0.00286	0.8596	0.0004	38.8041886	-89.877131
267	0.0061	0.00116	0.3492	0.0002		
795	0.0182	0.00346	1.0387	0.0005	38.7986786	-89.891563
104	0.0024	0.00045	0.1355	0.0001	38.798583	-89.893044
178	0.0041	0.00077	0.2323	0.0001	38.7976494	-89.889459
5	0.0001	0.00002	0.0064	0.0000	38.7968842	-89.866254
270	0.0062	0.00117	0.3523	0.0002	38.7972058	-89.866274
49	0.0011	0.00021	0.0636	0.0000	38.7969366	-89.866191
141	0.0032	0.00061	0.1836	0.0001	38.7958707	-89.864496
103	0.0024	0.00045	0.1344	0.0001	38.7955009	-89.888959
249	0.0057	0.00108	0.3248	0.0002	38.7942999	-89.889719
105	0.0024	0.00046	0.1370	0.0001	38.7939199	-89.88997
353	0.0081	0.00153	0.4605	0.0002	38.7940567	-89.890373
278	0.0064	0.00121	0.3629	0.0002	38.7935148	-89.890221
59	0.0013	0.00025	0.0765	0.0000	38.7916421	-89.847649
493	0.0113	0.00214	0.6445	0.0003	38.7914363	-89.846963
2586	0.0591	0.01124	3.3774	0.0017	38.791583	-89.888993
445	0.0102	0.00193	0.5807	0.0003	38.7905715	-89.848535
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667	0.0152	0.00290	0.8713	0.0004	38.7910095	-89.84814
278	0.0064	0.00121	0.3634	0.0002	38.7899556	-89.847875
610	0.0139	0.00265	0.7968	0.0004	38.7900728	-89.846983
120	0.0027	0.00052	0.1569	0.0001	38.7903383	-89.888538
253	0.0058	0.00110	0.3308	0.0002	38.7891615	-89.854575
41	0.0009	0.00018	0.0541	0.0000	38.7899055	-89.888522
128	0.0029	0.00056	0.1671	0.0001	38.7896518	-89.888533
713	0.0163	0.00310	0.9320	0.0005	38.7885765	-89.846618
757	0.0173	0.00329	0.9892	0.0005	38.7877566	-89.847074
199	0.0046	0.00087	0.2601	0.0001	38.7890157	-89.890978
459	0.0105	0.00200	0.5997	0.0003	38.7889093	-89.890076
291	0.0067	0.00126	0.3800	0.0002	38.7885769	-89.889774
471	0.0108	0.00205	0.6148	0.0003	38.7886201	-89.891518
1186	0.0271	0.00516	1.5498	0.0008	38.786117	-89.848608
1098	0.0251	0.00477	1.4340	0.0007	38.7861962	-89.851958
1239	0.0283	0.00539	1.6185	0.0008	38.7845756	-89.842598
150	0.0034	0.00065	0.1960	0.0001	38.7836315	-89.846151
879	0.0201	0.00382	1.1481	0.0006	38.7828235	-89.844807
85	0.0019	0.00037	0.1108	0.0001	38.7806057	-89.832771
1220	0.0279	0.00530	1.5932	0.0008	38.780274	-89.876108
779	0.0178	0.00339	1.0172	0.0005	38.7781779	-89.876897
2299	0.0526	0.00999	3.0027	0.0015	38.7791176	-89.834542
271	0.0062	0.00118	0.3545	0.0002	38.7768575	-89.842479
314	0.0072	0.00136	0.4099	0.0002	38.7768353	-89.842169
825	0.0189	0.00359	1.0773	0.0005	38.7763763	-89.843726
479	0.0110	0.00208	0.6261	0.0003	38.7759539	-89.842623
345	0.0079	0.00150	0.4501	0.0002	38.7759029	-89.875343
501	0.0115	0.00218	0.6547	0.0003	38.7748845	-89.843409
208	0.0048	0.00091	0.2720	0.0001	38.7742463	-89.835913
78	0.0018	0.00034	0.1018	0.0001	38.7739914	-89.83601
961	0.0220	0.00418	1.2557	0.0006	38.773897	-89.842272
218	0.0050	0.00095	0.2853	0.0001	38.7736357	-89.829054
468	0.0107	0.00203	0.6108	0.0003	38.7734759	-89.828191
742	0.0170	0.00322	0.9687	0.0005	38.773248	-89.835026
729	0.0167	0.00317	0.9529	0.0005	38.7737162	-89.832986
65	0.0015	0.00028	0.0851	0.0000	38.7731716	-89.839052
767	0.0175	0.00334	1.0024	0.0005	38.7734357	-89.829544
320	0.0073	0.00139	0.4177	0.0002	38.7729871	-89.82891
273	0.0062	0.00119	0.3570	0.0002	38.7738344	-89.878708
461	0.0105	0.00201	0.6026	0.0003	38.7735821	-89.875042
288	0.0066	0.00125	0.3762	0.0002	38.7730826	-89.879381
384	0.0088	0.00167	0.5022	0.0003	38.773083	-89.880403
1248	0.0285	0.00542	1.6298	0.0008	38.7725377	-89.8503
656	0.0150	0.00285	0.8574	0.0004	38.7728847	-89.849042
941	0.0215	0.00409	1.2292	0.0006	38.7726467	-89.85392
77	0.0018	0.00034	0.1011	0.0001	38.7716034	-89.834381
603	0.0138	0.00262	0.7872	0.0004	38.7720621	-89.828813

398	0.0091	0.00173	0.5201	0.0003	38.7725253	-89.880095
149	0.0034	0.00065	0.1949	0.0001	38.7721793	-89.880794
422	0.0097	0.00184	0.5518	0.0003	38.7716141	-89.848545
51	0.0012	0.00022	0.0669	0.0000	38.7710427	-89.847949
713	0.0163	0.00310	0.9320	0.0005	38.7703062	-89.827722
313	0.0072	0.00136	0.4092	0.0002	38.7706063	-89.837163
1124	0.0257	0.00489	1.4689	0.0007	38.7706243	-89.838957
468	0.0107	0.00203	0.6108	0.0003	38.7715916	-89.880704
842	0.0193	0.00366	1.1001	0.0006	38.7709722	-89.856971
1038	0.0237	0.00451	1.3564	0.0007	38.7715514	-89.855902
645	0.0147	0.00280	0.8425	0.0004	38.7705635	-89.846473
99	0.0023	0.00043	0.1290	0.0001	38.7703896	-89.869759
77	0.0018	0.00033	0.1000	0.0001	38.7700506	-89.855873
876	0.0200	0.00381	1.1443	0.0006	38.7711737	-89.855676
815	0.0186	0.00354	1.0642	0.0005	38.7708455	-89.852964
196	0.0045	0.00085	0.2559	0.0001	38.7699435	-89.848343
1267	0.0290	0.00551	1.6548	0.0008	38.7701658	-89.844325
681	0.0156	0.00296	0.8890	0.0004	38.7698813	-89.8522
191	0.0044	0.00083	0.2494	0.0001	38.7692047	-89.843119
1028	0.0235	0.00447	1.3424	0.0007	38.7699363	-89.841814
125	0.0029	0.00054	0.1632	0.0001	38.7693153	-89.853929
446	0.0102	0.00194	0.5831	0.0001	38.7694529	-89.854006
45	0.00102	0.00134	0.0594	0.0000	38.7689522	-89.85429
1041	0.0238	0.00452	1.3592	0.0007	38.7698734	-89.877549
977	0.0238	0.00432	1.2760	0.0007	38.7705305	-89.876937
367	0.0084	0.00423	0.4800	0.0000	38.7692607	-89.875489
757	0.0084	0.00100	0.9892	0.0002	38.7685702	-89.834455
688	0.0173	0.00329	0.8992	0.0003	38.7681532	-89.832021
348	0.0137	0.00255	0.4549	0.0004	38.7676655	-89.84888
					38.7668609	-89.82923
736	0.0168	0.00320	0.9611	0.0005		
508	0.0116	0.00221	0.6640	0.0003	38.767094	-89.82768
210	0.0048	0.00091	0.2747	0.0001	38.7664707	-89.827802
2278	0.0521	0.00991	2.9762	0.0015	38.7671916	-89.877396
1336	0.0305	0.00581	1.7450	0.0009	38.767603	-89.842592
252	0.0058	0.00109	0.3286	0.0002	38.7662257	-89.841637
63	0.0015	0.00028	0.0829	0.0000	38.7654188	-89.830081
66	0.0015	0.00028	0.0856	0.0000	38.7655974	-89.841245
977	0.0223	0.00425	1.2765	0.0006	38.7660972	-89.844453
145	0.0033	0.00063	0.1895	0.0001	38.7648355	-89.835692
193	0.0044	0.00084	0.2525	0.0001	38.7645565	-89.835444
231	0.0053	0.00100	0.3018	0.0002	38.7645201	-89.836032
591	0.0135	0.00257	0.7716	0.0004	38.7655039	-89.879969
42	0.0010	0.00018	0.0545	0.0000	38.7637907	-89.84851
249	0.0057	0.00108	0.3255	0.0002	38.762397	-89.826583
868	0.0199	0.00377	1.1342	0.0006	38.762485	-89.830874
87	0.0020	0.00038	0.1140	0.0001	38.7614171	-89.83016
568	0.0130	0.00247	0.7423	0.0004	38.7614054	-89.832806

1614	0.0369	0.00702	2.1089	0.0011	38.7616329	-89.851749
287	0.0066	0.00125	0.3745	0.0002	38.7602405	-89.854254
199	0.0045	0.00086	0.2596	0.0001	38.7598239	-89.853723
324	0.0074	0.00141	0.4228	0.0002	38.759829	-89.854468
218	0.0050	0.00095	0.2842	0.0001	38.7590783	-89.853826
360	0.0082	0.00157	0.4705	0.0002	38.7591239	-89.853341
7	0.0002	0.00003	0.0091	0.0000	38.758733	-89.854109
114	0.0026	0.00050	0.1488	0.0001	38.758784	-89.854218
52	0.0012	0.00023	0.0685	0.0000	38.7587507	-89.854192
41	0.0009	0.00018	0.0541	0.0000	38.7586012	-89.854482
339	0.0077	0.00147	0.4425	0.0002	38.758329	-89.854983
338	0.0077	0.00147	0.4421	0.0002	38.7582791	-89.851983
579	0.0132	0.00252	0.7564	0.0004	38.7578864	-89.854258
127	0.0029	0.00055	0.1654	0.0001	38.7573812	-89.862123
1474	0.0337	0.00641	1.9257	0.0010	38.7568286	-89.86737
572	0.0131	0.00249	0.7478	0.0004	38.8146115	-89.773969
189	0.0043	0.00082	0.2469	0.0001	38.8142299	-89.773088
118	0.0027	0.00051	0.1546	0.0001	38.8139078	-89.77185
64	0.0015	0.00028	0.0836	0.0000	38.8137796	-89.773074
568	0.0130	0.00247	0.7425	0.0004	38.8134388	-89.773696
145	0.0033	0.00063	0.1891	0.0001	38.8134934	-89.773087
924	0.0211	0.00402	1.2071	0.0006	38.8132359	-89.771
311	0.0071	0.00135	0.4060	0.0002	38.8135065	-89.772401
260	0.0059	0.00113	0.3396	0.0002	38.8129003	-89.773079
48	0.0011	0.00021	0.0632	0.0000	38.8118885	-89.782071
303	0.0069	0.00132	0.3962	0.0002	38.8117859	-89.782425
1067	0.0244	0.00464	1.3944	0.0007	38.8120608	-89.7669
458	0.0105	0.00199	0.5979	0.0003	38.8111846	-89.767465
134	0.0031	0.00058	0.1745	0.0001	38.8110904	-89.768338
39	0.0009	0.00017	0.0514	0.0000	38.8109399	-89.768383
1999	0.0457	0.00869	2.6116	0.0013		-89.776024
756	0.0173	0.00328	0.9870	0.0005	38.810288	-89.768891
7	0.0002	0.00003	0.0091	0.0000	38.8096198	-89.773149
161	0.0037	0.00070	0.2099	0.0001	38.8098234	-89.773183
409	0.0094	0.00178	0.5346	0.0003	38.8094211	-89.773697
1067	0.0244	0.00464	1.3932	0.0007	38.8104526	-89.771469
1645	0.0376	0.00715	2.1488	0.0011	38.810144	-89.778651
1355	0.0310	0.00589	1.7694	0.0009	38.8103416	-89.781506
684	0.0156	0.00297	0.8930	0.0004	38.8082938	-89.771384
455	0.0104	0.00198	0.5945	0.0003	38.8082716	-89.781301
220	0.0050	0.00095	0.2869	0.0001	38.8080323	-89.783252
651	0.0149	0.00283	0.8498	0.0004	38.8075004	-89.785659
135	0.0031	0.00059	0.1767	0.0001	38.8067125	-89.785551
431	0.0098	0.00187	0.5627	0.0003	38.8066867	-89.774777
313	0.0072	0.00136	0.4095	0.0003	38.8065101	-89.785033
1217	0.0278	0.00529	1.5900	0.0008	38.8059061	-89.771044
196	0.0045	0.00085	0.2554	0.0001	38.8060623	-89.780573
100	0.0015	2.00000	3.233 1	3.5001	30.3000023	25.700575

157	0.0036	0.00068	0.2055	0.0001	38.8057206	-89.767531
140	0.0032	0.00061	0.1825	0.0001	38.805536	-89.767456
260	0.0059	0.00113	0.3396	0.0002	38.8051764	-89.764931
853	0.0195	0.00371	1.1147	0.0006	38.8046358	-89.767995
255	0.0058	0.00111	0.3332	0.0002	38.8038552	-89.768239
216	0.0049	0.00094	0.2816	0.0001	38.8040327	-89.774653
2071	0.0473	0.00900	2.7053	0.0014	38.8039065	-89.772028
275	0.0063	0.00120	0.3596	0.0002	38.8033424	-89.769235
59	0.0013	0.00025	0.0765	0.0000	38.8038257	-89.791414
14	0.0003	0.00006	0.0182	0.0000	38.8037567	-89.791504
623	0.0142	0.00271	0.8138	0.0004	38.8037411	-89.790451
129	0.0030	0.00056	0.1687	0.0004	38.8037374	-89.791295
850	0.0194	0.00369	1.1098	0.0001	38.8038185	-89.785189
2351	0.0538	0.01022	3.0715	0.0005	38.805879	-89.79067
90	0.0021	0.01022	0.1182	0.0013	38.803659	-89.791638
			0.8939			-89.792882
684	0.0156	0.00298		0.0004	38.8038623 38.8038773	
640	0.0146	0.00278	0.8358	0.0004		-89.782605
114	0.0026	0.00050	0.1494	0.0001	38.8030261	-89.793246
67	0.0015	0.00029	0.0878	0.0000	38.8021887	-89.772941
1175	0.0269	0.00511	1.5346	0.0008	38.8032331	-89.781183
959	0.0219	0.00417	1.2522	0.0006	38.8023165	-89.780661
61	0.0014	0.00027	0.0798	0.0000	38.8013723	-89.77284
964	0.0220	0.00419	1.2593	0.0006	38.8011852	-89.766744
449	0.0103	0.00195	0.5866	0.0003	38.8014741	-89.788919
105	0.0024	0.00045	0.1366	0.0001	38.8011255	-89.790666
237	0.0054	0.00103	0.3090	0.0002	38.801083	-89.790105
792	0.0181	0.00344	1.0340	0.0005	38.8012216	-89.792223
160	0.0036	0.00069	0.2084	0.0001	38.8011211	-89.794423
1127	0.0258	0.00490	1.4720	0.0007	38.8006715	-89.764915
200	0.0046	0.00087	0.2612	0.0001	38.8008121	-89.781859
186	0.0042	0.00081	0.2425	0.0001	38.8006882	-89.775944
323	0.0074	0.00140	0.4221	0.0002	38.8006072	-89.77284
1216	0.0278	0.00529	1.5887	0.0008	38.8005472	-89.770763
162	0.0037	0.00070	0.2115	0.0001	38.7994108	-89.776558
299	0.0068	0.00130	0.3911	0.0002	38.7993761	-89.768366
445	0.0102	0.00193	0.5813	0.0003	38.7994614	-89.772339
182	0.0042	0.00079	0.2377	0.0001	38.7987894	-89.77786
332	0.0076	0.00144	0.4336	0.0002	38.7984736	-89.77687
786	0.0180	0.00342	1.0267	0.0005	38.799917	-89.798523
151	0.0034	0.00066	0.1971	0.0001	38.7989324	-89.79836
204	0.0047	0.00089	0.2670	0.0001	38.7982874	-89.769609
204	0.0047	0.00089	0.2665	0.0001	38.7984261	-89.777511
1299	0.0297	0.00565	1.6971	0.0008	38.7991168	-89.78999
634	0.0145	0.00276	0.8283	0.0004	38.7987151	-89.791678
268	0.0061	0.00276	0.3498	0.0004	38.7977677	-89.77763
1113	0.0254	0.00110	1.4534	0.0002	38.7987188	-89.773132
510	0.0234	0.00484	0.6664	0.0007	38.7980495	-89.795741
210	0.0117	0.00222	0.0004	0.0003	30.7300433	-05.753741

1506	0.0344	0.00655	1.9671	0.0010	38.7991636	-89.800864
49	0.0011	0.00021	0.0636	0.0000	38.7967452	-89.788874
2472	0.0565	0.01075	3.2297	0.0016	38.7972092	-89.768323
301	0.0069	0.00131	0.3935	0.0002	38.7966592	-89.788453
1404	0.0321	0.00610	1.8336	0.0009	38.7964435	-89.791185
1119	0.0256	0.00486	1.4615	0.0007	38.7973772	-89.778268
49	0.0011	0.00021	0.0643	0.0000	38.7960528	-89.782162
1069	0.0244	0.00465	1.3967	0.0007	38.7957779	-89.770304
1361	0.0311	0.00592	1.7785	0.0009	38.7954601	-89.770587
716	0.0164	0.00311	0.9355	0.0005	38.7963369	-89.777512
251	0.0057	0.00109	0.3281	0.0002	38.7953173	-89.772482
247	0.0057	0.00108	0.3233	0.0002	38.7947186	-89.76385
376	0.0086	0.00163	0.4909	0.0002	38.7954958	-89.796174
302	0.0069	0.00131	0.3940	0.0002	38.7948908	-89.79471
209	0.0048	0.00091	0.2736	0.0001	38.7942191	-89.773609
209	0.0048	0.00091	0.2727	0.0001	38.793973	-89.763815
45	0.0010	0.00031	0.0594	0.0001	38.7936089	-89.763812
626	0.0143	0.00020	0.8183	0.0004	38.7946989	-89.796119
904	0.0207	0.00272	1.1815	0.0004	38.7942358	-89.794008
322	0.0207	0.00393	0.4203	0.0000	38.7940535	-89.797841
56	0.0013	0.00024	0.0727	0.0000	38.793808	-89.797268
314	0.0072	0.00136	0.4101	0.0002	38.7930943	-89.76382
986	0.0225	0.00429	1.2876	0.0006	38.7934105	-89.762585
201	0.0046	0.00088	0.2629	0.0001	38.7935817	-89.792392
1206	0.0276	0.00524	1.5758	0.0008	38.7920823	-89.761813
154	0.0035	0.00067	0.2018	0.0001	38.7921302	-89.768316
857	0.0196	0.00373	1.1198	0.0006	38.7934344	-89.796599
133	0.0030	0.00058	0.1740	0.0001	38.7926702	-89.79766
197	0.0045	0.00086	0.2576	0.0001	38.7916556	-89.763958
1056	0.0242	0.00459	1.3800	0.0007	38.7925361	-89.795736
51	0.0012	0.00022	0.0669	0.0000	38.7915103	-89.799806
229	0.0052	0.00100	0.2997	0.0001	38.7914533	-89.800292
1141	0.0261	0.00496	1.4907	0.0007	38.7926017	-89.801553
354	0.0081	0.00154	0.4629	0.0002	38.7900853	-89.764153
426	0.0097	0.00185	0.5569	0.0003	38.7898988	-89.766869
606	0.0139	0.00263	0.7915	0.0004	38.7901723	-89.800185
1016	0.0232	0.00442	1.3276	0.0007	38.7893855	-89.783896
923	0.0211	0.00401	1.2052	0.0006	38.7903057	-89.802604
881	0.0201	0.00383	1.1506	0.0006	38.7880908	-89.767415
41	0.0009	0.00018	0.0541	0.0000	38.7889079	-89.821677
69	0.0016	0.00030	0.0905	0.0000	38.7872572	-89.771277
178	0.0041	0.00077	0.2323	0.0001	38.7886259	-89.821724
530	0.0121	0.00230	0.6925	0.0003	38.7870661	-89.796345
854	0.0195	0.00371	1.1161	0.0006	38.7873445	-89.799399
487	0.0111	0.00212	0.6359	0.0003	38.7877285	-89.821764
1009	0.0231	0.00438	1.3174	0.0007	38.7879769	-89.822651
148	0.0034	0.00064	0.1938	0.0001	38.7870399	-89.821954

514	0.0118	0.00224	0.6717	0.0003	38.786727	-89.809543
120	0.0028	0.00052	0.1574	0.0001	38.7868715	-89.823701
48	0.0011	0.00021	0.0621	0.0000	38.7866476	-89.823711
220	0.0050	0.00096	0.2873	0.0001	38.7852139	-89.824229
64	0.0015	0.00028	0.0836	0.0000	38.7842979	-89.796641
1079	0.0247	0.00469	1.4089	0.0007	38.7852777	-89.796041
99	0.0023	0.00043	0.1290	0.0001	38.7838329	-89.796213
318	0.0073	0.00138	0.4148	0.0002	38.7844733	-89.81559
913	0.0209	0.00397	1.1931	0.0006	38.7846159	-89.814447
527	0.0121	0.00229	0.6887	0.0003	38.7844978	-89.820012
456	0.0104	0.00198	0.5951	0.0003	38.7837293	-89.796848
179	0.0041	0.00078	0.2344	0.0001	38.7834937	-89.797125
1224	0.0280	0.00532	1.5987	0.0008	38.7853447	-89.833026
319	0.0073	0.00139	0.4170	0.0002	38.7846565	-89.832675
1429	0.0327	0.00621	1.8672	0.0009	38.7857949	-89.827724
663	0.0152	0.00288	0.8662	0.0004	38.7831545	-89.768991
74	0.0017	0.00032	0.0964	0.0000	38.782368	-89.769148
638	0.0146	0.00277	0.8332	0.0004	38.784549	-89.828208
332	0.0076	0.00144	0.4339	0.0002	38.7831515	-89.797846
1584	0.0362	0.00689	2.0698	0.0010	38.7851403	-89.807293
175	0.0040	0.00076	0.2286	0.0001	38.7834218	-89.8165
370	0.0085	0.00161	0.4838	0.0002	38.7836541	-89.81598
866	0.0198	0.00376	1.1307	0.0006	38.783346	-89.809959
119	0.0027	0.00052	0.1552	0.0001	38.7828055	-89.798632
395	0.0090	0.00172	0.5166	0.0003	38.7831726	-89.798845
1415	0.0323	0.00615	1.8484	0.0009	38.7819451	-89.771435
494	0.0113	0.00215	0.6451	0.0003	38.7824163	-89.793338
665	0.0152	0.00213	0.8686	0.0003	38.7824568	-89.797746
211	0.0048	0.00092	0.2762	0.0004	38.7832728	-89.827916
840	0.0192	0.00365	1.0970	0.0001	38.7832957	-89.824879
382	0.0087	0.00365	0.4993	0.0003	38.7816939	-89.784811
821	0.0188	0.00100	1.0729	0.0002	38.7826395	-89.80298
592	0.0135	0.00357	0.7736	0.0003	38.78233007	-89.801624
616	0.0133	0.00257	0.8041	0.0004	38.7825044	-89.816463
360		0.00208			38.7821865	-89.815761
665	0.0082 0.0152	0.00137	0.4705 0.8691	0.0002 0.0004	38.7810408	-89.791827
		0.00289				
1123	0.0257		1.4666	0.0007	38.78319	-89.831979
1255	0.0287	0.00546	1.6397	0.0008	38.7821177	-89.833712
7	0.0002	0.00003	0.0091	0.0000	38.7802639	-89.772938
993	0.0227	0.00432	1.2975	0.0006	38.7801844	-89.771291
34	0.0008	0.00015	0.0450	0.0000	38.7802097	-89.772932
301	0.0069	0.00131	0.3933	0.0002	38.7810948	-89.799322
964	0.0220	0.00419	1.2597	0.0006	38.7822599	-89.822277
245	0.0056	0.00107	0.3201	0.0002	38.7804508	-89.792421
646	0.0148	0.00281	0.8434	0.0004	38.7814723	-89.82963
1312	0.0300	0.00571	1.7143	0.0009	38.7811822	-89.807782
565	0.0129	0.00246	0.7379	0.0004	38.7802563	-89.781832

224	0.0051	0.00097	0.2927	0.0001	38.7809721	-89.829493
385	0.0088	0.00167	0.5033	0.0003	38.7807112	-89.815654
395	0.0090	0.00172	0.5166	0.0003	38.7809753	-89.831559
48	0.0011	0.00021	0.0632	0.0000	38.7791731	-89.782575
361	0.0082	0.00157	0.4709	0.0002	38.779385	-89.793501
1369	0.0313	0.00595	1.7883	0.0009	38.7809798	-89.804524
296	0.0068	0.00129	0.3864	0.0002	38.7789162	-89.782338
226	0.0052	0.00098	0.2949	0.0001	38.7797036	-89.821983
187	0.0043	0.00081	0.2447	0.0001	38.7793435	-89.80363
1054	0.0241	0.00458	1.3774	0.0007	38.7791436	-89.784439
1254	0.0287	0.00545	1.6378	0.0008	38.7802788	-89.801903
121	0.0028	0.00053	0.1579	0.0001	38.7794482	-89.826994
2080	0.0476	0.00904	2.7172	0.0014	38.7793601	-89.806646
73	0.0017	0.00032	0.0953	0.0000	38.7784323	-89.800778
600	0.0137	0.00032	0.7839	0.0004	38.7785469	-89.786403
267	0.0061	0.00201	0.3485	0.0004	38.7789525	-89.8227
1941	0.0444	0.00110	2.5361	0.0002	38.7811303	-89.817362
740	0.0169	0.00344	0.9662	0.0013	38.7782082	-89.788628
					38.7790667	-89.79653
1211	0.0277	0.00527	1.5822	0.0008		
255	0.0058	0.00111	0.3333	0.0002	38.7777448	-89.796094
2231	0.0510	0.00970	2.9145	0.0015	38.777185	-89.806526
263	0.0060	0.00115	0.3441	0.0002	38.7769888	-89.790152
734	0.0168	0.00319	0.9586	0.0005	38.7763381	-89.77877
886	0.0202	0.00385	1.1568	0.0006	38.7783034	-89.818564
368	0.0084	0.00160	0.4808	0.0002	38.7770354	-89.796494
290	0.0066	0.00126	0.3786	0.0002	38.7763685	-89.783773
107	0.0024	0.00046	0.1397	0.0001	38.7763697	-89.794476
1514	0.0346	0.00658	1.9778	0.0010	38.77855	-89.812988
1691	0.0386	0.00735	2.2083	0.0011	38.7771711	-89.810356
531	0.0121	0.00231	0.6942	0.0003	38.7775546	-89.827922
585	0.0134	0.00254	0.7644	0.0004	38.7764797	-89.787946
712	0.0163	0.00310	0.9305	0.0005	38.7775192	-89.828672
303	0.0069	0.00132	0.3960	0.0002	38.7764251	-89.798404
276	0.0063	0.00120	0.3601	0.0002	38.7756636	-89.781467
343	0.0078	0.00149	0.4483	0.0002	38.7759614	-89.78462
177	0.0041	0.00077	0.2317	0.0001	38.7762688	-89.814503
349	0.0080	0.00152	0.4565	0.0002	38.7764993	-89.814184
354	0.0081	0.00154	0.4620	0.0002	38.7762912	-89.818281
405	0.0093	0.00176	0.5297	0.0003	38.7766628	-89.827251
379	0.0087	0.00165	0.4957	0.0002	38.7766385	-89.826296
632	0.0145	0.00275	0.8261	0.0004	38.7766869	-89.819596
798	0.0182	0.00347	1.0422	0.0005	38.775612	-89.81308
640	0.0146	0.00278	0.8356	0.0004	38.7753516	-89.814113
444	0.0101	0.00193	0.5798	0.0003	38.7747843	-89.807633
430	0.0098	0.00187	0.5618	0.0003	38.7745483	-89.796422
462	0.0106	0.00201	0.6031	0.0003	38.7752146	-89.824822
149	0.0034	0.00065	0.1949	0.0001	38.7742681	-89.807577

208	0.0047	0.00090	0.2714	0.0001	38.7741901	-89.797854
317	0.0073	0.00138	0.4146	0.0002	38.7746962	-89.821229
760	0.0174	0.00330	0.9927	0.0005	38.7742271	-89.806169
786	0.0180	0.00342	1.0263	0.0005	38.7749785	-89.805137
1553	0.0355	0.00675	2.0285	0.0010	38.7735281	-89.792479
358	0.0082	0.00156	0.4680	0.0002	38.7735747	-89.804924
1086	0.0248	0.00472	1.4187	0.0007	38.7743394	-89.815454
78	0.0018	0.00034	0.1018	0.0001	38.7731922	-89.814661
194	0.0018	0.00034	0.2538	0.0001	38.7731538	-89.814248
706	0.0161	0.00307	0.9223	0.0005	38.7731145	-89.819721
125	0.0029	0.00054	0.1632	0.0001	38.7728178	-89.813544
52	0.0012	0.00022	0.0674	0.0000	38.7720151	-89.788578
50	0.0011	0.00022	0.0647	0.0000	38.7719839	-89.787724
34	0.0008	0.00015	0.0439	0.0000	38.772626	-89.813868
150	0.0034	0.00065	0.1955	0.0001	38.7719686	-89.79081
48	0.0011	0.00021	0.0621	0.0000	38.7719589	-89.791438
1271	0.0291	0.00552	1.6601	0.0008	38.7727669	-89.800626
34	0.0008	0.00015	0.0439	0.0000	38.7719062	-89.7933
332	0.0076	0.00144	0.4337	0.0002	38.7716771	-89.780685
193	0.0044	0.00084	0.2519	0.0001	38.7715189	-89.78083
325	0.0074	0.00141	0.4247	0.0002	38.7724498	-89.823799
1159	0.0265	0.00504	1.5134	0.0008	38.7725506	-89.804806
34	0.0008	0.00015	0.0439	0.0000	38.7710737	-89.820058
890	0.0204	0.00013	1.1629	0.0006	38.7710737	-89.780461
519	0.0119	0.00225	0.6776	0.0003	38.7711623	-89.819139
158	0.0036	0.00069	0.2060	0.0001	38.7698153	-89.77924
166	0.0038	0.00072	0.2166	0.0001	38.7697174	-89.779324
974	0.0223	0.00423	1.2717	0.0006	38.770763	-89.802979
480	0.0110	0.00209	0.6272	0.0003	38.7701984	-89.795737
187	0.0043	0.00081	0.2446	0.0001	38.7699255	-89.79551
381	0.0087	0.00166	0.4979	0.0002	38.7695641	-89.803591
43	0.0010	0.00019	0.0568	0.0000	38.7696493	-89.813091
1123	0.0257	0.00488	1.4672	0.0007	38.7688074	-89.78497
352	0.0081	0.00153	0.4605	0.0002	38.7697614	-89.822731
754	0.0172	0.00328	0.9852	0.0005	38.7695505	-89.818861
36	0.0008	0.00015	0.0466	0.0000	38.7685564	-89.789364
130	0.0030	0.00056	0.1696	0.0001	38.7694953	-89.822317
1100	0.0252	0.00478	1.4373	0.0007	38.7702858	-89.809179
1296	0.0296	0.00563	1.6932	0.0008	38.7695395	-89.807224
420	0.0096	0.00183	0.5487	0.0003	38.769488	-89.821515
49	0.0011	0.00103	0.0643	0.0003	38.7688541	-89.806274
144	0.0033	0.00063	0.1884	0.0001	38.7686008	-89.802957
302	0.0069	0.00131	0.3946	0.0002	38.7686049	-89.798621
1426	0.0326	0.00620	1.8628	0.0009	38.769542	-89.811378
190	0.0043	0.00083	0.2483	0.0001	38.7685616	-89.806388
436	0.0100	0.00190	0.5700	0.0003	38.7688401	-89.809701
860	0.0196	0.00374	1.1228	0.0006	38.7687967	-89.796196

475	0.0109	0.00207	0.6210	0.0003	38.767988	-89.797906
107	0.0024	0.00046	0.1397	0.0001	38.767757	-89.789891
478	0.0109	0.00208	0.6248	0.0003	38.7680714	-89.790135
52	0.0012	0.00022	0.0674	0.0000	38.7675556	-89.790038
233	0.0053	0.00101	0.3040	0.0002	38.7677984	-89.796913
988	0.0226	0.00429	1.2904	0.0006	38.768774	-89.799822
375	0.0086	0.00163	0.4899	0.0002	38.7674057	-89.821468
599	0.0137	0.00260	0.7822	0.0004	38.7659561	-89.794108
696	0.0159	0.00303	0.9092	0.0005	38.7657151	-89.785538
66	0.0015	0.00029	0.0867	0.0000	38.7652311	-89.786605
355	0.0081	0.00154	0.4640	0.0002	38.7653886	-89.795249
322	0.0074	0.00140	0.4211	0.0002	38.7651071	-89.786073
735	0.0168	0.00320	0.9607	0.0005	38.7649386	-89.793628
224	0.0051	0.00097	0.2924	0.0003	38.7649547	-89.794746
618	0.0141	0.00057	0.8075	0.0001	38.7649078	-89.798707
206	0.0047	0.00209	0.2692	0.0004	38.7648076	-89.821118
					38.7645631	-89.822279
297	0.0068	0.00129	0.3880	0.0002	38.7638829	
97	0.0022	0.00042	0.1273	0.0001		-89.8231
1489	0.0340	0.00647	1.9452	0.0010	38.7652428	-89.823005
365	0.0083	0.00159	0.4766	0.0002	38.7629265	-89.824661
249	0.0057	0.00108	0.3255	0.0002	38.762397	-89.826583
1207	0.0276	0.00525	1.5772	0.0008	38.7611974	-89.822944
1230	0.0281	0.00535	1.6070	0.0008	38.7609387	-89.815515
305	0.0070	0.00133	0.3986	0.0002	38.7590774	-89.812558
400	0.0091	0.00174	0.5228	0.0003	38.7591118	-89.81494
836	0.0191	0.00363	1.0917	0.0005	38.7580584	-89.797391
69	0.0016	0.00030	0.0905	0.0000	38.7572647	-89.795845
123	0.0028	0.00053	0.1607	0.0001	38.7573869	-89.800037
285	0.0065	0.00124	0.3727	0.0002	38.7574851	-89.799679
403	0.0092	0.00175	0.5263	0.0003	38.7571117	-89.795198
295	0.0068	0.00128	0.3857	0.0002	38.757029	-89.797102
541	0.0124	0.00235	0.7070	0.0004	38.756919	-89.792131
888	0.0203	0.00386	1.1601	0.0006	38.7569038	-89.794517
146	0.0033	0.00064	0.1909	0.0001	38.7570815	-89.800232
279	0.0064	0.00121	0.3649	0.0002	38.7570975	-89.803516
826	0.0189	0.00359	1.0796	0.0005	38.7568405	-89.799086
604	0.0138	0.00262	0.7886	0.0004	38.7566321	-89.792178
65	0.0015	0.00028	0.0851	0.0000	38.7566318	-89.80034
784	0.0179	0.00341	1.0242	0.0005	38.7565699	-89.798095
111	0.0025	0.00048	0.1455	0.0001	38.7567783	-89.815027
435	0.0099	0.00189	0.5685	0.0003	38.7561855	-89.804717
38	0.0009	0.00016	0.0492	0.0000	38.7547188	-89.803647
939	0.0215	0.00408	1.2265	0.0006	38.7553322	-89.800033
2097	0.0479	0.00912	2.7389	0.0014	38.7551379	-89.794184
132	0.0030	0.00057	0.1727	0.0014	38.7540615	-89.79852
251	0.0057	0.00037	0.3279	0.0001	38.7539166	-89.797923
634	0.0145	0.00103	0.8283	0.0002	38.7539100	-89.794767
034	0.0143	0.00270	0.0203	0.0004	30.733333	05.754707

1079	0.0247	0.00469	1.4092	0.0007	38.7547595	-89.807748
1323	0.0302	0.00575	1.7282	0.0009	38.7547214	-89.800363
591	0.0135	0.00257	0.7716	0.0004	38.7531475	-89.794529
551	0.0126	0.00239	0.7192	0.0004	38.7531601	-89.795909
225	0.0051	0.00098	0.2940	0.0001	38.7526044	-89.800389
160	0.0036	0.00069	0.2084	0.0001	38.7518927	-89.800386
737	0.0168	0.00320	0.9622	0.0005	38.7521657	-89.803965
336	0.0077	0.00146	0.4383	0.0002	38.7514895	-89.788911
228	0.0052	0.00099	0.2982	0.0001	38.7510931	-89.788641
1184	0.0271	0.00515	1.5467	0.0008	38.7511309	-89.790986
169	0.0039	0.00074	0.2212	0.0001	38.7513114	-89.800377
1588	0.0363	0.00691	2.0750	0.0010	38.7524756	-89.796932
179	0.0041	0.00078	0.2341	0.0001	38.7507032	-89.80037
512	0.0117	0.00222	0.6682	0.0003	38.7506343	-89.792815
91	0.0021	0.00222	0.1184	0.0003	38.7502568	-89.800356
73	0.0021	0.00033	0.0953	0.0001	38.7502478	-89.803316
	0.017	0.00032		0.0005	38.7490881	-89.796401
709			0.9259			
107	0.0025	0.00047	0.1403	0.0001	38.7486596	-89.809745
387	0.0088	0.00168	0.5053	0.0003	38.7484998	-89.810282
100	0.0023	0.00043	0.1301	0.0001	38.748412	-89.809687
51	0.0012	0.00022	0.0669	0.0000	38.7478588	-89.809677
148	0.0034	0.00064	0.1929	0.0001	38.7471589	-89.809674
212	0.0049	0.00092	0.2772	0.0001	38.747952	-89.842134
39	0.0009	0.00017	0.0514	0.0000	38.7467982	-89.809828
49	0.0011	0.00021	0.0643	0.0000	38.7475073	-89.842237
452	0.0103	0.00197	0.5909	0.0003	38.7472399	-89.816159
304	0.0069	0.00132	0.3971	0.0002	38.7470661	-89.815614
1235	0.0282	0.00537	1.6136	0.0008	38.747311	-89.797877
41	0.0009	0.00018	0.0541	0.0000	38.7466227	-89.820293
153	0.0035	0.00067	0.2000	0.0001	38.7459347	-89.799548
190	0.0043	0.00082	0.2477	0.0001	38.7466194	-89.830774
157	0.0036	0.00068	0.2051	0.0001	38.7466367	-89.830542
339	0.0078	0.00147	0.4430	0.0002	38.7463782	-89.816197
213	0.0049	0.00092	0.2778	0.0001	38.7466863	-89.841865
92	0.0021	0.00040	0.1204	0.0001	38.7466742	-89.841416
284	0.0065	0.00123	0.3705	0.0002	38.7459962	-89.816092
125	0.0029	0.00054	0.1636	0.0001	38.7456221	-89.799976
282	0.0064	0.00123	0.3684	0.0002	38.7464224	-89.827204
702	0.0161	0.00305	0.9172	0.0005	38.7461968	-89.807115
49	0.0011	0.00021	0.0643	0.0000	38.7453385	-89.800472
373	0.0085	0.00162	0.4875	0.0002	38.7457111	-89.817
97	0.0022	0.00042	0.1273	0.0001	38.745194	-89.800133
567	0.0130	0.00247	0.7411	0.0004	38.7456795	-89.808946
666	0.0150	0.00247	0.8698	0.0004	38.7453986	-89.806945
384	0.0132	0.00289	0.5010	0.0004	38.7459762	-89.830374
533	0.0122	0.00167	0.6968	0.0003	38.7457971	-89.831032
				0.0003	38.7452393	-89.817825
165	0.0038	0.00072	0.2151	0.0001	30.7432393	-03.01/025

541	0.0124	0.00235	0.7070	0.0004	38.7460483	-89.841681
117	0.0027	0.00051	0.1530	0.0001	38.7450845	-89.830379
948	0.0217	0.00412	1.2385	0.0006	38.7463252	-89.839662
304	0.0069	0.00132	0.3969	0.0002	38.7446988	-89.817248
367	0.0084	0.00160	0.4800	0.0002	38.745113	-89.82998
296	0.0068	0.00129	0.3866	0.0002	38.7442933	-89.809526
51	0.0012	0.00022	0.0669	0.0000	38.7437763	-89.809618
5	0.0001	0.00002	0.0064	0.0000	38.7435564	-89.809627
44	0.0010	0.00019	0.0579	0.0000	38.7436238	-89.809624
52	0.0012	0.00023	0.0685	0.0000	38.7435293	-89.809553
1316	0.0301	0.00572	1.7194	0.0009	38.7457412	-89.837725
56	0.0013	0.00024	0.0727	0.0000	38.7431888	-89.809281
486	0.0111	0.00211	0.6354	0.0003	38.7437997	-89.831126
151	0.0034	0.00066	0.1969	0.0001	38.7433118	-89.821175
41	0.0009	0.00018	0.0541	0.0000	38.7431957	-89.82088
329	0.0075	0.00143	0.4292	0.0002	38.7435603	-89.820463
682	0.0156	0.00297	0.8910	0.0004	38.7434874	-89.840506
492	0.0113	0.00214	0.6431	0.0003	38.743251	-89.838769
613	0.0140	0.00266	0.8005	0.0004	38.7429511	-89.840536
619	0.0141	0.00269	0.8083	0.0004	38.7434001	-89.83674
579	0.0132	0.00252	0.7564	0.0004	38.7422347	-89.811339
619	0.0142	0.00269	0.8092	0.0004	38.7418561	-89.808603
760	0.0174	0.00331	0.9932	0.0005	38.7429024	-89.839093
113	0.0026	0.00049	0.1472	0.0001	38.7415372	-89.837365
805	0.0184	0.00350	1.0509	0.0005	38.7415481	-89.820182
125	0.0029	0.00054	0.1636	0.0001	38.7406766	-89.821661
70	0.0016	0.00030	0.0909	0.0000	38.7400154	-89.813305
524	0.0120	0.00228	0.6844	0.0003	38.7402447	-89.817279
974	0.0223	0.00423	1.2719	0.0006	38.7409028	-89.816095
39	0.0009	0.00017	0.0503	0.0000	38.73974	-89.816745
1556	0.0356	0.00677	2.0331	0.0010	38.7416177	-89.831388
396	0.0091	0.00172	0.5179	0.0003	38.7400813	-89.836501
204	0.0047	0.00089	0.2660	0.0001	38.7390957	-89.809609
376	0.0086	0.00163	0.4909	0.0002	38.7386753	-89.821612
52	0.0012	0.00022	0.0674	0.0000	38.7382601	-89.81765
437	0.0100	0.00190	0.5707	0.0003	38.7379965	-89.805167
654	0.0150	0.00284	0.8542	0.0004	38.7377274	-89.804124
50	0.0012	0.00022	0.0658	0.0000	38.7371696	-89.817551
78	0.0018	0.00034	0.1022	0.0001	38.7370476	-89.817435
782	0.0179	0.00340	1.0220	0.0005	38.7371102	-89.833828
1535	0.0351	0.00667	2.0048	0.0010	38.7363479	-89.815572
506	0.0116	0.00220	0.6611	0.0003	38.7362982	-89.807842
71	0.0016	0.00031	0.0927	0.0000	38.7360559	-89.806894
61	0.0014	0.00027	0.0798	0.0000	38.7360488	-89.806635
41	0.0009	0.00018	0.0541	0.0000	38.7360431	-89.806429
260	0.0060	0.00113	0.3401	0.0002	38.7361253	-89.805483
111	0.0025	0.00048	0.1450	0.0001	38.7361048	-89.817622

665	0.0152	0.00289	0.8685	0.0004	38.7371231	-89.838637
644	0.0147	0.00280	0.8414	0.0004	38.735825	-89.814644
289	0.0066	0.00126	0.3780	0.0002	38.7356942	-89.813214
331	0.0076	0.00144	0.4325	0.0002	38.7365649	-89.831436
142	0.0032	0.00062	0.1856	0.0001	38.7359815	-89.831241
930	0.0213	0.00404	1.2152	0.0006	38.7360335	-89.83245
262	0.0060	0.00114	0.3425	0.0002	38.7354279	-89.813555
85	0.0019	0.00037	0.1108	0.0001	38.7354202	-89.829693
666	0.0152	0.00290	0.8705	0.0004	38.7347721	-89.82245
896	0.0205	0.00390	1.1711	0.0006	38.7349002	-89.815445
41	0.0009	0.00018	0.0541	0.0000	38.7810156	-89.910485
359	0.0082	0.00156	0.4692	0.0002	38.7806213	-89.9096
1129	0.0258	0.00491	1.4743	0.0007	38.7800453	-89.911082
1025	0.0234	0.00446	1.3393	0.0007	38.780047	-89.91545
470	0.0107	0.00204	0.6135	0.0003	38.7788856	-89.915811
1478	0.0338	0.00643	1.9311	0.0010	38.7790258	-89.906803
1317	0.0301	0.00573	1.7203	0.0009	38.7782539	-89.913519
1663	0.0380	0.00373	2.1728	0.0011	38.7774902	-89.910966
184	0.0042	0.00080	0.2408	0.0001	38.7742137	-89.907618
39	0.0009	0.00017	0.0503	0.0001	38.774001	-89.914004
14	0.0003	0.00017	0.0182	0.0000	38.7739586	-89.913935
1228	0.0281	0.00534	1.6044	0.0008	38.775416	-89.914306
995	0.0281	0.00334	1.2998	0.0008	38.7740189	-89.915695
251	0.0057	0.00433	0.3273	0.0000	38.7736935	-89.913618
585	0.0134	0.00254	0.7642	0.0004	38.7742445	-89.913284
429	0.0098	0.00187	0.5605	0.0003	38.7730121	-89.912805
197	0.0045	0.00086	0.2570	0.0001	38.7725841	-89.912553
181	0.0041	0.00079	0.2366	0.0001	38.7724971	-89.912328
214	0.0049	0.00093	0.2798	0.0001	38.772028	-89.912164
797	0.0182	0.00347	1.0416	0.0005	38.7721126	-89.914135
1436	0.0328	0.00624	1.8753	0.0009	38.7716426	-89.909115
233	0.0053	0.00101	0.3044	0.0002	38.7700603	-89.908436
167	0.0038	0.00073	0.2182	0.0001	38.7698337	-89.903134
182	0.0042	0.00079	0.2377	0.0001	38.7700911	-89.916466
167	0.0038	0.00073	0.2182	0.0001	38.7695221	-89.909707
118	0.0027	0.00051	0.1543	0.0001	38.7692657	-89.909718
261	0.0060	0.00113	0.3407	0.0002	38.7695037	-89.908759
105	0.0024	0.00046	0.1370	0.0001	38.7690771	-89.911924
89	0.0020	0.00039	0.1157	0.0001	38.7689642	-89.912614
141	0.0032	0.00061	0.1847	0.0001	38.7691367	-89.919882
279	0.0064	0.00121	0.3643	0.0002	38.7689355	-89.909007
153	0.0035	0.00066	0.1993	0.0001	38.7688288	-89.908788
695	0.0159	0.00302	0.9081	0.0005	38.7693506	-89.90794
206	0.0047	0.00090	0.2696	0.0001	38.7683908	-89.908624
74	0.0017	0.00032	0.0964	0.0000	38.7682779	-89.908397
518	0.0118	0.00225	0.6769	0.0003	38.7688539	-89.920801
1340	0.0306	0.00583	1.7504	0.0009	38.768913	-89.921867

48	0.0011	0.00021	0.0621	0.0000	38.7668421	-89.883718
487	0.0111	0.00212	0.6364	0.0003	38.7676882	-89.907819
433	0.0099	0.00188	0.5655	0.0003	38.7677934	-89.90721
466	0.0106	0.00202	0.6084	0.0003	38.7675748	-89.919194
42	0.0010	0.00018	0.0545	0.0000	38.7663119	-89.885111
170	0.0039	0.00074	0.2217	0.0001	38.7666886	-89.904489
412	0.0094	0.00179	0.5386	0.0003	38.7667863	-89.906742
333	0.0076	0.00145	0.4355	0.0002	38.7669117	-89.917432
61	0.0014	0.00027	0.0798	0.0000	38.7655515	-89.900147
549	0.0125	0.00239	0.7170	0.0004	38.765055	-89.88662
473	0.0108	0.00206	0.6177	0.0003	38.7656466	-89.897879
133	0.0030	0.00058	0.1734	0.0001	38.7643882	-89.884786
1447	0.0331	0.00629	1.8907	0.0009	38.766401	-89.926229
130	0.0030	0.00057	0.1703	0.0001	38.7640183	-89.894342
184	0.0042	0.00080	0.2403	0.0001	38.7639605	-89.905512
1199	0.0274	0.00521	1.5666	0.0008	38.7650958	-89.913989
342	0.0078	0.00149	0.4470	0.0002	38.7643321	-89.923447
50	0.0011	0.00022	0.0647	0.0000	38.7627535	-89.881701
860	0.0197	0.00374	1.1232	0.0006	38.7642915	-89.918789
219	0.0050	0.00095	0.2860	0.0001	38.7636301	-89.908978
694	0.0159	0.00302	0.9068	0.0005	38.7633983	-89.885307
692	0.0158	0.00301	0.9035	0.0005	38.7643058	-89.928573
203	0.0046	0.00088	0.2656	0.0001	38.7634618	-89.917103
7	0.0002	0.00003	0.0091	0.0000	38.7632169	-89.916789
883	0.0202	0.00384	1.1533	0.0006	38.7639255	-89.925362
519	0.0119	0.00226	0.6784	0.0003	38.7638716	-89.927677
263	0.0060	0.00114	0.3436	0.0002	38.7626148	-89.899924
1574	0.0360	0.00684	2.0567	0.0010	38.7627363	-89.919089
228	0.0052	0.00099	0.2975	0.0001	38.7613766	-89.899665
1725	0.0394	0.00750	2.2527	0.0011	38.7619962	-89.918743
275	0.0063	0.00120	0.3596	0.0002	38.7615722	-89.90701
75	0.0017	0.00032	0.0973	0.0000	38.760804	-89.915048
77	0.0018	0.00033	0.1000	0.0001	38.7606624	-89.915242
42	0.0010	0.00018	0.0545	0.0000	38.7605255	-89.915429
300	0.0068	0.00130	0.3913	0.0002	38.7603989	-89.915011
7	0.0002	0.00003	0.0091	0.0000	38.7601454	-89.916127
941	0.0215	0.00409	1.2292	0.0006	38.7616367	-89.936156
170	0.0039	0.00074	0.2221	0.0001	38.7595777	-89.900113
142	0.0032	0.00062	0.1856	0.0001	38.7600251	-89.916327
214	0.0049	0.00093	0.2798	0.0001	38.759789	-89.917287
35	0.0008	0.00015	0.0455	0.0000	38.7589266	-89.899766
117	0.0027	0.00051	0.1525	0.0001	38.7589228	-89.900162
57	0.0013	0.00025	0.0738	0.0000	38.758835	-89.899657
265	0.0061	0.00115	0.3468	0.0002	38.7594042	-89.918497
433	0.0099	0.00188	0.5662	0.0003	38.7592278	-89.924597
63	0.0014	0.00027	0.0818	0.0000	38.7584724	-89.906051
49	0.0011	0.00021	0.0636	0.0000	38.7583681	-89.906193

892	0.0204	0.00388	1.1654	0.0006	38.7591698	-89.928749
494	0.0113	0.00215	0.6448	0.0003	38.7584813	-89.912756
432	0.0099	0.00188	0.5640	0.0003	38.7582544	-89.900132
751	0.0172	0.00327	0.9814	0.0005	38.7578614	-89.899769
1107	0.0253	0.00481	1.4460	0.0007	38.7590126	-89.921569
499	0.0114	0.00217	0.6524	0.0003	38.7572107	-89.89446
63	0.0014	0.00027	0.0818	0.0000	38.7572502	-89.89366
80	0.0018	0.00035	0.1044	0.0001	38.7571836	-89.893445
35	0.0008	0.00015	0.0455	0.0000	38.7568644	-89.893384
1155	0.0264	0.00502	1.5087	0.0008	38.7587477	-89.916108
605	0.0138	0.00263	0.7907	0.0004	38.7575836	-89.906167
849	0.0194	0.00369	1.1091	0.0006	38.7568716	-89.894915
694	0.0159	0.00302	0.9061	0.0005	38.7571147	-89.920324
36	0.0008	0.00015	0.0466	0.0000	38.7561701	-89.900816
370	0.0085	0.00161	0.4838	0.0002	38.7569614	-89.926065
589	0.0135	0.00256	0.7691	0.0004	38.7567556	-89.922072
876	0.0200	0.00381	1.1440	0.0006	38.7571891	-89.91158
848	0.0194	0.00369	1.1081	0.0006	38.7565592	-89.909273
73	0.0017	0.00032	0.0958	0.0000	38.7559628	-89.927277
34	0.0008	0.00015	0.0439	0.0000	38.7558615	-89.926946
163	0.0037	0.00071	0.2129	0.0001	38.7559642	-89.927556
562	0.0129	0.00244	0.7344	0.0004	38.7559519	-89.933594
57	0.0013	0.00025	0.0738	0.0000	38.7559826	-89.932677
38	0.0009	0.00016	0.0492	0.0000	38.7557574	-89.927099
710	0.0162	0.00309	0.9274	0.0005	38.7544971	-89.859221
463	0.0106	0.00201	0.6053	0.0003	38.7557924	-89.912617
34	0.0008	0.00015	0.0439	0.0000	38.7550441	-89.900518
88	0.0020	0.00038	0.1146	0.0001	38.7538951	-89.858559
103	0.0024	0.00045	0.1348	0.0001	38.7558653	-89.929799
98	0.0023	0.00043	0.1286	0.0001	38.7556561	-89.92853
45	0.0010	0.00020	0.0594	0.0000	38.7556422	-89.928003
301	0.0069	0.00131	0.3933	0.0002	38.7557556	-89.926438
83	0.0019	0.00036	0.1086	0.0001	38.7553707	-89.919258
313	0.0072	0.00136	0.4091	0.0002	38.755612	-89.932234
57	0.0013	0.00025	0.0749	0.0000	38.7548928	-89.919296
1339	0.0306	0.00582	1.7494	0.0009	38.7556877	-89.894686
458	0.0105	0.00199	0.5977	0.0003	38.7551137	-89.914178
90	0.0021	0.00039	0.1182	0.0001	38.7550957	-89.931618
76	0.0017	0.00033	0.0995	0.0000	38.7550562	-89.931402
52	0.0012	0.00023	0.0685	0.0000	38.7549452	-89.931471
777	0.0178	0.00338	1.0152	0.0005	38.7533095	-89.857492
650	0.0149	0.00282	0.8487	0.0004	38.7550051	-89.927419
36	0.0008	0.00015	0.0466	0.0000	38.7526641	-89.864797
442	0.0101	0.00192	0.5769	0.0003	38.7527487	-89.855872
115	0.0026	0.00050	0.1499	0.0001	38.7526361	-89.86448
7	0.0002	0.00003	0.0091	0.0000	38.7522656	-89.856515
134	0.0031	0.00058	0.1745	0.0001	38.7524211	-89.856633

45	0.0010	0.00020	0.0594	0.0000	38.7524546	-89.864453
558	0.0128	0.00243	0.7292	0.0004	38.7524039	-89.857382
466	0.0107	0.00203	0.6091	0.0003	38.7545681	-89.932106
433	0.0099	0.00188	0.5662	0.0003	38.752533	-89.863602
79	0.0018	0.00035	0.1038	0.0001	38.7520551	-89.863838
307	0.0070	0.00133	0.4009	0.0002	38.7530205	-89.900063
2596	0.0593	0.01128	3.3907	0.0017	38.7545449	-89.924029
473	0.0108	0.00205	0.6172	0.0003	38.751339	-89.863117
1511	0.0345	0.00657	1.9732	0.0010	38.75413	-89.929338
1802	0.0412	0.00783	2.3536	0.0012	38.754222	-89.92172
45	0.0010	0.00020	0.0594	0.0000	38.7501105	-89.859524
251	0.0057	0.00109	0.3279	0.0002	38.7514876	-89.917052
35	0.0008	0.00015	0.0455	0.0000	38.7514433	-89.916657
91	0.0021	0.00039	0.1184	0.0001	38.7514149	-89.919407
71	0.0016	0.00031	0.0927	0.0000	38.7513988	-89.919822
498	0.0114	0.00216	0.6500	0.0003	38.7511085	-89.916145
355	0.0081	0.00154	0.4637	0.0002	38.7513427	-89.914901
40	0.0009	0.00017	0.0519	0.0000	38.7494158	-89.857894
541	0.0124	0.00235	0.7072	0.0004	38.749333	-89.858861
988	0.0226	0.00233	1.2907	0.0004	38.749988	-89.854966
1202	0.0275	0.00523	1.5702	0.0008	38.749765	-89.852697
468	0.0107	0.00323	0.6119	0.0003	38.7509476	-89.933236
		0.00204				-89.917905
571 746	0.0131	0.00248	0.7460	0.0004	38.7495102 38.7502772	
746	0.0171		0.9747	0.0005		-89.916215
901	0.0206	0.00392	1.1773	0.0006	38.7503343	-89.920907
89	0.0020	0.00039	0.1162	0.0001	38.7475955	-89.862471
143	0.0033	0.00062	0.1873	0.0001	38.7474693	-89.862773
70	0.0016	0.00030	0.0909	0.0000	38.7481947	-89.90602
514	0.0117	0.00223	0.6709	0.0003	38.7488828	-89.917226
49	0.0011	0.00021	0.0636	0.0000	38.7483559	-89.917946
329	0.0075	0.00143	0.4297	0.0002	38.7479347	-89.901972
232	0.0053	0.00101	0.3037	0.0002	38.7465551	-89.850873
153	0.0035	0.00067	0.2000	0.0001	38.7481407	-89.91824
657	0.0150	0.00286	0.8587	0.0004	38.7469288	-89.863691
236	0.0054	0.00103	0.3086	0.0002	38.7474473	-89.906881
602	0.0138	0.00262	0.7864	0.0004	38.7466487	-89.862637
275	0.0063	0.00119	0.3587	0.0002	38.7476487	-89.921091
448	0.0102	0.00195	0.5850	0.0003	38.7477874	-89.91791
332	0.0076	0.00144	0.4333	0.0002	38.7475215	-89.91905
641	0.0146	0.00278	0.8368	0.0004	38.7476866	-89.912289
450	0.0103	0.00196	0.5879	0.0003	38.7472493	-89.920299
84	0.0019	0.00036	0.1091	0.0001	38.7472028	-89.921093
839	0.0192	0.00365	1.0964	0.0005	38.7475581	-89.903908
1040	0.0238	0.00452	1.3591	0.0007	38.7463538	-89.856474
176	0.0040	0.00077	0.2303	0.0001	38.7466259	-89.902929
445	0.0102	0.00194	0.5818	0.0003	38.7471068	-89.907114
1138	0.0260	0.00495	1.4861	0.0007	38.7453485	-89.902658

799 0.0183 0.00347 1.0433 0.0005 38.7459293 -89.906973 296 0.0068 0.00129 0.3871 0.0002 38.7448122 -89.922537 49 0.0011 0.00021 0.0643 0.0000 38.744535 -89.917118 361 0.0083 0.00157 0.4718 0.0002 38.744535 -89.917184 376 0.0086 0.00163 0.4909 0.0002 38.7445135 -89.917184 162 0.0037 0.00071 0.2120 0.0001 38.7435214 -89.907186 93 0.0021 0.00040 0.1215 0.0001 38.7435214 -89.907186 293 0.0067 0.00127 0.3824 0.0002 38.7495283 -89.9017561 275 0.0063 0.00120 0.35596 0.0002 38.7495283 -89.90173 232 0.0053 0.00101 0.3037 0.0002 38.7465455 -89.80873 169 0.0039 0.00074 0.2212 0.0	2011	0.0460	0.00874	2.6269	0.0013	38.7486334	-89.92878
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93 0.0021 0.00040 0.1215 0.0001 38.7436416 -89.917177 611 0.0140 0.00266 0.7979 0.0004 38.7421273 -89.917561 273 0.0067 0.00127 0.3824 0.0002 38.7400585 -89.907545 275 0.0063 0.00101 0.3037 0.0002 38.7382945 -89.908173 232 0.0053 0.00101 0.3037 0.0002 38.7455551 -89.850873 169 0.0039 0.00074 0.2212 0.0005 38.74578467 -89.850869 740 0.0169 0.00322 0.9665 0.0005 38.7457838 89.856474 790 0.0181 0.00343 1.0317 0.0002 38.7456669 -89.85839 318 0.0073 0.00138 0.4157 0.0002 38.7456669 -89.85839 4851 0.0195 0.00370 1.1123 0.0004 38.744032 89.851344 187 0.0043 0.00129 0.3885 0.0	376	0.0086	0.00163	0.4909	0.0002	38.7442135	-89.917426
611 0.0140 0.00266 0.7979 0.0004 38.7421273 -89.917561 293 0.0067 0.00127 0.3824 0.0002 38.7305233 -89.9077192 275 0.0063 0.00120 0.3596 0.0002 38.7365233 -89.907192 1272 0.0291 0.00553 1.6615 0.0008 38.7382945 -89.908173 169 0.0039 0.00074 0.2212 0.0001 38.7465551 -89.850869 740 0.0169 0.00322 0.9665 0.0005 38.7461772 -89.850869 1040 0.0238 0.00452 1.3591 0.0007 38.7456669 -89.85699 318 0.0073 0.00138 0.4157 0.0002 38.7453959 -89.858389 636 0.0145 0.00277 0.8312 0.0004 38.7446732 -89.851934 187 0.0195 0.00370 1.1123 0.0006 38.74438879 -89.852675 297 0.0068 0.00129 0.3885	162	0.0037	0.00071	0.2120	0.0001	38.7435214	-89.907186
293 0.0067 0.00127 0.3824 0.0002 38.7400585 -89.907545 275 0.0063 0.00120 0.3596 0.0002 38.738233 -89.907192 1272 0.0291 0.00553 1.6615 0.0008 38.738233 -89.907192 1232 0.0053 0.00101 0.3037 0.0002 38.7465551 -89.850873 169 0.0039 0.00074 0.2212 0.0001 38.7455467 -89.850869 740 0.0169 0.00322 0.9665 0.0005 38.7461772 -89.850869 740 0.0181 0.00343 1.0317 0.0005 38.7453538 -89.85669 318 0.0073 0.00138 0.4157 0.0002 38.7453593 -89.855399 318 0.0145 0.00277 0.8312 0.0004 38.7446732 -89.851344 187 0.0043 0.00370 1.1123 0.0006 38.74461732 -89.851344 187 0.0043 0.00129 0.3885 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
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1126 0.0257 0.00490 1.4713 0.0007 38.7401639 -89.845695 678 0.0155 0.00295 0.8859 0.0004 38.7404547 -89.901938 275 0.0063 0.00120 0.3596 0.0002 38.7395233 -89.907192 460 0.0105 0.00200 0.6006 0.0003 38.7392972 -89.906247 337 0.0077 0.00147 0.4407 0.0002 38.7377221 -89.843566 363 0.0083 0.00158 0.4742 0.0002 38.738533 -89.906941 919 0.0210 0.00399 1.1999 0.0006 38.7377221 -89.838637 136 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.735668 -89.843752 341 0.0078 0.00148 0.4454 0	1332	0.0304	0.00579	1.7394	0.0009	38.7421205	-89.848093
678 0.0155 0.00295 0.8859 0.0004 38.7404547 -89.901938 275 0.0063 0.00120 0.3596 0.0002 38.7395233 -89.907192 460 0.0105 0.00200 0.6006 0.0003 38.7392972 -89.906247 337 0.0077 0.00147 0.4407 0.0002 38.7377221 -89.843566 363 0.0083 0.00158 0.4742 0.0002 38.7378533 -89.906941 919 0.0210 0.00399 1.1999 0.0006 38.7377581 -89.842046 665 0.0152 0.00289 0.8685 0.0004 38.737621 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7360335 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.7356568 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.7356568 -89.84311 1078 0.0246 0.00468 1.4076 0	2325	0.0531	0.01011	3.0365	0.0015	38.7431511	-89.846571
275 0.0063 0.00120 0.3596 0.0002 38.7395233 -89.907192 460 0.0105 0.00200 0.6006 0.0003 38.7392972 -89.906247 337 0.0077 0.00147 0.4407 0.0002 38.7377221 -89.843566 363 0.0083 0.00158 0.4742 0.0002 38.737851 -89.842046 665 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.837964 930 0.0213 0.00404 1.2152 0.0006 38.7360335 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.7356568 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.737048 -89.903368 227 0.0052 0.00099 0.2964 0.0001 38.735335 -89.84311 1078 0.0246 0.00468 1.4076 0.0	1126	0.0257	0.00490	1.4713	0.0007	38.7401639	-89.845695
460 0.0105 0.00200 0.6006 0.0003 38.7392972 -89.906247 337 0.0077 0.00147 0.4407 0.0002 38.7377221 -89.843566 363 0.0083 0.00158 0.4742 0.0002 38.7388533 -89.906941 919 0.0210 0.00399 1.1999 0.0006 38.7377581 -89.842046 665 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.837964 930 0.0213 0.00404 1.2152 0.0006 38.7356568 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.735668 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.735048 -89.903368 227 0.0052 0.00099 0.2964 0.0001 38.7358772 -89.83912 652 0.0149 0.00284 0.8518 0.0	678	0.0155	0.00295	0.8859	0.0004	38.7404547	-89.901938
337 0.0077 0.00147 0.4407 0.0002 38.7377221 -89.843566 363 0.0083 0.00158 0.4742 0.0002 38.7388533 -89.906941 919 0.0210 0.00399 1.1999 0.0006 38.7377581 -89.842046 665 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.837964 930 0.0213 0.00404 1.2152 0.0006 38.7360335 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.7356568 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.735048 -89.903368 227 0.0052 0.00099 0.2964 0.0001 38.7358772 -89.83912 652 0.0149 0.00284 0.8518 0.0004 38.7357788 -89.838232 992 0.0227 0.00431 1.2963 0.	275	0.0063	0.00120	0.3596			-89.907192
363 0.0083 0.00158 0.4742 0.0002 38.7388533 -89.906941 919 0.0210 0.00399 1.1999 0.0006 38.7377581 -89.842046 665 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.837964 930 0.0213 0.00404 1.2152 0.0006 38.7360335 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.7356568 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.737048 -89.903368 227 0.0052 0.00099 0.2964 0.0001 38.735335 -89.84311 1078 0.0246 0.00468 1.4076 0.0007 38.7358772 -89.83912 652 0.0149 0.00284 0.8518 0.0004 38.73566389 -89.901379 278 0.0064 0.00121 0.3629 0.							
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665 0.0152 0.00289 0.8685 0.0004 38.7371231 -89.838637 136 0.0031 0.00059 0.1771 0.0001 38.7366279 -89.837964 930 0.0213 0.00404 1.2152 0.0006 38.7360335 -89.83245 644 0.0147 0.00280 0.8414 0.0004 38.7356568 -89.843752 341 0.0078 0.00148 0.4454 0.0002 38.737048 -89.903368 227 0.0052 0.00099 0.2964 0.0001 38.735335 -89.84311 1078 0.0246 0.00468 1.4076 0.0007 38.7358772 -89.83912 652 0.0149 0.00284 0.8518 0.0004 38.7357788 -89.838232 992 0.0227 0.00431 1.2963 0.0006 38.7356389 -89.901379 278 0.0064 0.00121 0.3629 0.0002 38.7351607 -89.842401 1272 0.0291 0.00553 1.6615 0.							
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49 0.0011 0.00021 0.0636 0.0000 38.7367291 -89.908577 159 0.0036 0.00069 0.2082 0.0001 38.7367223 -89.902927							
	49					38.7367291	
0.0036 0.00069 0.2082 0.0001 38.7366887 -89.908331	159	0.0036	0.00069	0.2082	0.0001	38.7367223	-89.902927
	159	0.0036	0.00069	0.2082	0.0001	38.7366887	-89.908331

160	0.0037	0.00070	0.2091	0.0001	38.7348988	-89.837488
228	0.0052	0.00099	0.2977	0.0001	38.73474	-89.842013
215	0.0049	0.00093	0.2809	0.0001	38.7343971	-89.842339
790	0.0181	0.00343	1.0314	0.0005	38.7339544	-89.838364
492	0.0112	0.00214	0.6423	0.0003	38.73341	-89.836657
48	0.0011	0.00021	0.0632	0.0000	38.7331188	-89.835886
73	0.0017	0.00032	0.0953	0.0000	38.7347794	-89.900418
222	0.0051	0.00097	0.2902	0.0001	38.7329668	-89.836261
806	0.0184	0.00350	1.0531	0.0005	38.7334586	-89.832338
121	0.0028	0.00053	0.1579	0.0001	38.732905	-89.834146
645	0.0148	0.00281	0.8429	0.0004	38.734087	-89.902364
1193	0.0273	0.00519	1.5580	0.0008	38.7330284	-89.842634
686	0.0157	0.00313	0.8962	0.0004	38.7319531	-89.838105
140	0.0032	0.00238	0.1831	0.0004	38.7321162	-89.867738
69	0.0032	0.00030	0.0905	0.0001	38.7285283	-89.87042
		0.00030		0.0004	38.7290269	-89.868983
560	0.0128		0.7316			
108	0.0025	0.00047	0.1414	0.0001	38.7279943	-89.854207
591	0.0135	0.00257	0.7717	0.0004	38.7299431	-89.904324
952	0.0218	0.00414	1.2435	0.0006	38.7291628	-89.905826
2301	0.0526	0.01000	3.0062	0.0015	38.7281012	-89.89844
1223	0.0280	0.00532	1.5972	0.0008	38.7279745	-89.90586
669	0.0153	0.00291	0.8741	0.0004	38.728329	-89.904463
110	0.0025	0.00048	0.1434	0.0001	38.7273164	-89.902713
1761	0.0403	0.00765	2.3001	0.0012	38.7293147	-89.90352
799	0.0183	0.00348	1.0444	0.0005	38.7272247	-89.906811
327	0.0075	0.00142	0.4272	0.0002	38.7272801	-89.905026
2493	0.0570	0.01084	3.2569	0.0016	38.728524	-89.901642
65	0.0015	0.00028	0.0851	0.0000	38.7267422	-89.904048
79	0.0018	0.00034	0.1033	0.0001	38.7263842	-89.896891
547	0.0125	0.00238	0.7151	0.0004	38.7263522	-89.895692
153	0.0035	0.00067	0.2000	0.0001	38.7264589	-89.90375
286	0.0065	0.00124	0.3738	0.0002	38.7261227	-89.895194
699	0.0160	0.00304	0.9137	0.0005	38.7269658	-89.906523
474	0.0108	0.00206	0.6192	0.0003	38.7265675	-89.902637
271	0.0062	0.00118	0.3546	0.0002	38.7260053	-89.903209
925	0.0211	0.00402	1.2081	0.0006	38.7259134	-89.892459
97	0.0022	0.00042	0.1273	0.0001	38.7256355	-89.902768
113	0.0026	0.00049	0.1479	0.0001	38.725693	-89.902645
92	0.0021	0.00040	0.1199	0.0001	38.7254087	-89.893934
298	0.0068	0.00129	0.3886	0.0002	38.725388	-89.89432
42	0.0010	0.00018	0.0545	0.0000	38.7254959	-89.902601
180	0.0041	0.00078	0.2357	0.0001	38.7256214	-89.902406
470	0.0107	0.00204	0.6141	0.0003	38.725892	-89.898634
520	0.0107	0.00204	0.6795	0.0003	38.7257574	-89.903795
764	0.0119	0.00220	0.9981	0.0005	38.7255149	-89.901479
294	0.0173	0.00332	0.3846	0.0003	38.7250624	-89.902603
384				0.0002	38.7227443	-89.889074
304	0.0088	0.00167	0.5015	0.0003	30.7227443	-03.003074

56	0.0013	0.00024	0.0727	0.0000	38.7224227	-89.889728
153	0.0035	0.00067	0.2000	0.0001	38.7221228	-89.890138
357	0.0082	0.00155	0.4667	0.0002	38.7224613	-89.893818
235	0.0054	0.00102	0.3066	0.0002	38.7218123	-89.893689
472	0.0108	0.00205	0.6166	0.0003	38.7220484	-89.89449
558	0.0127	0.00242	0.7285	0.0004	38.721282	-89.888643
52	0.0012	0.00022	0.0674	0.0000	38.7207582	-89.886252
445	0.0102	0.00194	0.5818	0.0003	38.7210704	-89.893461
1940	0.0443	0.00843	2.5336	0.0013	38.7193649	-89.888069
233	0.0053	0.00101	0.3046	0.0002	38.7309993	-89.817711
1678	0.0384	0.00729	2.1913	0.0011	38.7309143	-89.815366
861	0.0197	0.00723	1.1246	0.0001	38.7294517	-89.817434
110	0.0025	0.00374	0.1434	0.0000	38.7292349	-89.815905
41	0.0023	0.00048	0.0541	0.0001	38.7289052	-89.814199
395	0.0090	0.00172	0.5159	0.0003	38.7293484	-89.815407
556	0.0127	0.00242	0.7262	0.0004	38.7298327	-89.830595
67	0.0015	0.00029	0.0878	0.0000	38.7283422	-89.818953
36	0.0008	0.00015	0.0466	0.0000	38.7287105	-89.838538
135	0.0031	0.00059	0.1765	0.0001	38.7283877	-89.835191
159	0.0036	0.00069	0.2071	0.0001	38.7285327	-89.839485
91	0.0021	0.00039	0.1184	0.0001	38.727648	-89.84342
1040	0.0238	0.00452	1.3587	0.0007	38.7282119	-89.832391
511	0.0117	0.00222	0.6675	0.0003	38.7274884	-89.82749
457	0.0104	0.00199	0.5966	0.0003	38.727052	-89.826975
265	0.0061	0.00115	0.3460	0.0002	38.7268809	-89.82814
439	0.0100	0.00191	0.5740	0.0003	38.7263072	-89.835852
557	0.0127	0.00242	0.7274	0.0004	38.7263675	-89.835089
251	0.0057	0.00109	0.3277	0.0002	38.7261523	-89.834772
487	0.0111	0.00212	0.6358	0.0003	38.7269419	-89.842109
96	0.0022	0.00042	0.1253	0.0001	38.7261395	-89.835278
41	0.0009	0.00018	0.0541	0.0000	38.7254201	-89.828686
89	0.0020	0.00039	0.1157	0.0001	38.72548	-89.842208
59	0.0014	0.00026	0.0776	0.0000	38.72533	-89.841659
764	0.0175	0.00332	0.9981	0.0005	38.7260178	-89.833162
438	0.0100	0.00190	0.5718	0.0003	38.7250024	-89.833589
82	0.0019	0.00036	0.1071	0.0001	38.7249629	-89.832881
2536	0.0580	0.01103	3.3128	0.0017	38.7262249	-89.844829
85	0.0019	0.00037	0.1113	0.0001	38.7248827	-89.853074
271	0.0013	0.00037	0.3538	0.0001	38.7249535	-89.849304
42	0.0002	0.00118	0.0545	0.0002	38.7241341	-89.832469
					38.7244968	
95 173	0.0022	0.00041	0.1242	0.0001		-89.849449
173	0.0040	0.00075	0.2266	0.0001	38.7246114	-89.856035
42	0.0010	0.00018	0.0545	0.0000	38.7238306	-89.832241
185	0.0042	0.00080	0.2414	0.0001	38.723137	-89.822665
799	0.0183	0.00347	1.0436	0.0005	38.7235749	-89.821259
73	0.0017	0.00032	0.0953	0.0000	38.7235384	-89.842219
100	0.0023	0.00044	0.1312	0.0001	38.7230526	-89.8271

263	0.0060	0.00114	0.3432	0.0002	38.7233693	-89.831951
42	0.0010	0.00018	0.0545	0.0000	38.7228834	-89.826245
123	0.0028	0.00053	0.1607	0.0001	38.7229213	-89.8316
1160	0.0265	0.00504	1.5157	0.0008	38.7244041	-89.831663
169	0.0039	0.00073	0.2206	0.0001	38.7228638	-89.822313
206	0.0047	0.00089	0.2687	0.0001	38.7230414	-89.838993
174	0.0040	0.00076	0.2273	0.0001	38.7227408	-89.831176
1065	0.0244	0.00463	1.3917	0.0007	38.7238643	-89.828893
364	0.0083	0.00158	0.4749	0.0002	38.722704	-89.836524
667	0.0153	0.00290	0.8715	0.0004	38.7216721	-89.819499
680	0.0156	0.00296	0.8888	0.0004	38.7213495	-89.821541
802	0.0183	0.00349	1.0482	0.0005	38.7227135	-89.845055
945	0.0216	0.00411	1.2342	0.0006	38.7216605	-89.837906
730	0.0167	0.00317	0.9540	0.0005	38.7208593	-89.819425
323	0.0074	0.00317	0.4223	0.0003	38.7213423	-89.837138
239	0.0055	0.00141	0.3120	0.0002	38.7210229	-89.836324
233 7	0.0003	0.00104	0.0091	0.0002	38.7210223	-89.833996
497	0.0002	0.00003	0.6493	0.0003	38.7206321	-89.834875
		0.00210		0.0003	38.7211714	-89.834359
493	0.0113		0.6436			-89.821926
1343	0.0307	0.00584	1.7542	0.0009	38.7195918	
847	0.0194	0.00368	1.1067	0.0006	38.718567	-89.835459
1232	0.0282	0.00536	1.6094	0.0008	38.7184224	-89.836105
846	0.0193	0.00368	1.1050	0.0006	38.7176363	-89.82511
35	0.0008	0.00015	0.0455	0.0000	38.7174621	-89.841293
627	0.0143	0.00272	0.8186	0.0004	38.7179791	-89.839208
310	0.0071	0.00135	0.4055	0.0002	38.717442	-89.841795
783	0.0179	0.00340	1.0231	0.0005	38.7173102	-89.839927
270	0.0062	0.00117	0.3521	0.0002	38.7166866	-89.827567
79	0.0018	0.00034	0.1029	0.0001	38.7160944	-89.823079
91	0.0021	0.00039	0.1184	0.0001	38.7160837	-89.822686
326	0.0075	0.00142	0.4261	0.0002	38.7166463	-89.844343
111	0.0025	0.00048	0.1445	0.0001	38.7160285	-89.841496
158	0.0036	0.00069	0.2062	0.0001	38.7155616	-89.847127
30	0.0007	0.00013	0.0386	0.0000	38.7150708	-89.841062
630	0.0144	0.00274	0.8227	0.0004	38.7151216	-89.839947
206	0.0047	0.00089	0.2689	0.0001	38.715082	-89.841474
1214	0.0277	0.00528	1.5854	0.0008	38.7158159	-89.842626
703	0.0161	0.00306	0.9187	0.0005	38.7141483	-89.836954
413	0.0094	0.00179	0.5390	0.0003	38.7145669	-89.840895
83	0.0019	0.00036	0.1086	0.0001	38.7142267	-89.849799
204	0.0047	0.00089	0.2665	0.0001	38.7108481	-89.850786
925	0.0211	0.00402	1.2078	0.0006	38.7092734	-89.848528
291	0.0066	0.00126	0.3796	0.0002	38.7075991	-89.842167
67	0.0015	0.00029	0.0878	0.0000	38.7072605	-89.843769
127	0.0029	0.00055	0.1660	0.0001	38.7067842	-89.83946
670	0.0153	0.00033	0.8755	0.0001	38.7072791	-89.838629
823	0.0133	0.00251	1.0746	0.0004	38.7058696	-89.839618
023	0.0100	0.00336	1.0740	0.0003	30.7030030	05.055010

39	0.0009	0.00017	0.0514	0.0000	38.7045832	-89.842507
5	0.0001	0.00002	0.0064	0.0000	38.7042232	-89.856656
435	0.0100	0.00189	0.5686	0.0003	38.7043491	-89.857315
255	0.0058	0.00111	0.3330	0.0002	38.7039102	-89.856781
480	0.0110	0.00209	0.6270	0.0003	38.7035139	-89.837346
1161	0.0265	0.00505	1.5162	0.0008	38.7035236	-89.858772
623	0.0142	0.00271	0.8137	0.0004	38.7033689	-89.848058
393	0.0090	0.00171	0.5139	0.0003	38.7029202	-89.842097
567	0.0130	0.00247	0.7411	0.0004	38.7028655	-89.857
372	0.0085	0.00162	0.4855	0.0002	38.7020429	-89.839832
79	0.0018	0.00035	0.1038	0.0001	38.7020025	-89.856843
535	0.0122	0.00233	0.6994	0.0003	38.700559	-89.844103
1116	0.0255	0.00485	1.4583	0.0003	38.7012386	-89.841883
66	0.0015	0.00029	0.0867	0.0007	38.7004379	-89.843299
556	0.013	0.00023	0.7268	0.0004	38.7005004	-89.853496
772	0.0127	0.00242	1.0079	0.0004	38.6975294	-89.854492
254	0.0178	0.00333	0.3317	0.0003	38.6994807	-89.836695
					38.6994501	
1190	0.0272	0.00517	1.5539	0.0008	38.6994501	-89.838692
300	0.0069	0.00130	0.3918	0.0002		-89.83691
69	0.0016	0.00030	0.0900	0.0000	38.6970146	-89.843292
1142	0.0261	0.00497	1.4923	0.0007	38.6978823	-89.835701
2812	0.0643	0.01222	3.6731	0.0018	38.6976853	-89.83919
791	0.0181	0.00344	1.0331	0.0005	38.6962961	-89.838726
368	0.0084	0.00160	0.4813	0.0002	38.695077	-89.841684
1067	0.0244	0.00464	1.3943	0.0007	38.6960904	-89.841987
1370	0.0313	0.00596	1.7893	0.0009	38.6947888	-89.838957
48	0.0011	0.00021	0.0632	0.0000	38.6945247	-89.843161
106	0.0024	0.00046	0.1381	0.0001	38.69461	-89.84319
469	0.0107	0.00204	0.6128	0.0003	38.6940514	-89.835797
179	0.0041	0.00078	0.2341	0.0001	38.6938488	-89.849135
140	0.0032	0.00061	0.1827	0.0001	38.6936406	-89.842454
688	0.0157	0.00299	0.8986	0.0004	38.6941115	-89.842153
161	0.0037	0.00070	0.2097	0.0001	38.6936033	-89.838096
99	0.0023	0.00043	0.1290	0.0001	38.6933914	-89.83726
433	0.0099	0.00188	0.5653	0.0003	38.6935033	-89.836405
45	0.0010	0.00020	0.0594	0.0000	38.6934451	-89.841414
5	0.0001	0.00002	0.0064	0.0000	38.6933429	-89.841444
64	0.0015	0.00028	0.0840	0.0000	38.6934211	-89.841484
266	0.0061	0.00116	0.3479	0.0002	38.6932995	-89.841836
308	0.0070	0.00134	0.4026	0.0002	38.6932202	-89.842897
429	0.0098	0.00187	0.5609	0.0003	38.6923832	-89.838244
75	0.0017	0.00033	0.0980	0.0000	38.6917507	-89.842527
236	0.0054	0.00103	0.3084	0.0002	38.6913105	-89.83337
951	0.0217	0.00413	1.2422	0.0006	38.6921231	-89.83292
418	0.0095	0.00182	0.5454	0.0003	38.6918367	-89.84769
130	0.0030	0.00057	0.1698	0.0001	38.6907095	-89.848979
534	0.0122	0.00232	0.6979	0.0003	38.6906924	-89.847349
				-		

117	0.0027	0.00051	0.1525	0.0001	38.6901919	-89.831635
860	0.0197	0.00374	1.1229	0.0006	38.6904526	-89.832412
2713	0.0620	0.01179	3.5437	0.0018	38.6901001	-89.839672
981	0.0224	0.00426	1.2810	0.0006	38.6890679	-89.831328
59	0.0013	0.00025	0.0765	0.0000	38.6889459	-89.84235
147	0.0034	0.00064	0.1918	0.0001	38.6887726	-89.842378
1784	0.0408	0.00775	2.3298	0.0012	38.6888564	-89.839447
189	0.0043	0.00082	0.2469	0.0001	38.6882637	-89.842401
57	0.0013	0.00025	0.0749	0.0000	38.6879716	-89.842403
397	0.0091	0.00173	0.5188	0.0003	38.6858958	-89.836919
154	0.0035	0.00067	0.2008	0.0001	38.6855654	-89.837382
656	0.0150	0.00285	0.8571	0.0004	38.6853208	-89.830736
1613	0.0369	0.00701	2.1070	0.0011	38.6853379	-89.84022
219	0.0050	0.00095	0.2858	0.0001	38.6855623	-89.848269
1298	0.0297	0.00564	1.6953	0.0008	38.6863092	-89.849166
36	0.0008	0.00015	0.0466	0.0000	38.6849496	-89.837125
2021	0.0462	0.00879	2.6400	0.0013	38.6851417	-89.840665
41	0.0009	0.00018	0.0530	0.0000	38.6845709	-89.847806
361	0.0083	0.00157	0.4722	0.0002	38.6850272	-89.847784
58	0.0013	0.00025	0.0760	0.0000	38.684488	-89.847739
693	0.0159	0.00301	0.9059	0.0005	38.6848432	-89.835566
147	0.0034	0.00064	0.1927	0.0001	38.6825709	-89.837887
929	0.0212	0.00404	1.2129	0.0006	38.6823657	-89.839138
452	0.0103	0.00197	0.5906	0.0003	38.6824303	-89.843621
157	0.0036	0.00068	0.2055	0.0001	38.6822445	-89.837637
1465	0.0335	0.00637	1.9134	0.0010	38.6838448	-89.849979
480	0.0110	0.00209	0.6273	0.0003	38.681727	-89.831456
823	0.0188	0.00358	1.0753	0.0005	38.6809913	-89.839434
518	0.0118	0.00225	0.6765	0.0003	38.6807798	-89.831555
470	0.0107	0.00204	0.6141	0.0003	38.6806638	-89.838632
958	0.0219	0.00417	1.2520	0.0006	38.6795651	-89.845576
625	0.0143	0.00272	0.8160	0.0004	38.6797919	-89.844035
208	0.0048	0.00090	0.2718	0.0001	38.6789001	-89.84134
143	0.0033	0.00062	0.1864	0.0001	38.6789264	-89.84426
640	0.0146	0.00278	0.8363	0.0004	38.678067	-89.843761
126	0.0029	0.00055	0.1647	0.0001	38.6773324	-89.833556
124	0.0028	0.00054	0.1621	0.0001	38.6773391	-89.833295
1159	0.0265	0.00504	1.5144	0.0008	38.6774167	-89.831617
643	0.0147	0.00280	0.8401	0.0004	38.6744272	-89.828132
723	0.0165	0.00314	0.9446	0.0005	38.6752698	-89.82747
216	0.0049	0.00094	0.2818	0.0001	38.6739541	-89.826688
388	0.0089	0.00168	0.5062	0.0003	38.6740185	-89.82708
48	0.0011	0.00021	0.0621	0.0000	38.6735461	-89.838256
1331	0.0304	0.00579	1.7391	0.0009	38.6747303	-89.838789
50	0.0011	0.00073	0.0647	0.0000	38.67319	-89.826594
523	0.011	0.00022	0.6838	0.0003	38.6715637	-89.824654
772	0.0120	0.00228	1.0079	0.0005	38.6666003	-89.827044
112	0.0170	0.00333	1.0079	0.0003	30.0000003	05.027044

286	0.0065	0.00124	0.3738	0.0002	38.6653478	-89.827696
286	0.0065	0.00125	0.3742	0.0002	38.6632803	-89.817873
144	0.0033	0.00063	0.1880	0.0001	38.6629083	-89.808659
228	0.0052	0.00099	0.2984	0.0001	38.6629552	-89.811356
189	0.0043	0.00082	0.2469	0.0001	38.6629575	-89.812424
101	0.0023	0.00044	0.1321	0.0001	38.6627058	-89.812914
79	0.0018	0.00034	0.1033	0.0001	38.6627309	-89.819842
59	0.0014	0.00026	0.0776	0.0000	38.6625179	-89.820425
1049	0.0240	0.00456	1.3697	0.0007	38.6624357	-89.817563
2049	0.0468	0.00891	2.6762	0.0013	38.663989	-89.810384
274	0.0063	0.00119	0.3581	0.0002	38.6616092	-89.80859
1633	0.0373	0.00710	2.1337	0.0011	38.6623388	-89.826507
216	0.0049	0.00094	0.2825	0.0001	38.6607775	-89.821795
79	0.0018	0.00034	0.1029	0.0001	38.6603625	-89.811915
702	0.0160	0.00305	0.9165	0.0005	38.6605423	-89.816831
817	0.0187	0.00355	1.0670	0.0005	38.6607525	-89.808899
893	0.0204	0.00388	1.1664	0.0006	38.6599096	-89.816594
35	0.0008	0.00015	0.0455	0.0000	38.6595408	-89.815218
218	0.0050	0.00095	0.2853	0.0001	38.6596201	-89.814903
71	0.0016	0.00031	0.0927	0.0000	38.6580909	-89.828078
629	0.0144	0.00274	0.8223	0.0004	38.6577839	-89.815726
271	0.0062	0.00118	0.3545	0.0002	38.6576839	-89.81427
1634	0.0374	0.00710	2.1346	0.0011	38.6595774	-89.818913
201	0.0046	0.00087	0.2623	0.0001	38.6574432	-89.814492
81	0.0018	0.00035	0.1055	0.0001	38.6575636	-89.828067
524	0.0120	0.00228	0.6846	0.0003	38.6568425	-89.825411
5	0.0001	0.00002	0.0064	0.0000	38.6568248	-89.852219
694	0.0159	0.00302	0.9066	0.0005	38.6574402	-89.85296
540	0.0123	0.00235	0.7057	0.0004	38.6567669	-89.853076
1352	0.0309	0.00588	1.7665	0.0009	38.6570241	-89.823448
91	0.0021	0.00039	0.1184	0.0001	38.6564293	-89.856584
3592	0.0821	0.01561	4.6918	0.0023	38.6550014	-89.816479
61	0.0014	0.00027	0.0798	0.0000	38.6535719	-89.830953
1140	0.0261	0.00496	1.4895	0.0007	38.6525601	-89.829527
193	0.0044	0.00084	0.2521	0.0001	38.6526363	-89.832322
136	0.0031	0.00059	0.1771	0.0001	38.6525327	-89.831828
342	0.0078	0.00149	0.4465	0.0002	38.6515382	-89.841494
514	0.0117	0.00223	0.6709	0.0003	38.6511553	-89.838965
1014	0.0232	0.00441	1.3243	0.0007	38.6514009	-89.831649
56	0.0013	0.00024	0.0727	0.0000	38.6483286	-89.841382
56	0.0013	0.00024	0.0727	0.0000	38.6480237	-89.837122
2060	0.0471	0.00896	2.6908	0.0013	38.7309803	-89.720989
177	0.0040	0.00077	0.2308	0.0001	38.729321	-89.722526
328	0.0075	0.00143	0.4288	0.0002	38.7292534	-89.723632
271	0.0062	0.00118	0.3546	0.0002	38.729076	-89.723183
123	0.0028	0.00053	0.1601	0.0001	38.7285642	-89.723481
273	0.0062	0.00119	0.3567	0.0002	38.7275043	-89.717088

35	0.0008	0.00015	0.0455	0.0000	38.7271071	-89.717097
1513	0.0346	0.00658	1.9759	0.0010	38.7269898	-89.719402
818	0.0187	0.00355	1.0681	0.0005	38.7260519	-89.720644
1813	0.0414	0.00788	2.3678	0.0012	38.7281137	-89.72917
117	0.0027	0.00051	0.1532	0.0001	38.7257254	-89.721965
547	0.0125	0.00238	0.7141	0.0004	38.7253075	-89.721121
1199	0.0274	0.00521	1.5666	0.0008	38.7254178	-89.729794
693	0.0158	0.00301	0.9049	0.0005	38.7246352	-89.721946
533	0.0122	0.00232	0.6957	0.0003	38.723769	-89.736376
389	0.0089	0.00169	0.5077	0.0003	38.7232096	-89.738536
1673	0.0383	0.00727	2.1856	0.0011	38.7225018	-89.743018
291	0.0067	0.00127	0.3805	0.0002	38.7219397	-89.739298
96	0.0022	0.00042	0.1253	0.0001	38.7216704	-89.741643
535	0.0122	0.00232	0.6985	0.0003	38.7218243	-89.735839
280	0.0064	0.00122	0.3660	0.0002	38.7212793	-89.735438
1095	0.0250	0.00476	1.4306	0.0007	38.7215464	-89.73725
455	0.0104	0.00478	0.5944	0.0007	38.7211367	-89.74139
501	0.0104	0.00138	0.6543	0.0003	38.7205738	-89.735377
156	0.0036	0.00218	0.2044	0.0003	38.7203738	-89.741312
1047	0.0239	0.00055	1.3678	0.0001	38.7190038	-89.747069
112	0.0026	0.00433	0.1461	0.0007	38.7183942	-89.748212
144	0.0020	0.00043	0.1401	0.0001	38.7176054	-89.732409
73	0.0017	0.00032	0.0958	0.0000	38.7179555	-89.751017
1417	0.0324	0.00616	1.8509	0.0009	38.7187853	-89.749505
2102	0.0480	0.00914	2.7455	0.0014	38.7172852	-89.727948
436	0.0100	0.00189	0.5689	0.0003	38.7173555	-89.735678
1315	0.0301	0.00572	1.7182	0.0009	38.7186844	-89.748238
554	0.0127	0.00241	0.7242	0.0004	38.717872	-89.749066
53	0.0012	0.00023	0.0696	0.0000	38.7174813	-89.751526
57	0.0013	0.00025	0.0749	0.0000	38.7171611	-89.742778
57 	0.0013	0.00025	0.0749	0.0000	38.7175529	-89.758732
57	0.0013	0.00025	0.0749	0.0000	38.717469	-89.758633
508	0.0116	0.00221	0.6637	0.0003	38.71663	-89.730358
852	0.0195	0.00370	1.1132	0.0006	38.7166957	-89.750785
903	0.0206	0.00393	1.1799	0.0006	38.7149894	-89.74147
315	0.0072	0.00137	0.4109	0.0002	38.714993	-89.739502
435	0.0100	0.00189	0.5686	0.0003	38.7147165	-89.738487
817	0.0187	0.00355	1.0668	0.0005	38.7148505	-89.733949
330	0.0075	0.00143	0.4312	0.0002	38.7142392	-89.739151
1062	0.0243	0.00462	1.3867	0.0007	38.7151946	-89.747076
356	0.0081	0.00155	0.4653	0.0002	38.7138488	-89.746317
588	0.0134	0.00256	0.7681	0.0004	38.713819	-89.747933
406	0.0093	0.00177	0.5307	0.0003	38.7136075	-89.73845
1601	0.0366	0.00696	2.0915	0.0010	38.7147324	-89.757415
1287	0.0294	0.00560	1.6812	0.0008	38.7150795	-89.752607
1099	0.0251	0.00478	1.4356	0.0007	38.7138032	-89.757042
344	0.0079	0.00150	0.4500	0.0002	38.7138871	-89.763934

134	0.0031	0.00058	0.1756	0.0001	38.7125886	-89.747505
739	0.0169	0.00321	0.9657	0.0005	38.7121985	-89.746036
109	0.0025	0.00047	0.1419	0.0001	38.7121275	-89.744456
229	0.0052	0.00100	0.2997	0.0001	38.7120282	-89.743815
518	0.0118	0.00225	0.6769	0.0003	38.7115108	-89.732118
253	0.0058	0.00110	0.3306	0.0002	38.7112254	-89.731489
104	0.0024	0.00045	0.1364	0.0001	38.7108912	-89.731948
764	0.0175	0.00332	0.9986	0.0005	38.7111824	-89.751059
682	0.0156	0.00297	0.8913	0.0004	38.7109145	-89.747677
51	0.0012	0.00022	0.0669	0.0000	38.7101778	-89.75206
638	0.0146	0.00277	0.8332	0.0004	38.7106581	-89.76769
542	0.0124	0.00236	0.7086	0.0004	38.710128	-89.736428
123	0.0028	0.00053	0.1601	0.0001	38.7096852	-89.737461
75	0.0017	0.00032	0.0973	0.0000	38.7095429	-89.73549
400	0.0091	0.00174	0.5225	0.0003	38.7094211	-89.734746
451	0.0103	0.00174	0.5898	0.0003	38.7090117	-89.739821
596	0.0136	0.00130	0.7788	0.0003	38.7090117	-89.735366
545	0.0136	0.00233	0.7117	0.0004	38.7087571	-89.74861
63		0.00237		0.0004	38.7079203	
	0.0015		0.0829			-89.741136 -89.756691
79 1502	0.0018	0.00035	0.1038	0.0001	38.7077801	
1503	0.0344	0.00653	1.9634	0.0010	38.7088356	-89.741676
461	0.0105	0.00200	0.6022	0.0003	38.7073511	-89.740865
497	0.0114	0.00216	0.6498	0.0003	38.7080169	-89.760823
291	0.0067	0.00127	0.3807	0.0002	38.7079848	-89.760255
103	0.0023	0.00045	0.1339	0.0001	38.7072892	-89.748307
512	0.0117	0.00222	0.6685	0.0003	38.7072554	-89.759747
226	0.0052	0.00098	0.2949	0.0001	38.7065668	-89.7539
418	0.0095	0.00182	0.5454	0.0003	38.7067974	-89.764314
293	0.0067	0.00128	0.3831	0.0002	38.7061557	-89.759982
83	0.0019	0.00036	0.1086	0.0001	38.7059242	-89.759502
896	0.0205	0.00390	1.1709	0.0006	38.7056763	-89.740894
187	0.0043	0.00081	0.2441	0.0001	38.7049586	-89.741833
458	0.0105	0.00199	0.5986	0.0003	38.7048896	-89.742858
404	0.0092	0.00176	0.5283	0.0003	38.704606	-89.744212
998	0.0228	0.00434	1.3041	0.0007	38.7053661	-89.757335
1082	0.0247	0.00470	1.4131	0.0007	38.7049251	-89.765004
451	0.0103	0.00196	0.5895	0.0003	38.7043003	-89.743328
521	0.0119	0.00227	0.6807	0.0003	38.7039345	-89.749854
128	0.0029	0.00056	0.1674	0.0001	38.7024975	-89.7455
569	0.0130	0.00247	0.7433	0.0004	38.7024269	-89.753228
1382	0.0316	0.00601	1.8049	0.0009	38.7039385	-89.754129
134	0.0031	0.00058	0.1756	0.0001	38.7023775	-89.754363
159	0.0036	0.00069	0.2077	0.0001	38.7021874	-89.745231
191	0.0044	0.00083	0.2499	0.0001	38.702189	-89.754025
58	0.0013	0.00025	0.0760	0.0000	38.7026638	-89.778306
316	0.0072	0.00137	0.4126	0.0002	38.7028344	-89.778022
328	0.0075	0.00143	0.4288	0.0002	38.7023366	-89.757694
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548	0.0125	0.00238	0.7155	0.0004	38.7020482	-89.755335
335	0.0077	0.00145	0.4371	0.0002	38.7019099	-89.745368
566	0.0129	0.00246	0.7390	0.0004	38.7020367	-89.746259
219	0.0050	0.00095	0.2858	0.0001	38.7013813	-89.745139
578	0.0132	0.00251	0.7545	0.0004	38.7009586	-89.747467
303	0.0069	0.00132	0.3953	0.0002	38.7010668	-89.745303
608	0.0139	0.00264	0.7944	0.0004	38.7008295	-89.747456
1036	0.0237	0.00450	1.3529	0.0007	38.700171	-89.757687
416	0.0095	0.00181	0.5432	0.0003	38.6994811	-89.753893
63	0.0014	0.00027	0.0818	0.0000	38.6998324	-89.7802
1390	0.0318	0.00604	1.8158	0.0009	38.7014037	-89.779568
178	0.0041	0.00077	0.2322	0.0001	38.6995911	-89.779913
350	0.0080	0.00152	0.4572	0.0002	38.6997045	-89.784612
50	0.0012	0.00132	0.0658	0.0002	38.6982764	-89.747291
571	0.0131	0.00022	0.7465	0.0004	38.6985143	-89.746678
7	0.002	0.00248	0.0091	0.0004	38.6988995	-89.775793
		0.00003			38.6989844	
380	0.0087		0.4968	0.0002		-89.7752
94	0.0021	0.00041	0.1221	0.0001	38.698079	-89.7473
40	0.0009	0.00017	0.0519	0.0000	38.6987454	-89.777375
123	0.0028	0.00053	0.1601	0.0001	38.6993865	-89.807189
519	0.0119	0.00226	0.6780	0.0003	38.6987068	-89.768792
343	0.0078	0.00149	0.4474	0.0002	38.698089	-89.763942
148	0.0034	0.00064	0.1938	0.0001	38.6992868	-89.811102
227	0.0052	0.00099	0.2971	0.0001	38.698974	-89.809131
796	0.0182	0.00346	1.0398	0.0005	38.6988162	-89.806321
639	0.0146	0.00278	0.8351	0.0004	38.6981488	-89.77537
543	0.0124	0.00236	0.7088	0.0004	38.6976116	-89.780391
160	0.0037	0.00070	0.2088	0.0001	38.6963833	-89.754018
807	0.0185	0.00351	1.0544	0.0005	38.6968137	-89.747715
302	0.0069	0.00131	0.3944	0.0002	38.6968116	-89.779691
159	0.0036	0.00069	0.2082	0.0001	38.6967866	-89.78019
688	0.0157	0.00299	0.8985	0.0004	38.6963253	-89.740448
122	0.0028	0.00053	0.1590	0.0001	38.6954961	-89.740232
754	0.0172	0.00328	0.9844	0.0005	38.6978309	-89.812902
168	0.0038	0.00073	0.2190	0.0001	38.6959511	-89.753984
41	0.0009	0.00018	0.0541	0.0000	38.6956486	-89.753997
48	0.0011	0.00021	0.0621	0.0000	38.6954056	-89.74955
1968	0.0450	0.00856	2.5714	0.0013	38.6967448	-89.742432
568	0.0130	0.00247	0.7426	0.0004	38.6950041	-89.74117
441	0.0101	0.00192	0.5764	0.0003	38.6946773	-89.7496
178	0.0041	0.00077	0.2328	0.0001	38.6956164	-89.781726
59	0.0014	0.00026	0.0771	0.0000	38.6952021	-89.772812
2162	0.0494	0.00940	2.8237	0.0014	38.6969382	-89.806807
326	0.0074	0.00142	0.4255	0.0002	38.6944627	-89.744602
77	0.0018	0.00033	0.1000	0.0002	38.6940614	-89.74425
556	0.0127	0.00033	0.7257	0.0001	38.694145	-89.741205
89	0.0127	0.00242	0.7237	0.0004	38.6948368	-89.772794
03	0.0020	0.00039	0.1137	0.0001	30.0340300	-03.112134

108	0.0025	0.00047	0.1408	0.0001	38.6938189	-89.740216
729	0.0167	0.00317	0.9520	0.0005	38.6946696	-89.746992
284	0.0065	0.00124	0.3716	0.0002	38.6954343	-89.794318
251	0.0057	0.00109	0.3281	0.0002	38.6953491	-89.794843
179	0.0041	0.00078	0.2334	0.0001	38.6938872	-89.744387
618	0.0141	0.00268	0.8067	0.0004	38.6946529	-89.754008
556	0.0127	0.00242	0.7266	0.0004	38.6943229	-89.753332
139	0.0032	0.00061	0.1820	0.0001	38.6941448	-89.76037
968	0.0221	0.00421	1.2639	0.0006	38.6944186	-89.759122
145	0.0033	0.00063	0.1900	0.0001	38.6943791	-89.769553
454	0.0104	0.00198	0.5935	0.0003	38.6947143	-89.769179
118	0.0027	0.00051	0.1543	0.0001	38.6944174	-89.772779
224	0.0051	0.00097	0.2924	0.0001	38.6935692	-89.74047
384	0.0088	0.00167	0.5015	0.0003	38.695017	-89.795283
167	0.0038	0.00073	0.2179	0.0001	38.6935978	-89.753987
754	0.0172	0.00328	0.9856	0.0005	38.6952312	-89.801602
156	0.0036	0.00068	0.2035	0.0001	38.6946853	-89.802885
325	0.0074	0.00141	0.4250	0.0002	38.6945576	-89.802143
112	0.0026	0.00049	0.1461	0.0001	38.6945599	-89.803079
1334	0.0305	0.00580	1.7426	0.0009	38.6941931	-89.7568
506	0.0116	0.00220	0.6609	0.0003	38.6945223	-89.80393
488	0.0111	0.00212	0.6370	0.0003	38.6934558	-89.760778
228	0.0052	0.00099	0.2980	0.0001	38.6930991	-89.762369
483	0.0110	0.00210	0.6305	0.0003	38.6926858	-89.75668
78	0.0018	0.00034	0.1022	0.0001	38.6926653	-89.759722
192	0.0044	0.00084	0.2510	0.0001	38.6928164	-89.76455
343	0.0078	0.00149	0.4485	0.0002	38.692538	-89.759105
942	0.0215	0.00410	1.2309	0.0006	38.6945417	-89.809321
1428	0.0326	0.00621	1.8649	0.0009	38.6935602	-89.746264
306	0.0070	0.00133	0.3991	0.0002	38.6937539	-89.804252
1704	0.0390	0.00741	2.2263	0.0011	38.6943799	-89.76578
466	0.0107	0.00203	0.6092	0.0003	38.6937513	-89.807891
50	0.0011	0.00022	0.0647	0.0000	38.693417	-89.80725
517	0.0118	0.00225	0.6748	0.0003	38.6917395	-89.752792
34	0.0008	0.00015	0.0439	0.0000	38.6925278	-89.793032
75	0.0017	0.00033	0.0980	0.0000	38.6922118	-89.792423
169	0.0039	0.00074	0.2212	0.0001	38.6921269	-89.803853
434	0.0099	0.00189	0.5664	0.0003	38.6912904	-89.755539
316	0.0072	0.00138	0.4133	0.0002	38.6911376	-89.766995
1556	0.0356	0.00676	2.0325	0.0010	38.6928057	-89.782402
206	0.0047	0.00089	0.2687	0.0001	38.6904524	-89.749284
371	0.0085	0.00161	0.4849	0.0002	38.6913993	-89.783429
1528	0.0349	0.00664	1.9964	0.0010	38.69232	-89.769528
971	0.0222	0.00422	1.2686	0.0006	38.6918701	-89.814193
183	0.0042	0.00080	0.2392	0.0001	38.6910476	-89.78406
1604	0.0367	0.00697	2.0955	0.0010	38.69221	-89.772336
373	0.0085	0.00162	0.4873	0.0002	38.6902961	-89.755584

1315	0.0301	0.00572	1.7180	0.0009	38.6911553	-89.758546
138	0.0031	0.00060	0.1798	0.0001	38.6896799	-89.755724
514	0.0117	0.00223	0.6713	0.0003	38.6900041	-89.76228
670	0.0153	0.00291	0.8755	0.0004	38.6893857	-89.738045
462	0.0106	0.00201	0.6032	0.0003	38.6894523	-89.737657
2118	0.0484	0.00921	2.7666	0.0014	38.6921335	-89.808028
1356	0.0310	0.00590	1.7714	0.0009	38.6904178	-89.753355
952	0.0218	0.00414	1.2433	0.0006	38.6912821	-89.813447
1320	0.0302	0.00574	1.7247	0.0009	38.6907112	-89.807412
566	0.0130	0.00246	0.7400	0.0004	38.6902945	-89.767826
1001	0.0229	0.00435	1.3072	0.0007	38.6908759	-89.777076
939	0.0215	0.00408	1.2271	0.0007	38.690935	-89.778694
309	0.0071	0.00433	0.4037	0.0002	38.689851	-89.779123
34	0.0001	0.0015	0.0439	0.0002	38.6897428	-89.778662
619	0.0141	0.00013	0.8085	0.0004	38.6896037	-89.777597
137	0.0031	0.00209	0.1789	0.0004	38.6886485	-89.737636
462	0.0106	0.00000	0.6031	0.0001	38.6889524	-89.737636
	0.0108					
39		0.00017	0.0514	0.0000	38.6903827	-89.80972
982	0.0224	0.00427	1.2826	0.0006	38.6904303	-89.773317
1111	0.0254	0.00483	1.4509	0.0007	38.6907991	-89.772631
855	0.0195	0.00372	1.1167	0.0006	38.689201	-89.754797
535	0.0122	0.00233	0.6994	0.0003	38.6885029	-89.74336
972	0.0222	0.00422	1.2692	0.0006	38.6898871	-89.756017
805	0.0184	0.00350	1.0513	0.0005	38.6898774	-89.7659
558	0.0128	0.00243	0.7294	0.0004	38.6905618	-89.817813
595	0.0136	0.00259	0.7777	0.0004	38.6913673	-89.829712
223	0.0051	0.00097	0.2916	0.0001	38.6891653	-89.772941
340	0.0078	0.00148	0.4438	0.0002	38.6894105	-89.774603
55	0.0013	0.00024	0.0723	0.0000	38.6886091	-89.75974
419	0.0096	0.00182	0.5479	0.0003	38.6893839	-89.779225
487	0.0111	0.00212	0.6359	0.0003	38.6885972	-89.746695
272	0.0062	0.00118	0.3559	0.0002	38.6882037	-89.742265
130	0.0030	0.00057	0.1698	0.0001	38.6903708	-89.829652
1203	0.0275	0.00523	1.5719	0.0008	38.6886955	-89.770522
36	0.0008	0.00015	0.0466	0.0000	38.6900554	-89.829659
59	0.0014	0.00026	0.0771	0.0000	38.689517	-89.80969
1233	0.0282	0.00536	1.6103	0.0008	38.6889477	-89.750749
34	0.0008	0.00015	0.0450	0.0000	38.6888818	-89.791019
803	0.0184	0.00349	1.0488	0.0005	38.6890331	-89.789646
1639	0.0375	0.00712	2.1404	0.0011	38.6891692	-89.783908
318	0.0073	0.00138	0.4155	0.0002	38.6893524	-89.817987
179	0.0041	0.00078	0.2339	0.0001	38.688655	-89.7909
603	0.0138	0.00262	0.7875	0.0004	38.6883575	-89.762362
223	0.0051	0.00097	0.2909	0.0001	38.6895639	-89.830188
694	0.0159	0.00302	0.9068	0.0005	38.6880283	-89.760032
981	0.0224	0.00426	1.2810	0.0006	38.6890679	-89.831328
865	0.0198	0.00376	1.1298	0.0006	38.6875316	-89.744399

1214	0.0277	0.00528	1.5855	0.0008	38.6875732	-89.740919
79	0.0018	0.00034	0.1033	0.0001	38.6871609	-89.770933
592	0.0135	0.00257	0.7727	0.0004	38.6878513	-89.776179
180	0.0041	0.00078	0.2348	0.0001	38.6869992	-89.776163
342	0.0078	0.00149	0.4470	0.0002	38.6861752	-89.775253
1622	0.0371	0.00705	2.1182	0.0011	38.6856897	-89.75504
981	0.0224	0.00426	1.2815	0.0006	38.6852591	-89.764604
615	0.0141	0.00267	0.8030	0.0004	38.6852743	-89.757087
225	0.0051	0.00098	0.2935	0.0001	38.684599	-89.765196
219	0.0050	0.00095	0.2855	0.0001	38.6845032	-89.763694
546	0.0125	0.00237	0.7135	0.0004	38.6865548	-89.820959
1125	0.0257	0.00489	1.4693	0.0007	38.6859083	-89.775762
140	0.0032	0.00061	0.1831	0.0001	38.685984	-89.823088
2047	0.0468	0.00890	2.6735	0.0013	38.6854258	-89.772455
387	0.0088	0.00168	0.5050	0.0003	38.6846514	-89.777697
398	0.0091	0.00173	0.5201	0.0003	38.6847264	-89.790279
642	0.0147	0.00173	0.8383	0.0003	38.6841499	-89.768682
322	0.0074	0.00273	0.4201	0.0004	38.6840113	-89.769516
334	0.0074	0.00140	0.4363	0.0002	38.6845369	-89.789158
656	0.0150	0.00145	0.4565	0.0002	38.6853208	-89.830736
813	0.0186	0.00353	1.0620	0.0005	38.6844084	-89.792183
604	0.0138	0.00262	0.7884	0.0004	38.6854675	-89.819071
251	0.0057	0.00109	0.3281	0.0002	38.6849627	-89.822513
447	0.0102	0.00194	0.5835	0.0003	38.684907	-89.821463
516	0.0118	0.00224	0.6742	0.0003	38.6842539	-89.8012
290	0.0066	0.00126	0.3789	0.0002	38.6837905	-89.800855
131	0.0030	0.00057	0.1712	0.0001	38.6842878	-89.826007
349	0.0080	0.00152	0.4559	0.0002	38.6831179	-89.779225
145	0.0033	0.00063	0.1894	0.0001	38.682855	-89.778599
483	0.0111	0.00210	0.6314	0.0003	38.6835649	-89.792921
440	0.0101	0.00191	0.5744	0.0003	38.6840588	-89.814484
1071	0.0245	0.00466	1.3988	0.0007	38.6841045	-89.812968
620	0.0142	0.00269	0.8096	0.0004	38.6826413	-89.79653
1443	0.0330	0.00627	1.8843	0.0009	38.6835783	-89.775828
112	0.0025	0.00048	0.1457	0.0001	38.6820706	-89.77519
985	0.0225	0.00428	1.2863	0.0006	38.6836957	-89.804873
342	0.0078	0.00149	0.4470	0.0002	38.6829996	-89.80625
467	0.0107	0.00203	0.6100	0.0003	38.6831712	-89.815138
1369	0.0313	0.00595	1.7888	0.0009	38.683307	-89.785297
1231	0.0281	0.00535	1.6078	0.0008	38.6832643	-89.783063
2295	0.0525	0.00998	2.9979	0.0015	38.6831578	-89.771898
59	0.0014	0.00026	0.0776	0.0000	38.682668	-89.815617
419	0.0096	0.00182	0.5467	0.0003	38.6820278	-89.782128
108	0.0025	0.00047	0.1414	0.0001	38.6824431	-89.809452
537	0.0123	0.00233	0.7009	0.0001	38.6818019	-89.779578
1519	0.0347	0.00253	1.9844	0.0004	38.6834302	-89.826768
838	0.0192	0.00364	1.0946	0.0010	38.6830146	-89.827564
030	0.0132	0.00304	1.0340	0.0003	30.0030140	-03.02/304

89	0.0020	0.00039	0.1157	0.0001	38.6820373	-89.809436
2674	0.0611	0.01162	3.4925	0.0017	38.6837982	-89.770295
355	0.0081	0.00154	0.4640	0.0002	38.6805756	-89.768239
108	0.0025	0.00047	0.1414	0.0001	38.6816584	-89.809418
922	0.0211	0.00401	1.2039	0.0006	38.6811898	-89.797283
1626	0.0372	0.00707	2.1236	0.0011	38.6814315	-89.801015
245	0.0056	0.00106	0.3197	0.0002	38.6815106	-89.803356
928	0.0212	0.00404	1.2125	0.0006	38.6812536	-89.774577
462	0.0106	0.00201	0.6037	0.0003	38.6819999	-89.828529
480	0.0110	0.00209	0.6273	0.0003	38.681727	-89.831456
810	0.0185	0.00352	1.0574	0.0005	38.6805606	-89.777969
582	0.0133	0.00253	0.7602	0.0004	38.6800225	-89.768668
694	0.0159	0.00302	0.9070	0.0005	38.6804288	-89.779062
61	0.0014	0.00027	0.0798	0.0000	38.6802468	-89.804861
985	0.0225	0.00428	1.2864	0.0006	38.6809761	-89.815094
1053	0.0241	0.00458	1.3759	0.0007	38.6812697	-89.818596
195	0.0045	0.00085	0.2547	0.0001	38.6796139	-89.795752
688	0.0157	0.00299	0.8992	0.0004	38.6799964	-89.789943
518	0.0118	0.00225	0.6765	0.0003	38.6807798	-89.831555
133	0.0030	0.00058	0.1740	0.0001	38.6793629	-89.795487
1141	0.0261	0.00496	1.4907	0.0007	38.6804141	-89.78793
280	0.0064	0.00122	0.3662	0.0002	38.6797871	-89.812053
173	0.0040	0.00075	0.2257	0.0001	38.6790222	-89.802285
878	0.0201	0.00382	1.1473	0.0006	38.6792383	-89.797081
601	0.0137	0.00261	0.7850	0.0004	38.680503	-89.83064
246	0.0056	0.00107	0.3210	0.0002	38.6797578	-89.829773
373	0.0085	0.00162	0.4871	0.0002	38.6792171	-89.804941
909	0.0208	0.00395	1.1876	0.0006	38.6790977	-89.806712
159	0.0036	0.00069	0.2075	0.0001	38.6792045	-89.811796
256	0.0059	0.00111	0.3346	0.0002	38.6787671	-89.80503
1554	0.0355	0.00676	2.0301	0.0010	38.6789797	-89.782417
1227	0.0281	0.00534	1.6031	0.0008	38.6802171	-89.822129
741	0.0169	0.00322	0.9677	0.0005	38.6795721	-89.821597
1108	0.0253	0.00482	1.4474	0.0007	38.6783352	-89.784881
714	0.0163	0.00310	0.9321	0.0005	38.6781329	-89.786172
134	0.0031	0.00058	0.1745	0.0001	38.6785221	-89.822659
640	0.0146	0.00278	0.8358	0.0004	38.6781158	-89.787062
362	0.0083	0.00157	0.4731	0.0002	38.6785526	-89.822336
85	0.0019	0.00037	0.1113	0.0001	38.6774236	-89.797918
54	0.0012	0.00024	0.0712	0.0000	38.6774784	-89.802614
7	0.0002	0.00003	0.0091	0.0000	38.6779249	-89.823349
279	0.0064	0.00121	0.3640	0.0002	38.6781131	-89.823066
193	0.0044	0.00084	0.2516	0.0001	38.6778875	-89.823043
381	0.0087	0.00166	0.4981	0.0002	38.6774089	-89.791541
694	0.0159	0.00302	0.9068	0.0005	38.6776788	-89.806423
543	0.0124	0.00236	0.7088	0.0004	38.6768227	-89.8022
468	0.0107	0.00203	0.6108	0.0003	38.6771025	-89.817258
.50	0.0107	5.55265	3.3100	0.0003	30.37, 1023	33.31,230

386	0.0088	0.00168	0.5044	0.0003	38.6769635	-89.818581
486	0.0111	0.00211	0.6352	0.0003	38.6768456	-89.802426
1159	0.0265	0.00504	1.5144	0.0008	38.6774167	-89.831617
938	0.0214	0.00408	1.2247	0.0006	38.6765958	-89.797434
1241	0.0284	0.00540	1.6216	0.0008	38.6777653	-89.81478
800	0.0183	0.00348	1.0444	0.0005	38.6758343	-89.791611
755	0.0173	0.00328	0.9860	0.0005	38.6764117	-89.817101
5	0.0001	0.00002	0.0064	0.0000	38.6750753	-89.797782
112	0.0025	0.00048	0.1457	0.0001	38.6750366	-89.797603
935	0.0214	0.00407	1.2218	0.0006	38.6758096	-89.792026
66	0.0015	0.00029	0.0867	0.0000	38.6748	-89.798162
176	0.0040	0.00077	0.2301	0.0001	38.6748634	-89.797895
439	0.0100	0.00191	0.5733	0.0003	38.6754375	-89.822796
752	0.0172	0.00131	0.9819	0.0005	38.6753858	-89.794263
187	0.0043	0.00081	0.2446	0.0003	38.6743198	-89.794146
284	0.0045	0.00081	0.3714	0.0001	38.6741569	-89.794651
450	0.0103	0.00124	0.5882	0.0002	38.6742735	-89.798334
594 722	0.0136	0.00258	0.7760	0.0004	38.674438	-89.808357
723	0.0165	0.00314	0.9446	0.0005	38.6752698	-89.82747
1665	0.0381	0.00724	2.1749	0.0011	38.6764455	-89.826647
2230	0.0510	0.00970	2.9133	0.0015	38.6763378	-89.825756
1569	0.0359	0.00682	2.0490	0.0010	38.6751888	-89.818211
297	0.0068	0.00129	0.3880	0.0002	38.6734646	-89.807632
216	0.0049	0.00094	0.2818	0.0001	38.6739541	-89.826688
349	0.0080	0.00152	0.4558	0.0002	38.6723759	-89.795386
716	0.0164	0.00311	0.9356	0.0005	38.6729819	-89.799254
608	0.0139	0.00265	0.7948	0.0004	38.6731322	-89.819623
88	0.0020	0.00038	0.1146	0.0001	38.6724392	-89.819169
121	0.0028	0.00053	0.1579	0.0001	38.6711255	-89.8087
515	0.0118	0.00224	0.6723	0.0003	38.6716133	-89.813692
867	0.0198	0.00377	1.1328	0.0006	38.6718715	-89.820519
579	0.0132	0.00252	0.7560	0.0004	38.6717192	-89.819272
523	0.0120	0.00228	0.6838	0.0003	38.6715637	-89.824654
244	0.0056	0.00106	0.3190	0.0002	38.6708952	-89.819041
2023	0.0463	0.00880	2.6433	0.0013	38.6723579	-89.802019
381	0.0087	0.00166	0.4973	0.0002	38.670596	-89.808669
207	0.0047	0.00090	0.2709	0.0001	38.6701904	-89.808111
476	0.0109	0.00207	0.6223	0.0003	38.6701865	-89.806985
66	0.0015	0.00028	0.0856	0.0000	38.6700983	-89.807708
351	0.0080	0.00153	0.4587	0.0002	38.6706335	-89.819604
439	0.0100	0.00191	0.5740	0.0003	38.6698352	-89.806984
517	0.0118	0.00225	0.6758	0.0003	38.6694286	-89.814829
521	0.0119	0.00226	0.6804	0.0003	38.669391	-89.807516
1018	0.0233	0.00443	1.3300	0.0007	38.6690689	-89.808461
372	0.0085	0.00162	0.4858	0.0002	38.6683603	-89.812219
277	0.0063	0.00120	0.3620	0.0002	38.667987	-89.811534
214	0.0049	0.00093	0.2794	0.0001	38.6676326	-89.808955

120	0.0027	0.00052	0.1569	0.0001	38.6670978	-89.809065
81	0.0018	0.00035	0.1055	0.0001	38.666746	-89.809047
590	0.0135	0.00256	0.7707	0.0004	38.6671991	-89.808773
998	0.0228	0.00434	1.3043	0.0007	38.6668434	-89.811249
119	0.0027	0.00052	0.1552	0.0001	38.7214054	-89.906645
228	0.0052	0.00099	0.2977	0.0001	38.7212528	-89.901253
317	0.0073	0.00138	0.4144	0.0002	38.7209098	-89.900749
130	0.0030	0.00057	0.1703	0.0001	38.7210835	-89.907159
645	0.0148	0.00281	0.8431	0.0004	38.7207167	-89.902069
388	0.0089	0.00169	0.5068	0.0003	38.7188287	-89.902747
91	0.0021	0.00040	0.1193	0.0001	38.7181954	-89.901515
185	0.0042	0.00080	0.2414	0.0001	38.7178389	-89.898502
1308	0.0299	0.00569	1.7083	0.0009	38.7192718	-89.897199
48	0.0011	0.00021	0.0621	0.0000	38.7175722	-89.897179
41	0.0009	0.00018	0.0530	0.0000	38.7175545	-89.898582
210	0.0048	0.00013	0.2747	0.0001	38.7176195	-89.898949
297	0.0048	0.00031	0.3875	0.0001	38.7176459	-89.9084
79	0.0018	0.00129	0.3873	0.0002	38.7170439	-89.901373
	0.018	0.00034	0.1029	0.0001	38.7172786	-89.900062
628 641	0.0143	0.00273	0.8372	0.0004	38.7166493	-89.900082
436	0.0100	0.00189	0.5694	0.0003	38.7163406	-89.894244
590	0.0135	0.00257	0.7709	0.0004	38.7152022	-89.894373
191	0.0044	0.00083	0.2499	0.0001	38.7146436	-89.894027
717	0.0164	0.00312	0.9366	0.0005	38.7145634	-89.908013
738	0.0169	0.00321	0.9638	0.0005	38.7153887	-89.907267
48	0.0011	0.00021	0.0621	0.0000	38.7144759	-89.906755
133	0.0030	0.00058	0.1740	0.0001	38.7146037	-89.906715
166	0.0038	0.00072	0.2164	0.0001	38.714009	-89.898355
943	0.0216	0.00410	1.2319	0.0006	38.714379	-89.896964
963	0.0220	0.00419	1.2586	0.0006	38.7136892	-89.905783
951	0.0218	0.00414	1.2428	0.0006	38.7141025	-89.905008
1127	0.0258	0.00490	1.4723	0.0007	38.7131679	-89.89422
686	0.0157	0.00298	0.8957	0.0004	38.7126554	-89.901671
350	0.0080	0.00152	0.4576	0.0002	38.711655	-89.894039
781	0.0179	0.00340	1.0205	0.0005	38.7122757	-89.907734
92	0.0021	0.00040	0.1199	0.0001	38.7110474	-89.908932
506	0.0116	0.00220	0.6607	0.0003	38.7113993	-89.908136
96	0.0022	0.00042	0.1253	0.0001	38.7109283	-89.90885
791	0.0181	0.00344	1.0334	0.0005	38.7107893	-89.906342
250	0.0057	0.00108	0.3259	0.0002	38.7099529	-89.901093
54	0.0012	0.00023	0.0701	0.0000	38.7092751	-89.876403
82	0.0019	0.00036	0.1071	0.0001	38.7092953	-89.878739
90	0.0021	0.00039	0.1173	0.0001	38.7092424	-89.878784
100	0.0023	0.00043	0.1306	0.0001	38.7094457	-89.88637
450	0.0103	0.00196	0.5877	0.0003	38.7093776	-89.885846
186	0.0043	0.00081	0.2430	0.0001	38.7099656	-89.905857
120	0.0027	0.00052	0.1569	0.0001	38.7087257	-89.864196

677	0.0155	0.00294	0.8844	0.0004	38.7087822	-89.87775
850	0.0194	0.00370	1.1105	0.0006	38.7085554	-89.888419
959	0.0219	0.00417	1.2522	0.0006	38.7083743	-89.8872
300	0.0069	0.00131	0.3922	0.0002	38.7074882	-89.879531
172	0.0039	0.00075	0.2248	0.0001	38.706822	-89.875914
739	0.0169	0.00321	0.9654	0.0005	38.7073494	-89.880279
125	0.0029	0.00055	0.1638	0.0001	38.7068492	-89.881253
80	0.0018	0.00035	0.1049	0.0001	38.7067077	-89.881192
295	0.0067	0.00128	0.3855	0.0002	38.7070878	-89.888137
306	0.0070	0.00133	0.4002	0.0002	38.7069845	-89.902026
163	0.0037	0.00071	0.2126	0.0001	38.7068279	-89.902713
1375	0.0314	0.00598	1.7967	0.0009	38.7071892	-89.865147
749	0.0171	0.00326	0.9786	0.0005	38.7065591	-89.863965
1235	0.0282	0.00537	1.6139	0.0008	38.7062449	-89.87776
222	0.0051	0.00096	0.2896	0.0001	38.7061984	-89.888878
191	0.0044	0.00083	0.2490	0.0001	38.7065571	-89.902543
720	0.0165	0.00313	0.9409	0.0005	38.7067194	-89.886533
220	0.0050	0.00096	0.2875	0.0001	38.7046847	-89.878143
837	0.0191	0.00364	1.0937	0.0005	38.7045571	-89.879881
547	0.0125	0.00238	0.7141	0.0004	38.7044461	-89.879354
612	0.0140	0.00266	0.7999	0.0004	38.7045468	-89.901288
427	0.0098	0.00186	0.5578	0.0003	38.703421	-89.871342
223	0.0051	0.00097	0.2918	0.0001	38.702994	-89.870945
325	0.0074	0.00141	0.4248	0.0002	38.7032437	-89.884818
479	0.0109	0.00208	0.6252	0.0003	38.7028958	-89.863175
244	0.0056	0.00106	0.3192	0.0002	38.7026372	-89.871343
89	0.0020	0.00039	0.1157	0.0001	38.7025898	-89.87964
532	0.0122	0.00231	0.6948	0.0003	38.7025904	-89.872619
331	0.0076	0.00144	0.4330	0.0002	38.6998356	-89.888563
349	0.0080	0.00152	0.4560	0.0002	38.6997785	-89.887981
279	0.0064	0.00121	0.3642	0.0002	38.6994709	-89.90478
145	0.0033	0.00063	0.1895	0.0001	38.6991468	-89.904534
563	0.0129	0.00245	0.7349	0.0004	38.6995336	-89.906123
427	0.0098	0.00186	0.5578	0.0003	38.6990365	-89.90547
449	0.0103	0.00195	0.5859	0.0003	38.6988368	-89.88841
186	0.0043	0.00081	0.2432	0.0001	38.6985394	-89.906131
205	0.0047	0.00089	0.2671	0.0001	38.6981993	-89.908545
663	0.0152	0.00288	0.8657	0.0004	38.6981907	-89.907203
1172	0.0268	0.00509	1.5305	0.0008	38.6973534	-89.909255
1114	0.0255	0.00484	1.4553	0.0007	38.6967132	-89.907383
179	0.0041	0.00078	0.2341	0.0001	38.6939319	-89.856808
325	0.0074	0.00141	0.4244	0.0002	38.6936027	-89.863512
862	0.0197	0.00375	1.1259	0.0006	38.6935429	-89.866791
5	0.0001	0.00002	0.0064	0.0000	38.6931688	-89.908156
510	0.0117	0.00222	0.6663	0.0003	38.6927432	-89.908669
891	0.0204	0.00387	1.1638	0.0006	38.692059	-89.856857
117	0.0027	0.00051	0.1530	0.0001	38.6905396	-89.871016

1767	0.0404	0.00768	2.3080	0.0012	38.6929717	-89.904668
164	0.0038	0.00071	0.2146	0.0001	38.6906957	-89.883585
367	0.0084	0.00160	0.4793	0.0002	38.6903552	-89.85693
1087	0.0249	0.00473	1.4205	0.0007	38.6920548	-89.907652
1457	0.0333	0.00634	1.9036	0.0010	38.6899283	-89.86112
333	0.0076	0.00145	0.4349	0.0002	38.6893442	-89.856871
383	0.0088	0.00166	0.5002	0.0003	38.6897012	-89.883359
661	0.0151	0.00287	0.8634	0.0004	38.689718	-89.86907
109	0.0025	0.00047	0.1423	0.0001	38.6894494	-89.880739
445	0.0102	0.00193	0.5813	0.0003	38.6885786	-89.873974
342	0.0078	0.00149	0.4465	0.0002	38.6882115	-89.886847
570	0.0130	0.00248	0.7440	0.0004	38.6876902	-89.88136
981	0.0224	0.00427	1.2820	0.0006	38.6857078	-89.864355
181	0.0041	0.00079	0.2368	0.0001	38.6846702	-89.858517
299	0.0068	0.00073	0.3908	0.0001	38.6846369	-89.859282
474	0.0108	0.00130	0.6188	0.0002	38.6846745	-89.857495
	0.0108	0.00206	0.4807	0.0003	38.6854094	-89.883698
368						
120	0.0027	0.00052	0.1563	0.0001	38.6845301	-89.858332
1431	0.0327	0.00622	1.8692	0.0009	38.6848928	-89.861041
211	0.0048	0.00092	0.2762	0.0001	38.6851297	-89.89033
885	0.0202	0.00385	1.1555	0.0006	38.6858671	-89.911405
401	0.0092	0.00174	0.5233	0.0003	38.6854259	-89.910009
175	0.0040	0.00076	0.2292	0.0001	38.6832397	-89.856793
1178	0.0269	0.00512	1.5389	0.0008	38.6840508	-89.917204
123	0.0028	0.00053	0.1607	0.0001	38.6832949	-89.91596
96	0.0022	0.00042	0.1253	0.0001	38.6828935	-89.91229
1014	0.0232	0.00441	1.3243	0.0007	38.6838506	-89.913029
216	0.0049	0.00094	0.2818	0.0001	38.6829099	-89.91571
288	0.0066	0.00125	0.3758	0.0002	38.6825183	-89.911908
713	0.0163	0.00310	0.9311	0.0005	38.682188	-89.916263
150	0.0034	0.00065	0.1964	0.0001	38.6805053	-89.858217
38	0.0009	0.00016	0.0492	0.0000	38.6802175	-89.86062
39	0.0009	0.00017	0.0503	0.0000	38.6806119	-89.885826
636	0.0145	0.00276	0.8303	0.0004	38.6804835	-89.886758
139	0.0032	0.00061	0.1820	0.0001	38.6804541	-89.885663
39	0.0009	0.00017	0.0514	0.0000	38.678744	-89.84725
640	0.0146	0.00278	0.8363	0.0004	38.678067	-89.843761
77	0.0018	0.00033	0.1007	0.0001	38.678291	-89.860778
207	0.0047	0.00090	0.2709	0.0001	38.6776343	-89.845612
65	0.0015	0.00028	0.0851	0.0000	38.6773829	-89.845706
217	0.0050	0.00094	0.2838	0.0001	38.6774645	-89.852109
439	0.0100	0.00191	0.5740	0.0003	38.677311	-89.854262
86	0.0020	0.00037	0.1124	0.0001	38.6784852	-89.919787
391	0.0089	0.00170	0.5101	0.0003	38.6788526	-89.919565
563	0.0129	0.00245	0.7352	0.0004	38.6766489	-89.850638
358	0.0082	0.00156	0.4680	0.0002	38.6766877	-89.855115
743	0.0170	0.00323	0.9709	0.0005	38.6765504	-89.855873
	5.5275	2.20020	0.0.7	2.000		22.000073

932	0.0213	0.00405	1.2170	0.0006	38.6767175	-89.863714
316	0.0072	0.00137	0.4126	0.0002	38.6762244	-89.86233
205	0.0047	0.00089	0.2678	0.0001	38.6760175	-89.862364
426	0.0097	0.00185	0.5571	0.0003	38.6759877	-89.86126
5	0.0001	0.00002	0.0064	0.0000	38.6770009	-89.91736
102	0.0023	0.00044	0.1333	0.0001	38.6770591	-89.917516
1465	0.0335	0.00637	1.9142	0.0010	38.6768383	-89.919376
1011	0.0231	0.00440	1.3208	0.0007	38.6751872	-89.864019
1575	0.0360	0.00685	2.0575	0.0010	38.6760716	-89.850556
218	0.0050	0.00095	0.2842	0.0001	38.675259	-89.878691
213	0.0049	0.00093	0.2784	0.0001	38.674345	-89.852477
1331	0.0304	0.00579	1.7391	0.0009	38.6747303	-89.838789
400	0.0091	0.00373	0.5219	0.0003	38.6738651	-89.854717
414	0.0095	0.00174	0.5414	0.0003	38.6733516	-89.85628
179	0.0033	0.00180	0.2334	0.0003	38.672573	-89.844927
	0.0393	0.00078		0.0001	38.6744606	-89.845299
1721			2.2483			
1126	0.0257	0.00490	1.4712	0.0007	38.6724263	-89.847493
250	0.0057	0.00109	0.3261	0.0002	38.672101	-89.844732
573	0.0131	0.00249	0.7485	0.0004	38.6721105	-89.843904
114	0.0026	0.00050	0.1494	0.0001	38.6713904	-89.844391
286	0.0065	0.00124	0.3738	0.0002	38.6713478	-89.848585
63	0.0015	0.00028	0.0829	0.0000	38.672292	-89.891948
575	0.0131	0.00250	0.7507	0.0004	38.6704952	-89.847843
122	0.0028	0.00053	0.1596	0.0001	38.6691705	-89.840345
214	0.0049	0.00093	0.2794	0.0001	38.6692164	-89.851362
1005	0.0230	0.00437	1.3134	0.0007	38.6690719	-89.841097
706	0.0161	0.00307	0.9219	0.0005	38.6687635	-89.848281
2395	0.0548	0.01041	3.1292	0.0016	38.6715197	-89.882853
163	0.0037	0.00071	0.2135	0.0001	38.6665218	-89.854011
867	0.0198	0.00377	1.1322	0.0006	38.6666028	-89.855138
127	0.0029	0.00055	0.1665	0.0001	38.6662799	-89.853709
36	0.0008	0.00015	0.0466	0.0000	38.6662028	-89.853429
332	0.0076	0.00144	0.4341	0.0002	38.6667333	-89.86593
127	0.0029	0.00055	0.1659	0.0001	38.6673793	-89.912623
517	0.0118	0.00225	0.6755	0.0003	38.6658942	-89.852529
256	0.0058	0.00111	0.3341	0.0002	38.6660036	-89.851726
59	0.0013	0.00025	0.0765	0.0000	38.6656177	-89.851666
430	0.0098	0.00187	0.5622	0.0003	38.6654222	-89.852329
1738	0.0397	0.00756	2.2707	0.0011	38.6667964	-89.849178
36	0.0008	0.00015	0.0466	0.0001	38.6663347	-89.892531
50	0.0011	0.00013	0.0647	0.0000	38.6652782	-89.85328
745	0.011	0.00022	0.9728	0.0005	38.6648365	-89.855653
745 146	0.0170	0.00324	0.9728	0.0003	38.6639347	-89.848814
227	0.0052	0.00099	0.2971	0.0001	38.6639576	-89.855121
387	0.0088	0.00168	0.5050	0.0003	38.6638039	-89.85045
1113	0.0255	0.00484	1.4544	0.0007	38.6656156	-89.91404
562	0.0128	0.00244	0.7337	0.0004	38.6635863	-89.853879

622	0.0142	0.00271	0.8129	0.0004	38.6630984	-89.854344
963	0.0220	0.00419	1.2576	0.0006	38.6629997	-89.851693
694	0.0159	0.00302	0.9068	0.0005	38.6646087	-89.916838
1937	0.0443	0.00842	2.5301	0.0013	38.6635137	-89.864957
562	0.0129	0.00245	0.7348	0.0004	38.6620765	-89.858583
166	0.0038	0.00072	0.2164	0.0001	38.6628573	-89.916528
712	0.0163	0.00309	0.9294	0.0005	38.6613952	-89.86494
896	0.0205	0.00390	1.1704	0.0006	38.662755	-89.917863
795	0.0182	0.00346	1.0387	0.0005	38.6624797	-89.920129
217	0.0050	0.00094	0.2833	0.0001	38.6596826	-89.850961
890	0.0203	0.00387	1.1622	0.0006	38.6602886	-89.85238
1117	0.0255	0.00486	1.4597	0.0007	38.659295	-89.851618
619	0.0141	0.00269	0.8083	0.0004	38.6595771	-89.862354
588	0.0134	0.00256	0.7678	0.0004	38.6616079	-89.919684
172	0.0039	0.00075	0.2253	0.0001	38.6605922	-89.914611
194	0.0044	0.00084	0.2536	0.0001	38.6589878	-89.916142
515	0.0118	0.00224	0.6733	0.0003	38.6576209	-89.865692
188	0.0043	0.00082	0.2458	0.0001	38.657562	-89.864949
598	0.0137	0.00260	0.7806	0.0004	38.6588841	-89.917721
337	0.0077	0.00146	0.4401	0.0002	38.6586174	-89.919207
146	0.0033	0.00063	0.1905	0.0001	38.6571552	-89.864794
448	0.0102	0.00195	0.5855	0.0003	38.6584321	-89.919087
289	0.0066	0.00125	0.3769	0.0002	38.6566299	-89.866026
869	0.0199	0.00378	1.1347	0.0006	38.6586165	-89.91509
	0.094	0.028	7.71	0.0039	39.0337756	-89.688237
	0.018	0.005	1.51	0.0008	39.0191383	-89.726353
	0.038	0.011	3.14	0.0016	39.0413253	-89.722348
	0.008	0.003	0.70	0.0003	39.0113448	-89.697405
	0.010	0.003	0.85	0.0004	39.0418858	-89.699522
	0.007	0.002	0.54	0.0003	39.0192474	-89.698349
	0.016	0.005	1.34	0.0007	39.0110784	-89.712224
	0.057	0.017	4.67	0.0023	39.0101612	-89.696772
	0.030	0.009	2.46	0.0012	39.0382059	-89.703368
	0.030	0.009	2.49	0.0012	39.0421429	-89.699877
	0.021	0.006	1.74	0.0009	39.020315	-89.698694
	0.015	0.004	1.21	0.0006	39.0393267	-89.692782
	0.015	0.005	1.27	0.0006	39.0390294	-89.699676
	0.014	0.004	1.18	0.0006	39.0122817	-89.723717
	0.008	0.002	0.67	0.0003	39.0201797	-89.696748
	0.033	0.010	2.72	0.0014	39.0159452	-89.724105
	0.015	0.004	1.21	0.0006	39.0467189	-89.716682
	0.043	0.013	3.50	0.0018	39.0468982	-89.705499
	0.019	0.006	1.54	0.0008	39.0099364	-89.725418
	0.008	0.002	0.63	0.0003	39.010573	-89.700638
	0.031	0.009	2.57	0.0013	39.0116202	-89.724242
	0.005	0.002	0.43	0.0002	39.0112791	-89.709392
	0.037	0.011	3.03	0.0015	39.0114238	-89.710269

0.035	0.010	2.91	0.0015	39.0122159	-89.697058
0.060	0.018	4.91	0.0025	39.0127022	-89.724812
0.010	0.003	0.80	0.0004	39.0128723	-89.698528
0.006	0.002	0.48	0.0002	39.0135131	-89.710028
0.015	0.004	1.25	0.0006	39.0140989	-89.711442
0.011	0.003	0.87	0.0004	39.0136014	-89.696843
0.023	0.007	1.92	0.0010	39.0152876	-89.725453
0.017	0.005	1.42	0.0007	39.0141721	-89.697714
0.005	0.002	0.45	0.0002	39.0142612	-89.696561
0.012	0.003	0.96	0.0005	39.0145997	-89.695921
0.007	0.002	0.60	0.0003	39.0153103	-89.697345
0.010	0.003	0.82	0.0004	39.0176017	-89.695001
0.033	0.010	2.69	0.0013	39.0226176	-89.709394
0.010	0.003	0.85	0.0004	39.0367923	-89.7161
0.030	0.009	2.49	0.0012	39.0389458	-89.722949
0.041	0.012	3.37	0.0017	39.0390234	-89.691329
0.008	0.002	0.62	0.0003	39.0404112	-89.723072
0.018	0.005	1.49	0.0007	39.0440781	-89.694835
0.004	0.001	0.31	0.0002	38.9715477	-89.72791
0.020	0.006	1.67	0.0008	38.9717116	-89.728914
0.025	0.007	2.01	0.0010	38.9720791	-89.730014
0.011	0.003	0.93	0.0005	38.9699866	-89.691036
0.007	0.002	0.57	0.0003	38.9738559	-89.719204
0.006	0.002	0.46	0.0002	38.982645	-89.728266
0.023	0.007	1.87	0.0009	38.9756037	-89.690839
0.005	0.001	0.37	0.0002	38.9671603	-89.724434
0.005	0.002	0.44	0.0002	38.9676431	-89.724166
0.022	0.006	1.80	0.0009	38.9594432	-89.735347
0.052	0.015	4.30	0.0021	38.9663267	-89.727104
0.009	0.003	0.71	0.0004	38.9675947	-89.722193
0.008	0.002	0.69	0.0003	38.9710938	-89.728849
0.013	0.004	1.04	0.0005	38.9737852	-89.709003
0.018	0.005	1.51	0.0008	38.9746708	-89.69168
0.018	0.005	1.48	0.0007	38.9749485	-89.689414
0.004	0.001	0.30	0.0001	38.9849884	-89.735785
0.024	0.007	1.96	0.0010	38.9560252	-89.737838
0.021	0.006	1.70	0.0009	38.9566206	-89.737775
0.007	0.002	0.60	0.0003	38.9512914	-89.739787
0.010	0.003	0.84	0.0004	38.9849264	-89.735601
0.004	0.001	0.32	0.0002	38.9574797	-89.73767
0.006	0.002	0.51	0.0003	38.9560621	-89.74343
0.012	0.004	0.99	0.0005	38.9556697	-89.743908
0.011	0.003	0.88	0.0004	38.9579528	-89.737531
0.012	0.004	0.98	0.0005	38.9587267	-89.737433
0.007	0.002	0.59	0.0003	38.9592949	-89.737087
0.011	0.003	0.89	0.0004	38.9476141	-89.738716
0.005	0.002	0.43	0.0002	38.9490351	-89.737994

0.007	0.002	0.53	0.0003	38.9498983	-89.738023
0.005	0.002	0.43	0.0002	38.9496353	-89.738501
0.005	0.001	0.39	0.0002	38.9494821	-89.739078
0.039	0.011	3.19	0.0016	38.9503386	-89.741599
0.018	0.005	1.50	0.0008	38.9519107	-89.741579
0.017	0.005	1.38	0.0007	38.9549649	-89.744896
0.006	0.002	0.45	0.0002	38.9558822	-89.737239
0.005	0.001	0.40	0.0002	38.9558963	-89.736633
0.004	0.001	0.33	0.0002	38.9565756	-89.738555
0.006	0.002	0.52	0.0003	38.9579108	-89.736833
0.006	0.002	0.48	0.0002	38.9588822	-89.740046
0.005	0.002	0.43	0.0002	38.9588818	-89.739434
0.006	0.002	0.53	0.0003	38.9585501	-89.743929
0.007	0.002	0.58	0.0003	38.9588758	-89.744393
0.006	0.002	0.51	0.0003	38.959149	-89.744865
0.000	0.002	0.77	0.0003	38.9590696	-89.738003
0.005	0.003	0.49	0.0004	38.960564	-89.741546
0.007	0.002	0.55	0.0002	38.9600665	-89.74109
0.007	0.002	0.59	0.0003	38.9603991	-89.740606
0.007	0.002	0.78	0.0003	38.9609008	-89.739449
			0.0004	38.9610928	-89.738521
0.017	0.005	1.39			
0.019	0.006	1.55	0.0008	38.9857149	-89.7348
0.033	0.010	2.70	0.0013	38.9894483	-89.733083
0.013	0.004	1.08	0.0005	38.9904582	-89.740668
0.007	0.002	0.56	0.0003	38.920924	-89.723491
0.014	0.004	1.15	0.0006	38.9318641	-89.74536
0.038	0.011	3.10	0.0016	38.8940003	-89.755869
0.012	0.004	1.01	0.0005	38.9427259	-89.731746
0.005	0.002	0.42	0.0002	38.9429588	-89.731129
0.005	0.002	0.42	0.0002	38.9434583	-89.730995
0.023	0.007	1.86	0.0009	38.9131322	
0.041	0.012	3.40	0.0017	38.9333788	-89.754766
0.023	0.007	1.85	0.0009	38.9388427	-89.715439
0.018	0.005	1.47	0.0007	38.923188	-89.754308
0.014	0.004	1.16	0.0006	38.9233862	-89.755593
0.012	0.004	0.99	0.0005	38.9033659	-89.76701
0.065	0.019	5.31	0.0027	38.9052648	-89.767185
0.009	0.003	0.77	0.0004	38.9229786	-89.725826
0.014	0.004	1.15	0.0006	38.9033671	-89.763514
0.015	0.004	1.21	0.0006	38.9037162	-89.763957
0.014	0.004	1.18	0.0006	38.9360108	-89.720441
0.054	0.016	4.43	0.0022	38.8896481	-89.755086
0.011	0.003	0.92	0.0005	38.9035929	-89.766239
0.012	0.003	0.96	0.0005	38.9034815	-89.767694
0.011	0.003	0.94	0.0005	38.9132797	-89.762993
0.007	0.002	0.56	0.0003	38.921791	-89.754649
0.012	0.004	0.98	0.0005	38.9225823	-89.751042

0.017	0.005	1.43	0.0007	38.9237348	-89.756263
0.013	0.004	1.10	0.0006	38.9241092	-89.756698
0.018	0.005	1.47	0.0007	38.924521	-89.757173
0.047	0.014	3.88	0.0019	38.9305076	-89.747616
0.021	0.006	1.76	0.0009	38.9307352	-89.753843
0.016	0.005	1.30	0.0007	38.9303703	-89.743384
0.013	0.004	1.07	0.0005	38.9308396	-89.743369
0.024	0.007	1.99	0.0010	38.9319192	-89.743303
0.028	0.008	2.34	0.0012	38.9325891	-89.745066
0.024	0.007	2.01	0.0010	38.9347022	-89.719254
0.035	0.010	2.88	0.0014	38.9360262	-89.719793
0.005	0.002	0.43	0.0002	38.9421997	-89.73798
0.013	0.004	1.11	0.0006	38.9431558	-89.729316
0.023	0.007	1.91	0.0010	38.945691	-89.73923
0.018	0.005	1.46	0.0007	38.9468938	-89.713728
0.011	0.003	0.89	0.0004	38.9476141	-89.738716
0.036	0.011	2.98	0.0015	38.950299	-89.711895
0.010	0.003	0.79	0.0004	38.9498992	-89.713831
0.016	0.005	1.32	0.0007	38.9512245	-89.7195
0.006	0.002	0.52	0.0003	38.9503332	-89.714895
0.030	0.009	2.50	0.0013	38.9520288	-89.714881
0.008	0.002	0.67	0.0003	38.9421253	-89.768736
0.006	0.002	0.51	0.0003	38.9422218	-89.768018
0.037	0.011	3.02	0.0015	38.9423377	-89.766955
0.029	0.009	2.39	0.0012	38.9542495	-89.781161
0.009	0.003	0.76	0.0004	38.9435592	-89.772079
0.020	0.006	1.67	0.0008	38.9121239	-89.774584
0.034	0.010	2.83	0.0014	38.911776	-89.780074
0.036	0.011	2.94	0.0015	38.9127679	-89.774319
0.026	0.008	2.15	0.0011	38.9137058	-89.774082
0.018	0.005	1.46	0.0007	38.9333584	-89.768835
0.007	0.002	0.55	0.0003	38.9445134	-89.773075
0.006	0.002	0.46	0.0002	38.9450024	-89.773191
0.047	0.014	3.85	0.0019	38.9340135	-89.774578
0.011	0.003	0.87	0.0004	38.915814	-89.780369
0.011	0.003	0.89	0.0004	38.9153952	-89.781401
0.006	0.002	0.47	0.0002	38.9222761	-89.772985
0.009	0.003	0.71	0.0004	38.9493866	-89.770786
0.010	0.003	0.85	0.0004	38.9273225	-89.775011
0.014	0.004	1.15	0.0006	38.92786	-89.775275
0.027	0.008	2.24	0.0011	38.9192955	-89.782212
0.046	0.014	3.81	0.0019	38.9503044	-89.778543
0.015	0.004	1.22	0.0006	38.9359375	-89.769847
0.011	0.003	0.93	0.0005	38.9353976	-89.768689
0.014	0.004	1.18	0.0006	38.9290683	-89.770495
0.010	0.003	0.78	0.0004	38.9271133	-89.77556
0.009	0.003	0.75	0.0004	38.9494048	-89.77109

0.019	0.006	1.54	0.0008	38.9164117	-89.770429
0.013	0.004	1.04	0.0005	38.9167552	-89.770862
0.020	0.006	1.63	0.0008	38.9327226	-89.768337
0.097	0.029	7.96	0.0040	38.9620212	-89.776859
0.118	0.035	9.65	0.0048	38.9247283	-89.786873
0.065	0.019	5.31	0.0027	38.9052648	-89.767185
0.015	0.004	1.19	0.0006	38.9302379	-89.77132
0.041	0.012	3.34	0.0017	38.9034598	-89.77117
0.038	0.011	3.10	0.0015	38.9074751	-89.769735
0.010	0.003	0.78	0.0004	38.9093384	-89.780059
0.012	0.003	0.96	0.0005	38.9127461	-89.775089
0.013	0.004	1.06	0.0005	38.912639	-89.780649
0.028	0.008	2.32	0.0012	38.9132131	-89.780832
0.020	0.006	1.62	0.0008	38.9136294	-89.779928
0.016	0.005	1.28	0.0006	38.9146094	-89.766355
0.013	0.004	1.05	0.0005	38.9144131	-89.765349
0.013	0.005	1.42	0.0003	38.9162934	-89.781999
0.025	0.007	2.04	0.0010	38.9185014	-89.781152
0.005	0.002	0.42	0.0010	38.9183681	-89.770488
0.024	0.007	1.93	0.0010	38.9184651	-89.771307
0.008	0.002	0.64	0.0013	38.9200473	-89.76689
0.030	0.002	2.43	0.0003	38.9224076	-89.764308
0.017	0.005	1.43	0.0012	38.9231476	-89.779633
0.017	0.003	0.82	0.0007	38.9290948	-89.769542
0.010	0.003	0.81	0.0004	38.929918	-89.769319
0.010	0.003	0.63	0.0004	38.9308327	-89.770549
0.008	0.002	0.69	0.0003	38.9312957	-89.7704
0.003	0.002	1.39	0.0003	38.9330947	-89.779788
0.017	0.003	1.05	0.0007	38.9338763	-89.77299
0.013	0.004	1.12	0.0005	38.9342632	-89.772576
0.008	0.002	0.68	0.0003	38.9346899	
0.031	0.002	2.56	0.0003	38.9362149	-89.769467
0.014	0.004	1.16	0.0015	38.9379153	-89.775871
0.014	0.004	1.21	0.0006	38.9370106	-89.769055
0.015	0.007	2.05	0.0000	38.9381659	-89.776918
0.025	0.007	0.50	0.0010	38.9412906	-89.769148
0.008	0.002	0.68	0.0003	38.9422999	-89.772402
0.008	0.002	1.45	0.0003	38.9426998	-89.772769
0.016	0.005	1.30	0.0007	38.9439643	-89.776075
0.010	0.005	1.52	0.0007	38.9444756	-89.776364
0.015	0.005	1.25	0.0008	38.9475136	-89.771043
0.013	0.003	1.19	0.0006	38.9480069	-89.772157
0.014	0.004	0.54	0.0008	38.9494682	-89.772137
0.007	0.002	1.53	0.0003	38.9499036	-89.771291
0.019	0.009	2.41	0.0008	38.9558026	-89.77253
0.029	0.009	0.33	0.0012	38.9598981	-89.77253
				38.9631678	
0.010	0.003	0.80	0.0004	30.9031078	-89.775922

0.027	0.008	2.25	0.0011	38.9646362	-89.777738
0.008	0.002	0.63	0.0003	38.9647385	-89.775852
0.010	0.003	0.86	0.0004	38.9663436	-89.774161
0.051	0.015	4.20	0.0021	38.9668315	-89.773473
0.038	0.011	3.14	0.0016	38.967638	-89.775693
0.024	0.007	1.95	0.0010	38.9691542	-89.779812
0.062	0.018	5.13	0.0026	38.9717892	-89.782899
0.011	0.003	0.89	0.0004	38.9169565	-89.794043
0.052	0.015	4.29	0.0021	38.9000169	-89.786247
0.016	0.005	1.35	0.0007	38.9023542	-89.817833
0.054	0.016	4.46	0.0022	38.8772261	-89.781179
0.004	0.001	0.34	0.0002	38.8738023	-89.784599
0.033	0.010	2.73	0.0014	38.8975055	-89.804015
0.018	0.005	1.49	0.0007	38.9023085	-89.784444
0.032	0.009	2.59	0.0013	38.9192016	-89.803553
0.010	0.003	0.86	0.0004	38.9102385	-89.791472
0.023	0.007	1.90	0.0009	38.9004503	-89.799299
0.022	0.006	1.80	0.0009	38.902787	-89.817465
0.036	0.011	2.98	0.0015	38.8736507	-89.784053
0.019	0.006	1.58	0.0008	38.8997307	-89.793882
0.025	0.007	2.03	0.0010	38.900393	-89.794787
0.017	0.005	1.41	0.0007	38.9095123	-89.79617
0.038	0.011	3.09	0.0015	38.8729682	-89.782448
0.015	0.004	1.24	0.0006	38.8730252	-89.784465
0.021	0.006	1.70	0.0009	38.8847245	-89.802956
0.010	0.003	0.82	0.0004	38.8973031	-89.795731
0.008	0.002	0.69	0.0003	38.8970626	-89.791581
0.010	0.003	0.80	0.0004	38.8981654	-89.795416
0.016	0.005	1.31	0.0007	38.8991659	-89.795194
0.015	0.005	1.27	0.0006	38.8996218	-89.795458
0.010	0.003	0.86	0.0004	38.8999021	-89.795916
0.006	0.002	0.50	0.0003	38.9008995	-89.793228
0.020	0.006	1.65	0.0008	38.9013338	-89.784358
0.021	0.006	1.70	0.0009	38.900936	-89.78426
0.031	0.009	2.51	0.0013	38.901669	-89.784089
0.034	0.010	2.80	0.0014	38.9047693	-89.794662
0.030	0.009	2.48	0.0012	38.9104767	-89.790915
0.008	0.002	0.64	0.0003	38.9162469	-89.797578
0.018	0.005	1.47	0.0007	38.9172803	-89.797726
0.020	0.006	1.67	0.0008	38.9188626	-89.799761
0.028	0.008	2.33	0.0012	38.9198888	-89.800013
0.018	0.005	1.45	0.0007	38.9375154	-89.814517
0.063	0.019	5.14	0.0026	38.9501856	-89.824804
0.087	0.026	7.11	0.0036	38.8634245	-89.765571
0.046	0.013	3.74	0.0019	38.8729838	-89.75901
0.042	0.012	3.43	0.0017	38.8653579	-89.769605
0.023	0.007	1.93	0.0010	38.8931841	-89.736764
			- 1		

0.011	0.003	0.90	0.0005	38.8822299	-89.753684
0.012	0.004	0.98	0.0005	38.8826392	-89.753757
0.011	0.003	0.90	0.0004	38.8724534	-89.762141
0.025	0.007	2.04	0.0010	38.8755714	-89.756462
0.020	0.006	1.66	0.0008	38.8757663	-89.755822
0.044	0.013	3.61	0.0018	38.8720152	-89.758805
0.019	0.006	1.53	0.0008	38.906383	-89.708138
0.020	0.006	1.64	0.0008	38.8662257	-89.779155
0.067	0.020	5.50	0.0028	38.8784023	-89.752268
0.019	0.006	1.55	0.0008	38.8606654	-89.773097
0.020	0.006	1.68	0.0008	38.8634916	-89.768751
0.019	0.006	1.54	0.0008	38.8651084	-89.768743
0.016	0.005	1.30	0.0006	38.8668174	-89.778873
0.014	0.004	1.16	0.0006	38.8711168	-89.783295
0.007	0.002	0.58	0.0003	38.8711956	-89.774671
0.007	0.002	1.18	0.0005	38.8715603	-89.761701
0.014	0.004	0.72	0.0004	38.8715906	-89.773526
					-89.76051
0.026	0.008	2.14	0.0011	38.8716668	
0.009	0.003	0.77	0.0004	38.8722243	-89.772041
0.020	0.006	1.62	0.0008	38.8731216	-89.774235
0.016	0.005	1.33	0.0007	38.8730381	-89.759632
0.024	0.007	1.99	0.0010	38.8750082	-89.754446
0.020	0.006	1.61	0.0008	38.8768874	-89.756566
0.020	0.006	1.66	0.0008	38.8773558	-89.75848
0.009	0.003	0.74	0.0004	38.8777674	-89.7629
0.006	0.002	0.53	0.0003	38.8790048	-89.75457
0.027	0.008	2.21	0.0011	38.8820337	-89.754413
0.034	0.010	2.82	0.0014	38.8905828	-89.739297
0.021	0.006	1.69	0.0008	38.9001595	-89.721455
0.025	0.007	2.04	0.0010	38.9096251	-89.709941
0.046	0.014	3.79	0.0019	38.9111611	-89.710171
0.007	0.002	0.61	0.0003	38.8837365	-89.825419
0.004	0.001	0.34	0.0002	38.8471668	-89.829738
0.037	0.011	3.00	0.0015	38.8837082	-89.82586
0.047	0.014	3.88	0.0019	38.8671442	-89.822625
0.029	0.009	2.39	0.0012	38.8613755	-89.821788
0.027	0.008	2.18	0.0011	38.8838685	-89.826801
0.019	0.006	1.59	0.0008	38.883953	-89.827319
0.047	0.014	3.88	0.0019	38.882579	-89.815537
0.090	0.027	7.36	0.0037	38.8362342	-89.822156
0.083	0.024	6.78	0.0034	38.8840709	-89.828175
0.021	0.006	1.75	0.0009	38.8571226	-89.824188
0.029	0.009	2.37	0.0012	38.8581555	-89.824139
0.089	0.026	7.35	0.0037	38.8667889	-89.80687
0.033	0.010	2.71	0.0014	38.8458274	-89.835003
0.028	0.008	2.27	0.0014	38.8804754	-89.816542
0.028	0.003	0.97	0.00011	38.8760769	-89.824255
0.012	0.005	0.57	0.0003	30.0700703	05.024233

0.019	0.006	1.54	0.0008	38.8514894	-89.826105
0.051	0.015	4.15	0.0021	38.8602063	-89.821423
0.077	0.023	6.34	0.0032	38.8612043	-89.823685
0.026	0.008	2.10	0.0010	38.8647511	-89.820346
0.047	0.014	3.86	0.0019	38.8581098	-89.833073
0.019	0.005	1.52	0.0008	38.8571624	-89.825354
0.021	0.006	1.72	0.0009	38.8580034	-89.826166
0.024	0.007	1.96	0.0010	38.8348533	-89.822419
0.045	0.013	3.71	0.0019	38.8365682	-89.820523
0.022	0.007	1.81	0.0009	38.8367391	-89.821428
0.020	0.006	1.67	0.0008	38.8480366	-89.830298
0.009	0.003	0.74	0.0004	38.8484436	-89.827358
0.007	0.002	0.59	0.0003	38.8485281	-89.827965
0.012	0.004	0.98	0.0005	38.8480096	-89.82926
0.063	0.019	5.21	0.0026	38.8490599	-89.829931
0.013	0.004	1.10	0.0005	38.8517183	-89.82665
0.019	0.005	1.53	0.0008	38.8521435	-89.827074
0.026	0.008	2.13	0.0011	38.8575638	-89.827974
0.013	0.004	1.04	0.0005	38.8573079	-89.821653
0.038	0.011	3.12	0.0016	38.8579348	-89.822008
0.032	0.010	2.66	0.0013	38.8593204	-89.821712
0.007	0.002	0.59	0.0003	38.8601841	-89.820058
0.024	0.007	1.93	0.0010	38.8611858	-89.822686
0.010	0.003	0.78	0.0004	38.8621815	-89.816736
0.023	0.007	1.85	0.0009	38.8654494	-89.818794
0.016	0.005	1.31	0.0007	38.8656794	-89.807858
0.038	0.011	3.09	0.0015	38.8658942	-89.821711
0.028	0.008	2.28	0.0011	38.8688295	-89.807105
0.038	0.011	3.13	0.0016	38.870844	-89.814063
0.021	0.006	1.69	0.0008	38.872211	-89.819809
0.016	0.005	1.33		38.8770155	-89.822078
0.030	0.009	2.46	0.0012	38.8792984	-89.824363
0.016	0.005	1.35	0.0007	38.8530755	-89.838403
0.026	0.008	2.14	0.0011	38.861778	-89.851683
0.012	0.004	0.99	0.0005	38.8553039	-89.852987
0.025	0.007	2.07	0.0010	38.8470255	-89.838115
0.031	0.009	2.55	0.0013	38.8584426	-89.839512
0.051	0.015	4.20	0.0021	38.8496853	-89.851945
0.028	0.008	2.26	0.0011	38.8631523	-89.84743
0.077	0.023	6.33	0.0032	38.8640286	-89.847497
0.051	0.015	4.15	0.0021	38.8476179	-89.83718
0.017	0.005	1.38	0.0007	38.8456474	-89.851322
0.033	0.010	2.71	0.0014	38.8458274	-89.835003
0.044	0.013	3.64	0.0018	38.8812206	-89.849195
0.031	0.009	2.54	0.0013	38.8483514	-89.83631
0.023	0.007	1.87	0.0009	38.8494969	-89.849684
0.009	0.003	0.74	0.0004	38.8434136	-89.840498

0.013	0.004	1.10	0.0005	38.8433348	-89.841194
0.018	0.005	1.51	0.0008	38.84577	-89.847795
0.013	0.004	1.04	0.0005	38.8454545	-89.848235
0.023	0.007	1.89	0.0009	38.8444652	-89.841694
0.014	0.004	1.19	0.0006	38.845438	-89.845046
0.018	0.005	1.52	0.0008	38.849186	-89.848357
0.030	0.009	2.43	0.0012	38.8489768	-89.836549
0.028	0.008	2.26	0.0011	38.8488999	-89.854303
0.033	0.010	2.71	0.0014	38.8506197	-89.842547
0.017	0.005	1.42	0.0007	38.8505707	-89.837825
0.020	0.006	1.63	0.0008	38.8507159	-89.836608
0.013	0.004	1.03	0.0005	38.8520021	-89.841408
0.018	0.005	1.49	0.0007	38.852357	-89.837371
0.023	0.007	1.89	0.0009	38.8522558	-89.836065
0.015	0.004	1.25	0.0006	38.8545584	-89.847302
0.013	0.004	1.10	0.0006	38.8558862	-89.847604
0.025	0.007	2.03	0.0010	38.8549118	-89.848872
0.017	0.005	1.43	0.0010	38.8560205	-89.841454
0.017	0.003	1.98	0.0007	38.8578443	-89.842654
0.024	0.007	1.25	0.0010	38.8613258	-89.852727
0.013	0.010	2.69	0.0000	38.861741	-89.846022
0.033	0.006	1.69	0.0013	38.8721292	-89.854156
0.034	0.010	2.79	0.0014	38.8737506	-89.854554
0.077	0.023	6.36	0.0032	38.8806162	-89.862745
0.016	0.005	1.35	0.0007	38.8134202	-89.838729
0.108	0.032	8.84	0.0044	38.8218509	-89.84386
0.014	0.004	1.18	0.0006	38.8255931	-89.818737
0.004	0.001	0.33	0.0002	38.8277527	-89.826482
0.029	0.009	2.40	0.0012	38.812433	-89.824564
0.057	0.017	4.72	0.0024	38.8259201	-89.826619
0.016	0.005	1.34	0.0007	38.8262132	-89.818845
0.035	0.010	2.89	0.0014	38.8239208	-89.843965
0.018	0.005	1.48	0.0007	38.8164546	-89.813175
0.015	0.004	1.19	0.0006	38.8160128	-89.813526
0.028	0.008	2.27	0.0011	38.8223812	-89.793703
0.041	0.012	3.38	0.0017	38.8217608	-89.838321
0.027	0.008	2.19	0.0011	38.8220555	-89.806599
0.010	0.003	0.83	0.0004	38.8106963	-89.833018
0.003	0.001	0.28	0.0001	38.8106004	-89.833557
0.050	0.015	4.09	0.0020	38.8293119	-89.809349
0.011	0.003	0.91	0.0005	38.8187218	-89.844465
0.021	0.006	1.75	0.0009	38.8159575	-89.810892
0.020	0.006	1.65	0.0008	38.8173716	-89.817615
0.025	0.007	2.02	0.0010	38.8153867	-89.821152
0.026	0.008	2.17	0.0011	38.8146567	-89.820059
0.027	0.008	2.20	0.0011	38.8227438	-89.839408
0.024	0.007	1.94	0.0010	38.8233624	-89.83931

0.019	0.006	1.60	0.0008	38.8166832	-89.817767
0.024	0.007	1.97	0.0010	38.8113465	-89.82241
0.017	0.005	1.42	0.0007	38.8220786	-89.824922
0.028	0.008	2.34	0.0012	38.8276093	-89.81216
0.023	0.007	1.92	0.0010	38.821027	-89.846334
0.019	0.006	1.58	0.0008	38.8246709	-89.843942
0.014	0.004	1.12	0.0006	38.8215107	-89.82466
0.024	0.007	1.97	0.0010	38.8250641	-89.812734
0.035	0.010	2.86	0.0014	38.8242414	-89.811979
0.009	0.003	0.76	0.0004	38.8106024	-89.83372
0.012	0.003	0.96	0.0005	38.8105081	-89.834317
0.017	0.005	1.38	0.0007	38.8109717	-89.823201
0.014	0.004	1.15	0.0006	38.8106916	-89.822692
0.014	0.004	1.12	0.0006	38.8116229	-89.825521
0.011	0.003	0.94	0.0005	38.8113481	-89.825055
0.028	0.008	2.31	0.0012	38.8114122	-89.823578
0.009	0.003	0.70	0.0004	38.8128511	-89.823881
0.011	0.003	0.89	0.0004	38.8129584	-89.823216
0.031	0.009	2.55	0.0013	38.8159916	-89.842936
0.018	0.005	1.51	0.0008	38.8158914	-89.819494
0.019	0.006	1.54	0.0008	38.8160717	-89.80858
0.029	0.009	2.39	0.0012	38.8166882	-89.836336
0.018	0.005	1.45	0.0007	38.8162737	-89.816817
0.011	0.003	0.93	0.0005	38.8184213	-89.844611
0.019	0.006	1.60	0.0008	38.819108	-89.845803
0.022	0.007	1.82	0.0009	38.8186297	-89.846936
0.012	0.003	0.95	0.0005	38.8180214	-89.819615
0.018	0.005	1.49	0.0007	38.8211613	-89.848902
0.030	0.009	2.46	0.0012	38.8207068	-89.847045
0.020	0.006	1.68	0.0008	38.8201301	-89.814404
0.007	0.002	0.53	0.0003	38.8211029	
0.030	0.009	2.44	0.0012	38.8207544	-89.808754
0.025	0.008	2.09	0.0010	38.8210982	-89.812977
0.015	0.005	1.27	0.0006	38.8210783	-89.824665
0.013	0.004	1.09	0.0005	38.8211508	-89.824027
0.018	0.005	1.47	0.0007	38.8212646	-89.823432
0.012	0.004	1.01	0.0005	38.8221247	-89.841414
0.010	0.003	0.85	0.0004	38.8225648	-89.841214
0.015	0.004	1.24	0.0006	38.8215503	-89.805321
0.013	0.004	1.06	0.0005	38.8231285	-89.842392
0.017	0.005	1.43	0.0007	38.822653	-89.817003
0.009	0.003	0.72	0.0004	38.8205526	-89.816832
0.015	0.004	1.23	0.0006	38.8237466	-89.838627
0.007	0.002	0.58	0.0003	38.8234156	-89.820537
0.046	0.014	3.77	0.0019	38.8226922	-89.806632
0.036	0.011	2.92	0.0015	38.8245157	-89.829361
0.037	0.011	3.05	0.0015	38.8240468	-89.84063

0.027	0.008	2.22	0.0011	38.8233598	-89.813959
0.023	0.007	1.85	0.0009	38.8233034	-89.813317
0.018	0.005	1.46	0.0007	38.8241712	-89.842604
0.056	0.017	4.58	0.0023	38.8231819	-89.846819
0.027	0.008	2.22	0.0011	38.8241632	-89.848139
0.070	0.021	5.72	0.0029	38.8245992	-89.826421
0.027	0.008	2.24	0.0011	38.8246563	-89.825551
0.021	0.006	1.76	0.0009	38.8242003	-89.844612
0.037	0.011	3.08	0.0015	38.8254081	-89.841628
0.019	0.005	1.52	0.0008	38.8254488	-89.828372
0.015	0.004	1.25	0.0006	38.8252076	-89.827782
0.011	0.003	0.89	0.0004	38.8248044	-89.844811
0.024	0.007	2.00	0.0010	38.8273089	-89.848119
0.032	0.010	2.65	0.0013	38.8256467	-89.821962
0.032	0.013	3.67	0.0013	38.8243357	-89.804185
0.043	0.006	1.57	0.0018	38.8264553	-89.812608
0.019	0.006	1.71	0.0008	38.8256814	-89.811844
		2.79	0.0009	38.827314	-89.841069
0.034	0.010				
0.021	0.006	1.74	0.0009	38.8276113	-89.811112
0.017	0.005	1.42	0.0007	38.8267087	-89.819481
0.020	0.006	1.64	0.0008	38.8330551	-89.848766
0.013	0.004	1.08	0.0005	38.8324876	-89.848725
0.038	0.011	3.15	0.0016	38.8228163	-89.880976
0.005	0.001	0.42	0.0002	38.8109578	-89.877835
0.006	0.002	0.51	0.0003	38.8106337	-89.878901
0.004	0.001	0.36	0.0002	38.8104713	-89.879283
0.265	0.078	21.76	0.0109	38.8170604	-89.86015
0.020	0.006	1.67	0.0008	38.8065122	-89.869641
0.005	0.001	0.40	0.0002	38.8130202	-89.860042
0.009	0.003	0.74	0.0004	38.8133903	-89.859696
0.042	0.012	3.44	0.0017	38.8141468	-89.859346
0.005	0.001	0.41	0.0002	38.8125424	-89.883326
0.004	0.001	0.32	0.0002	38.8058534	-89.811695
0.010	0.003	0.84	0.0004	38.8063717	-89.848596
0.023	0.007	1.89	0.0009	38.8106035	-89.813738
0.025	0.007	2.05	0.0010	38.8109005	-89.814425
0.014	0.004	1.14	0.0006	38.8111951	-89.876513
0.025	0.007	2.02	0.0010	38.8058699	-89.81136
0.005	0.002	0.43	0.0002	38.8245835	-89.870359
0.006	0.002	0.52	0.0003	38.8250637	-89.870284
0.019	0.006	1.59	0.0008	38.8058165	-89.819426
0.028	0.008	2.30	0.0011	38.8067528	-89.819077
0.043	0.013	3.50	0.0018	38.8020636	-89.821366
0.034	0.010	2.79	0.0014	38.805694	-89.810725
0.075	0.022	6.16	0.0031	38.8048613	-89.809442
0.029	0.009	2.37	0.0012	38.8065744	-89.871211
0.032	0.010	2.65	0.0013	38.8214398	-89.876261

0.017	0.005	1.42	0.0007	38.8089312	-89.85683
0.009	0.003	0.77	0.0004	38.8105974	-89.874814
0.094	0.028	7.71	0.0039	38.815575	-89.87283
0.023	0.007	1.92	0.0010	38.7951977	-89.838185
0.023	0.007	1.91	0.0010	38.7946902	-89.837187
0.019	0.006	1.58	0.0008	38.8032916	-89.815449
0.021	0.006	1.74	0.0009	38.8226138	-89.867606
0.037	0.011	3.04	0.0015	38.8101402	-89.839636
0.017	0.005	1.42	0.0007	38.8030331	-89.81212
0.010	0.003	0.83	0.0004	38.8106963	-89.833018
0.003	0.001	0.28	0.0001	38.8106004	-89.833557
0.055	0.016	4.50	0.0023	38.7956152	-89.839486
0.049	0.014	4.02	0.0020	38.7994247	-89.827836
0.023	0.007	1.89	0.0009	38.8097112	-89.843383
0.030	0.009	2.43	0.0012	38.8088467	-89.824204
0.027	0.008	2.25	0.0011	38.8074056	-89.818904
0.132	0.039	10.85	0.0054	38.8087676	-89.819125
0.038	0.011	3.15	0.0016	38.8058497	-89.849915
0.018	0.005	1.44	0.0007	38.8083596	-89.856343
0.018	0.005	1.44	0.0007	38.8088201	-89.855985
0.029	0.009	2.40	0.0012	38.8099089	-89.855596
0.067	0.020	5.48	0.0027	38.8109669	-89.854885
0.017	0.005	1.37	0.0007	38.8043202	-89.837304
0.011	0.003	0.90	0.0005	38.8039918	-89.838301
0.020	0.006	1.65	0.0008	38.803841	-89.838966
0.017	0.005	1.40	0.0007	38.8079449	-89.85642
0.024	0.007	1.94	0.0010	38.8075211	-89.857891
0.029	0.009	2.42	0.0012	38.8086294	-89.813651
0.020	0.006	1.66	0.0008	38.7943286	-89.838471
0.032	0.009	2.62	0.0013	38.7935945	-89.86085
0.013	0.004	1.11	0.0006	38.7938831	-89.86171
0.009	0.003	0.77	0.0004	38.797318	-89.832757
0.005	0.002	0.43	0.0002	38.8004194	-89.864388
0.023	0.007	1.92	0.0010	38.8197811	-89.86455
0.030	0.009	2.44	0.0012	38.8209377	-89.864245
0.009	0.003	0.71	0.0004	38.8085654	-89.841981
0.035	0.010	2.91	0.0015	38.8004441	-89.826944
0.025	0.007	2.06	0.0010	38.8134026	-89.872138
0.017	0.005	1.37	0.0007	38.8206851	-89.870914
0.037	0.011	3.01	0.0015	38.8201228	-89.871355
0.011	0.003	0.93	0.0005	38.8058956	-89.845488
0.047	0.014	3.88	0.0019	38.8071245	-89.844158
0.014	0.004	1.14	0.0006	38.8110266	-89.812388
0.181	0.053	14.83	0.0074	38.8084888	-89.866118
0.005	0.001	0.40	0.0002	38.7927728	-89.860832
0.004	0.001	0.33	0.0002	38.792743	-89.861426
0.014	0.004	1.12	0.0006	38.7927524	-89.854145
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0.010	0.003	0.79	0.0004	38.7930117	-89.853646
0.018	0.005	1.46	0.0007	38.7942901	-89.862441
0.012	0.003	0.96	0.0005	38.794031	-89.862958
0.014	0.004	1.13	0.0006	38.7937467	-89.851014
0.008	0.002	0.62	0.0003	38.7944709	-89.851104
0.022	0.007	1.84	0.0009	38.7944069	-89.850243
0.032	0.009	2.62	0.0013	38.7940592	-89.849127
0.011	0.003	0.88	0.0004	38.7951682	-89.843511
0.010	0.003	0.84	0.0004	38.7951886	-89.844154
0.007	0.002	0.55	0.0003	38.7952573	-89.844752
0.023	0.007	1.92	0.0010	38.795926	-89.829531
0.011	0.003	0.92	0.0005	38.7961637	-89.843318
0.006	0.002	0.53	0.0003	38.7962644	-89.843893
0.006	0.002	0.53	0.0003	38.7962902	-89.844509
0.013	0.004	1.05	0.0005	38.7968078	-89.83059
0.025	0.008	2.09	0.0010	38.7965925	-89.8318
0.027	0.008	2.18	0.0011	38.7966077	-89.832957
0.016	0.005	1.34	0.0007	38.796542	-89.833679
0.022	0.007	1.81	0.0009	38.7970435	-89.836723
0.008	0.003	0.70	0.0003	38.7978308	-89.82589
0.013	0.004	1.08	0.0005	38.797132	-89.826046
0.005	0.002	0.42	0.0002	38.8000137	-89.864315
0.012	0.004	1.00	0.0005	38.7990014	-89.826706
0.009	0.003	0.74	0.0004	38.8001134	-89.827042
0.022	0.006	1.80	0.0009	38.8023844	-89.82209
0.024	0.007	2.00	0.0010	38.8030301	-89.844416
0.031	0.009	2.53	0.0013	38.8022664	-89.824289
0.025	0.007	2.08	0.0010	38.8019806	-89.851618
0.040	0.012	3.31	0.0017	38.8028852	-89.851701
0.017	0.005	1.43	0.0007	38.8036044	-89.85197
0.021	0.006	1.76	0.0009	38.8026159	-89.823904
0.013	0.004	1.04	0.0005	38.8032209	-89.849596
0.028	0.008	2.30	0.0012	38.8037019	-89.850024
0.006	0.002	0.46	0.0002	38.8048732	-89.867515
0.012	0.004	1.00	0.0005	38.8035789	-89.823887
0.006	0.002	0.49	0.0002	38.8040827	-89.857267
0.022	0.006	1.78	0.0009	38.8038133	-89.815466
0.012	0.004	0.98	0.0005	38.8044377	-89.844477
0.020	0.006	1.66	0.0008	38.8039669	-89.813412
0.026	0.008	2.10	0.0011	38.8056136	-89.850597
0.042	0.012	3.45	0.0017	38.8049563	-89.851728
0.024	0.007	1.96	0.0010	38.8055248	-89.844272
0.032	0.010	2.64	0.0013	38.8041223	-89.812235
0.005	0.002	0.44	0.0002	38.8059691	-89.855301
0.005	0.001	0.38	0.0002	38.8059624	-89.855855
0.012	0.003	0.94	0.0005	38.802629	-89.842081
0.009	0.003	0.75	0.0004	38.8030547	-89.842165
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0.019	0.006	1.55	0.0008	38.8051339	-89.842195
0.006	0.002	0.52	0.0003	38.8070482	-89.855918
0.010	0.003	0.80	0.0004	38.8068498	-89.856549
0.026	0.008	2.11	0.0011	38.8055141	-89.835941
0.021	0.006	1.73	0.0009	38.8055148	-89.837252
0.021	0.006	1.71	0.0009	38.8053974	-89.838499
0.062	0.018	5.13	0.0026	38.8055484	-89.840551
0.006	0.002	0.50	0.0003	38.8060288	-89.864895
0.034	0.010	2.77	0.0014	38.8068175	-89.86501
0.007	0.002	0.54	0.0003	38.8069054	-89.838007
0.014	0.004	1.12	0.0006	38.8066526	-89.838662
0.027	0.008	2.24	0.0011	38.8066197	-89.839942
0.022	0.006	1.77	0.0009	38.8061473	-89.81744
0.014	0.004	1.18	0.0006	38.8066645	-89.846455
0.041	0.012	3.36	0.0017	38.807845	-89.870992
0.014	0.004	1.17	0.0006	38.8067527	-89.850874
0.012	0.003	0.95	0.0005	38.8082547	-89.868543
0.006	0.002	0.52	0.0003	38.8070931	-89.854843
0.007	0.002	0.56	0.0003	38.8075594	-89.854649
0.013	0.004	1.04	0.0005	38.8073155	-89.834852
0.010	0.003	0.86	0.0004	38.8063648	-89.821549
0.019	0.006	1.56	0.0004	38.8072172	-89.820862
0.008	0.002	0.64	0.0003	38.8083168	-89.839849
0.026	0.002	2.10	0.0003	38.8086653	-89.868336
0.031	0.009	2.59	0.0013	38.8087815	-89.869564
0.024	0.007	2.00	0.0010	38.8077876	-89.824509
0.011	0.003	0.89	0.0010	38.8076907	-89.82382
0.009	0.003	0.72	0.0004	38.807753	-89.823208
0.072	0.021	5.95	0.0030	38.8079502	-89.838277
0.014	0.004	1.14	0.0006	38.8083732	-89.837056
0.003	0.001	0.28	0.0001	38.8110141	-89.872385
0.018	0.005	1.45	0.0007	38.8094116	-89.865122
0.019	0.006	1.58	0.0008	38.8066417	-89.848573
0.016	0.005	1.33	0.0007	38.8088619	-89.822836
0.023	0.007	1.91	0.0010	38.8093658	-89.844043
0.036	0.011	2.98	0.0015	38.8097207	-89.857328
0.022	0.006	1.80	0.0009	38.8084886	-89.833277
0.029	0.009	2.36	0.0012	38.8088869	-89.83448
0.012	0.004	1.02	0.0005	38.8097627	-89.833733
0.011	0.003	0.88	0.0004	38.8100051	-89.838595
0.036	0.011	2.95	0.0015	38.8096844	-89.824255
0.009	0.003	0.76	0.0013	38.8106024	-89.83372
0.012	0.003	0.96	0.0005	38.8105081	-89.834317
0.008	0.002	0.65	0.0003	38.8121834	-89.874946
0.014	0.004	1.17	0.0006	38.8126925	-89.859349
0.014	0.005	1.35	0.0007	38.8124366	-89.871557
0.010	0.003	0.78	0.0007	38.8133545	-89.865454
0.010	3.003	0.70	5.550-	30.0133343	33.003434

0.012	0.004	1.02	0.0005	38.8134166	-89.866074
0.018	0.005	1.49	0.0007	38.8136504	-89.867211
0.013	0.004	1.11	0.0006	38.8140138	-89.862019
0.017	0.005	1.42	0.0007	38.8148242	-89.867587
0.009	0.003	0.75	0.0004	38.813124	-89.876578
0.026	0.008	2.10	0.0011	38.815709	-89.861325
0.025	0.007	2.04	0.0010	38.8155261	-89.866864
0.031	0.009	2.54	0.0013	38.81598	-89.86861
0.014	0.004	1.15	0.0006	38.8179027	-89.863174
0.014	0.004	1.19	0.0006	38.8176036	-89.862332
0.016	0.005	1.28	0.0006	38.8178627	-89.861752
0.009	0.003	0.70	0.0003	38.8210401	-89.870453
0.015	0.004	1.21	0.0006	38.8213124	-89.866907
0.035	0.010	2.88	0.0014	38.821687	-89.866269
0.034	0.010	2.75	0.0014	38.8231155	-89.867268
0.014	0.004	1.12	0.0006	38.8246607	-89.872464
0.011	0.003	0.93	0.0005	38.7820977	-89.875816
0.026	0.008	2.12	0.0011	38.7820256	-89.87664
0.039	0.012	3.22	0.0016	38.7986195	-89.892657
0.056	0.017	4.62	0.0023	38.7820796	-89.878258
0.017	0.005	1.38	0.0007	38.7828783	-89.844709
0.061	0.018	5.01	0.0025	38.7757123	-89.843079
0.042	0.013	3.49	0.0017	38.772992	-89.879835
0.033	0.010	2.74	0.0014	38.7570993	-89.868253
0.123	0.036	10.10	0.0050	38.7684499	-89.842911
0.005	0.002	0.43	0.0002	38.7796564	-89.874377
0.046	0.014	3.78	0.0019	38.780041	-89.875456
0.022	0.006	1.77	0.0009	38.7804975	-89.876921
0.035	0.010	2.86	0.0014	38.772005	-89.880787
0.013	0.004	1.04	0.0005	38.7886924	-89.845767
0.040	0.012	3.32	0.0017	38.7697618	
0.018	0.005	1.51	0.0008	38.769568	-89.877047
0.017	0.005	1.37	0.0007	38.7672052	-89.876739
0.014	0.004	1.17	0.0006	38.7672898	-89.877764
0.039	0.012	3.20	0.0016	38.7659616	-89.844297
0.019	0.006	1.53	0.0008	38.7696211	-89.842536
0.021	0.006	1.71	0.0009	38.7909429	-89.848126
0.077	0.023	6.33	0.0032	38.7667719	-89.827825
0.004	0.001	0.34	0.0002	38.7968444	-89.86627
0.115	0.034	9.42	0.0047	38.7646472	-89.835099
0.023	0.007	1.88	0.0009	38.7604764	-89.854625
0.024	0.007	1.93	0.0010	38.7857477	-89.84807
0.007	0.002	0.57	0.0003	38.7857085	-89.846967
0.014	0.004	1.14	0.0006	38.7660606	-89.857422
0.026	0.008	2.10	0.0011	38.7780683	-89.876069
0.024	0.007	2.00	0.0010	38.7782779	-89.877288
0.011	0.003	0.87	0.0004	38.7698691	-89.877557

0.016	0.005	1.32	0.0007	38.7907108	-89.848979
0.009	0.003	0.71	0.0004	38.7984183	-89.86874
0.014	0.004	1.15	0.0006	38.7704628	-89.876813
0.016	0.005	1.28	0.0006	38.7711055	-89.877811
0.123	0.036	10.12	0.0051	38.7645602	-89.856551
0.018	0.005	1.45	0.0007	38.7573398	-89.851302
0.014	0.004	1.17	0.0006	38.7600284	-89.851272
0.014	0.004	1.13	0.0006	38.7602344	-89.855408
0.016	0.005	1.33	0.0007	38.7609683	-89.855012
0.018	0.005	1.51	0.0008	38.7652619	-89.880486
0.015	0.004	1.24	0.0006	38.7660863	-89.857905
0.007	0.002	0.55	0.0003	38.7678486	-89.874677
0.014	0.004	1.13	0.0006	38.7672963	-89.87487
0.023	0.007	1.89	0.0009	38.7678888	-89.880338
0.008	0.002	0.62	0.0003	38.769533	-89.878307
0.016	0.005	1.29	0.0006	38.7709018	-89.876554
0.016	0.003	2.12	0.0001	38.7715545	-89.87806
0.020	0.003	0.81	0.0011	38.7722158	-89.871417
0.010	0.003	0.77	0.0004	38.7721983	-89.872042
0.009	0.005	1.55	0.0004	38.7731704	-89.880692
		1.06			-89.872185
0.013	0.004		0.0005	38.7743296	
0.022	0.006	1.79	0.0009	38.7757128	-89.875722
0.015	0.004	1.23	0.0006	38.7757105	-89.876697
0.101	0.030	8.32	0.0042	38.7741661	-89.852436
0.026	0.008	2.13	0.0011	38.7786003	-89.878255
0.013	0.004	1.03	0.0005	38.779151	-89.878266
0.026	0.008	2.13	0.0011	38.7834113	-89.84865
0.035	0.010	2.87	0.0014	38.7857487	-89.846451
0.014	0.004	1.14	0.0006	38.7870861	-89.846866
0.016	0.005	1.31	0.0007	38.7878353	-89.845618
0.017	0.005	1.36	0.0007	38.7898869	
0.017	0.005	1.41	0.0007	38.7903193	-89.850041
0.023	0.007	1.92	0.0010	38.7910333	-89.849423
0.009	0.003	0.77	0.0004	38.7909517	-89.849937
0.026	0.008	2.12	0.0011	38.7909674	-89.854596
0.011	0.003	0.93	0.0005	38.7950214	-89.863717
0.014	0.004	1.13	0.0006	38.797099	-89.867025
0.007	0.002	0.55	0.0003	38.7974597	-89.865081
0.015	0.004	1.20	0.0006	38.7984242	-89.86821
0.010	0.003	0.85	0.0004	38.797965	-89.866105
0.014	0.004	1.11	0.0006	38.7988457	-89.867772
0.037	0.011	3.08	0.0015	38.7992197	-89.870778
0.143	0.042	11.71	0.0059	38.7772686	-89.806308
0.013	0.004	1.09	0.0005	38.7892757	-89.783415
0.015	0.005	1.27	0.0006	38.8006594	-89.768561
0.139	0.041	11.43	0.0057	38.7766404	-89.814327
0.012	0.004	0.99	0.0005	38.7917848	-89.80688

0.068	0.020	5.59	0.0028	38.7778861	-89.796191
0.056	0.017	4.61	0.0023	38.7789271	-89.796607
0.100	0.030	8.20	0.0041	38.7925117	-89.807214
0.048	0.014	3.95	0.0020	38.7910483	-89.791119
0.014	0.004	1.13	0.0006	38.7758108	-89.787476
0.028	0.008	2.27	0.0011	38.7678538	-89.815532
0.014	0.004	1.14	0.0006	38.7642444	-89.824875
0.013	0.004	1.08	0.0005	38.7656966	-89.824688
0.020	0.006	1.67	0.0008	38.7666563	-89.823562
0.015	0.005	1.26	0.0006	38.7674884	-89.822307
0.018	0.005	1.51	0.0008	38.7695985	-89.822388
0.020	0.006	1.68	0.0008	38.7696993	-89.818416
0.023	0.007	1.87	0.0009	38.7698852	-89.823023
0.023	0.007	1.90	0.0010	38.7703716	-89.824011
0.028	0.008	2.34	0.0012	38.7704485	-89.801644
0.029	0.008	2.35	0.0012	38.7714926	-89.818149
0.016	0.005	1.32	0.0007	38.7735974	-89.818691
0.023	0.007	1.90	0.0009	38.7744121	-89.818323
0.014	0.004	1.12	0.0006	38.7756913	-89.790277
0.027	0.008	2.19	0.0011	38.7777437	-89.798271
0.007	0.002	0.55	0.0003	38.7787547	-89.790489
0.029	0.009	2.42	0.0012	38.7788889	-89.788179
0.011	0.003	0.94	0.0005	38.7875689	-89.79367
0.006	0.002	0.46	0.0002	38.7879622	-89.793868
0.008	0.003	0.70	0.0003	38.7884548	-89.79395
0.003	0.001	0.28	0.0001	38.7879325	-89.796378
0.003	0.001	0.25	0.0001	38.7884641	-89.796363
0.004	0.001	0.30	0.0002	38.7888195	-89.789968
0.088	0.026	7.24	0.0036	38.7355445	-89.813819
0.047	0.014	3.87	0.0019	38.7605388	-89.815954
0.042	0.012	3.41	0.0017	38.7467431	-89.830694
0.075	0.022	6.17	0.0031	38.7357158	-89.812223
0.041	0.012	3.35	0.0017	38.7460776	-89.831957
0.046	0.014	3.81	0.0019	38.7398745	-89.836754
0.031	0.009	2.52	0.0013	38.7421874	-89.832685
0.036	0.011	2.93	0.0015	38.7461201	-89.816212
0.052	0.015	4.25	0.0021	38.7468042	-89.815914
0.054	0.016	4.44	0.0022	38.7442278	-89.816304
0.055	0.016	4.50	0.0022	38.7474017	-89.815249
0.010	0.003	0.78	0.0004	38.7376939	-89.839166
0.041	0.012	3.37	0.0017	38.7422956	-89.816114
0.044	0.013	3.61	0.0018	38.7365598	-89.812793
0.021	0.006	1.72	0.0009	38.7374333	-89.835632
0.073	0.022	6.00	0.0030	38.7381143	-89.839426
0.045	0.013	3.69	0.0018	38.740346	-89.817343
0.025	0.007	2.06	0.0010	38.7416489	-89.817608
0.018	0.005	1.44	0.0007	38.7448266	-89.811445

0.007	0.002	0.61	0.0003	38.7591637	-89.814906
0.020	0.006	1.67	0.0008	38.7596219	-89.814337
0.048	0.014	3.97	0.0020	38.7602983	-89.813259
0.026	0.008	2.15	0.0011	38.7594112	-89.812339
0.025	0.007	2.04	0.0010	38.7613008	-89.815274
0.035	0.010	2.89	0.0014	38.7617125	-89.81504
0.144	0.043	11.83	0.0059	38.7564672	-89.921734
0.029	0.009	2.40	0.0012	38.7501307	-89.8549
0.044	0.013	3.63	0.0018	38.7541041	-89.858528
0.035	0.010	2.91	0.0015	38.7543998	-89.921792
0.020	0.006	1.67	0.0008	38.7537811	-89.92187
0.008	0.002	0.63	0.0003	38.7626218	-89.919716
0.033	0.010	2.72	0.0014	38.7531382	-89.92227
0.040	0.012	3.32	0.0017	38.7515582	-89.854522
0.010	0.003	0.85	0.0004	38.7719141	-89.909089
0.065	0.019	5.33	0.0007	38.7557231	-89.894705
0.003	0.007	1.90	0.0027	38.7491712	-89.853202
0.023	0.011	2.95	0.0010	38.7498312	-89.852617
0.030	0.008	2.19	0.0013	38.7532332	-89.85536
0.027	0.008	0.42	0.0011	38.7470377	-89.863309
				38.7724011	
0.041	0.012	3.36	0.0017		-89.909033
0.003	0.001	0.24	0.0001	38.7568523	-89.894118
0.029	0.009	2.36	0.0012	38.7565448	-89.896214
0.017	0.005	1.36	0.0007	38.7651615	-89.897752
0.018	0.005	1.45	0.0007	38.7461246	-89.862605
0.023	0.007	1.85	0.0009	38.7455855	-89.862638
0.030	0.009	2.50	0.0012	38.7508017	-89.887549
0.011	0.003	0.87	0.0004	38.7496471	-89.885433
0.025	0.007	2.03	0.0010	38.7488976	-89.852552
0.025	0.007	2.02	0.0010	38.7505609	-89.889067
0.011	0.003	0.88	0.0004	38.7502486	-89.884424
0.011	0.003	0.90	0.0004	38.7507874	-89.884388
0.016	0.005	1.32	0.0007	38.751273	-89.865168
0.027	0.008	2.18	0.0011	38.7548444	-89.895451
0.030	0.009	2.49	0.0012	38.7543357	-89.895685
0.016	0.005	1.33	0.0007	38.7522011	-89.858628
0.032	0.010	2.64	0.0013	38.7541101	-89.923106
0.010	0.003	0.80	0.0004	38.7530446	-89.858346
0.014	0.004	1.15	0.0006	38.7535688	-89.864835
0.048	0.014	3.92	0.0020	38.7554197	-89.911175
0.013	0.004	1.03	0.0005	38.7535448	-89.863147
0.025	0.007	2.07	0.0010	38.7577959	-89.894128
0.018	0.005	1.46	0.0007	38.7582194	-89.894252
0.029	0.009	2.39	0.0012	38.7626539	-89.920134
0.010	0.003	0.86	0.0004	38.7637633	-89.908922
0.022	0.007	1.83	0.0009	38.7626576	-89.909088
0.026	0.008	2.11	0.0011	38.7633184	-89.898272

0.033	0.010	2.73	0.0014	38.7635813	-89.886748
0.040	0.012	3.25	0.0016	38.7648665	-89.897408
0.048	0.014	3.94	0.0020	38.7655129	-89.899566
0.021	0.006	1.70	0.0008	38.7650982	-89.898901
0.006	0.002	0.47	0.0002	38.7649047	-89.883568
0.006	0.002	0.47	0.0002	38.7650098	-89.887089
0.010	0.003	0.86	0.0004	38.7650154	-89.887681
0.008	0.002	0.69	0.0003	38.765146	-89.88828
0.009	0.003	0.74	0.0004	38.766595	-89.883136
0.007	0.002	0.55	0.0003	38.7662929	-89.882751
0.027	0.008	2.20	0.0011	38.7676443	-89.90436
0.020	0.006	1.64	0.0008	38.7680569	-89.905639
0.037	0.011	3.02	0.0015	38.7701953	-89.906999
0.029	0.008	2.35	0.0012	38.7709081	-89.907988
0.023	0.007	1.93	0.0010	38.7779785	-89.905301
0.011	0.003	0.90	0.0005	38.7279923	-89.897388
0.137	0.041	11.28	0.0056	38.7282802	-89.898343
0.036	0.011	2.95	0.0015	38.7422505	-89.848109
0.047	0.014	3.85	0.0019	38.7458423	-89.85849
0.066	0.019	5.39	0.0027	38.7414712	-89.845253
0.090	0.027	7.38	0.0037	38.7430285	-89.844441
0.010	0.003	0.78	0.0004	38.7376939	-89.839166
0.039	0.012	3.23	0.0016	38.7452931	-89.852357
0.033	0.012	2.72	0.0014	38.7436391	-89.848947
0.024	0.007	1.96	0.0010	38.7276672	-89.854141
0.006	0.002	0.47	0.0002	38.7297286	-89.868496
0.010	0.003	0.82	0.0004	38.7302403	-89.868541
0.015	0.004	1.20	0.0006	38.7321149	-89.867689
0.011	0.003	0.92	0.0005	38.7322001	-89.868301
0.010	0.003	0.83	0.0004	38.7323367	-89.868875
0.012	0.004	1.02	0.0005	38.7332509	-89.843156
0.009	0.003	0.72	0.0004	38.733026	-89.844278
0.011	0.003	0.90	0.0005	38.7345229	-89.844394
0.035	0.010	2.84	0.0014	38.7378124	-89.841984
0.021	0.006	1.71	0.0009	38.7430614	-89.897016
0.024	0.007	2.01	0.0010	38.7451555	-89.858641
0.012	0.004	1.00	0.0005	38.7444989	-89.859266
0.014	0.004	1.13	0.0006	38.7444773	-89.861916
0.017	0.005	1.36	0.0007	38.7444605	-89.857472
0.008	0.002	0.66	0.0003	38.7456796	-89.859278
0.028	0.008	2.29	0.0011	38.7421962	-89.846775
0.063	0.019	5.18	0.0026	38.7437569	-89.846808
0.024	0.007	2.00	0.0020	38.747189	-89.859496
0.011	0.003	0.87	0.0010	38.7496471	-89.885433
0.048	0.014	3.94	0.0020	38.7008498	-89.842321
0.029	0.009	2.37	0.0020	38.7213628	-89.820711
0.041	0.012	3.36	0.0012	38.7213212	-89.820081
0.041	0.012	5.50	0.0017	30.7213212	33.020001

0.060	0.018	4.89	0.0024	38.7248547	-89.834562
0.037	0.011	3.07	0.0015	38.7229498	-89.845243
0.019	0.006	1.57	0.0008	38.7192182	-89.82157
0.024	0.007	1.97	0.0010	38.7034069	-89.85804
0.017	0.005	1.38	0.0007	38.703709	-89.859257
0.033	0.010	2.70	0.0013	38.7041396	-89.86052
0.014	0.004	1.13	0.0006	38.723618	-89.821124
0.032	0.010	2.65	0.0013	38.7207845	-89.819458
0.013	0.004	1.05	0.0005	38.698016	-89.852036
0.019	0.006	1.56	0.0008	38.7043478	-89.857508
0.014	0.004	1.15	0.0006	38.7045117	-89.858677
0.028	0.008	2.27	0.0011	38.7047702	-89.859343
0.033	0.010	2.71	0.0011	38.7054713	-89.841062
0.055	0.016	4.49	0.0022	38.7062275	-89.842851
0.033	0.006	1.65	0.0022	38.7094795	-89.849098
0.020	0.004	1.20	0.0008	38.7096176	-89.850261
0.013	0.004	1.02	0.0005	38.7096647	-89.851437
0.012		0.69		38.710419	-89.851629
	0.002		0.0003		-89.840914
0.005	0.001	0.41	0.0002	38.7141194	
0.045	0.013	3.68	0.0018	38.714653	-89.84437
0.029	0.009	2.42	0.0012	38.7189081	-89.838245
0.021	0.006	1.70	0.0009	38.7193222	-89.837454
0.010	0.003	0.81	0.0004	38.7228738	-89.820929
0.030	0.009	2.47	0.0012	38.7235301	-89.833758
0.004	0.001	0.36	0.0002	38.7246839	-89.845174
0.010	0.003	0.79	0.0004	38.7245506	-89.849481
0.046	0.014	3.82	0.0019	38.7264537	-89.836974
0.010	0.003	0.78	0.0004	38.6534195	-89.830609
0.007	0.002	0.59	0.0003	38.6641678	-89.811503
0.009	0.003	0.71	0.0004	38.6526552	-89.829732
0.004	0.001	0.36	0.0002	38.6525065	-89.829246
0.013	0.004	1.05	0.0005	38.655856	-89.817479
0.014	0.004	1.16	0.0006	38.6571205	-89.82354
0.049	0.015	4.05	0.0020	38.6525207	-89.827569
0.025	0.007	2.05	0.0010	38.6979092	-89.841448
0.031	0.009	2.55	0.0013	38.6666532	-89.826877
0.019	0.006	1.57	0.0008	38.6667777	-89.825799
0.010	0.003	0.81	0.0004	38.6576994	-89.815402
0.012	0.003	0.94	0.0005	38.6576499	-89.814714
0.016	0.005	1.28	0.0006	38.6632565	-89.824272
0.016	0.005	1.30	0.0006	38.6524017	-89.831921
0.016	0.005	1.34	0.0007	38.6508833	-89.831496
0.003	0.001	0.23	0.0001	38.650565	-89.831616
0.003	0.001	0.28	0.0001	38.6571925	-89.814621
0.019	0.006	1.57	0.0008	38.6606303	-89.816521
0.004	0.001	0.32	0.0002	38.6553104	-89.813569
0.036	0.011	2.95	0.0015	38.6519216	-89.831594

0.060	0.018	4.97	0.0025	38.6566897	-89.853227
0.017	0.005	1.43	0.0007	38.6569809	-89.854789
0.008	0.002	0.64	0.0003	38.6485273	-89.840772
0.007	0.002	0.61	0.0003	38.6506507	-89.839041
0.019	0.006	1.53	0.0008	38.6500226	-89.838948
0.007	0.002	0.60	0.0003	38.650124	-89.84158
0.011	0.003	0.94	0.0005	38.6503967	-89.831548
0.009	0.003	0.73	0.0004	38.6500713	-89.831192
0.010	0.003	0.84	0.0004	38.6496561	-89.830764
0.005	0.001	0.37	0.0004	38.6505569	-89.83744
0.006	0.002	0.46	0.0002	38.6510746	-89.830788
0.000	0.002	1.69	0.0002	38.6548761	-89.81681
0.021	0.008	2.24	0.0008	38.6548605	-89.81418
	0.008			38.6546802	
0.010		0.82	0.0004		-89.812702
0.022	0.006	1.80	0.0009	38.6560889	-89.825077
0.015	0.004	1.23	0.0006	38.6558762	-89.824542
0.011	0.003	0.88	0.0004	38.6564328	-89.816636
0.003	0.001	0.21	0.0001	38.6565469	-89.814799
0.006	0.002	0.52	0.0003	38.6570545	-89.815792
0.018	0.005	1.44	0.0007	38.6578497	-89.819247
0.017	0.005	1.41	0.0007	38.6569132	-89.819674
0.022	0.007	1.83	0.0009	38.658238	-89.81907
0.010	0.003	0.79	0.0004	38.6588388	-89.821184
0.010	0.003	0.79	0.0004	38.6590189	-89.815032
0.008	0.002	0.65	0.0003	38.6585966	-89.814817
0.008	0.003	0.70	0.0003	38.6595341	-89.814539
0.008	0.002	0.64	0.0003	38.6592141	-89.814049
0.009	0.003	0.76	0.0004	38.6611583	-89.807873
0.008	0.002	0.66	0.0003	38.6608438	-89.807376
0.037	0.011	3.02	0.0015	38.6622438	-89.816484
0.006	0.002	0.49	0.0002	38.6625572	-89.823604
0.010	0.003	0.86	0.0004	38.6622706	-89.80798
0.010	0.003	0.84	0.0004	38.6629454	-89.827261
0.012	0.004	1.00	0.0005	38.6651974	-89.826762
0.026	0.008	2.14	0.0011	38.6993637	-89.839482
0.032	0.010	2.66	0.0013	38.698489	-89.805513
0.056	0.016	4.57	0.0023	38.6873029	-89.820435
0.022	0.007	1.83	0.0009	38.6985263	-89.788876
0.008	0.002	0.63	0.0003	38.6746948	-89.794285
0.032	0.009	2.60	0.0013	38.7010825	-89.780116
0.015	0.004	1.20	0.0015	38.6831302	-89.785195
0.013	0.002	0.61	0.0003	38.6778499	-89.787187
0.007	0.005	1.39	0.0003	38.6773577	-89.787426
0.017	0.003	0.62	0.0007	38.6969192	-89.787426
0.012	0.003	0.95	0.0005	38.6967217	-89.77938
0.042	0.012	3.46	0.0017	38.6893548	-89.798128
0.033	0.010	2.69	0.0013	38.6841052	-89.80459

0.015	0.004	1.23	0.0006	38.6845939	-89.804714
0.027	0.008	2.22	0.0011	38.6835383	-89.785334
0.033	0.010	2.70	0.0013	38.6926028	-89.769517
0.150	0.044	12.31	0.0062	38.6897762	-89.778759
0.026	0.008	2.16	0.0011	38.7018927	-89.778901
0.032	0.009	2.62	0.0013	38.6722895	-89.819266
0.014	0.004	1.14	0.0006	38.6938923	-89.794371
0.019	0.006	1.56	0.0008	38.6752796	-89.818618
0.047	0.014	3.89	0.0019	38.6761218	-89.791946
0.017	0.005	1.39	0.0007	38.6833359	-89.783092
0.078	0.023	6.42	0.0032	38.6846729	-89.786351
0.032	0.010	2.65	0.0013	38.707353	-89.759915
0.031	0.009	2.56	0.0013	38.6931853	-89.769427
0.029	0.008	2.36	0.0012	38.6896945	-89.796535
0.020	0.006	1.63	0.0008	38.6901141	-89.798714
0.036	0.011	2.94	0.0015	38.6677154	-89.811714
0.015	0.004	1.23	0.0006	38.6668808	-89.811397
0.031	0.009	2.54	0.0013	38.6949061	-89.794924
0.024	0.007	2.00	0.0010	38.682537	-89.801169
0.026	0.008	2.10	0.0011	38.6835874	-89.801226
0.016	0.005	1.31	0.0007	38.6938714	-89.786953
0.029	0.008	2.34	0.0012	38.6806311	-89.787642
0.052	0.016	4.31	0.0022	38.6941465	-89.760044
0.014	0.004	1.12	0.0006	38.6881123	-89.799012
0.020	0.006	1.64	0.0008	38.689436	-89.784315
0.014	0.004	1.13	0.0006	38.6713171	-89.819436
0.009	0.003	0.75	0.0004	38.6770123	-89.817876
0.005	0.001	0.37	0.0002	38.6820195	-89.769004
0.009	0.003	0.72	0.0004	38.6810008	-89.768703
0.027	0.008	2.23	0.0011	38.7077864	-89.760457
0.038	0.011	3.09	0.0015	38.7084412	
0.009	0.003	0.76	0.0004	38.6782417	-89.784746
0.019	0.006	1.60	0.0008	38.6961019	-89.790483
0.015	0.004	1.23	0.0006	38.6780001	-89.785985
0.009	0.003	0.78	0.0004	38.6775976	-89.785739
0.042	0.012	3.42	0.0017	38.6840894	-89.812979
0.009	0.003	0.74	0.0004	38.6797678	-89.783004
0.005	0.001	0.39	0.0002	38.6789549	-89.782377
0.009	0.003	0.77	0.0004	38.6786578	-89.781875
0.011	0.003	0.91	0.0005	38.6978861	-89.775315
0.007	0.002	0.56	0.0003	38.6780321	-89.784144
0.013	0.004	1.06	0.0005	38.6811468	-89.787431
0.020	0.006	1.60	0.0008	38.6708773	-89.819301
0.013	0.004	1.07	0.0005	38.6704554	-89.819708
0.026	0.008	2.16	0.0011	38.6785743	-89.813332
0.011	0.003	0.92	0.0005	38.6779908	-89.814227
0.018	0.005	1.49	0.0007	38.6776195	-89.814823

0.023	0.007	1.89	0.0009	38.6830569	-89.792778
0.041	0.012	3.39	0.0017	38.6944895	-89.769425
0.023	0.007	1.87	0.0009	38.7122554	-89.745064
0.021	0.006	1.73	0.0009	38.7050432	-89.765138
0.061	0.018	4.98	0.0025	38.7049237	-89.763606
0.005	0.002	0.42	0.0002	38.6812485	-89.778986
0.012	0.003	0.96	0.0005	38.6801866	-89.779026
0.007	0.002	0.62	0.0003	38.679751	-89.779004
0.010	0.003	0.80	0.0004	38.6774717	-89.783577
0.011	0.003	0.88	0.0004	38.6764589	-89.802091
0.013	0.004	1.10	0.0006	38.6842829	-89.78271
0.013	0.002	0.54	0.0003	38.6806009	-89.818363
0.007	0.002	0.84	0.0003	38.6721123	-89.820019
0.010	0.003	0.80	0.0004	38.67155	-89.821018
0.010	0.003			38.7050927	-89.756736
		3.47	0.0017		
0.036	0.011	2.95	0.0015	38.7090541	-89.747883
0.014	0.004	1.15	0.0006	38.6762477	-89.816911
0.009	0.003	0.72	0.0004	38.6707741	-89.81869
0.005	0.001	0.41	0.0002	38.6707872	-89.805504
0.010	0.003	0.79	0.0004	38.6719721	-89.818551
0.009	0.003	0.74	0.0004	38.6716503	-89.81816
0.009	0.003	0.71	0.0004	38.6730277	-89.821834
0.017	0.005	1.40	0.0007	38.6745404	-89.817858
0.012	0.003	0.96	0.0005	38.6738964	-89.817172
0.017	0.005	1.37	0.0007	38.6745119	-89.791688
0.011	0.003	0.91	0.0005	38.676207	-89.801994
0.010	0.003	0.81	0.0004	38.6757794	-89.801659
0.008	0.002	0.65	0.0003	38.6770048	-89.803611
0.006	0.002	0.47	0.0002	38.676544	-89.803454
0.018	0.005	1.47	0.0007	38.6768241	-89.802252
0.015	0.004	1.23	0.0006	38.6763891	-89.800649
0.010	0.003	0.82	0.0004	38.6770151	-89.799275
0.017	0.005	1.41	0.0007	38.6773157	-89.816433
0.005	0.002	0.44	0.0002	38.6781232	-89.821083
0.007	0.002	0.59	0.0003	38.6775906	-89.817546
0.021	0.006	1.72	0.0009	38.6784187	-89.818981
0.010	0.003	0.85	0.0004	38.6777228	-89.789769
0.008	0.002	0.66	0.0003	38.678218	-89.781517
0.011	0.003	0.91	0.0005	38.6779832	-89.780932
0.008	0.002	0.64	0.0003	38.6777113	-89.780464
0.010	0.002	0.84	0.0003	38.6800557	-89.817908
0.010	0.003		0.0004	38.6795941	-89.817714
0.009	0.003	0.77 0.92	0.0004	38.6794772	-89.817714
0.011	0.003	0.91	0.0005	38.6790367	-89.778633
0.020	0.006	1.67	0.0008	38.6797126	-89.768887
0.011	0.003	0.91	0.0005	38.6805136	-89.777904
0.009	0.003	0.77	0.0004	38.6801023	-89.777492

0.008	0.002	0.63	0.0003	38.6803908	-89.781284
0.009	0.003	0.71	0.0004	38.6799618	-89.780946
0.004	0.001	0.35	0.0002	38.6801575	-89.775065
0.005	0.002	0.43	0.0002	38.6801075	-89.773439
0.010	0.003	0.84	0.0004	38.680679	-89.786343
0.030	0.009	2.48	0.0012	38.680479	-89.767862
0.004	0.001	0.36	0.0002	38.6809904	-89.773778
0.008	0.002	0.63	0.0003	38.6813374	-89.796235
0.008	0.002	1.15	0.0005	38.6816021	-89.795576
0.010	0.003	0.86	0.0004	38.6809318	-89.789633
0.008	0.002	0.69	0.0003	38.6813953	-89.789732
0.013	0.004	1.03	0.0005	38.6814075	-89.771412
0.007	0.002	0.56	0.0003	38.6814017	-89.770758
0.015	0.004	1.22	0.0006	38.6821578	-89.792616
0.008	0.002	0.67	0.0003	38.6826217	-89.79554
0.015	0.005	1.27	0.0006	38.682722	-89.794891
0.022	0.006	1.78	0.0009	38.6817568	-89.787234
0.016	0.005	1.32	0.0007	38.683138	-89.782146
0.011	0.003	0.94	0.0005	38.6838743	-89.800559
0.018	0.005	1.45	0.0007	38.6859954	-89.82006
0.016	0.005	1.32	0.0007	38.6846034	-89.814184
0.009	0.003	0.76	0.0004	38.6855985	-89.793501
0.011	0.003	0.88	0.0004	38.6866476	-89.793355
0.015	0.004	1.23	0.0006	38.6863257	-89.792852
0.013	0.004	1.03	0.0005	38.6860065	-89.792397
0.019	0.006	1.57	0.0008	38.686833	-89.791797
0.004	0.001	0.37	0.0002	38.6861803	-89.745963
0.020	0.001	1.62	0.0002	38.6890216	-89.788787
0.020	0.006	1.63	0.0008	38.6884687	-89.769144
0.020	0.004	1.18	0.0008	38.6891013	-89.798808
0.006	0.002	0.49	0.0002	38.6899072	-89.794106
0.010	0.003	0.78	0.0004	38.690367	-89.796394
0.013	0.004	1.05	0.0005	38.6908822	-89.796478
0.014	0.004	1.16	0.0006	38.6912987	-89.785841
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0.071	0.021	5.79	0.0029	38.6916315	-89.783499
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0.008	0.002	0.67	0.0003	38.6927471	-89.788375
0.021	0.006	1.75	0.0009	38.6922741	-89.787048
0.030	0.009	2.46	0.0012	38.6920385	-89.769661
0.008	0.002	0.67	0.0003	38.6935894	-89.78667
0.017	0.005	1.39	0.0007	38.6932122	-89.786155
0.068	0.020	5.62	0.0028	38.6927814	-89.78233
0.009	0.003	0.75	0.0004	38.6939977	-89.786097
0.012	0.004	0.99	0.0005	38.6939468	-89.785422
0.019	0.006	1.53	0.0008	38.6947919	-89.785786
0.010	0.003	0.81	0.0004	38.696225	-89.782054
0.010	0.000	2.01	2.3001	55.555225	3032031

0.013	0.004	1.03	0.0005	38.6958894	-89.779997
0.016	0.005	1.34	0.0007	38.6976126	-89.775233
0.031	0.009	2.53	0.0013	38.6975163	-89.771586
0.014	0.004	1.19	0.0006	38.6980769	-89.768476
0.034	0.010	2.82	0.0014	38.6979979	-89.764375
0.037	0.011	3.05	0.0015	38.6984472	-89.787699
0.012	0.003	0.97	0.0005	38.7035682	-89.868706
0.004	0.001	0.32	0.0002	38.7034493	-89.869213
0.005	0.002	0.42	0.0002	38.7034444	-89.869325
0.029	0.008	2.34	0.0012	38.6653491	-89.853265
0.009	0.003	0.74	0.0004	38.7145029	-89.906478
0.013	0.004	1.10	0.0005	38.7033342	-89.870366
0.080	0.024	6.55	0.0033	38.715017	-89.906837
0.052	0.015	4.29	0.0021	38.7089308	-89.878452
0.032	0.009	2.62	0.0013	38.6846229	-89.858607
0.017	0.005	1.41	0.0007	38.7032084	-89.870843
0.022	0.007	1.85	0.0009	38.6661532	-89.853185
0.004	0.001	0.31	0.0002	38.6902347	-89.895353
0.006	0.002	0.52	0.0003	38.6902391	-89.896419
0.020	0.006	1.63	0.0008	38.6631559	-89.853462
0.009	0.003	0.74	0.0004	38.7028406	-89.871081
0.017	0.005	1.40	0.0007	38.7071324	-89.879138
0.011	0.003	0.93	0.0005	38.6770779	-89.874301
0.048	0.014	3.97	0.0020	38.6649074	-89.855589
0.043	0.013	3.51	0.0018	38.6831071	-89.912372
0.076	0.022	6.24	0.0031	38.7115871	-89.907629
0.005	0.001	0.41	0.0002	38.6899768	-89.896768
0.024	0.007	1.99	0.0010	38.693227	-89.866666
0.050	0.015	4.12	0.0021	38.7046071	-89.879055
0.014	0.004	1.16	0.0006	38.6865118	-89.863514
0.027	0.008	2.21	0.0011	38.6860798	
0.006	0.002	0.47	0.0002	38.7078422	-89.900895
0.011	0.003	0.87	0.0004	38.6565749	-89.866361
0.020	0.006	1.65	0.0008	38.6939607	-89.867106
0.015	0.005	1.26	0.0006	38.6911342	-89.872148
0.041	0.012	3.38	0.0017	38.7088159	-89.888449
0.058	0.017	4.77	0.0024	38.7085433	-89.887046
0.020	0.006	1.66	0.0008	38.6767865	-89.864248
0.029	0.008	2.35	0.0012	38.657473	-89.865334
0.007	0.002	0.59	0.0003	38.6576921	-89.866189
0.011	0.003	0.89	0.0004	38.7026251	-89.873014
0.006	0.002	0.47	0.0002	38.6731384	-89.869567
0.004	0.001	0.33	0.0002	38.6734882	-89.870456
0.006	0.002	0.48	0.0002	38.6739085	-89.870847
0.014	0.004	1.12	0.0006	38.6854094	-89.864754
0.028	0.008	2.33	0.0012	38.7024888	-89.863324
0.018	0.005	1.52	0.0008	38.6914675	-89.872471

0.018	0.005	1.50	0.0008	38.6920706	-89.872656
0.012	0.003	0.97	0.0005	38.6593951	-89.909089
0.004	0.001	0.32	0.0002	38.7039049	-89.898607
0.015	0.004	1.21	0.0006	38.7044627	-89.899608
0.035	0.010	2.89	0.0014	38.7046216	-89.90173
0.004	0.001	0.36	0.0002	38.6911822	-89.893022
0.024	0.007	1.95	0.0010	38.6847405	-89.859749
0.023	0.007	1.90	0.0009	38.6849512	-89.860961
0.018	0.005	1.48	0.0007	38.6845269	-89.861958
0.008	0.002	0.68	0.0003	38.6852741	-89.890854
0.013	0.004	1.10	0.0006	38.684786	-89.890368
0.016	0.005	1.31	0.0007	38.7000061	-89.88789
0.060	0.018	4.93	0.0025	38.7075102	-89.879733
0.015	0.004	1.25	0.0006	38.6894864	-89.883584
0.053	0.016	4.39	0.0022	38.6609678	-89.853478
0.063	0.019	5.19	0.0022	38.6737701	-89.855244
0.004	0.001	0.31	0.0020	38.6700678	-89.882423
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0.003	0.001	1.03	0.0002	38.6716018	-89.882827
0.013	0.004	1.05	0.0005	38.6725735	-89.882774
0.009	0.004	0.72	0.0003	38.6733657	-89.88324
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0.016	0.005	1.33	0.0007 0.0005	38.660759	-89.898577 -89.865866
0.013 0.010	0.004 0.003	1.06 0.85	0.0003	38.6940721	-89.893766
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0.050	0.015		0.0008	38.6834553	-89.916085
		4.07		38.656261	-89.86781
0.016 0.031	0.005 0.009	1.29 2.57	0.0006 0.0013	38.6589573	-89.909018
0.031		1.92	0.0013	38.6580659	-89.865042
	0.007	1.44	0.0010	38.658948	-89.865237
0.017	0.005			38.6596118	
0.018 0.018	0.005	1.49	0.0007 0.0007		-89.862191
	0.005	1.50		38.6594962	-89.862786
0.017	0.005	1.41	0.0007	38.659888	-89.863794
0.016	0.005	1.33	0.0007	38.6606273	-89.866418
0.018	0.005	1.44	0.0007	38.6630778	-89.854834
0.008	0.003	0.69	0.0003	38.6636101	-89.863776
0.023	0.007	1.90	0.0010	38.6632167	-89.857901
0.010	0.003	0.84	0.0004	38.6641133	-89.852654
0.007	0.002	0.58	0.0003	38.6655072	-89.891875
0.015	0.005	1.26	0.0006	38.6641388	-89.865981
0.025	0.007	2.03	0.0010	38.6646692	-89.867167
0.013	0.004	1.06	0.0005	38.6648763	-89.868175
0.011	0.003	0.87	0.0004	38.6726796	-89.89225

0.008	0.002	0.68	0.0003	38.6724195	-89.870381
0.008	0.002	0.62	0.0003	38.6725321	-89.870912
0.011	0.003	0.91	0.0005	38.6736025	-89.86951
0.010	0.003	0.80	0.0004	38.674081	-89.869622
0.010	0.003	0.81	0.0004	38.6744945	-89.869877
0.022	0.007	1.82	0.0009	38.6744862	-89.883579
0.019	0.006	1.60	0.0008	38.6749863	-89.883553
0.012	0.004	0.98	0.0005	38.6756541	-89.863335
0.012	0.003	0.79	0.0003	38.6750524	-89.864379
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0.008	0.002	0.68	0.0003	38.6748601	-89.865618
0.009	0.003	0.76	0.0004	38.6749443	-89.866268
0.015	0.004	1.23	0.0006	38.6749316	-89.866904
0.025	0.008	2.09	0.0010	38.6759578	-89.855435
0.014	0.004	1.18	0.0006	38.6770895	-89.874823
0.007	0.002	0.55	0.0003	38.6767269	-89.875087
0.011	0.003	0.87	0.0004	38.6764837	-89.864833
0.011	0.003	0.86	0.0004	38.6760405	-89.866577
0.016	0.005	1.31	0.0007	38.6767897	-89.863677
0.006	0.002	0.53	0.0003	38.6777654	-89.861744
0.014	0.004	1.12	0.0006	38.6786739	-89.869133
0.012	0.003	0.96	0.0005	38.6804398	-89.886557
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0.012	0.004	1.02	0.0005	38.680922	-89.858196
0.011	0.003	0.89	0.0004	38.6825764	-89.86167
0.008	0.002	0.63	0.0003	38.6843291	-89.890318
0.007	0.002	0.60	0.0003	38.6838572	-89.890264
0.018	0.005	1.47	0.0007	38.6828812	-89.864631
0.013	0.004	1.03	0.0007	38.6838949	-89.85925
0.015	0.004	1.24	0.0005	38.6834681	-89.859612
0.013	0.004	1.09	0.0005	38.6830315	-89.86519
0.015	0.004	1.22	0.0006	38.683555	-89.865973
0.009	0.003	0.76	0.0004	38.6838068	-89.866348
0.008	0.002	0.67	0.0003	38.684498	-89.860105
0.012	0.003	0.96	0.0005	38.6840769	-89.86052
0.056	0.016	4.57	0.0023	38.6840522	-89.913317
0.022	0.006	1.80	0.0009	38.6844224	-89.862496
0.011	0.003	0.91	0.0005	38.6840056	-89.862764
0.020	0.006	1.65	0.0008	38.6846067	-89.86368
0.009	0.003	0.76	0.0004	38.6855125	-89.865634
0.007	0.002	0.55	0.0003	38.6856301	-89.866181
0.019	0.006	1.55	0.0008	38.6859912	-89.883925
0.017	0.005	1.41	0.0007	38.6864081	-89.883513
0.006	0.002	0.47	0.0002	38.686375	-89.886377
0.008	0.002	0.63	0.0003	38.6861308	-89.865537
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0.012	0.004	0.98	0.0005	38.6884262	-89.894878
0.006	0.002	0.50	0.0002	38.6885108	-89.891495
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0.012	0.003	0.95	0.0005	38.689431	-89.883976
0.012	0.003	0.77	0.0003	38.6907137	-89.897184
0.010	0.003	0.83	0.0004	38.6910195	-89.89487
0.007	0.002	0.56	0.0003	38.6910532	-89.895357
0.059	0.017	4.84	0.0024	38.6902046	-89.870156
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0.005	0.001	0.39	0.0002	38.6915802	-89.893804
0.023	0.007	1.87	0.0009	38.6914852	-89.896926
0.011	0.003	0.90	0.0004	38.6915943	-89.891507
0.011	0.003	0.89	0.0004	38.69202	-89.891748
0.019	0.006	1.60	0.0008	38.6898311	-89.860959
0.026	0.008	2.14	0.0011	38.6904684	-89.861998
0.006	0.002	0.46	0.0002	38.693122	-89.893785
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0.010	0.003	0.79	0.0004	38.6924745	-89.867406
0.008	0.002	0.65	0.0003	38.6927178	-89.867935
0.041	0.012	3.36	0.0017	38.6924278	-89.862917
0.017	0.005	1.41	0.0007	38.6928266	-89.858836
0.019	0.006	1.55	0.0008	38.693476	-89.87156
0.021	0.006	1.71	0.0009	38.6950113	-89.858969
0.008	0.002	0.64	0.0003	38.6991288	-89.887656
0.000	0.002	0.88	0.0003	38.7006342	-89.88748
0.011	0.006	1.57	0.0004	38.7006289	-89.888896
0.021	0.006	1.69	0.0008	38.7014964	-89.888771
0.017	0.005	1.44	0.0007	38.7021499	-89.873527
0.013	0.004	1.11	0.0006	38.7021226	-89.871553
0.039	0.011	3.16	0.0016	38.7042461	-89.902328
0.012	0.003	0.95	0.0005	38.7034562	-89.871481
0.009	0.003	0.78	0.0004	38.7036286	-89.872645
0.025	0.008	2.09	0.0010	38.7037211	-89.873443
0.036	0.011	2.98	0.0015	38.7043455	-89.880519
0.013	0.004	1.06	0.0005	38.7029586	-89.863133
0.028	0.008	2.32	0.0012	38.7044108	-89.862823
0.014	0.004	1.19	0.0006	38.7067321	-89.901099
0.028	0.008	2.30	0.0012	38.7065111	-89.898906
0.008	0.002	0.66	0.0003	38.7075305	-89.898934
0.011	0.003	0.88	0.0004	38.7063979	-89.865027
0.024	0.007	1.94	0.0010	38.707373	-89.865117
0.012	0.004	0.98	0.0005	38.7062817	-89.863997
0.012	0.009	2.62	0.0003	38.7074572	-89.86402
0.032	0.005	2.02	0.0013	30.7074372	03.00402

0.026	0.008	2.14	0.0011	38.7127044	-89.8933
0.029	0.009	2.38	0.0012	38.7149204	-89.893373
0.036	0.011	2.93	0.0015	38.7155044	-89.900987
0.100	0.051	15.355	0.0077	38.9469557	-89.728198
0.195	0.100	29.827	0.0149	38.9477871	-89.724655
0.129	0.066	19.769	0.0099	38.9153565	-89.736882
0.094	0.048	14.455	0.0072	38.9156464	-89.735631
0.103	0.052	15.725	0.0079	38.828144	-89.849225
0.142	0.072	21.689	0.0108	38.8284849	-89.850661
0.153	0.078	23.403	0.0117	38.8213966	-89.798386
0.234	0.120	35.828	0.0179	38.8216239	-89.796342
0.047	0.024	7.162	0.0036	38.8207611	-89.837469
0.178	0.091	27.249	0.0136	38.8206783	-89.840282
0.055	0.028	8.410	0.0042	38.8338053	-89.84802
0.110	0.056	16.840	0.0084	38.8340761	-89.849012
0.058	0.030	8.875	0.0044	38.8219463	-89.848813
0.128	0.066	19.646	0.0098	38.8220461	-89.850369
0.145	0.074	22.268	0.0030	38.8090272	-89.813521
0.283	0.145	43.326	0.0217	38.8102135	-89.811963
0.049	0.025	7.455	0.0217	38.7997174	-89.830029
0.043	0.050	15.040	0.0037	38.7984946	-89.828478
0.106	0.054	16.224	0.0073	38.8050802	-89.813082
0.164	0.034	25.154	0.0031	38.8051052	-89.812375
0.104	0.035	10.580	0.0120	38.7927578	-89.841315
0.085	0.044	13.071	0.0065	38.7921279	-89.840743
0.038	0.020	5.858	0.0003	38.806458	-89.835526
0.036	0.049	14.645	0.0023	38.8071649	-89.836887
0.058	0.030	8.856	0.0073	38.8222693	-89.877896
0.128	0.066	19.655	0.0098	38.8221036	-89.878915
0.029	0.015	4.481	0.0038	38.801574	-89.859313
0.023	0.015	7.760	0.0022	38.8011429	
0.265	0.136	40.627	0.0033	38.7648045	-89.904041
0.310	0.159	47.553	0.0238	38.7643764	-89.904858
0.044	0.023	6.769	0.0034	38.7749956	-89.898473
0.047	0.023	7.225	0.0034	38.775797	-89.900115
0.047	0.024	11.054	0.0055	38.7633824	-89.915103
0.189	0.037	29.005	0.0033	38.7639091	-89.916028
0.183	0.024	7.256	0.0036	38.7597107	-89.918758
0.105	0.054	16.115	0.0030	38.7598847	-89.919631
0.103	0.034	12.615	0.0063	38.7686544	-89.908564
0.082	0.050	14.848	0.0003	38.7695659	-89.909421
0.057	0.131	39.347	0.0074	38.7279154	-89.867433
0.237	0.068	20.379	0.0197	38.7274695	-89.869162
0.133	0.074	20.379	0.0102	38.7425647	-89.863094
0.145	0.100	30.012	0.0111	38.7431834	-89.864791
0.196	0.041	12.366	0.0130	38.7460974	-89.881799
0.078	0.040	11.907	0.0060	38.7459088	-89.883361

0.096	0.049	14.751	0.0074	38.7436053	-89.890986
0.072	0.037	10.962	0.0055	38.7434429	-89.892348
0.043	0.022	6.551	0.0033	38.7357797	-89.866135
0.050	0.025	7.600	0.0038	38.735623	-89.867547
0.416	0.213	63.751	0.0319	38.7116177	-89.839442
0.121	0.062	18.546	0.0093	38.7098738	-89.843478
0.096	0.049	14.725	0.0074	38.7128343	-89.849709
0.110	0.056	16.847	0.0084	38.7131094	-89.851354
0.063	0.032	9.663	0.0048	38.7204349	-89.84475
0.115	0.059	17.555	0.0088	38.7212169	-89.845646
0.042	0.022	6.481	0.0032	38.7070564	-89.849418
0.078	0.040	11.935	0.0060	38.7072296	-89.850348
0.007	0.004	1.107	0.0006	38.9928604	-95.712213
0.000	0.000	0.043	0.0000	38.9828232	-95.698097
0.000	0.000	0.012	0.0000	38.9827643	-95.698016
0.001	0.001	0.228	0.0001	38.9816318	-95.698346
0.001	0.000	0.086	0.0000	38.9814045	-95.69825
0.001	0.000	0.138	0.0001	38.9811775	-95.698563
0.000	0.000	0.055	0.0000	38.974857	-95.705409
0.000	0.000	0.060	0.0000	38.9739249	-95.733862
0.000	0.000	0.012	0.0000	38.9738662	-95.733745
0.000	0.000	0.012	0.0000	38.974095	-95.722157
0.001	0.000	0.109	0.0001	38.9743971	-95.705495
0.002	0.001	0.306	0.0002	38.9739178	-95.722042
0.001	0.000	0.086	0.0000	38.9736855	-95.722099
0.001	0.000	0.077	0.0000	38.9726782	-95.722142
0.002	0.001	0.373	0.0002	38.9723489	-95.722028
0.000	0.000	0.025	0.0000	38.9703294	-95.721467
0.007	0.003	1.030	0.0005	38.9700314	-95.72135
0.000	0.000	0.018	0.0000	38.9697065	-95.721007
0.001	0.000	0.115	0.0001		-95.720875
0.000	0.000	0.061	0.0000	38.9695067	-95.7207
0.000	0.000	0.038	0.0000	38.9645011	-95.719832
0.004	0.002	0.556	0.0003	38.964203	-95.71981
0.000	0.000	0.025	0.0000	38.9637031	-95.723579
0.001 0.002	0.001	0.152	0.0001	38.963838 38.9637999	-95.72023
	0.001	0.296	0.0001	38.9637939	-95.725907 -95.723352
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0.000	0.000	0.145	0.0001	38.9606066	-95.691031
0.001	0.000	0.145	0.0001	38.9607199	-95.691051
0.002	0.001	0.642	0.0002	38.9596948	-95.727881
0.004	0.002	0.042	0.0003	38.9604355	-95.691054
0.000	0.001	0.320	0.0000	38.9574221	-95.730847
0.002	0.001	0.308	0.0002	38.9569553	-95.730962
0.002	0.000	0.098	0.0002	38.9561678	-95.731269
3.301	5.000	0.050	5.5555	30.3301070	33.731203

0.010	0.005	1.564	0.0008	38.9532877	-95.730289
0.003	0.002	0.451	0.0002	38.9523097	-95.730237
0.000	0.000	0.051	0.0000	38.9518411	-95.730252
0.000	0.000	0.025	0.0000	38.951741	-95.730158
0.000	0.000	0.058	0.0000	38.9493004	-95.731589
0.001	0.000	0.135	0.0001	38.9491514	-95.731896
0.001	0.000	0.148	0.0001	38.9475056	-95.732297
0.001	0.000	0.126	0.0001	38.9903415	-95.737191
0.000	0.000	0.012	0.0000	38.9901412	-95.737087
0.000	0.000	0.018	0.0000	38.9900966	-95.737026
0.000	0.000	0.018	0.0000	38.990053	-95.736967
0.000	0.000	0.012	0.0000	38.9900085	-95.736906
0.014	0.007	2.087	0.0010	38.9853762	-95.734974
0.029	0.015	4.437	0.0022	38.9836647	-95.743146
0.001	0.001	0.163	0.0001	38.9820822	-95.745196
0.000	0.000	0.012	0.0000	38.9802597	-95.743516
0.112	0.057	17.086	0.0085	38.9806675	-95.743719
0.001	0.000	0.099	0.0000	38.9778366	-95.735875
0.000	0.000	0.012	0.0000	38.9736294	-95.734316
0.003	0.001	0.430	0.0002	38.9669945	-95.744015
0.001	0.001	0.157	0.0001	38.9636516	-95.748594
0.004	0.002	0.635	0.0003	38.9635478	-95.748177
0.005	0.002	0.693	0.0003	38.9627572	-95.747792
0.089	0.046	13.698	0.0068	38.9623963	-95.744718
0.005	0.003	0.777	0.0004	38.9487441	-95.750703
0.015	0.007	2.245	0.0011	38.9483569	-95.750546
0.000	0.000	0.025	0.0000	38.9473405	-95.732442
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0.000	0.000	0.012	0.0000	38.9413211	-95.734746
0.000	0.000	0.026	0.0000	38.9408623	-95.752166
0.002	0.001	0.253	0.0001	38.9407511	-95.751975
0.001	0.000	0.080	0.0000	38.9395073	-95.75355
0.001	0.001	0.160	0.0001	38.9384805	-95.717897
0.001	0.000	0.140	0.0001	38.9377798	-95.716511
0.000	0.000	0.012	0.0000	38.9376016	-95.71655
0.003	0.001	0.442	0.0002	38.9351215	-95.734693
0.000	0.000	0.051	0.0000	38.934482	-95.734776
0.000	0.000	0.025	0.0000	38.9341788	-95.734705
0.000	0.000	0.012	0.0000	38.9340712	-95.73464
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0.000	0.000	0.012	0.0000	38.9339384	-95.73446
0.002	0.001	0.259	0.0001	38.9330103	-95.753241
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0.055	0.028	8.376	0.0042	38.927171	-95.742732
0.004	0.002	0.594	0.0003	38.926207	-95.755936
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0.007	0.003	1.012	0.0005	38.9246918	-95.752664
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0.001	0.000	0.086	0.0000	38.9161527	-95.757262
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0.004	0.002	0.556	0.0003	38.9047623	-95.757379
0.001	0.001	0.206	0.0001	38.8998035	-95.759775
0.010	0.005	1.588	0.0001	38.8996564	-95.776163
				38.8980372	-95.781339
0.007	0.004	1.100	0.0005		
0.000	0.000	0.025	0.0000	38.8978578	-95.78014
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0.030	0.015	4.625	0.0023	38.8983609	-95.776261
0.004	0.002	0.574	0.0003	38.8978185	-95.752874
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0.000	0.000	0.025	0.0000	38.9907562	-95.791774
0.020	0.010	3.030	0.0015	38.991069	-95.790468
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0.006	0.003	0.937	0.0005	38.9892662	-95.793647
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0.001	0.000	0.083	0.0000	38.9813357	-95.773409
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0.001	0.000	0.146	0.0001	38.9812538	-95.772683
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0.004	0.002	0.588	0.0003	38.9099725	-95.772674
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0.002	0.001	0.379	0.0002	38.9071236	-95.777756
0.002	0.001	0.379	0.0002	38.9515879	-95.809665
0.001	0.000	0.149	0.0001	38.926097	-95.834471
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				38.9079484	
0.002	0.001	0.379	0.0002		-95.819059
0.003	0.002	0.489	0.0002	38.9077068	-95.819662
0.004	0.002	0.637	0.0003	38.9070217	-95.820236

0.009	0.005	1.397	0.0007	38.9054842	-95.820154
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0.006	0.003	0.891	0.0004	38.8985997	-95.812827
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0.002	0.001	0.304	0.0002	38.8859955	-95.810624
0.001	0.000	0.142	0.0001	38.8863239	-95.789125
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0.000	0.000	0.058	0.0000	38.9178557	-95.68987
0.004	0.002	0.590	0.0003	38.9178555	-95.688815
0.001	0.001	0.179	0.0001	38.9170297	-95.688804
0.046	0.023	7.023	0.0035	38.9162749	-95.689242
0.001	0.000	0.101	0.0001	38.9156496	-95.689985
0.010	0.005	1.458	0.0007	38.9155187	-95.689386
0.002	0.001	0.243	0.0001	38.9123251	-95.715095
0.000	0.000	0.012	0.0000	38.9042966	-95.717295
0.000	0.000	0.064	0.0000	38.9042148	-95.717345
0.002	0.001	0.332	0.0002	38.9042395	-95.71677
0.001	0.000	0.135	0.0001	38.9008607	-95.722604
0.002	0.001	0.304	0.0002	38.894441	-95.732831
0.001	0.001	0.229	0.0001	38.8941611	-95.733086
0.000	0.000	0.012	0.0000	38.8938809	-95.733097
0.001	0.000	0.090	0.0000	38.8932655	-95.732965
0.001	0.001	0.189	0.0001	38.8828109	-95.74067
0.004	0.002	0.687	0.0003	38.8811288	-95.755177
0.000	0.000	0.042	0.0000	38.8796449	-95.753496
0.000	0.000	0.018	0.0000	38.8795715	-95.75341
0.001	0.000	0.082	0.0000	38.8794814	-95.753278
0.001	0.000	0.119	0.0001	38.8794453	-95.747614
0.000	0.000	0.012	0.0000	38.8788169	-95.752978
0.001	0.001	0.172	0.0001	38.8787024	-95.752825
0.004	0.002	0.569	0.0003	38.8745218	-95.763871
0.011	0.006	1.726	0.0009	38.8740502	-95.764873
0.004	0.002	0.614	0.0003	38.8725129	-95.767287
0.002	0.001	0.240	0.0001	38.8723586	-95.767862
0.002	0.001	0.335	0.0002	38.8712947	-95.752467
0.003	0.002	0.506	0.0003	38.8689796	-95.789775
0.005	0.003	0.829	0.0004	38.8669106	-95.785045
0.004	0.002	0.656	0.0003	38.8663338	-95.785663

0.009	0.005	1.381	0.0007	38.8599416	-95.751944
0.000	0.000	0.049	0.0000	38.8682675	-95.797719
0.001	0.000	0.092	0.0000	38.8676956	-95.797631
0.000	0.000	0.012	0.0000	38.8663568	-95.80689
0.000	0.000	0.056	0.0000	38.8662912	-95.806771
0.001	0.001	0.171	0.0001	38.866227	-95.806556
0.001	0.000	0.086	0.0000	38.8662842	-95.793138
0.004	0.002	0.572	0.0003	38.8658409	-95.805893
0.002	0.001	0.284	0.0001	38.8645936	-95.794581
0.006	0.003	0.940	0.0005	38.8642217	-95.805185
0.000	0.000	0.049	0.0000	38.8597769	-95.793007
0.000	0.000	0.025	0.0000	38.8593121	-95.790858
0.000	0.000	0.042	0.0000	38.8592411	-95.790977
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			0.0005	38.8575415	-95.808455
0.006	0.003	0.976			
0.008	0.004	1.229	0.0006	38.856692	-95.809392
0.008	0.004	1.206	0.0006	38.854822	-95.822121
0.004	0.002	0.668	0.0003	38.8540877	-95.821678
0.006	0.003	0.882	0.0004	38.846824	-95.822772
0.002	0.001	0.382	0.0002	38.8467439	-95.823939
0.000	0.000	0.012	0.0000	38.8465661	-95.824199
0.003	0.001	0.423	0.0002	38.845591	-95.824791
0.003	0.002	0.500	0.0002	38.8444752	-95.824048
0.000	0.000	0.041	0.0000	38.8430872	-95.817334
0.001	0.001	0.227	0.0001	38.8430874	-95.817518
0.000	0.000	0.018	0.0000	38.8430359	-95.817492
0.002	0.001	0.342	0.0002	38.8428796	-95.817519
0.008	0.004	1.213	0.0006	38.8426961	-95.82585
0.001	0.000	0.097	0.0000	38.8421772	-95.826264
0.010	0.005	1.489	0.0007	38.841802	-95.832658
0.004	0.002	0.630	0.0003	38.841521	-95.832643
0.001	0.000	0.086	0.0000	38.8403719	-95.827332
0.000	0.000	0.012	0.0000	38.8402273	-95.82746
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0.003	0.002	0.501	0.0003	38.8396421	-95.827714
0.008	0.004	1.238	0.0006	38.8388944	-95.828268
0.002	0.001	0.301	0.0002	38.8380194	-95.828875
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0.000	0.000	0.012	0.0000	38.8375067	-95.822631
0.006	0.003	0.925	0.0005	38.8357732	-95.822043
0.002	0.001	0.331	0.0003	38.8353769	-95.829329
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0.004	0.002		0.0003	38.8332046	-95.831314
		0.243			
0.005	0.003	0.783	0.0004	38.8324447	-95.831606
0.012	0.006	1.833	0.0009	38.8321175	-95.831821
0.006	0.003	0.877	0.0004	38.9213829	-95.843321

0.007	0.004	1.109	0.0006	38.8864461	-95.853062
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0.006	0.003	0.947	0.0005	38.8543659	-95.836786
0.000	0.000	0.072	0.0000	38.853275	-95.83748
0.006	0.003	0.929	0.0005	38.8493156	-95.850261
0.004	0.002	0.594	0.0003	38.8470033	-95.848159
0.000	0.000	0.012	0.0000	38.8467717	-95.849092
0.013	0.006	1.916	0.0010	38.8460262	-95.849119
0.002	0.001	0.264	0.0001	38.8441348	-95.859133
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0.000	0.000	0.025	0.0000	38.8385905	-95.802919
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0.017	0.009	2.598	0.0013	38.8294162	-95.855614
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0.030	0.015	4.556	0.0023	38.8284523	-95.852772
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0.020	0.010	3.014	0.0015	38.8259803	-95.833751
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0.002	0.001	0.327	0.0002	38.8193216	-95.817296
0.014	0.007	2.155	0.0011	38.8185779	-95.82272
0.001	0.000	0.123	0.0001	38.8182915	-95.814988
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0.002	0.001	0.272	0.0001	38.7804181	-95.85099
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0.000	0.000	0.000	0.0000	30.7 033 707	33.0 11102

0.003	0.002	0.491	0.0002	38.76354	-95.875759
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0.002	0.001	0.328	0.0002	38.7947153	-95.783802
0.000	0.000	0.025	0.0000	38.7944342	-95.783771
0.001	0.001	0.154	0.0001	38.7937845	-95.786511
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0.000	0.000	0.049	0.0000	38.7607652	-95.821863
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0.011	0.006	1.738	0.0009	38.7539675	-95.819652
0.003	0.002	0.516	0.0003	38.753367	-95.817393
0.000	0.000	0.073	0.0000	38.7532706	-95.816977
0.001	0.000	0.105	0.0001	38.7532988	-95.816795
0.002	0.001	0.247	0.0001	38.7521845	-95.827044
0.002	0.001	0.250	0.0001	38.7458559	-95.828123
0.001	0.000	0.095	0.0000	38.7443274	-95.829876
0.001	0.001	0.205	0.0001	38.7441612	-95.830142
0.000	0.000	0.012	0.0000	38.7422634	-95.830667
0.004	0.002	0.545	0.0003	38.7420676	-95.830283
0.001	0.000	0.131	0.0003	38.7415958	-95.830077
0.003	0.001	0.392	0.0001	38.740508	-95.82954
0.000	0.000	0.018	0.0002	38.7402583	-95.829723
0.001	0.000	0.092	0.0000	38.740158	-95.829853
0.001	0.001	0.159	0.0001	38.740019	-95.8341
0.001	0.000	0.012	0.0001	38.740047	-95.831039
0.000	0.000	0.049	0.0000	38.7400567	-95.830763
0.000	0.000	0.012	0.0000	38.7400703	-95.830005
0.001	0.000	0.080	0.0000	38.7400183	-95.831453
0.001	0.000	0.042	0.0000	38.740028	-95.831178
0.026	0.013	3.950	0.0000	38.7359805	-95.830029
0.000	0.000	0.025	0.0020	38.7353396	-95.829245
0.001	0.000	0.109	0.0001	38.7344668	-95.822421
0.001	0.000	0.012	0.0001	38.7813532	-95.896951
0.002	0.001	0.284	0.0001	38.7813556	
0.002	0.004	1.175	0.0001	38.7697229	-95.908052
0.003	0.002	0.484	0.0002	38.7649847	-95.916097
0.001	0.000	0.095	0.0002	38.7645073	-95.885173
0.001	0.001	0.244	0.0001	38.763801	-95.886002
0.002	0.001	0.215	0.0001	38.7628282	-95.884956
0.001	0.001	0.252	0.0001	38.7614068	-95.899044
0.002	0.000	0.051	0.0001	38.7612511	-95.89884
0.000	0.001	0.345	0.0000	38.760558	-95.91455
0.002	0.000	0.121	0.0002	38.7568391	-95.899009
0.001	0.000	0.149	0.0001	38.754997	-95.902413
0.001	0.000	0.012	0.0001	38.7548607	-95.902558
0.000	0.000	0.012	0.0000	38.7493512	-95.864288
0.001	0.002	0.653	0.0003	38.7492942	-95.863217
0.004	0.002	0.049	0.0003	38.7490891	-95.859307
0.000	0.000	0.049	0.0000	38.749054	-95.859722
0.001	0.000	0.025	0.0000	38.7490413	-95.859722
0.000	0.000	0.025	0.0000	30.7430413	-33.033132

0.002	0.001	0.258	0.0001	38.7489538	-95.861535
0.009	0.005	1.446	0.0007	38.748801	-95.859664
0.000	0.000	0.065	0.0000	38.7426717	-95.900927
0.002	0.001	0.275	0.0001	38.7422564	-95.896559
0.000	0.000	0.045	0.0000	38.735348	-95.836415
0.004	0.002	0.658	0.0003	38.7348541	-95.831059
0.001	0.000	0.145	0.0001	38.7348586	-95.829404
0.009	0.005	1.396	0.0007	38.7340955	-95.831697
0.004	0.002	0.641	0.0003	38.7330987	-95.831885
0.000	0.000	0.012	0.0000	38.7328997	-95.832195
0.013	0.007	1.990	0.0010	38.7319921	-95.832361
0.000	0.000	0.012	0.0000	38.7231342	-95.868668
0.009	0.005	1.409	0.0007	38.7305914	-95.831388
0.008	0.004	1.163	0.0006	38.7293473	-95.825673
0.002	0.001	0.382	0.0002	38.7290067	-95.8231
0.001	0.001	0.182	0.0001	38.7270247	-95.830249
0.013	0.007	1.955	0.0010	38.7274408	-95.824839
0.000	0.000	0.036	0.0000	38.7268225	-95.824942
0.017	0.009	2.552	0.0013	38.7257598	-95.826217
0.004	0.002	0.649	0.0003	38.7242241	-95.826234
0.000	0.000	0.067	0.0000	38.7238178	-95.824524
0.001	0.000	0.139	0.0001	38.7237045	-95.824187
0.000	0.000	0.012	0.0000	38.7235937	-95.824004
0.009	0.005	1.352	0.0007	38.7232149	-95.823492
0.000	0.000	0.061	0.0000	38.7221107	-95.854549
0.001	0.001	0.214	0.0001	38.7227511	-95.823563
0.007	0.003	1.024	0.0005	38.7227133	-95.828
0.000	0.000	0.025	0.0000	38.7209025	-95.830163
0.000	0.000	0.025	0.0000	38.7207636	-95.830108
0.000	0.000	0.038	0.0000	38.7206026	-95.830045
0.000	0.000	0.025	0.0000	38.7204514	
0.000	0.000	0.025	0.0000	38.7203177	-95.829918
0.034	0.017	5.224	0.0026	38.7216809	-95.830386
0.001	0.000	0.142	0.0001	38.7200679	-95.82953
0.016	0.008	2.448	0.0012	38.7192157	-95.829182
0.001	0.000	0.101	0.0001	38.7182282	-95.828983
0.003	0.002	0.470	0.0002	38.717882	-95.829103
0.000	0.000	0.025	0.0000	38.7152045	-95.839228
0.001	0.000	0.145	0.0001	38.7152482	-95.838424
0.000	0.000	0.012	0.0000	38.715113	-95.839483
0.000	0.000	0.068	0.0000	38.7151504	-95.839368
0.000	0.000	0.036	0.0000	38.7151407	-95.839139
0.004	0.002	0.583	0.0003	38.7152134	-95.839071
0.000	0.000	0.012	0.0000	38.7150778	-95.839079
0.002	0.001	0.274	0.0001	38.7147351	-95.829396
0.001	0.001	0.178	0.0001	38.7144177	-95.839533
0.003	0.001	0.425	0.0002	38.7129443	-95.8501

0.001	0.000	0.127	0.0001	38.7122076	-95.848059
0.001	0.000	0.088	0.0000	38.7065762	-95.836018
0.001	0.000	0.130	0.0001	38.7023353	-95.836812
0.001	0.001	0.207	0.0001	38.7008386	-95.84797
0.000	0.000	0.025	0.0000	38.7006454	-95.848054
0.026	0.013	3.969	0.0020	38.7010432	-95.836878
0.000	0.000	0.012	0.0000	38.7005949	-95.836148
0.002	0.001	0.289	0.0001	38.7001889	-95.835463
0.001	0.000	0.080	0.0000	38.6975237	-95.835007
0.003	0.001	0.385	0.0002	38.6973929	-95.834061
0.022	0.011	3.345	0.0017	38.69557	-95.833423
0.001	0.001	0.166	0.0001	38.6942623	-95.833529
0.001	0.001	0.182	0.0001	38.692995	-95.83102
0.112	0.057	17.111	0.0086	38.6913851	-95.83392
0.166	0.085	25.440	0.0127	38.6912563	-95.834359
0.011	0.006	1.722	0.0009	38.6892282	-95.835124
0.000	0.000	0.025	0.0000	38.6842383	-95.835447
0.007	0.004	1.059	0.0005	38.6842546	-95.835797
0.007	0.004	1.080	0.0005	38.6835518	-95.835694
0.001	0.000	0.112	0.0001	38.6824691	-95.837781
0.028	0.014	4.249	0.0021	38.6820647	-95.836369
0.001	0.000	0.112	0.0001	38.6813367	-95.838169
0.011	0.006	1.673	0.0008	38.6807759	-95.838296
0.001	0.000	0.099	0.0000	38.6802592	-95.837914
0.001	0.001	0.183	0.0001	38.6793499	-95.836034
0.004	0.002	0.657	0.0003	38.679099	-95.83545
0.001	0.000	0.084	0.0000	38.6778344	-95.835544
0.001	0.000	0.084	0.0000	38.6776223	-95.835665
0.001	0.001	0.222	0.0001	38.6773742	-95.835633
0.012	0.006	1.830	0.0009	38.6774673	-95.833657
0.003	0.002	0.470	0.0002		-95.832475
0.004	0.002	0.541	0.0003	38.6746191	-95.836719
0.000	0.000	0.012	0.0000	38.6734023	-95.839271
0.004	0.002	0.608	0.0003	38.6733472	-95.838815
0.009	0.005	1.377	0.0007	38.6737881	-95.826542
0.039	0.020	5.968	0.0030	38.6733213	-95.827393
0.000	0.000	0.067	0.0000	38.6717754	-95.824246
0.042	0.022	6.484	0.0032	38.6715279	-95.825585
0.006	0.003	0.870	0.0004	38.6687342	-95.838196
0.039	0.020	5.921	0.0030	38.6625745	-95.835514
0.001	0.001	0.186	0.0001	38.6620353	-95.836683
0.002	0.001	0.279	0.0001	38.6619299	-95.836117
0.005	0.003	0.837	0.0004	38.6619196	-95.833923
0.001	0.000	0.137	0.0001	38.6615434	-95.826811
0.001	0.000	0.109	0.0001	38.6611086	-95.835365
0.000	0.000	0.025	0.0000	38.6604192	-95.821919
0.035	0.018	5.380	0.0027	38.6604814	-95.833764

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0.005	0.003	0.765	0.0004	38.6601261	-95.821638
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0.000	0.000	0.018	0.0000	38.6596414	-95.810402
0.001	0.000	0.101	0.0001	38.6592672	-95.811749
0.012	0.006	1.848	0.0009	38.656992	-95.852259
0.000	0.000	0.012	0.0000	38.7114216	-95.751084
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0.005	0.003	0.752	0.0004	38.7110586	-95.750741
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0.001	0.000	0.096	0.0000	38.7051781	-95.765653
0.009	0.005	1.379	0.0007	38.7050791	-95.765368
0.001	0.001	0.220	0.0001	38.7008302	-95.769906
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0.004	0.002	0.079	0.0003	38.6974209	-95.784395
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0.001	0.001	0.458	0.0001	38.6880322	-95.799487
0.003	0.002	3.183	0.0002	38.6882257	-95.799769
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0.002	0.001	0.236	0.0001	38.6846559	-95.826611
0.022	0.011	3.296	0.0016	38.6846173	-95.827064
0.013	0.007	2.036	0.0010	38.6800964	-95.830703
0.018	0.009	2.694	0.0013	38.6803623	-95.800455
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0.000	0.000	0.072	0.0000	38.6946875	-95.867871
0.006	0.003	0.882	0.0004	38.6917496	-95.887402
0.004	0.002	0.640	0.0003	38.6884838	-95.867925
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0.010	0.005	1.515	0.0008	38.6856334	-95.905417
0.001	0.000	0.108	0.0001	38.6844642	-95.906135
0.003	0.002	0.506	0.0003	38.6805297	-95.899603
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0.015	0.008	2.339	0.0012	38.6647062	-95.842451
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0.001	0.000	0.089	0.0000	38.663991	-95.842449
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783	39.0123071	-95.704222
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2361	39.0335921	-95.699787
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2687	39.0165505	-95.703864
2222	39.0327994	-95.714668
1767	38.9848044	-95.715477
3055	39.02869	-95.702179
16	38.988182	-95.71465
179	38.9690211	-95.69754
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1247	38.9677888	-95.699114
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1983	38.9217024	-95.771388
1851	38.9354736	-95.771742
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2949	38.9130467	-95.771099
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702	38.8932548	-95.791312
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808	38.8938104	-95.789458
86	38.8852553	-95.796127
2346	38.8965596	-95.8114
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749	38.8840695	-95.790247
1613	38.8832403	-95.792554
24	38.8929751	-95.792426
2828	38.915134	-95.798144
2020	30.313134	33.730144

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1344	38.8747524	-95.762806
2274	38.8919758	-95.734415
5059	38.8674497	-95.792874
2017	38.8702699	-95.773023
3807	38.9034081	-95.718056
2448	38.9074142	-95.709697
1663	38.8792845	-95.758102
3170	38.900674	-95.729093
309	38.8693263	-95.776173
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325	38.8577706	-95.846834
1925	38.8700606	-95.854797
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3300	38.8182129	-95.866506
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1870	38.8035811	-95.860719
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106	38.6787403	-95.85227
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\$	9,320	
\$	14,229	
\$	18,735	
\$	12,349	
\$	4,221	
\$	8,539	
\$	22,593	
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\$	25,328	
\$	19,192	
\$	9,429	
\$	21,861	
\$	11,994	
\$	7,198	
\$	26,067	
\$	16,018	
\$	1,314	
\$	14,863	
\$	37,514	
\$	747	
\$	8,839	
\$	18,730	
\$	10,928	
\$	9,319	
\$	12,477	
\$	31,073	
\$	14,236	
\$	22,146	
\$	25,196	
\$	68,144	
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      1,462
         25
        830
        172
        265
$
        773
      1,943
$
      1,096
      2,122
$
$
$
        456
      2,368
        190
        531
$
        416
        459
$
$
      1,220
      2,634
$
      3,529
$
$
$
      6,803
      1,579
        909
$ $ $ $ $ $ $
        220
      6,752
        546
        826
         99
      1,637
      1,368
      1,158
$
        352
      2,399
$
$
         85
      1,272
```

```
$
$
       1,086
         995
$
$
$
$
       2,420
         154
       1,892
         856
       2,077
$
$
$
       1,865
         402
       3,894
$ $ $ $ $ $ $
       1,922
         272
          97
         812
         234
         636
         399
       4,419
$
$
$
         552
         112
       3,650
       1,540
$
$
$
       3,206
       2,147
         799
         915
$
$
$
       1,231
         185
       1,110
         901
$
$
$
       2,934
       1,109
         180
       1,977
$ $ $ $ $ $ $ $ $ $ $
         233
       2,025
         255
         373
       1,284
         496
         796
       1,055
       2,715
         489
       1,473
         211
```

```
$
$
       2,123
       2,907
$ $ $ $ $ $ $
         224
         572
         348
         105
         525
         712
         767
         530
$
$
$
$
       2,938
       1,904
       1,699
          18
       4,227
$
$
$
       5,709
       3,119
       3,220
$ $ $ $ $ $ $
       5,253
       1,089
         154
       1,173
         386
         882
         392
         448
$ $ $ $ $ $ $
       1,892
       1,101
         465
         780
         335
         154
         249
         235
$
         545
       1,543
$
       1,580
       1,325
$ $ $ $ $ $ $
       1,048
         701
       2,395
         325
       5,938
         581
       2,108
         411
```

```
$
$
         297
         752
$ $ $ $ $ $ $
       3,014
       3,712
         925
         447
       1,758
         917
       1,101
         228
$
       4,306
       3,612
$
$
       1,621
         671
$
       2,884
$ $ $ $ $ $ $ $ $ $
       3,665
       4,296
         423
         154
          12
         192
         655
       1,290
         939
         154
       3,853
$
$
$
       2,746
         448
         766
       4,703
$
$
$
       3,461
       2,098
       2,783
       1,762
$ $ $ $ $ $ $
         225
         384
       6,218
         486
       1,769
         270
       2,101
       6,468
$
$
$
       2,015
         980
       3,592
       1,803
```

```
$
$
       3,681
         507
$ $ $ $ $ $ $
       2,295
         356
         685
       4,597
         914
         158
         469
         224
$ $ $ $ $ $ $
         224
         112
         157
         383
         185
         840
       3,084
       2,563
$ $ $ $ $ $ $
       1,314
       3,158
         479
       1,677
         773
         510
         246
         143
$
       3,940
       2,909
$
$
$
$
$
       1,524
          18
       1,907
         963
       1,379
         485
$
       1,709
         959
$
$
       3,316
       3,820
$
       1,139
$
$
$
       2,087
       1,470
       4,063
$
$
$
       2,994
         204
         729
       4,163
```

```
$ $ $ $ $ $ $ $ $
       3,511
           97
          102
         464
         492
         302
       1,320
         165
         149
       1,155
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       1,249
       1,367
         675
       1,201
         252
         370
         441
          267
       1,771
           12
       2,655
       1,571
         495
         696
       2,510
         472
$ $ $ $ $ $ $
         898
       1,467
         295
         707
       2,668
       1,598
        1,881
         965
$ $ $ $ $ $ $ $ $ $ $
         480
       1,500
       1,003
         537
       1,620
       3,597
         258
       1,524
       1,878
         348
        3,245
          276
$
```

```
$
$
         534
       3,565
$ $ $ $ $ $ $
       2,654
       1,221
         222
         222
           12
         310
       1,867
         124
$ $ $ $ $ $ $ $ $ $ $
       3,772
         818
         799
       1,480
         886
         350
         685
         681
         689
         150
       1,463
       1,511
$
         247
$
$
$
       2,183
       2,748
       3,887
$
         558
       2,219
$
$
       3,073
         378
$
       1,955
$
$
$
       2,486
       2,347
       3,603
$ $ $ $ $ $ $ $ $ $ $
         773
       3,609
       4,376
         254
         592
         179
       1,868
       1,520
         176
         419
         668
         359
$
       1,404
```

```
$
$
         710
       1,559
$
       1,527
       3,796
$
$
       2,104
       1,538
$
       1,446
$
$
$
         805
       1,684
       4,204
$
$
$
$
       2,582
         985
         912
       8,785
         316
$
$
$
       4,954
       1,044
         519
$
$
$
       3,030
         511
       1,134
         578
$
       1,744
$
$
$
       2,302
         560
       2,682
$
$
$
$
         257
       1,901
         258
         105
         696
$
$
$
       1,455
       2,512
         659
$ $ $ $ $ $ $ $ $ $ $
       1,083
       3,000
         325
         558
          95
         199
       3,657
       1,112
         280
       4,385
         303
       3,947
$
```

```
$
$
         145
       1,293
$ $ $ $ $ $ $
         553
         405
       2,077
       2,226
         475
       2,580
         400
         575
$ $ $ $ $ $ $
         875
         200
       3,574
       1,678
         150
         353
         302
         765
$ $ $ $ $ $ $
       1,854
       1,192
         661
         176
         577
         197
       1,367
       1,011
$
       1,024
         825
$
$
$
$
$
       2,692
       1,045
         259
         796
       1,237
       2,789
$
$
$
         437
         508
         881
       1,968
$
$
$
       1,126
         827
       2,302
         969
$
$
$
       2,756
       2,395
         369
         522
$
         257
```

```
$
$
      3,900
      1,144
$
$
$
        855
         279
        620
      3,051
$
$
$
       3,921
        383
        180
      2,145
$ $ $ $ $ $ $
         611
         685
         411
          35
      1,363
        690
          90
        862
$
$
$
         593
          90
      1,291
        373
$
      1,276
$
$
$
      2,047
      1,962
        697
$
        282
      1,127
$
$
      1,224
      2,498
$
       2,565
$
$
$
        150
       2,842
      1,568
$
      1,055
      4,399
$
$
        454
      3,708
$
$
$
      2,549
      6,753
          12
      1,174
$
      1,959
      4,577
$
$
       1,628
        150
```

```
$
$
      2,065
      3,150
$
      2,840
         90
$
$
      1,012
      4,952
$
      2,313
$
      1,845
      2,202
$
      6,146
$
      4,142
$
      1,856
$
$
        185
      4,051
$
$
$
      1,073
        984
        348
        105
$
        572
        572
$
$
      5,560
      1,084
$
        852
$
$
$
      1,559
      1,847
```

2,086

1,353

2,196 1,629

2,849

\$ \$ \$

\$

\$

\$

\$ \$ \$ \$ \$ \$ \$

\$ \$ \$

\$

```
$
$
         768
       1,540
$ $ $ $ $ $ $
         810
       3,158
         991
       2,589
         621
         966
       3,035
       2,416
$
       1,255
       2,438
$
$
$
$
$
         258
       1,559
       1,633
         628
         844
       1,728
$
       1,425
       3,105
$
         147
       2,719
$
$
$
       2,686
          90
         170
       1,615
$ $ $ $ $ $ $
       1,287
         105
         453
       1,333
       1,646
         528
         255
       3,385
$ $ $ $ $ $ $ $ $ $ $
         105
         849
       1,240
         177
         236
         866
         261
       1,685
         358
         124
       1,189
       2,514
$
         651
```

```
$
$
       2,273
           87
$ $ $ $ $ $ $
       1,115
         659
       1,033
       1,258
         423
       1,808
       1,550
         490
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       2,692
         498
       1,410
         671
       1,052
         179
       2,590
         416
         356
         334
         112
       1,437
         547
       1,512
         229
         445
$ $ $ $ $ $ $
       4,408
         463
         113
         890
         762
         744
       1,317
         555
$ $ $ $ $ $ $ $ $ $ $
       1,102
         992
       2,977
         193
       1,285
         405
       3,784
         150
         511
         507
       1,523
       2,185
$
           97
```

```
$ $ $ $ $ $ $ $ $
         165
         420
         727
         374
         105
         242
         172
       2,413
           85
         871
$
       1,936
       1,728
$
$
       1,287
       1,923
$
       1,666
$
$
$
         190
       4,273
       1,074
$
         297
       1,412
$
$
$
$
$
       3,056
         654
       2,798
       2,115
         152
       2,304
$ $ $ $ $ $ $
       2,391
         464
       2,349
         621
         257
         934
       2,812
       1,029
$ $ $ $ $ $ $ $ $ $ $
       1,201
         826
         300
         205
         706
         328
         888
       2,537
           95
         110
       1,623
       3,644
$
```

```
$
$
      3,655
        809
$
        105
      1,102
$
$
      3,733
        542
$
      1,032
$
$
$
      2,580
      2,205
        323
$
$
$
        274
        634
      1,619
        385
$
      2,081
$
$
$
      2,552
        976
        488
$
$
$
        207
      2,062
        504
        664
$
        229
$
      4,389
$
      1,352
$
      3,092
$
$
      1,292
      2,694
$
$
        694
      2,866
$
      1,391
$
      1,040
$
      2,533
$
      3,218
$
        790
      2,450
$
$
        690
      1,739
$
$
$
      1,809
      1,185
        822
        510
$
$
$
      1,023
      1,290
         18
      2,081
$
```

```
$
$
       1,687
         232
$ $ $ $ $ $ $
       1,577
         154
         264
         127
       2,095
         948
       2,937
       2,281
$ $ $ $ $ $ $
       2,456
         865
         570
         176
         494
         149
         895
       3,378
$$$$$$$$$$$$$$$$
         339
         320
       2,436
         416
         644
         268
         154
         260
          92
         112
         165
       2,136
         582
       1,778
       2,602
       2,580
$
       5,050
       2,883
$ $ $ $ $ $ $ $ $
       2,969
         120
         243
       3,615
       2,627
         300
         125
         521
         522
         110
$
```

```
$
$
         873
         700
$ $ $ $ $ $ $
         658
       2,413
       2,670
         323
         821
       1,460
         547
       2,021
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       2,188
       2,903
         758
         969
       1,119
         811
           99
         298
         398
         897
         925
         129
         518
       2,283
         521
         200
$
         493
       3,137
$
         476
       1,018
$
       3,354
$
$
$
       1,629
       3,914
         426
$ $ $ $ $ $ $ $ $ $ $
       2,137
         666
         317
       4,017
         886
       1,891
       1,708
         165
       2,198
         964
         312
         939
$
       1,060
```

```
$
$
       1,056
         287
$ $ $ $ $ $ $
       3,100
         120
         105
         120
       4,466
         715
       3,760
       2,763
$ $ $ $ $ $ $
         678
         903
       3,738
       1,061
         977
         525
         683
       2,215
$
       1,246
       1,655
$
$
       1,279
       1,100
$
$
$
         476
       1,916
         215
         946
$
       2,308
       2,157
$
$
         227
       2,611
$
       1,838
$
$
$
       2,973
       1,009
          95
$
$
$
       1,322
       1,083
         147
       3,583
$ $ $ $ $ $ $
         801
       2,732
         515
       1,587
         329
         806
         330
         294
```

```
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
         423
         553
         464
       2,314
         120
       2,001
         105
       1,104
         293
         733
       1,276
         205
         681
         398
       2,747
       3,535
         306
       1,006
$ $ $ $ $ $ $
         963
       2,811
         816
         892
         531
         208
         822
       2,032
$$$$$$$$$$$$$$$$$$$
       1,956
         483
         130
         945
       2,979
         704
         336
       1,883
         261
         620
         360
         708
       1,708
         242
       1,817
       2,892
         842
       1,189
       2,102
         923
$
         443
```

```
$
$
      1,261
       434
$ $ $ $ $ $ $
      2,275
      1,195
      1,827
      1,513
       428
       155
       117
      1,949
2,023
        274
        286
        241
       735
        286
        562
        265
      1,665
       820
      1,099
        312
       100
      4,711
        378
      5,050
       371
       384
      2,883
      2,922
       380
       501
      1,713
       246
        892
       594
        510
        255
         12
      1,097
      1,066
      1,131
        149
       384
        543
        155
```

```
$
      1,578
$
      3,819
$
$
$
      2,303
        242
        303
      1,916
$
      1,325
$
$
$
        353
        674
      3,133
$
      2,193
$
      1,112
$
$
       1,481
      1,300
$
        623
$
$
$
      1,337
         942
      3,677
$
$
$
         616
         876
        924
      2,250
$
       2,046
$
$
$
      2,934
         108
         788
$ $ $ $ $ $ $
      2,552
      6,475
        546
        424
      4,556
        543
      1,501
        365
$
      2,984
      1,087
$
$
       1,043
      1,812
$
$
$
        352
      1,620
      2,763
        108
$
$
$
      9,879
      1,414
         696
         771
```

```
$
$
         219
         195
$
$
$
         619
       1,238
         480
       1,210
$
$
$
       5,827
       4,280
         793
       3,040
$ $ $ $ $ $ $
       1,417
       4,219
         541
       1,282
         201
         784
       1,015
         165
$ $ $ $ $ $ $
         699
       1,410
         367
         935
         768
         651
       1,003
       1,592
$ $ $ $ $ $ $
         262
         671
         154
       1,532
       2,354
       2,517
         889
         879
$ $ $ $ $ $ $ $ $ $ $
       1,005
       1,513
         378
         150
       1,345
         703
       1,707
       3,488
         741
       1,141
           95
       4,618
$
         762
```

```
$
$
$
$
$
         138
       1,172
         551
         155
       1,194
       2,298
$
$
$
       2,619
         125
         739
       2,318
$ $ $ $ $ $ $
       2,845
       2,043
         454
         409
       3,258
         395
         927
       1,290
$ $ $ $ $ $ $ $ $ $ $
         542
         515
         486
       1,759
         658
         605
         440
         199
         150
         983
         579
       1,922
$
$
$
       1,492
       3,877
       3,589
         285
$
$
$
         519
         685
       2,188
       1,084
$
$
$
         359
       3,675
       2,602
       1,576
$
$
$
       2,289
         159
         944
         325
$
       1,053
```

```
$
$
         483
       1,566
$ $ $ $ $ $ $
       1,843
         258
         511
         395
       1,739
         138
         197
       3,388
$
$
$
          18
         526
       1,711
       3,218
$
       1,183
$
$
$
       1,164
       2,488
         468
$ $ $ $ $ $ $
       1,742
         489
         448
       7,857
         147
         567
       1,049
          12
$$$$$$$$$$$$$$$$$$$
       1,029
         732
         903
       2,056
       2,303
         130
         170
         879
         566
         115
         309
         515
         591
       2,889
       2,511
         105
       1,049
         225
       3,959
         735
$
```

```
$
$
      3,188
      1,031
$
        480
      1,510
$
$
      3,291
        255
$
      5,697
$
$
$
      3,713
      1,233
        366
$
$
$
        870
        687
      1,124
        656
$
      1,744
$
      5,110
      2,278
$
      3,186
$
         97
      1,191
$
$
      2,971
      1,892
$
      1,171
$
      1,155
$
      3,392
        409
$
        657
      2,047
$
$
      1,366
      1,484
$
      1,210
$
      2,632
$
      1,415
$
      3,808
$
      1,201
        601
$
$
$
$
$
      1,669
      1,089
        728
        636
      1,987
         99
$
      3,741
      1,425
$
$
        234
```

3,264

3,513

\$

```
$
$
       1,638
       2,128
$ $ $ $ $ $ $
       1,687
       2,089
         867
         431
         732
       1,883
       1,321
         432
$ $ $ $ $ $ $
         593
       4,259
       5,718
         451
         313
          25
         654
         990
$
         844
         473
$
$
       1,135
       1,243
$
         500
$
$
$
       1,121
       2,450
         677
$ $ $ $ $ $ $
       1,976
         284
         744
       6,904
         912
         681
         487
       3,585
$
       2,131
       2,086
$
$
$
$
$
       1,554
         868
       2,609
       1,358
         385
       1,364
$
         110
       3,306
$
$
       5,843
       1,536
```

```
$ $ $ $ $ $ $ $ $
          176
          147
          765
          896
        2,578
        1,007
          398
        1,010
        2,063
          818
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
          246
        1,435
          512
        1,020
          870
          938
        1,492
          951
          525
          330
        3,760
        3,049
          613
          162
           92
        1,352
$
        1,954
        3,013
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
        1,644
          621
        1,185
           12
        2,577
          791
        1,125
          670
          394
          741
          514
        1,650
          506
          325
        5,608
          855
          880
        1,295
$
```

```
$
$
        174
        466
$
      1,116
      2,959
$
$
        458
      1,593
$
       1,387
$
$
$
      3,809
        611
        129
$
        165
      2,433
$
$
      2,962
      1,135
$
       1,403
$
$
$
      2,493
       1,052
        172
$
        232
      2,542
$
$
$
$
$
      2,540
      4,337
        483
          87
          97
      1,767
$
        597
      1,492
$
$
      2,365
      2,649
$
       2,352
$
$
$
      4,581
       3,834
        173
$
        242
      1,921
$
      2,481
        222
$ $ $ $ $ $ $
      3,147
      3,318
       2,109
        542
        705
        720
       1,640
       1,723
$
        952
```

```
$
$
       1,974
         892
$
$
$
         391
         896
         495
       1,204
$
       4,100
$
$
$
       2,544
        105
       2,633
$
       1,059
       3,388
$
$
$
$
$
       6,194
        761
         440
       1,083
       1,967
       2,831
$
$
$
         100
         447
         715
       2,266
$
       1,894
$
$
$
       1,367
        135
       2,330
$
       2,495
       2,547
$
$
$
$
$
       1,525
         623
         132
       5,953
         819
         203
$ $ $ $ $ $ $ $ $ $ $
         277
       1,672
         418
         925
         459
       2,885
         472
       1,515
         706
       1,494
         363
         518
```

```
$
$
      1,924
         12
$ $ $ $ $ $ $
        786
      3,684
        909
        894
        342
        249
        520
      1,318
549
        810
        250
        447
        293
      1,387
        442
      3,713
        913
        882
        392
      5,304
      1,945
      2,268
        441
        462
        390
        589
      1,360
      1,575
$$$$$$$$$$$$$$$$$
      2,647
      1,745
      4,777
         87
        510
        984
        273
      1,915
        621
      1,202
      2,253
      1,843
        418
        192
        112
        170
         12
```

```
$
$
       2,986
         388
$ $ $ $ $ $ $
         155
         892
       2,419
         657
       1,035
         712
         675
       2,879
$
$
$
$
         891
          18
       2,685
       2,236
         705
$
$
$
       1,484
       1,769
         401
$
       1,841
       1,827
$
$
$
$
$
       2,975
         377
         585
         808
         957
       2,183
$ $ $ $ $ $ $
       2,383
         579
       1,362
       3,580
         225
         885
       1,602
       7,914
$ $ $ $ $ $ $ $ $ $ $
       3,584
         312
         325
         733
       1,009
         174
       3,853
         581
       1,141
         719
         175
         353
```

```
$ $ $ $ $ $ $ $ $
         18
        387
        186
        527
        236
        321
        105
        298
        199
        633
2,670
      3,267
      1,027
        313
       129
       984
        198
       173
       739
      2,898
      1,306
      1,913
      1,296
      1,596
        154
        204
      4,675
        105
        160
       710
       526
      1,230
       696
      1,330
       137
       122
      1,108
       137
       845
        966
      1,880
         90
        250
        355
        353
        844
$
      1,412
```

```
1,513
        60
       105
       714
     1,641
     2,712
       204
       200
       816
       331
       582
        90
     3,907
       682
     2,346
        99
       129
       102
       864
       737
       246
       150
       339
       795
     1,040
       328
       297
       816
     2,118
       453
     1,595
       869
       614
     2,093
       130
       578
       582
     2,273
     1,501
       179
        12
       197
       227
       578
       826
       653
```

```
$
$
      1,192
      1,561
```

- \$ 1,941
- 3,134
- 603
- \$ 2,605
- 3,874
- \$ \$ \$ 50
- 2,598
- 211
- 1,049
- 95
- 147
- 1,177
- \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ 453
- 703
- 1,074
- 172
- 2,336
- 677
- 4,062
- 1,018
- 1,013
- 1,624
- 800
- \$ \$ \$ 963
- \$ \$ \$ \$ \$ \$ \$ 1,652
- 779
- 2,521
- 853
- 1,158
- 1,763
- 1,398
- 2,635
- \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ 4,431
- 1,458
- 430
- 507 919
- 949
- 507
- 3,992
- 823
- 1,964
- 498
- 2,989
- \$ 1,326

```
$
$
        254
        204
$
        519
      2,565
$
$
      1,385
      1,361
$
      1,090
$
$
$
      2,575
          90
        345
$
$
$
        218
        599
        366
      3,605
$
      2,050
$
$
$
        155
      2,884
      2,356
$ $ $ $ $ $ $
        377
        190
        931
      1,207
        998
        285
      1,879
        141
$
$
$
$
        868
        824
      2,947
        155
        648
$
$
      4,050
      1,843
$
      1,030
$
      1,653
      1,652
$
      1,774
          18
$
$
$
       1,101
      5,299
        448
      2,264
$
        219
      1,181
$
$
      1,437
        400
```

```
266
        968
        776
      4,772
        230
        105
        398
      2,489
        180
        309
      1,299
        591
        866
         12
         87
        611
         12
        510
         88
      1,843
      2,193
        913
      1,221
      2,106
        739
        839
$ $ $ $ $ $ $
      2,316
      1,977
      2,474
      1,911
        750
        195
        148
        342
$ $ $ $ $ $ $ $ $ $ $
        921
      1,406
      1,027
        379
        712
        484
      1,536
      1,883
        459
      1,203
        506
        836
$
```

```
$
$
        953
        931
$$$$$$$$$$$$$$$$$$$$$$
      1,006
        348
      1,351
        811
      1,368
        267
      2,372
        378
        756
      1,459
        793
      2,006
      1,048
      1,418
        569
        102
        174
      2,433
        122
        811
      2,605
          99
      2,476
      1,453
$$$$$$$$$$$$$$$$$$$
        159
      2,311
        962
      1,234
        879
      2,158
        684
      4,431
        398
          12
        112
         97
      1,876
        843
        667
        875
      1,824
        974
      1,999
        404
$
```

```
$ $ $ $ $ $ $ $ $ $ $
           18
         302
          138
           85
       1,250
          261
         552
         228
         264
         716
         294
       2,428
$
$
       4,342
       1,228
$
       1,581
$
$
$
       4,081
       1,038
       1,416
$ $ $ $ $ $ $
       1,066
       2,063
         454
         129
       1,841
           85
       1,737
         210
$ $ $ $ $ $ $
         981
       2,423
         448
       1,050
       3,698
         178
         807
       1,343
$ $ $ $ $ $ $ $ $ $ $
       1,339
         438
         220
         120
       1,200
       3,574
       2,091
       1,448
         222
         417
         834
         237
$
       3,225
```

```
$
$
       1,663
         515
$
       2,922
       1,121
$
$
$
$
$
       1,695
       1,622
         498
       1,310
         154
       1,450
$ $ $ $ $ $ $ $ $ $ $
       2,839
         125
       2,133
         105
       2,000
       1,971
           95
         328
         766
         582
         948
       1,266
$
$
$
       2,275
       4,290
         527
         339
$
       1,022
       2,319
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
         853
       1,662
         675
       2,008
         262
         449
           12
         681
         123
         355
          260
         628
          265
         890
         702
         148
       1,246
       6,529
```

```
$
$
       1,684
         702
$
$
$
$
       1,540
         303
         639
         105
         323
$
$
$
       1,802
       1,912
         503
$
       1,159
         735
$
$
       1,189
       2,996
$
       2,772
$
$
$
       3,129
         379
       2,219
$
         214
       3,080
$
$
       1,966
       5,805
$
$
$
         685
         792
       2,083
       1,210
$ $ $ $ $ $ $
         870
       1,266
         526
         197
       2,428
         552
       1,181
       1,873
$ $ $ $ $ $ $
       1,842
         165
       1,938
         807
         690
       1,165
         727
         971
$
$
$
       3,151
       1,657
       2,376
         195
```

```
$
$
       1,006
        377
$
$
$
       1,067
        129
       1,802
        791
$
       2,840
$
       1,181
       2,127
$
       2,622
$
$
$
       1,629
        249
        193
       2,212
$
       2,057
$
$
$
        495
       3,199
       1,719
$
$
$
        482
       2,595
        315
       1,127
$
$
$
        115
       2,628
       2,467
        928
$
       1,912
       1,738
$
$
        879
       1,858
$
       1,284
$
$
$
        531
       5,754
       3,373
$ $ $ $ $ $ $ $ $ $ $
         635
        160
         165
       2,468
         366
        488
         583
       1,492
        105
        629
       2,193
         220
```

```
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       4,077
         724
         502
         817
         549
         909
           18
         288
         132
         105
         856
         855
       1,462
         320
       3,723
       1,446
         477
         299
$ $ $ $ $ $ $
         162
       1,435
         366
       2,333
         785
         657
         122
         766
$ $ $ $ $ $ $
       2,696
       1,156
         337
           99
       5,049
       1,908
           18
         406
$
       1,033
       2,693
$
       4,154
       3,420
$ $ $ $ $ $ $
       1,726
       1,149
         555
       1,643
         342
       1,088
         792
       3,074
$
```

```
$
$
          397
          353
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
          657
       2,155
          644
          544
       5,230
          695
          148
           35
       1,573
          326
        2,145
       5,938
          228
       1,728
       1,616
          289
$ $ $ $ $ $ $
          170
       2,967
       2,421
         154
       2,434
       1,134
          264
          597
$ $ $ $ $ $ $
       1,999
          403
        2,846
          505
          469
          816
       3,071
          409
$ $ $ $ $ $ $ $ $ $ $
          756
       1,124
          459
          838
       1,985
          381
          516
          515
       3,281
       1,601
          676
        2,810
$
```

```
$
$
       3,803
         123
$
$
$
$
       6,244
         761
       3,545
       2,825
         124
$
$
$
       2,700
       3,438
       1,809
$ $ $ $ $ $ $
         634
         625
         949
         762
         529
         527
         115
       1,582
$ $ $ $ $ $ $
       2,284
         813
         141
         793
       2,489
         508
       3,046
         390
$ $ $ $ $ $ $
       2,165
         336
         498
       2,668
         129
         579
       2,882
         895
$
       1,077
       1,530
$
       2,566
       2,330
$
$
$
       2,224
         105
         175
         449
$
       1,339
       2,158
$
$
       1,229
       2,547
```

```
$
$
       1,298
         304
$ $ $ $ $ $ $
         120
         555
         162
       2,724
         249
         802
       2,306
       1,331
$
$
$
       1,150
         453
       3,090
         806
$
       3,610
$
$
$
       1,674
         186
       1,611
$ $ $ $ $ $ $
         839
       4,001
         442
         935
       2,186
         300
         999
       3,573
$
       1,247
       1,679
$
$
$
$
$
        534
       2,121
         965
       2,074
       1,495
       1,554
$
         909
       1,680
$ $ $ $ $ $ $ $ $
       2,835
       3,170
          18
       2,508
          87
         760
       2,435
         619
       1,630
       3,314
```

```
$ $ $ $ $ $ $ $ $
         566
         973
         999
         122
         910
       3,457
         747
        570
        473
       2,663
$
$
$
       3,166
        305
       5,253
        184
$
       1,515
$
$
$
        674
       4,903
       1,868
$
       3,059
         644
$
       5,634
        665
$
$
$
       1,853
       2,236
         930
        732
$
        270
       3,823
$
$
       4,269
       1,342
$
$
$
       1,478
       1,799
         766
         696
$
$
$
         867
         448
         882
        893
$
$
$
       1,024
        958
       1,597
       2,015
$
       1,615
       1,121
$
$
       1,086
       1,166
$
```

```
$
$
        525
        802
$$$$$$$$$$$$$$$$$$$$$$
      1,919
      1,984
      3,921
        905
      2,743
        197
        491
      1,783
         315
        130
         125
          85
        378
         120
      3,209
          85
         838
        487
         821
      2,926
          85
      2,248
      1,310
        398
$$$$$$$$$$$$$$$$$$$
        419
      2,458
      1,213
        473
        963
        110
      2,836
        890
      1,905
          90
        328
      2,779
       3,273
      1,061
         124
        364
        763
      3,601
        480
      1,102
$
```

```
$
$
       1,200
         270
$ $ $ $ $ $ $
       1,208
         130
         588
       2,494
         947
       1,512
       1,758
         168
$ $ $ $ $ $ $
         897
         814
       1,857
         565
       1,561
         520
         750
         246
$
$
$
       3,760
         921
         629
       3,049
$
$
$
       3,107
         771
       1,011
       2,110
$ $ $ $ $ $ $
         175
         311
         721
       1,017
         746
       1,367
       2,243
         369
$ $ $ $ $ $ $ $ $ $ $
         705
       2,087
       1,524
         165
       1,980
         281
       1,099
           95
       2,371
       5,295
         334
         634
```

```
$
$
     2,724
     3,341
1,492
     1,390
       568
       403
     1,860
       847
       576
     2,990
       428
     4,011
       453
     1,292
       229
       184
     1,790
       271
       977
       252
       129
       373
       536
        99
       124
     1,142
       768
     3,119
       105
       387
       479
       396
       856
       537
       233
       716
       316
       712
     1,773
       124
       943
       246
     1,433
     1,681
       969
     1,347
```

```
$
$
       1,367
         296
$ $ $ $ $ $ $
       2,394
         767
         928
         747
         129
          12
         112
         132
$ $ $ $ $ $ $
       3,324
         141
       1,228
         381
         105
         830
       1,722
       1,243
$
       1,548
       1,563
$
       1,462
       1,564
$
$
$
       1,920
         285
       2,032
         316
$ $ $ $ $ $ $
         176
       1,323
       2,459
          97
       3,930
       1,001
         514
         949
$ $ $ $ $ $ $ $ $ $ $
         130
       1,103
       1,651
         127
         198
       1,976
       3,876
       1,278
         179
         154
         105
         657
```

```
$
$
       1,679
       1,627
$ $ $ $ $ $ $
         731
         836
         359
       2,349
         662
         214
       1,683
       2,264
$
$
$
         105
         907
       2,850
       2,589
$
       1,186
$ $ $ $ $ $ $
       3,733
       3,326
       4,200
         465
          97
          35
       3,102
$
$
$
       2,513
         633
       1,477
       1,084
$$$$$$$$$$$$$$$$$$$
         497
         457
         541
       2,014
       3,625
         589
         422
         459
         422
         298
         659
         265
         224
         357
         704
         385
       1,756
         521
         186
       1,309
$
       3,384
```

```
$
$
         120
       1,230
$ $ $ $ $ $ $
       1,093
       1,176
         105
         429
       1,041
         842
         154
       1,386
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       1,194
         335
       3,655
         329
         465
       3,028
         864
         125
       2,171
         553
       1,753
       1,747
         513
           18
       2,230
       1,311
$$$$$$$$$$$$$$$$$$$
         664
       3,976
         575
       4,355
         695
         188
         193
         105
         756
           18
       2,376
         429
         359
         541
          88
         295
          143
         670
       1,095
         158
```

```
$
$
       2,253
       1,246
$ $ $ $ $ $ $
       1,090
       1,897
       2,795
       1,261
         158
         202
          88
       2,916
$$$$$$$$$$$$$$$$$$$$$
       1,529
       2,144
       1,752
          90
         935
       1,487
       2,211
       2,142
         185
          85
         412
       1,420
         143
          95
       1,793
       1,170
          85
         222
         261
         249
         115
         760
         210
         791
$ $ $ $ $ $ $ $ $ $ $ $
         145
       3,382
       1,156
         228
         192
         132
       1,963
       1,641
          90
       1,115
         290
          18
```

```
$
$
         115
       1,410
$
$
$
$
       1,178
       1,095
         201
         775
       6,555
$
$
$
       1,193
       3,815
       4,550
$ $ $ $ $ $ $
         115
         634
          88
         229
         179
       1,257
         896
         100
$
       1,367
       2,495
$
$
       3,035
       1,183
$
       1,442
$
$
$
       1,884
       2,276
         225
$ $ $ $ $ $ $
         362
         176
       1,297
         123
         831
         587
         387
       1,660
$ $ $ $ $ $ $ $ $ $ $
         597
       1,520
         693
       1,131
         838
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       1,137
         211
       2,120
       2,627
         445
       1,125
$
```

```
$
$
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$ $ $ $ $ $ $
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         124
         912
         949
         410
         235
       1,543
         739
$
$
$
         695
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         587
         428
$
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$
$
$
       2,627
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$ $ $ $ $ $ $
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       2,150
         473
         751
         726
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       3,363
       5,870
$
       2,844
       1,713
$
$
$
$
$
         695
       1,161
         852
         917
       2,320
       1,679
$
         342
       2,349
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$
$
$
$
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       1,647
       2,506
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$
$
         702
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         123
         402
$
```

```
$ $ $ $ $ $ $ $ $
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         561
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         305
$ $ $ $ $ $ $
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         273
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$
       2,404
       5,811
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       3,088
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$
$
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       2,019
         826
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         387
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       1,197
$ $ $ $ $ $ $
         685
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         246
         286
         232
         751
         105
         456
$
$
$
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       1,314
       1,930
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$
```

```
$ $ $ $ $ $ $ $ $
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        1,408
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        1,125
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          589
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          997
        1,404
          170
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          105
          240
          438
          105
          467
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          184
$
```

```
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$
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$ $ $ $ $ $ $
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         519
         439
       2,690
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$
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$
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$
$
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         102
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$
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       1,187
$
$
$
       2,420
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         525
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$
$
$
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         313
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$ $ $ $ $ $ $
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         979
         120
       3,362
         125
       1,322
```

```
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          723
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          200
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          141
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          685
          309
```

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$
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$
$
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       1,380
$
       3,028
$
$
$
       1,749
       1,345
         981
$
$
$
$
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       5,307
       1,100
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         145
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       2,281
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$
$
$
$
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       1,026
       4,043
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$
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```

```
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         579
       1,309
         639
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       1,930
       1,723
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$
$
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         309
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       1,010
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$
$
       1,140
       1,506
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$
         160
         201
$
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       1,164
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$
$
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       2,732
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         147
         798
$
```

```
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$
$
$
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       1,459
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       1,536
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$
$
       2,615
       1,050
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         884
         127
       1,443
           18
         960
         236
         100
         309
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         375
         574
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       1,614
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         762
         402
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         307
       1,903
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$
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         120
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         822
         193
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$
```

```
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         634
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       1,405
         352
       2,443
         367
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         565
         969
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         393
         822
$
         282
       3,369
$
$
$
$
$
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       1,231
         576
       1,219
         198
         485
$$$$$$$$$$$$$$$$$$$
         867
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       3,605
         772
       4,304
       1,178
         125
       1,305
          85
         189
         428
       1,095
         799
       3,929
         519
         937
       3,859
       2,452
         462
       4,051
$
         942
```

```
$
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$
      1,166
      5,348
$
      3,424
$
      2,404
$
      3,334
$
      1,431
$
$
$
$
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      2,372
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      1,563
$
$
$
        346
      1,166
         99
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      2,479
      2,805
$
$
      2,159
      1,352
$
      2,453
$
      2,032
$
      1,410
      1,503
```

\$ \$

\$ \$ \$

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\$ \$

\$

564 858

140 1,059

1,229 688 328 3,039

2,028 4,138 803 452

1,522 562

1,753 2,476

```
$
$
      3,065
        200
$
$
$
      1,494
        454
        864
      4,095
$
      2,477
$
$
$
      1,552
        567
        552
$
      1,379
      2,840
$
        354
      5,168
$
        976
$
$
$
      1,005
      1,620
        812
$
        843
      1,657
$
$
      2,053
      1,524
$
        634
$
$
$
      1,128
      1,303
        732
$
$
$
        331
        881
        366
      1,221
$
      1,110
$
$
$
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      1,565
      3,643
$
        282
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$
$
        864
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$
      3,458
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$
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$
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$
$
      1,355
      3,836
```

```
$ $ $ $ $ $
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         897
         273
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       4,105
         618
$
$
$
       2,344
       1,167
       1,213
$
       2,044
       1,470
$
       1,753
         154
$
       2,487
$
$
$
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         492
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         336
       2,882
         708
         436
       2,218
       1,518
         621
$
$
$
         942
       2,296
         401
         647
$
       3,924
$
$
$
       3,099
       1,871
       2,798
$ $ $ $ $ $ $ $ $ $ $
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         337
       1,616
         915
         215
         138
          18
         704
         486
         963
       1,753
       1,370
```

```
$
$
         975
       1,228
$
       2,928
       2,368
$
$
       3,135
       2,019
$
$
$
       1,906
          12
         282
       2,362
$ $ $ $ $ $ $
         168
         445
       1,108
       1,898
         473
         718
       1,137
       1,500
$
       1,826
       4,205
$
$
$
$
$
       5,632
       3,961
         750
         545
         881
       1,809
$
$
$
       1,537
         222
         305
       1,300
$
       2,190
$
$
$
       1,461
       1,322
         617
$ $ $ $ $ $ $
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         524
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       1,306
$
$
$
       1,315
       2,571
         939
         700
```

```
$
$
         303
         204
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $
       1,490
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          300
         576
         801
         329
       1,630
         980
         231
         467
       3,302
         120
         102
         531
         749
         199
$
       1,585
       1,618
$
       1,101
       1,490
$ $ $ $ $ $ $
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       1,863
         120
         336
         418
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       2,433
$
       2,403
$
$
$
       2,846
       1,732
         885
$ $ $ $ $ $ $ $ $ $ $
       1,973
         232
       1,277
         242
       1,998
         630
          135
         207
         227
         252
       1,136
         470
```

```
$
$
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       2,147
$ $ $ $ $ $ $
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         758
         435
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         317
         203
         745
         774
$
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$
$
$
$
$
       1,892
       3,120
         560
         481
       1,819
         556
$
       2,114
       1,380
$
$
$
$
$
       1,546
       1,078
         564
         821
       1,209
         617
$ $ $ $ $ $ $
         224
       1,343
         837
         882
         704
         366
       1,421
       1,078
$
$
$
       1,133
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         820
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       2,250
```

```
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$
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       967
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       275
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863
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       458
       756
      1,196
       929
       302
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       534
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      1,012
       443
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        311
        242
      2,560
        545
        726
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      1,605
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         99
      1,617
       195
        524
       165
        549
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       905
```

```
$
$
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       3,977
         549
$
         538
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$
$
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$
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$
$
$
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         630
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         160
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```

```
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      1,302
       475
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         38
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        111
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         53
         30
        121
         54
        156
         69
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        114
        19
```

```
130
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        85
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        38
       111
       150
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        80
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        31
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24
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        19
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        44
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```
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        54
        91
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        86
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       101
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```
68
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        44
       232
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        95
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       101
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       101
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       121
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       113
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        33
```

```
49
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        46
        66
        84
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        90
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        88
        56
       120
        75
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       393
        53
        15
       107
       210
        60
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        66
        53
       101
       150
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37
        12
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        98
        86
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71
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```

```
99
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        18
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       156
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       118
```

```
63
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