Illinois
Environmental
Protection Agency

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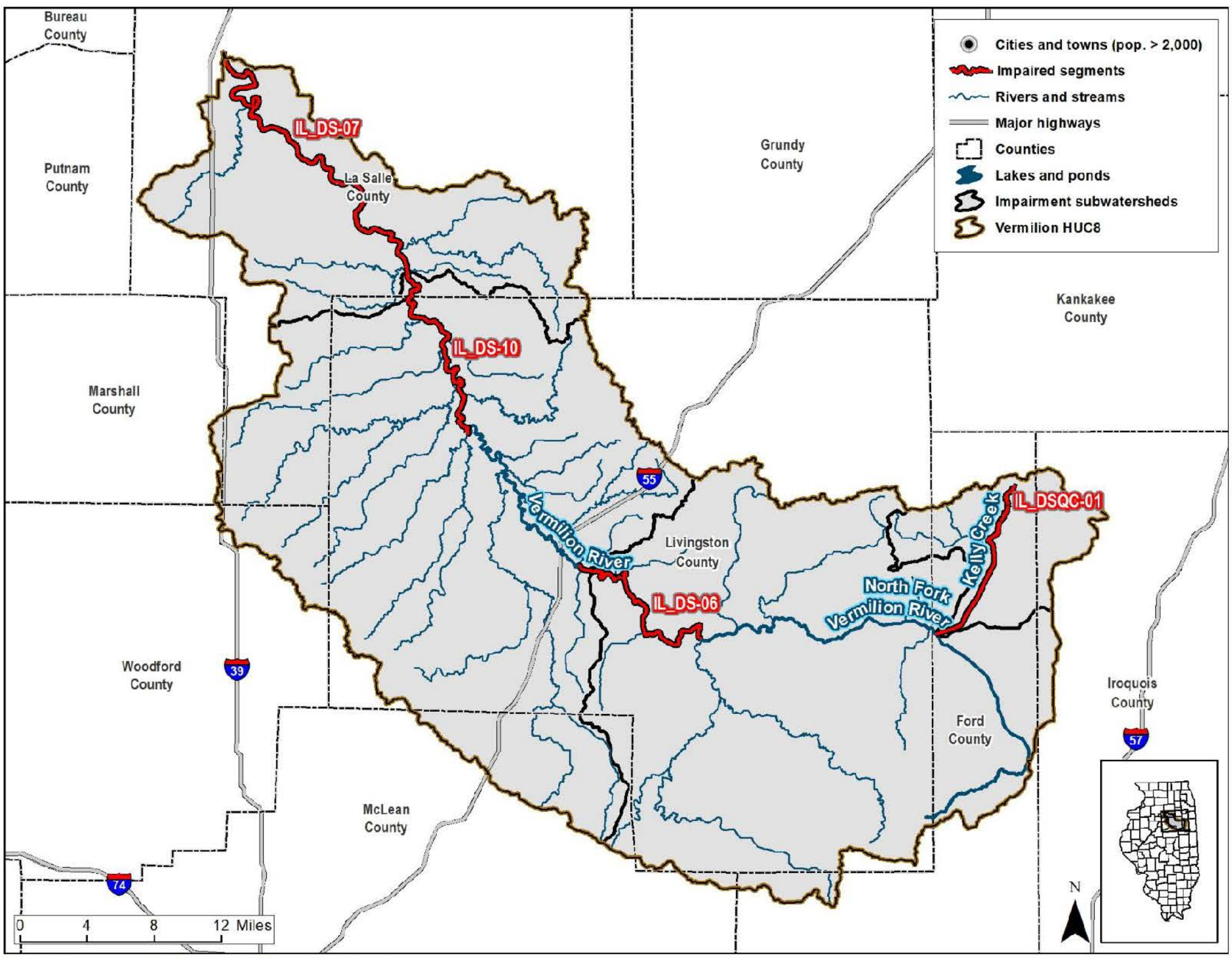
August 2022

IEPA/BOW/IL-2022-001

Vermilion River Watershed (Illinois Basin) TMDL Report



Vermilion River Watershed (Illinois Basin)

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TMDL Development for the Vermilion River Watershed (Illinois Basin), Illinois This file contains the following documents:

1) U.S. EPA Approval Letter and Decision Document for the Final TMDL Report
2) TMDL Report

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
W-16J

August 9, 2022

Sanjay Sofat
Chief, Bureau of Water
Illinois Environmental Protection Agency
P.O. Box 19276
Springfield, IL 62794-9276

Dear Mr. Sofat:

The U.S. Environmental Protection Agency completed its review of the final Total Maximum Daily Loads (TMDL) within the Vermilion River (Illinois Basin) TMDL study area, including supporting documentation. The Vermilion River (Illinois Basin) watershed TMDLs address impaired primary contact recreation use due to excessive bacteria; the impaired use of Public and Food Processing Water Supply Standards due to nitrate-nitrogen; and Aquatic Life Use due to dissolved iron.

The Vermilion River (Illinois Basin) TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves five total Illinois TMDLs: two (2) bacteria TMDLs; two (2) nitrate-nitrogen TMDLs; and one (1) iron TMDL. EPA describes Illinois' compliance with the statutory and regulatory requirements in the enclosed decision document.

EPA acknowledges Illinois' efforts in submitting these TMDLs and we look forward to future TMDL submissions by the State of Illinois. If you have any questions, please contact Ms. Christine Urban, at 312-886-3493 or urban.christine@epa.gov .

Sincerely,

8/9/2022

X

Tera L. Fong
Division Director, Water Division
Signed by: TERA FONG

Enclosure

TMDL: Vermilion River (Illinois Basin) TMDL
Effective Date: 8/9/2022

Decision Document for Approval of
Vermilion River (Illinois Basin) TMDL Report

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the water body and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL

(e.g., the TMDL could include the design capacity of a wastewater treatment facility); and

(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location/Description/Spatial Extent

The Vermilion River Watershed (VRW) is located in the Illinois River Basin in central Illinois, and the TMDL study area is the approximately 1,321 square miles in size (Section 3 of the final TMDL document). Waters flow northwest from this watershed into the Illinois River and eventually to the Mississippi River. The TMDL study area contains portions of the following counties: Livingston, LaSalle, Ford, McLean, Iroquois, Woodford, and Marshall, with Livingston County containing the majority of the watershed (62%) (Table 6 of the final TMDL document). The Illinois Environmental Protection Agency (IEPA) identified four impaired waterbodies in the VRW (Table 1 of this Decision Document; Table 1 of the final TMDL document).

Table 1: Impaired waters in the Vermilion River Watershed

HUC 10	Water ID	Water name	Miles	Drainage area (sq miles) [a]	Designated use	Pollutant
0713000203	IL_DS-06	Vermilion River	14.11	580	PCR	Fecal Coliform
					PFPWS	Nitrate-Nitrogen
0713000208	IL_DS-10	Vermilion River	16.09	1,157	PFPWS	Nitrate-Nitrogen
0713000209	IL_DS-07	Vermilion River	26.38	1,333	PCR	Fecal Coliform
0713000201	IL_DSQC-01	Kelly Creek	11.44	69	Aquatic Life	Iron

PCR = primary contact recreation
PFPWS = public food processing and water supply
a – drainage area to each impaired water includes all upstream areas within the project area

Land Use:

IEPA noted that approximately 90% of the watershed is agricultural, including 87% in cropland and almost 3% in grassland/pasture (Section 3.3 of the final TMDL document). Corn and soybeans make up most of the cropland in the watershed. Developed areas make up approximately 6% of the watershed (Table 2 of this Decision Document; Table 9 and Figure 4 of the final TMDL document).

Population information for the Vermilion River watershed estimates approximately 55,000 people live in the watershed. The cities of Streator and Pontiac are the largest cities in the watershed and have populations of approximately 11,000-13,000 people (Section 3.1 of the final TMDL document).

Table 2. Land cover distribution in the Vermilion River watershed

Map Name	Area ($miles^2$)	Relative area (%)
Corn	581.9	43.6%
Soybeans	565.2	42.4%
Other cropland	13.6	1.0%
Developed	83.9	6.3%
Forested	39.7	3.0%
Grassland/Pasture	36.6	2.7%
Open Water and other	12.2	<1.0%
Total	**1,331.1**	**100%**

Problem Identification/Pollutant of Concern:
IEPA identified fecal coliform, nitrate nitrogen, and iron as impairments requiring the development of a TMDL. Table 1 of this Decision Document lists these pollutant(s) and the corresponding impaired segments.

Fecal coliform: The waterbodies identified in Table 1 of this Decision Document as being addressed for fecal coliform all exceeded the IEPA fecal coliform water quality standard (WQS), both the single-sample maximum and the geometric mean (Figure 12, Table 26 and Section 5 of the final TMDL document). Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating, etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria-laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Nitrate-nitrogen: The waterbodies identified in Table 1 of this Decision Document as being addressed for nitrate-nitrogen exceeded the IEPA nitrate WQS for drinking water (Table 24 and Section 5 of the final TMDL document).[1] Excessive nitrate-nitrogen in drinking water can be harmful to young infants. Excessive nitrate can result in restriction of oxygen transport in the bloodstream in infants (“blue baby syndrome").

Iron: Iron is an essential element in small amounts. However, in higher doses, iron can be toxic to aquatic life. Iron particulates can deposit on the gills of fish and other aquatic life. The iron can physically clog the gills, suffocating aquatic life, or it can react with oxygen in the gills to destroy gill tissue, also causing suffocation. Iron can also form bottom deposits that reduce feeding and reproduction of aquatic life species.

Source Identification:
Section 4 of the final TMDL document contains a pollutant source assessment. The source assessment of the TMDL report discusses nonpoint and point sources that potentially contribute to the impairment of the Vermilion River TMDL study area.

1 IEPA, 2022, VRW TMDL Section 2.2.2: “For this study of the Vermilion River watershed, the Safe Drinking Water Act MCL for nitrate is 10 mg/L as nitrogen (40 CFR 141.62), which is equivalent to Illinois’s numeric criterion for nitrate to protect the PFPWS use (35 Ill. Adm. Code 302.304).”

Point Sources – fecal coliform and nitrate-nitrogen:
Point sources in the VRW include municipal wastewater treatment plants (WWTPs) and combined sewer systems (CSOs). Facilities covered by NPDES permits in the Vermilion River (Illinois Basin) watershed fall under the headings of individual, and general and are discussed in the subsections below. IEPA noted that there are no permitted Confined Animal Feeding Operation (CAFOs) or Municipal Separate Storm Sewer Systems (MS4s) in the watershed.

WWTPs: IEPA identified ten (10) individually-permitted WWTPs that discharge wastewater that contribute bacteria and nitrate-nitrogen in the VRW (Table 3 of this Decision Document; Table 12 of the final TMDL document). IEPA also identified thirteen (13) facilities regulated under general NPDES permits (Section 4.2.3 of the final TMDL document). These facilities are typically lagoon systems serving smaller populations in the watershed. Table 15 of this Decision Document contains the facilities addressed through general NPDES permits. IEPA noted that Public Water Supply (PWS) backwash dischargers typically do not contain bacteria or nitrogen; however, these facilities could discharge iron in the backwash.

CSOs: IEPA identified five communities that have CSO discharges (Section 4.2.2 of the final TMDL document). CSO discharges contain mixed stormwater and sewage when inflow into the wastewater system exceeds capacity. These discharges are regulated under NPDES permits as well as managed through state-approved long-term control plans (LTCP). The LTCP provides an enforceable framework for improvements that are implemented through the individual NPDES permits and other BMPs. These facilities are noted in Table 4 of this Decision Document. Appendix A in the final TMDL document contains summaries of CSO events by outfall for each permittee. Data and assumptions that went into each CSO assessment are found for each impaired segment of the VRW TMDL in Section 4.2.2 of the final TMDL document.

Table 3. Facilities covered by individual NPDES permits (fecal coliform and nitrate-nitrogen).

NPDES	Facility	Effluent type	DAF (mgd)	DMF (mgd)
IL0021601	Fairbury STP, City of	Treated sanitary	0.66	2.4
IL0022004	Streator STP, City of	Treated sanitary	4.0	11.4
IL0023639	Tonica STP, Village of	Treated sanitary	0.100	0.250
IL0024996	Oglesby STP, City of	Treated sanitary	0.879 [a]	1.224 [a]
IL0026697	Stelle Community Association STP	Treated sanitary	0.02	0.04
IL0028819	Forrest STP, Village of	Treated sanitary	0.35	0.88
IL0030457	Pontiac WWTP, City of	Treated sanitary	3.5	8.5
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	0.008	0.032
IL0037818	Minonk STP, City of	Treated sanitary	0.34	0.85
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	0.012	0.03

DAF = design average flow.
DMF = design maximum flow.
mgd = million gallons per day.
STP = sewage treatment plant.
WWTP = wastewater treatment plant.
a = The city of Oglesby is under administrative orders on consent with EPA for the construction and operation of a new STP. Scheduled to be operational in 2028, the permit will be transferred to the new STP.

Table 4. CSOs in the Vermilion River TMDL study area

NPDES	Facility	CSO outfalls	Receiving waterbodies
IL0021601	Fairbury STP, City of	7[a]	Indian Creek
IL0022004	Streator STP, City of	13	Coal Run Creek, Prairie Creek, Pumpkin Creek, Vermilion River
IL0024996	Oglesby STP, City of	5	Vermilion River and its small tributaries
IL0030457	Pontiac WWTP, City of	5	Vermilion River and a tributary
IL0037818	Minonk STP, City of	2	Long Point Creek

STP = sewage treatment plant.
WWTP = wastewater treatment plant
[a] five of the seven CSO outfalls were eliminated in 2019 and 2020

Point Sources – iron:
IEPA identified two water treatment facilities that could discharge iron in the VRW (Table 5 of this Decision Document; Table 45 of the final TMDL document). Drinking water facilities must periodically backflush the filters used to purify drinking water. These filters also remove iron from the drinking water, and therefore when the filters are flushed, iron can be discharged. The loads are typically small.

Table 5. Facilities assigned iron allocations in the Vermilion River TMDL study area

NPDES	Facility	Design flow (mgd)
ILG640007	WTP of Stelle Community Association	0.0016
ILG640275	Kempton Water Treatment Plant	0.015

Nonpoint Sources – bacteria and nitrate-nitrogen:
IEPA discussed nonpoint sources of bacteria and nitrate-nitrogen in Section 4.3 of the final TMDL document.

Non-regulated stormwater runoff*:* Non-regulated urban stormwater runoff can add fecal coliform and nitrate-nitrogen to the impaired waters. The sources of bacteria and nitrate-nitrogen in stormwater include animal/pet wastes, pesticides, fertilizers, and wildlife. IEPA noted that a limited portion of the watershed is urbanized, and therefore non-regulated urban stormwater runoff has limited impact in the watersheds.

Agricultural Operations: Runoff from agricultural lands may contain significant amounts of bacteria and nitrate-nitrogen which may lead to impairments in the VRW. In the TMDL watershed, 87% of the land area is dedicated to growing either corn or soybeans. Row-crop agriculture (particularly rotations of corn and soybeans) can be a major contributor of nitrate nitrogen in the watershed due to fertilizer (anhydrous ammonia) applications. IEPA noted that much of the watershed has drainage tiles, which can serve to increase the runoff from fields into nearby streams. These drainage tiles also increase peak flow, exacerbating erosion in stream channels.

Animal Feeding Operations (AFOs): Runoff from animal operations may contain significant amounts of nitrate-nitrogen and bacteria. Manure spread onto fields is often a source of phosphorus and bacteria, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Stormwater runoff may contribute nutrients and organic-rich sediment to surface waters from livestock manure, fertilizers, vegetation and erodible soils. Furthermore, livestock with direct access to a waterway can directly deposit nutrients via animal wastes into a waterbody, which may result in very high localized nutrient and bacteria concentrations. This pollutant runoff may also contribute to downstream impairments.

Failing septic systems: IEPA noted that failing septic systems, where waste material can pond at the surface and eventually flow into surface waters or be washed in during precipitation events, are potential sources of bacteria and nitrate-nitrogen. IEPA determined there are numerous septic systems in the watershed, and failing systems could be a source of bacteria and nitrate-nitrogen (Section 4.3.5 of the final TMDL document).

Wildlife: Wildlife was noted as a potential source of bacteria and nitrate-nitrogen in the VRW (Section 4.3.3 of the final TMDL document). Significant numbers of deer and other wildlife were noted in the watershed.

Nonpoint sources – iron:
IEPA determined that the primary source of iron in the watershed is from iron-rich soils in the Kellye Creek watershed. The iron can leach out of soil and rocks in the subwatershed and enter Kellye Creek (Section 4.3.4 of the final TMDL document).

Streambank/Field Erosion: Increased channelization and tiling in the Kellye Creek subwatershed have increases streambank erosion, contributing more sediment to the creek. In addition, this erosion can also expose iron-rich rocks to weathering and thereby increase iron mobility into the system.

Population and future growth trends:
The population for the watershed is fairly small. IEPA set aside 10% of the loading capacity to account for future growth in the watershed (Section 6.5 of the final TMDL document).

Priority Ranking:
The watershed was given priority for TMDL development due to the impairment impacts on the public value of the impaired water resource, and the timing as part of the Illinois basin monitoring process.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements of this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:

Designated Use/Standards

Section 2.1 of the TMDL states that the VRW is not meeting the General Use, and Public and Food Processing Water Supply (PFPWS) designations. The applicable water quality standards (WQS) for these waterbodies are established in Illinois Administrative Rules Title 35, Environmental Protection; Subtitle C, Water Pollution; Chapter I, Pollution Control Board; Part 302, Water Quality Standards, Subpart B for General Use Water Quality Standards and Subpart C for PFPWS Water Quality Standards. The impaired designated uses for each impaired waterbody are in Table 1 of this Decision Document.

Water Quality Standards and Numeric Targets

TMDL endpoints are the numeric target values of pollutants and parameters for a waterbody that represent the conditions that will attain water quality standards and restore the waterbody to its designated uses. The most stringent standards are chosen as the endpoints for the TMDL analysis. Table 6 of this Decision Document summarizes the endpoints that were used in the TMDL development for the VRW TMDLs.

Table 6. Water Quality Standards/Numeric Targets for Vermilion River TMDLs

Parameter	**Standard**
General Use	
Fecal Coliform[a]	400 cfu/100ml (in <10% of samples)[b] Geometric mean < 200 cfu/100ml[c]
Iron (dissolved)	1.0 milligram per liter (mg/l)
PFPWS use	
Nitrogen, Nitrate	10 mg/l[d]

a Fecal coliform standards are applicable for the recreation season only (May through October).
b Standard shall not be exceeded by more than 10% of the samples collected during a 30-day period.
c Geometric mean based on minimum of 5 samples taken over not more than a 30-day period.
d The in-stream water quality standard applicable at any point of withdrawal, for the Public and Food Processing Water Supply use, is 10 mg/L as nitrogen (35 Ill. Adm. Code 302.304). The Illinois drinking water standard for distributed, treated water (34 Ill. Adm. Code 611) directly references the federal Safe Drinking Water Act maximum contaminant level, which is also 10 mg/l as nitrogen.

Bacteria targets: In Section 2.2.1 of the final TMDL document, IEPA describes the guidelines for assessing the General Use for Vermilion River segments. The IEPA fecal coliform WQS requires that during the months May through October, based on a minimum of five samples taken over not more than a 30-day period, fecal coliform shall not exceed a geometric mean (GM) of 200 colony forming units (cfu) per 100 ml (cfu/100 ml), nor shall more than 10 percent of the samples during any 30 days period exceed 400 cfu/100 ml in protected waters. IEPA utilized both the geometric mean portion of the WQS (200 cfu/100 mL) and the not-to-exceed portion of the WQS (400 cfu/100mL) to develop allocations for the impaired waters (Section 5 of the final TMDL document). EPA notes that both portions of the WQS must be met.

Nitrate/Nitrogen targets: In Section 2.2.2 of the final TMDL document, IEPA describes the guidelines for assessing the PFPWS use for the VRW. Attainment of PFPWS use is assessed in waters where there is evidence that the use is occuring (i.e., the presence of an active public-water supply intake). The numeric standard for nitrate/nitrogen is 10 mg/L (35 IAC 302.304).

Iron: The WQS and TMDL target for iron in Illinois is 1.0 mg/L (35 Ill. Adm. Code 302.208(g)).

EPA finds that the TMDL document submitted by IEPA satisfies all requirements of this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:
The approach utilized by IEPA to calculate the loading capacity for the fecal coliform, nitrate-nitrogen, and iron TMDLs is described in Section 6.1 of the TMDL. The TMDL summaries for are presented in Tables 7-13 at the end of this Decision Document. As discussed below, IEPA developed separate load calculations for both parts of the fecal coliform criteria.

<u>TMDL development</u>:
For the bacteria TMDLs both the geometric mean of 200 counts/100 ml fecal coliform for five samples equally spaced over a 30-day period, and the single sample maximum (SSM) of 400 counts/100mL exceeded in no more than 10% of the samples per 30 days, were used to calculate the loading capacity of the TMDLs. For nitrate-nitrogen and iron, the TMDL endpoints in Table 6 of this Decision Document were used.

Typically loading capacities are expressed as a mass per time (e.g., pounds per day). However, for bacteria loading capacity calculations, mass is not always an appropriate measure because bacteria is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 C.F.R. §130.2). To establish the loading capacities for the VRW bacteria TMDLs, IEPA used Illinois's water quality standards for fecal coliform (200 cfu/100 mL and 400 cfu/100 mL). By calculating loads based upon both portions of the fecal coliform WQS, IEPA determined that the WQS will be met under either portion. A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 C.F.R. §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. IEPA's fecal coliform TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Flow data from several USGS gages in the two watersheds were used to develop the Load Duration Curves (LDCs). Flow data was available for a number of years (Section 3.6.1 and Figure 9 of the TMDL). Daily stream flows are necessary to implement the LDC approach.

The LDCs were created by multiplying individual flow values by the WQS and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. The LDC graphs for impaired waterbodies have flow duration interval (percentage of time flow exceeded) on the X-axis and pollutant loads (number of bacteria or pollutant mass per unit time) on the Y-axis. The fecal coliform LDCs used fecal coliform measurements in millions of bacteria per day, while the nitrate-nitrogen LDCs used tons per day, and the iron LDC used pounds per day. The curved line on a LDC graph represents the TMDL for the respective flow conditions observed at that location.

Pollutant values from the monitoring sites were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the LDC (Section 7 of the TMDL).

The LDC plot was subdivided into five flow regimes; very high flows (exceeded 0–10% of the time), high conditions (exceeded 10–40% of the time), mid-range flows (exceeded 40–60% of the time), low conditions (exceeded 60–90% of the time), and very low flows (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with the LDC) to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the LDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, IEPA believes, and EPA concurs that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing pollutant loads based on flow magnitudes. Different sources will contribute pollutant loads under varying flow conditions. For example, if exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently pollutant loading into surface waters. This allows for a more efficient implementation effort.

The TMDLs for the VRW were calculated as appropriate. The regulated permittees discharging fecal coliform, nitrate-nitrogen and iron have allocations determined for them (Tables 7-13 of this Decision Document). The load allocations were calculated after the determination of the Margin of Safety. Other load allocations (ex. non-regulated stormwater runoff, wildlife inputs, etc.) were not divided amongst individual nonpoint contributors. Instead, load allocations were combined into a generalized loading.

The LDC for fecal coliform for segment IL_DS-06 shows no exceedances for the geometric mean portion of the WQS, but a small reductions are needed from the SSM portion of the WQS (Table 35 of the final TDL document). For segment IL_DS-07, the LDC indicates an 83% reduction is needed; however, this is based upon limited data (Figure 25 of the final TMDL document). For nitrate-nitrogen, both LDCs indicate a relatively small reduction in loading; approximately 3-18%. Exceedances appear to occur under higher flows, but there is limited data for segment IL_DS-10. For iron, there is one exceedance under mid-range flows, but there is limited data (Figure 26 of the final TMDL document).

Tables 7-13 of this Decision Document calculates five points (the midpoints of the designated flow regime) on the loading capacity curves. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The load duration curve method can be used to display collected pollutant monitoring data and allows for the estimation of load reductions necessary for attainment of the appropriate water quality standards. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDLs to be represented by an allowable daily load across all flow conditions. Although there are numeric loads for each flow regime, the LDC is what is being approved for these TMDLs.

<u>Critical Conditions</u>
IEPA determined that there is no one critical condition for the VRW TMDLs that will assure attainment of WQSs. The Load Duration Curves (LDCs) show that exceedances are occurring under varying flow regimes. IEPA used the load duration curve approach to determine needed load reductions for specific flow conditions. The critical conditions (the periods when the greatest reductions are required) vary by location, source and conditions and are addressed setting levels of reduction that vary according to each specific to flow regime.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements of this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:
IEPA determined the loading capacity using LDCs for the river segments to determine total loading capacity. Load allocations for the Vermilion River TMDL are based on subtracting the WLAs and the MOS from the LC. The load allocations are summarized in Section 7 for each of the waterbody pollutant combinations along with the existing, baseline loads and WLAs and in TMDL Summary Tables 7-13 in this Decision Document. IEPA discussed several sources contributing pollutant loads to the waters, but did not subdivide the LA further.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements of this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass-based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
The WLAs are summarized in Section 7 of the final TMDL document for each of the waterbodies and in TMDL Summary Tables 7-13 in this Decision document.

As required by the CWA, individual WLAs were developed for these facilities as part of the TMDL development process. Each facility's Design Maximum Flow (DMF) was used to calculate the WLA for the high flow zone and the Design Average Flow (DAF) was used to calculate WLAs for the other four flow zones (moist conditions, mid-range flows, dry conditions, and low flows)(Section 6.3 of the final TMDL document).

Water Treatment Facilities WLA for Bacteria:
Fecal coliform WLAs are based on compliance with the geometric mean fecal coliform water quality standard of 200 cfu/100 mL and the instantaneous water quality standard of 400 cfu/100 mL, with a 10% exceedance rate. IEPA developed WLAs for each individually permitted facility (Table 14 of this Decision Document) and for the applicable facilities regulated under a General Permit (Table 15 of this Decision Document).

See Tables 14-15 of this Decision Document for the individual fecal coliform WLAs for the Vermilion River (IL_DS-06 and IL_DS-07).

Thirteen facilities in the watershed have disinfection exemptions (Table 32 and Figure 21 of the final TMDL document). Disinfection exemptions are either seasonal (November-April) or year-round and allow a facility to discharge without disinfection. Facilities with disinfection exemptions are required to meet the in-stream water quality standard at the end of the exempted reach (Figure 21 of the final TMDL document). IEPA stated that facilities with year-round disinfection exemptions may be required to provide IEPA with updated information to demonstrate compliance with these requirements, and facilities directly discharging into a fecal impaired segment may have their year-round disinfection exemption reviewed through future NPDES permitting actions.

CSO WLAs for Fecal Coliform:
IEPA determined allocations for two forms of CSOs: treated (disinfected) and untreated. For the treated CSOs, IEPA utilized a TMDL target of 400 cfu/100 mL (Section 6.3 of the final TMDL document). To determine the WLA for treated CSOs, IEPA determined the largest bypass volume monitored during the last several years multiplied by the WQS for fecal coliform. The WLA was applied only to the high flow conditions in the load tables. For untreated CSOs, IEPA utilized a WLA of 0.

IEPA noted that the allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved LTCPs, and currently only four CSO discharges are allowed per year. EPA agrees with this assumption.

As stated previously in Section 1, animal feedlots are another potential source of nutrient loads and pathogens. However, IEPA determined that none of the feedlots in the watershed were large enough to be considered a CAFO requiring a permit under the NPDES program. There were no MS4 permitted dischargers in the watershed. Therefore, the WLA = 0, for both these source types.

NPDES-permitted facilities WLAs for Nitrate Nitrogen:
Similar to the fecal coliform discussion above, IEPA calculated the WLAs for nitrate-nitrogen by using either the DMF (for the high flow regime) or the DAF for the other four flow regimes multiplied by the TMDL target of 10 mg/L (Section 6 of the final TMDL document).

See Tables 14-15 of this Decision Document for the individual nitrate-nitrogen WLAs for the Vermilion River (IL_DS-06 and IL_DS-10).

CSO WLAs for Nitrate Nitrogen:
Similar to the fecal coliform process above, IEPA calculated WLAs for the CSO discharges for either treated or untreated CSOs. For the treated CSOs, IEPA utilized a TMDL target of 10 mg/L (Section 6.3 of the final TMDL document). To determine the WLA for treated CSOs, IEPA determined the largest bypass volume monitored during the last several years multiplied by the WQS for nitrate-nitrogen. The WLA was applied only to the high flow conditions in the load tables. For untreated CSOs, IEPA utilized a WLA of 0.

IEPA noted that the allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved LTCP, and currently, only four CSO discharges are allowed per year. EPA agrees with this assumption.

<u>NPDES-permitted facilities WLA for Iron:</u>
Table 16 of this Decision Document contains the individual WLAs for iron for NPDES-permitted facilities. The WLA is based upon the permit limit multiplied by the design flow.

EPA finds that this criterion has been adequately addressed.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
The VRW TMDLs incorporate an explicit MOS of 10% of the total loading capacity (Tables 7-13 of this Decision Document and Section 6.4 of the TMDL). The use of the LDC approach minimized variability associated with the development of the TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error and assumptions made during the TMDL development process.

For bacteria, an additional conservative assumption is that IEPA did not use a rate of decay, or die-off rate of pathogen species, in the TMDL calculations or in the creation of the load duration curve for fecal coliform. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. IEPA determined that it was more conservative to use the WQS (200/400 counts/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient to meet the WQS of 200 cfu/100 mL. Thus, it is more conservative to apply the State's WQS as the MOS, because this standard must be met at all times under all environmental conditions.

EPA finds that this criterion has been adequately addressed.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:
The LDC process accounts for seasonal variation by utilizing streamflows over a wide range (Section 6.6 of the final TMDL document). The LDC graphs can be used to determine under which conditions exceedances are occurring, and any seasonal component (i.e., spring melt).

Bacterial loads vary by season, typically reaching higher values in the dry summer months when low flows and warm water contribute to increased bacteria abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate. Bacterial WQS need to be met between May 1st to October 31st, regardless of the flow condition. The development of the LDC utilized flow measurements from local flow gages. These flow measurements were collected over a variety of flow conditions observed during the recreation season. The LDC developed from these flow records represents a range of flow conditions within the impaired watersheds and thereby accounted for seasonal variability over the recreation season.

For nitrate-nitrogen and iron, the development of the LDC utilized flow measurements from local flow gages. These flow measurements were collected over a variety of flow conditions observed during the year. The LDC developed from these flow records represents a range of flow conditions within the impaired watersheds and thereby accounted for seasonal variability over the year.

EPA finds that this criterion has been adequately addressed.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with “the assumptions and requirements of any available wasteload allocation” in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:
Sections 8 and 9 of the final TMDL document discuss reasonable assurances for the VRW TMDLs. IEPA provided information on controls of fecal coliform, nitrate-nitrogen, and iron that will be targeted in the watershed.

<u>Point Sources:</u>
Reasonable assurance that the WLAs will be implemented are through the NPDES program. IEPA listed numerous WWTPs that discharge the pollutants of concern in the Vermilion watershed. WLAs have been determined for all three pollutants, and individual WLAs calculated for each point source discharger (Tables 14-16 of this Decision Document; Tables 46 and 47 of the final TMDL document). IEPA noted that there are no permitted CAFO or MS4 dischargers in the watershed (Section 4.2 of the final TMDL document).

<u>Nonpoint Sources:</u>
Section 9.5 of the final TMDL document discusses various BMPs that, when implemented, will significantly reduce pollutant loadings to attain WQS. For most of these BMPs, IEPA provided watershed analysis on the impacts these BMPs may have on pollutant loads. For example, IEPA noted that cropland BMPs will be important in controlling nitrate and sediment loads in the watershed (sediment being the source of iron in Kellye Creek). Table 52 of the final TMDL document identifies removal efficiencies for various BMPs addressing cropland runoff of nitrates and sediment. The table also contains a cost estimate for the various BMPs. In Section 9.6.2 and Table 54 of the final TMDL document, IEPA calculated the impacts on nitrate and sediment loading of the BMPs and estimated overall loading reductions in the watershed. Based upon the results, IEPA calculated that ongoing activities should result in meeting the nitrate reductions determined in the TMDL. However, controls on cropland alone will not meet the needed reductions for sediment (iron). IEPA explained that the role that streambank erosion contributing sediment loads is not well understood and will pursue further investigation.

IEPA also noted that bacteria loadings are much more variable and harder to quantify, and therefore did not quantify bacteria reductions in a similar manner. However, IEPA did discuss various BMPs that will reduce bacteria loads in the watershed (Section 9.6.1 of the final TMDL document).

IEPA also identified critical areas for BMP implementation in Section 9.4 of the final TMDL document. For each of the pollutants, IEPA analyzed source and water quality data to identify the HUC-12 subwatersheds deemed critical for BMP implementation. Tables 57 and 58 of the final TMDL document identifies the schedule and milestones for implementation of the BMPs.

IEPA also identified several local watershed groups that will assist in controlling pollutants. These groups include the Vermilion Headwaters Watershed Partnership, the Indian Creek Watershed Project, and the Agricultural Water Quality Partnership Forum. These groups are in addition to the county Soil and Water Conservation Districts that are present in the watershed.

EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:
IEPA discusses follow up monitoring plan as a part of its description of implementation (Section 9.11 of the final TMDL document). Adaptive management will be conducted through the implementation of a long-term monitoring plan designed to assess the effectiveness of pollution controls as they are implemented as well as progress towards attaining water quality standards. Illinois focused on the requirements of a watershed plan under Section 319 of the CWA. Monitoring will evaluate the effectiveness of the implementation efforts to improving water quality over time. Table 58 of the final TMDL document contains the progress benchmarks that will be pursued by IEPA in implementing the TMDL. A primary goal of the monitoring plan is to assess the effectiveness of source reduction strategies for attaining WQS and designated uses. This approach supports implementation of future TMDLs are being developed for sites dominated by nonpoint sources, which will allow implementation activities (and water quality improvement) to begin sooner.

The TMDL document noted several recommendations that IEPA will pursue in the near future. These include continued monitoring of the Indian Creek subwatershed, as well as increased monitoring along the Vermilion River to better identify sources and source contributions.

EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
The findings from the VRW TMDLs will be used to inform the selection of implementation activities in the watershed. The TMDL outlined some implementation strategies in Section 9 of the final TMDL document. IEPA outlined the importance of prioritizing areas within the VRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The reduction goals for the bacteria, nitrate, and iron TMDLs may be met via a combination of the following strategies:

<u>Cropland Conservation Practices</u>: IEPA identified several cropland runoff measures as a primary BMP to reduce pollutant loadings to waters. This includes conservation tillage, cover crops, and tile drainage management. These BMPs reduce the erosion of sediment and other pollutants from cropland, and reduce flow and loads from the soil.

<u>Pasture management/livestock BMPs</u>: Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria to surface waters. The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would work to reduce the influxes of bacteria and improve water quality within the watershed. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria and other pollutants entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of pollutants in stormwater runoff

<u>Manure management plans</u>: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that take into account the crop to be grown on that particular field and soil type will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of bacteria to migrate to surface waters. Treatment of feedlot runoff via diversion structures, holding/storage areas, and stream buffering areas can all reduce the transmission of pollutants to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots so as to not liberate bacteria.

Subsurface septic treatment systems: Improvements to septic management programs and educational opportunities can reduce the occurrence of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacteria inputs into the Vermilion River.

Stream restoration: IEPA noted that streambank erosion is a source of pollutants, particularly sediment. Re-establishing streams with a more natural flowage will reduce stream velocity and reduce erosion of the streambank. This can include either physically rebuilding the stream, or the use of various engineering controls such as rip-rap or armoring to protect streambanks. In addition, the use of vegetative buffers and filter strips can reduce pollutants flowing into the stream as well as reduce the amount and velocity of water entering the system, thereby reducing erosion in the stream.

Buffer and filter strips: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate pollutant inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the Vermilion River.

EPA finds that this criterion has been adequately addressed.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R.§130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
The public comment period for the draft TMDL opened on May 4, 2022 and closed on June 2, 2022. A public meeting was held on May 4, 2022, via webinar. The public notice was sent to interested stakeholders and permittees in the watershed. The draft TMDL was made available at the webpage: http:\\www2.illinois.gov/epa/public-notices/Pages/general-notices.aspx**.**

One set of comments were received during the public meeting, from the City of Streator (Appendix D of the final TMDL document). Streator's comments focused on the other sources of bacteria and nitrates in the VRW watershed, and that the city has spent considerable time and money in improving discharges from the city. Streator also noted that monitoring data from the tributaries to the Vermilion River showed that nonpoint sources are the source of impairment, not discharges from the city.

IEPA responded that nonpoint sources in the watershed are clearly significant contributors to the impairments in the VRW watershed, but that discharges from the city, particularly CSOs, contribute to the impairments. Sampling results reviewed by IEPA indicated that exceedances of the fecal coliform WQS occurred during high to medium flows in the river, indicating that CSO discharges could be contributing to the impairments, and therefore must be considered when developing the TMDL. IEPA noted that the city will need to continue the ongoing monitoring program and LTCP regarding CSOs.

EPA finds that this criterion has been adequately addressed.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

Comment:
The TMDL transmittal letter was dated July 11, 2022 from Sanjay Sofat, Chief, Bureau of Water, IEPA, to Tera Fong, Director, Water Division, Region 5 EPA. The letter stated clearly that this was a final TMDL submittal under Section 303(d) of the CWA. The letter also contained the name of the watershed as it appears on the Illinois Section 303(d) list, and the pollutants of concern.

EPA finds that this criterion has been adequately addressed.

13. Conclusion

After a full and complete review, EPA finds that the TMDLs for the Vermilion River (Illinois River) Watershed satisfy all of the elements of an approvable TMDL. This TMDL decision document approves five (5) TMDLs in the Vermilion River (Illinois Basin) watershed; two (2) for fecal coliform, two (2) for nitrate-nitrogen, and one (1) for iron, as noted in Table 1 of this Decision Document.

EPA's approval of these TMDLs does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) of the CWA for those waters.

Table 7. Vermilion River Fecal Coliform (geometric mean) TMDL Summary (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.093	0.035	0.035	0.035	a
LA	8.0	2.0	0.75	0.11	a
MOS (10%)	1.0	0.25	0.098	0.018	0.0029
RC (10%)	1.0	0.25	0.098	0.018	a
Loading capacity	**10**	**2.5**	**0.98**	**0.18**	**0.029**
Existing concentration [b]	41				
Necessary reduction	0%				

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (200 cfu/100 mL). The allowable concentration is based on the water quality standard.
b The existing concentration is a geometric mean of 5 samples collected in a 30-day period from August 24 through September 21, 2020 at monitoring station DS-19. No other data collected at monitoring sites DS-06 or DS-19 included 5 samples within a 30-day period

Table 8. Vermilion River Fecal Coliform (single sample) TMDL Summary (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.19	0.072	0.072	0.072	a
LA	16	4.0	1.5	0.21	a
MOS (10%)	2.0	0.51	0.20	0.035	0.0057
RC (10%)	2.0	0.51	0.20	0.035	a
Loading capacity	**20**	**5.1**	**2.0**	**0.35**	**0.057**
Existing load [b]	--	5.6	0.46	0.18	--
Necessary reduction	--	9%	0%	0%	--

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an single sample absolute number: WLA, LA, or RC = (flow contribution from a given source) x (400 cfu/100 mL). The allowable concentration is based on the water quality standard.
b The existing load is the 90th percentile of observed loads in each flow zone.

Table 9. Vermilion River Fecal Coliform (geometric mean) TMDL Summary (IL_DS-07)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.24	0.080	0.080	0.080	a
LA	17	4.3	1.8	0.25	a
MOS (10%)	2.2	0.55	0.23	0.041	0.089
RC (10%)	2.2	0.55	0.23	0.041	a
Loading capacity	**22**	**5.5**	**2.3**	**0.41**	**0.089**
Existing concentration [b]	1,208				
Necessary reduction [c]	83%				

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (200 cfu/100 mL). The allowable concentration is based on the water quality standard.
b The existing concentration is a geometric mean of 5 samples collected in a 30-day period from August 24 through September 21, 2020 at monitoring station DS-01. No other data included 5 samples within a 30-day period

Table 10. Vermilion River Fecal Coliform (single sample) TMDL Summary (IL_DS-07)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.48	0.16	0.16	0.16	a
LA	35	8.7	3.5	0.50	a
MOS (10%)	4.4	1.1	0.46	0.082	0.018
RC (10%)	4.4	1.1	0.46	0.082	a
Loading capacity	**44**	**11**	**4.6**	**0.82**	**0.18**
Existing load [b]	--	--	3.2	20	--
Necessary reduction	--	--	0%	96%	--

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an single sample absolute number: WLA, LA, or RC = (flow contribution from a given source) x (400 cfu/100 mL). The allowable concentration is based on the water quality standard.
b The existing load is the 90th percentile of observed loads in each flow zone.

Table 11. Vermilion River Nitrate-Nitrogen TMDL Summary (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.92	0.20	0.20	0.20	a
LA	44	11	4.1	0.58	a
MOS (10%)	5.6	1.4	0.54	0.097	0.016
RC (10%)	5.6	1.4	0.54	0.097	a
Loading capacity	**56**	**14**	**5.4**	**0.97**	**0.16**
Existing load [b]	129	54	8.4	2.0	--
Necessary reduction [c]	18%				

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in tons of nitrate (as nitrogen) per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (10 mg/L). The allowable concentration is based on the water quality standard.
b The existing load is the maximum observed load in each flow zone.
c The reduction is the average of the individual reductions for samples that exceeded the TMDL target (10 mg/L)

Table 12. Vermilion River Nitrate-Nitrogen TMDL summary (IL_DS-10)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	2.4	0.40	0.40	0.40	-- [a]
LA	82	20	8.4	1.2	-- [a]
MOS (10%)	11	2.6	1.1	0.20	0.042
RC (10%)	11	2.6	1.1	0.20	-- [a]
Loading capacity	**106**	**26**	**11**	**2.0**	**0.42**
Existing load [b]	96	--	14	1.1	--
Necessary reduction [c]	3%				

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in tons of nitrate (as nitrogen) per day.

a The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (10 mg/L). The allowable concentration is based on the water quality standard.
b The existing load is the maximum observed load in each flow zone.
c The reduction is the average of the individual reductions for samples that exceeded the TMDL target (10 mg/L)

Table 13. Vermilion River Iron TMDL Summary (Kellye Creek, IL_DSQC-01)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.14	0.14	0.14	0.14	0.14
LA	1,065	267	103	18	2.9
MOS (10%)	133	34	13	2.3	0.38
RC (10%)	133	34	13	2.3	0.38
Loading capacity	**1,331**	**335**	**129**	**23**	**3.8**
Existing load [a]	795	--	202	0.24	0.036
Necessary reduction [b]	29%				

LA = load allocation MOS = margin of safety RC = reserve capacity TMDL = total maximum daily load WLA = wasteload allocation
Allocations are in pounds per day of dissolved iron.

a The existing load is the maximum observed load in each flow zone.
b The reduction is the average of the individual reductions for samples that exceeded the TMDL target (1 mg/L)

Table 14. WLAs by Individually-permitted Facility for fecal coliform and nitrate-nitrogen for the Vermilion River TMDL

NPDES	Facility	Effluent Type	Design flows (mgd)		Fecal coliform (billion cfu per day)				Nitrate (lbs per day)	
			DMF	DAF	200 cfu/100 mL		400 cfu/100 mL		10 mg/L	
					DMF	DAF	DMF	DAF	DMF	DAF
IL0021601	Fairbury STP, City of	Treated sanitary (001)	2.4	0.66	18	5.0	36	10	200	55
		Treated combined (002)	7.3 [a]	--	--	--	111	--	609	--
		Untreated CSO (003, 008)	--	--	--	--	0 [b]	--	0 [b]	--
IL0022004	Streator STP, City of	Treated sanitary (B01)	11.4	4.0	86	30	173	61	951	334
		Treated combined (024, A01, C01)	17 [a]	--	--	--	257	--	1,419	--
		Untreated CSO (003, 018-023, 027)	--	--	--	--	0 [b]	--	0 [b]	--
		Untreated CSO (009, 025, 026, A24, C24)	--	--	--	--	0 [b]	--	0 [b]	--
IL0023639	Tonica STP, Village of	Treated sanitary	0.250	0.100	1.9	0.76	3.8	1.5	-- [c]	-- [c]
IL0024996	Oglesby STP, City of	Treated sanitary (001)	1.224	0.879	9.3	6.7	19	13	-- [c]	-- [c]
		Untreated CSO (A01, B01, C01, 003, 005)	--	--	--	--	0 [b]	--	-- [c]	-- [c]
IL0026697	Stelle Community Association STP	Treated sanitary	0.04	0.02	0.30	0.15	0.61	0.30	3.3	1.7
IL0028819	Forrest STP, Village of	Treated sanitary (001)	0.88	0.35	6.7	2.6	13	5.3	73	29
		Excess flow (A01)	2.35 [d]	--	--	--	36	--	196	--
IL0030457	Pontiac WWTP, City of	Treated sanitary (001)	8.5	3.5	64	26	129	53	709	292
		Untreated CSO (A02, 002-005)	--	--	--	--	0 [b]	--	0 [b]	--
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	0.032	0.008	0.24	0.061	0.48	0.12	2.7	0.67
IL0037818	Minonk STP, City of	Treated sanitary	0.85	0.34	6.4	2.6	13	5.1	71	28
		Excess flow (A01)	4.25 [e]	--	--	--	64	--	355	--
		Untreated CSO (002, 003)	--	--	--	--	0 [b]	--	0 [b]	--
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	0.030	0.012	0.23	0.091	0.45	0.18	2.5	1.0

cfu = colony forming unit.
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lbs = pounds (as nitrogen).
mgd = million gallons per day.
mg/L = milligram (as nitrogen) per liter.
mL = milliliter.
NPDES = National Pollutant Discharge Elimination System.
STP = sewage treatment plant.
WLA = wasteload allocation.
WWTP = wastewater treatment plant.

[a] As described in Section 6.3, treated combined sewage is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[b] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[c] The receiving water for these facilities (Vermilion River segment IL_DS-07) is not designated for the public food processing and water supply use.

[d] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

[e] After the main treatment facility reaches its DMF, excess flow is routed for treatment at a rate of 590 to 2,951 gallons per minute (0.850 to 4.25 mgd).

Table 15. WLAs by General-permitted Facility for fecal coliform and nitrate-nitrogen for the Vermilion River TMDL

NPDES	Facility	Effluent type	Design flows (mgd)		Fecal coliform (billion cfu per day)				Nitrate (lbs per day)	
			DMF	DAF	200 cfu/100 mL		400 cfu/100 mL		10 mg/L	
					DMF	DAF	DMF	DAF	DMF	DAF
ILG551: Non-Publicly Owned Domestic Lagoon Serving a Population Less than 2,500										
ILG551020	Meadows Mennonite Retirement Community	Treated sanitary	0.1125	0.045	0.85	0.34	1.7	0.68	9.4	3.8
ILG551038	Salem Children's Home	Treated sanitary	0.030	0.011	0.23	0.083	0.45	0.17	2.5	9.2
ILG551063	Illinois DOT I-55 Livingston Co N STP	Treated sanitary	0.0465	0.0155	0.35	0.12	0.70	0.23	3.9	1.3
ILG551069	Illinois DOT I-55 Livingston Co S STP	Treated sanitary	0.0465	0.0155	0.35	0.12	0.70	0.23	3.9	1.3
ILG580: Publicly Owned Domestic Lagoon Serving a Population of Less than 2,500										
ILG580057	Flanagan STP	Treated sanitary	0.320	0.128	2.4	0.97	4.8	1.9	27	11
ILG580091	Chatsworth STP	Treated sanitary	0.460	0.184	3.5	1.4	7.0	2.8	38	15
ILG582: Publicly Owned Domestic Lagoon Serving a Population of 2,500 to 5,000										
ILG582009	Chenoa WWTP, City of	Treated sanitary	0.658	0.263	5.0	2.0	10	4.0	55	22
ILG620: Private Sewage Disposal System										
ILG620223	Cody Harris	Treated sanitary	0.001500		0.011		0.023		0.13	

cfu = colony forming unit.
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lbs = pounds (as nitrogen).
mgd = million gallons per day.
mg/L = milligram (as nitrogen) per liter.
mL = milliliter.
NPDES = National Pollutant Discharge Elimination System.
STP = sewage treatment plant.
WLA = wasteload allocation.
WWTP = wastewater treatment plant.

Public waters supplies (PWS) covered by general NPDES permit ILG640 are not sources of fecal coliform or nitrate; therefore, WLAs are not assigned. The following five PWS are covered by ILG640: Cullom Water Treatment Plant PWS (ILG6400003), Kempton Water Treatment Plant (ILG640275), Rutland WTP (ILG640074), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

Table 16. Iron WLAs for Facilities in Kellye Creek (IL_DSQC-01)*

NPDES	Facility	Design flow (mgd)	Iron (dissolved) WLA (pounds per day)
ILG640007	WTP of Stelle Community Association	0.0016	0.013
ILG640275	Kempton Water Treatment Plant	0.015	0.13

mgd = million gallons per day
NPDES = National Pollutant Discharge Elimination System
PWS = public water supply
WLA = wasteload allocation
WTP = water treatment plant.

* covered by general NPDES permit ILG640 (PWS)

Vermilion River Watershed (Illinois Basin)

Total Maximum Daily Load Study

Final TMDL

Prepared by:

TETRA TECH

Prepared for:

U.S. Environmental Protection Agency, Region 5
Contract: 68HERC20D0016
Task Order: 68HERC21F0095

June 2022

Contents

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Acronyms and Abbreviations

AFOs	animal feeding operations
BMP	best management practice
CAFO	confined animal feeding operation
CBMP	Council on Best Management Practices
CFR	Code of Federal Regulation
CSA	critical source area
CSO	combined sewer overflow
CSS	combined sewer system
CWA	Clean Water Act
DAF	design average flow
DMF	design maximum flow
DNR	Department of Natural Resources
fIBI	fish Index of Biological Integrity
GM	geometric mean
HSG	hydrologic soil group
HUC	hydrologic unit code
HUC12	12-digit hydrologic unit code (“subwatershed”)
IAH	Illinois Agronomy Handbook
IDOA	Illinois Department of Agriculture
IEPA	Illinois Environmental Protection Agency
Ill. Adm. Code	Illinois Administrative Code
ILSAM	Illinois Streamflow Assessment Model
IPCB	Illinois Pollution Control Board
LA	load allocation
LC	loading capacity
MCL	maximum contaminant level
mIBI	macroinvertebrate index of biological integrity
MOS	margin of safety
MST	microbial source tracking
MS4	municipal separate storm sewer system
NLRS	Nutrient Loss Reduction Strategy
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWIS	National Water Information System
PFPWS	public food processing and waters supply
PWS	public water supply
RC	reserve capacity
STEPL	Spreadsheet Tool for the Estimation of Pollutant Load
STP	sewage treatment plant
SWCD	Soil and Water Conservation District
TMDL	total maximum daily load
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	wasteload allocation
WQS	water quality standards
WWTP	wastewater treatment plant
7Q10	7-day average flow at a 10-year recurrence

Units of Measure

cfs	cubic feet per second
cfu/100 mL	colony forming unit (fecal coliform) per 100 milliliters
mgd	millions of gallons per day
mg/L	milligrams per liter (parts per million)
µg/L	micrograms per liter (parts per billion)

Executive Summary

A total maximum daily load (TMDL) study was conducted for the approximately 1,321 square mile Vermilion River watershed in the Illinois River basin in Illinois. The TMDL study addresses three impaired segments of the Vermilion River and one impaired segment on Kelly Creek. Fecal coliform bacteria impair two segments of the Vermilion River, nitrate impairs two segments of the Vermilion River, and dissolved iron impairs one segment of Kelly Creek (Table ES-1).

The Clean Water Act (CWA) and U.S. Environmental Protection Agency (EPA) regulations require that TMDLs be developed for waters that do not support their designated uses and are on states Section 303(d) lists of impaired waters. In simple terms, a TMDL is a plan to attain and maintain water quality standards in waters that are not currently meeting them.

A TMDL identifies the total allowable load that a waterbody can assimilate (the loading capacity) and still meet water quality standards or targets. The loading capacity (LC) for each stream is determined using a load duration curve framework.

In the Vermilion River watershed, two segments of the Vermilion River receive fecal coliform TMDLs, two segments of the Vermilion River receive nitrate TMDLs, and one segment of Kelly Creek receives a dissolved iron TMDL. The sources of pollutants in the watershed include permitted facilities (e.g., wastewater treatment facilities). Nonpoint sources of pollution include runoff from agricultural operations, onsite wastewater treatment systems, and erosion.

A TMDL is equal to the LC for a waterbody, and that LC is distributed among load allocations to account for nonpoint and background sources and wasteload allocations to account for point sources. The required pollutant reductions range from 3% to 73% (Table ES-1), depending upon waterbody and pollutant.

An implementation plan is provided that includes potential implementation activities to address sources of pollutants. This plan includes many of the elements needed for CWA section 319 funding and includes an analysis of critical areas, extent of needed implementation, schedule, milestones, partners, and estimated costs.

Table ES-1. Summary of TMDLs

Water ID	Water name	Miles	Impaired Designated Use	TMDL Pollutant	Average Necessary Reduction [a]
IL_DS-06	Vermilion River	14.11	Primary Contact Recreation	Fecal Coliform	40%
			PFPWS	Nitrate (as Nitrogen)	18%
IL_DS-10	Vermilion River	16.09	PFPWS	Nitrate (as Nitrogen)	3%
IL_DS-07	Vermilion River	26.38	Primary Contact Recreation	Fecal Coliform	73%
IL_DSQC-01	Kelly Creek	11.44	Aquatic Life	Dissolved Iron	29%

Notes

PFPWS = Public food processing and water supply.

[a] Arithmetic average of reductions necessary for each sample (i.e., each individual sample compared with the TMDL target).

1 Introduction

The Clean Water Act (CWA) and U.S. Environmental Protection Agency (U.S. EPA) regulations require that Total Maximum Daily Loads (TMDLs) be developed for waters that do not support their designated uses and are on states Section 303(d) lists of impaired waters. In simple terms, a TMDL is a plan to attain and maintain water quality standards (WQS) in waters that are not currently meeting them. This TMDL study addresses the approximately 1,321 square miles of the Vermilion River watershed (Illinois River Basin) located in central Illinois. Several waters within the watershed have been placed on the State of Illinois 303(d) list and require the development of a TMDL.

Figure 1. Left: South Fork Vermilion River; Right: Kelley Creek (Illinois EPA).

1.1 TMDL Development Process

The TMDL process establishes the loading capacity (LC) of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and instream conditions. This LC represents the maximum quantity of the pollutant that the waterbody can receive without exceeding water quality standards. The TMDL also takes into account a margin of safety (which reflects scientific uncertainty), the effects of seasonal variation, and a reserve capacity (RC) to account for future loading. By following the TMDL process, states can establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (U.S. EPA 1991).

1.2 Water Quality Impairments

Three segments of the Vermilion River (Illinois Basin) mainstem and one segment of Kelly Creek are impaired (Table 1 and Figure 2) and the focus of this TMDL.

Table 1. Waterbody Impairments for the Illinois Vermilion River (Illinois Basin) TMDL Study (Illinois 2018 303(d) List)

HUC 10	Water ID	Water name	Miles	Drainage area (sq miles) [a]	Designated use	Potential cause(s) of impairment
0713000203	IL_DS-06	Vermilion River	14.11	580	PCR	Fecal Coliform
					PFPWS	Nitrogen, Nitrate
0713000208	IL_DS-10	Vermilion River	16.09	1,157	PFPWS	Nitrogen, Nitrate
0713000209	IL_DS-07	Vermilion River	26.38	1,333	PCR	Fecal Coliform
0713000201	IL_DSQC-01	Kelly Creek	11.44	69	Aquatic Life	Iron

PCR = primary contact recreation

PFPWS = public food processing and waters supply

[a] Drainage area to each impaired water includes all upstream areas within the project area.

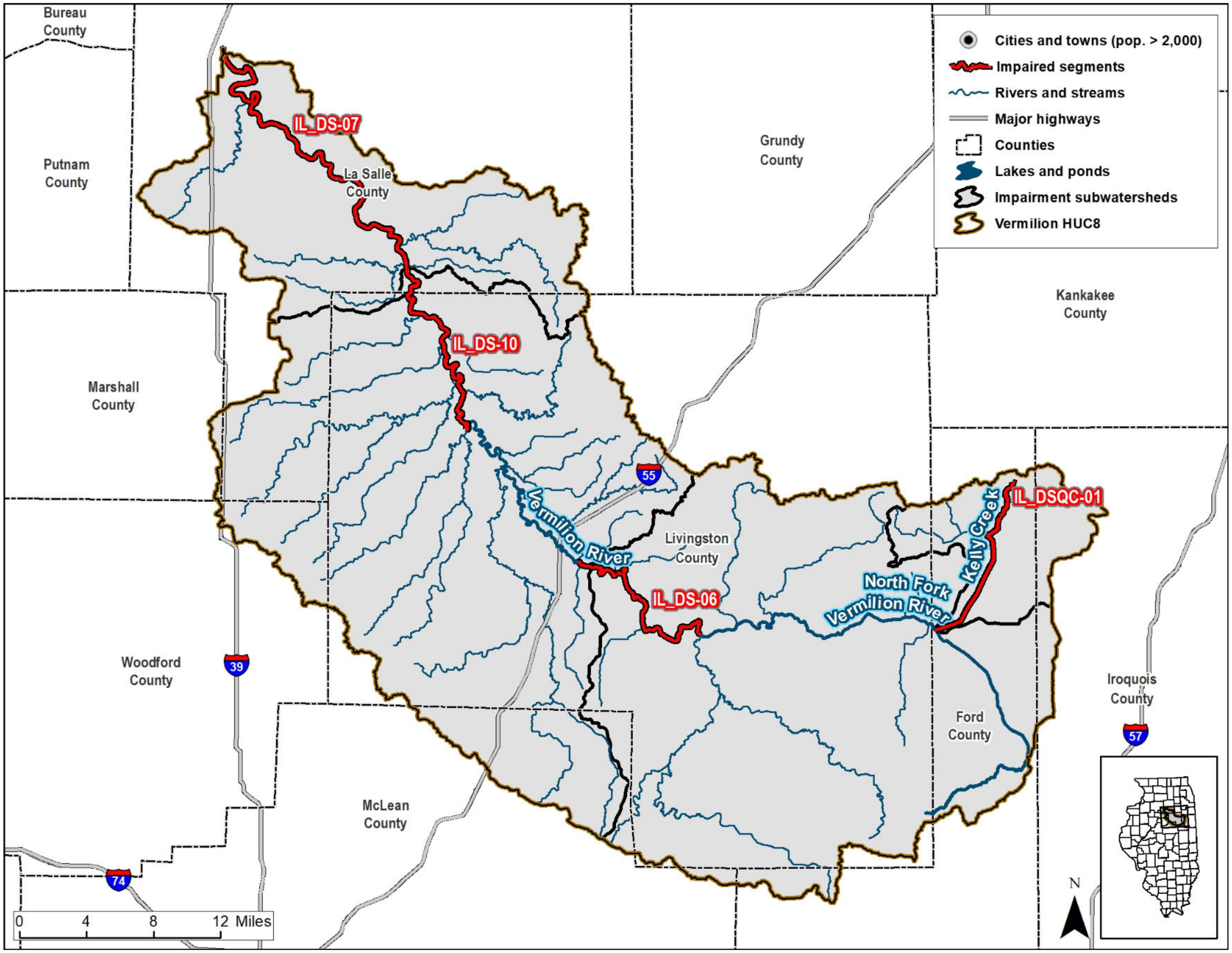

Figure 2. Impaired segments in the Vermilion River watershed.

2 Water Quality Standards and TMDL Endpoints

This section presents information on the water quality impairments within the Vermilion River watershed (Illinois Basin) and the associated WQS and targets.

WQS are designed to protect beneficial uses. The authority to designate beneficial uses and adopt WQS is granted through Title 35 of the Illinois Administrative Code (Ill. Adm. Code). Within Title 35, designated uses to be protected in surface waters of the state are defined under Section 303, and WQS are designated under Section 302. Designated uses and water quality criteria are discussed below.

2.1 Designated Uses

IEPA uses rules and regulations adopted by the Illinois Pollution Control Board (IPCB) to assess the designated use support for Illinois waterbodies. Two designated uses in the Vermilion River watershed (Illinois Basin) are addressed in this TMDL report: General Use (which includes primary contact recreation and aquatic life) and Public and Food Processing Water Supply (PFPWS) Use.

The next sections present water quality criteria and TMDL endpoints to protect these two uses for the impairments identified by IEPA in the Vermilion River watershed.

Contact Recreation

Primary contact is where physical configuration of the waterbody permits it, any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing.

Secondary contact is any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating, and any limited contact incident to shoreline activity.

2.2 Water Quality Criteria and TMDL Endpoints

IPCB adopted WQS for the protection of the General Use and PFPWS Use (35 Ill. Adm. Code 302). IPCB also adopted drinking water standards, which are related to the PFPWS use (35 Ill Adm. Code 611).

> *General Use Standards* – These standards protect for aquatic life, wildlife, agricultural uses, primary contact, secondary contact, and most industrial uses. These standards are also designed to ensure the aesthetic quality of the state's aquatic environment.
>
> *Public and food processing water supply standards (PFPWS)*– These standards are cumulative with the general use standards and apply to waters of the state at any point at which water is withdrawn for treatment and distribution as a potable supply to the public or for food processing.

This section presents the standards applicable to impairments in the study area. WQS and TMDL endpoints to be used for TMDL development are listed in Table 2.

Table 2. Summary of water quality standards

Parameter	Units	Water Quality Standard
General Use		
Fecal Coliform [a]	#/100 ml	400 in <10% of samples [b]
		Geometric mean < 200 [c]
Iron (dissolved)	mg/L	1.0 mg/L
Public and Food Processing Water Supply Use		
Nitrogen, Nitrate	mg/L	10 mg/L [d]

mg/L = milligram per liter

[a] Fecal coliform standards are applicable for the recreation season only (May through October).

[b] Standard shall not be exceeded by more than 10% of the samples collected during a 30-day period.

[c] Geometric mean based on minimum of 5 samples taken over not more than a 30-day period.

[d] The in-stream water quality standard applicable at any point of withdrawal, for the Public and Food Processing Water Supply use, is 10 mg/L as nitrogen (35 Ill. Adm. Code 302.304). The Illinois drinking water standard for distributed, treated water (34 Ill. Adm. Code 611) directly references the federal Safe Drinking Water Act maximum contaminant level, which is also 10 mg/L as nitrogen.

2.2.1 General Use Standards

According to Illinois water quality standards, primary contact means ...any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing (35 Ill. Adm. Code 301.355). The assessment of primary contact use is based on fecal coliform bacteria data. The General Use standard for fecal coliform bacteria specifies that during the months of May through October, based on a minimum of five samples taken over not more than a 30-day period, fecal coliform bacteria counts shall not exceed a geometric mean of 200/100 mL, nor shall more than 10% of the samples during any 30-day period exceed 400/100 mL (35 Ill. Adm. Code 302.209). This standard protects primary contact use of Illinois waters by humans.

Due to limited state resources, fecal coliform bacteria are not normally sampled at a frequency necessary to apply the General Use standard (i.e., at least five times per month during May through October), and very little data available from others are collected at the required frequency. Therefore, assessment guidelines are based on application of the standard when sufficient data is available to determine standard exceedances; but, in most cases, attainment of primary contact use is based on a broader methodology intended to assess the likelihood that the General Use standard is being attained.

When fecal coliform is sampled at a frequency less than necessary to apply the General Use standard, to assess primary contact use, IEPA uses all fecal coliform bacteria from water samples collected in May through October, over the most recent five-year period. Based on these water samples, geometric means and individual measurements of fecal coliform bacteria are compared to the concentration thresholds in Table 3 and Table 4. To apply the guidelines, the geometric mean of fecal coliform bacteria concentration is calculated from the entire set of May through October water samples, across the five years. No more than 10% of all the samples may exceed 400/100 mL for a water body to be considered Fully Supporting. Table 3 presents the use support determination process for the primary contact recreation use, which relies on the fecal coliform standard.

Table 3. Guidelines for assessing primary contact use (via the fecal coliform standard) in Illinois streams and inland lakes

Degree of Use Support	Guidelines
Fully Supporting	No exceedances of the fecal coliform bacteria standard in the last five years, and the geometric mean of all fecal coliform bacteria observations in the last five years ≤200 cfu/100 mL, and ≤10% of all observations in the last five years exceed 400 cfu/100 mL.
Not Supporting	At least one exceedance of the fecal coliform bacteria standard in the last five years (when sufficient data is available to assess the standard); or, The geometric mean of all fecal coliform bacteria observations in the last five years >200 cfu/100 mL, or >10% of all observations in the last five years exceed 400 cfu/100 mL.

Source: IEPA 2021 (This is Table C-16 in the *Illinois Integrated Water Quality Report and Section 303(d) List, 2018*).

Table 4. Guidelines for identifying potential causes of impairment of primary contact use in Illinois streams and freshwater lakes

Potential Cause	Basis for Identifying Cause - Numeric Standard
Fecal coliform	When *Primary Contact* Use is assessed as Not Supporting based on the criteria in Table C-16, Fecal Coliform is listed as the cause.

Source: IEPA 2021 (This is Table C-17 in the *Illinois Integrated Water Quality Report and Section 303(d) List, 2018*).

Note: This table references Table C-16 of the *Illinois Integrated Water Quality Report and Section 303(d) List, 2018*, which is reproduced as Table 3 in this report.

Aquatic life use assessments in streams are typically based on the interpretation of biological information, physicochemical water data and physical-habitat information from the Intensive Basin Survey, Ambient Water Quality Monitoring Network or Facility-Related Stream Survey programs. The primary biological measures used are the fish Index of Biotic Integrity (fIBI; Karr et al. 1986; Smogor 2000, 2005), the macroinvertebrate Index of Biotic Integrity (mIBI; Tetra Tech 2004) and the Macroinvertebrate Biotic Index (MBI; IEPA 1994). Physical habitat information used in assessments includes quantitative or qualitative measures of stream bottom composition and qualitative descriptors of channel and riparian conditions. Physicochemical water data used include measures of ―conventional parameters (e.g., dissolved oxygen, pH, and temperature), priority pollutants, non-priority pollutants, and other pollutants (U.S. EPA 2002a). In a minority of streams for which biological information is unavailable, aquatic life use assessments are based primarily on physicochemical water data.

When a stream segment is determined to be Not Supporting aquatic life use, generally, one exceedance of an applicable Illinois water quality standard (related to the protection of aquatic life) results in identifying the parameter as a potential cause of impairment. Additional guidelines used to determine potential causes of impairment include site-specific standards (35 Ill. Adm. Code 303, Subpart C), or adjusted standards.

2.2.2 Public and Food Processing Water Supply Use Standards

Attainment of PFPWS use is assessed only in waters in which the use is currently occurring, as evidenced by the presence of an active public-water supply intake. The assessment of PFPWS use is based on conditions in both untreated and treated water. For raw, untreated water, the PFPWS standards must be met at any location that water is withdrawn (35 Ill. Adm. Code, 302.301).

By incorporating data through programs related to both the Federal Clean Water Act and the Federal Safe Drinking Water Act, IEPA believes that these guidelines provide a comprehensive assessment of PFPWS use. Assessments of PFPWS use recognize that characteristics and concentrations of substances in Illinois surface waters can vary and that a single assessment guideline may not protect sufficiently in all situations. Using multiple assessment guidelines helps improve the reliability of these assessments. When applying these assessment guidelines, IEPA also considers the water-quality substance, the level of treatment available for that substance, and the monitoring frequency of that substance in the untreated water. Table 5 includes the assessment guidelines for waters with PFPWS designated uses.

Table 5. Guidelines for assessing public water supply use support in waters of the State

Degree of Use Support	Guidelines
Fully Supporting	For each substance in untreated water[1], for the most-recent three years of readily available data or equivalent dataset, a) ≤ 10% of observations exceed an applicable Public and Food Processing Water Supply Standard[2]; and b) for which the concentration is not readily reducible by conventional treatment, i)) no observation exceeds by at least fourfold the Maximum Contaminant Level threshold concentration[3] for that substance; and ii) no quarterly average concentration exceeds the Maximum Contaminant Level threshold concentration[3] for that substance; and [4], For each substance in treated water, no violation of an applicable Maximum Contaminant Level[3] occurs during the most recent four years of readily available data.
Not Supporting	For any single substance in untreated water[1],for the most-recent three years of readily available data or equivalent dataset, a) > 10% of observations exceed a Public and Food Processing Water Supply Standard[2]; or b) for which the concentration is not readily reducible by conventional treatment, i) at least one observation exceeds by at least fourfold the Maximum Contaminant Level threshold concentration[3] for that substance; or ii) the quarterly average concentration exceeds the Maximum Contaminant Level threshold concentration[3] for that substance; or, For any single substance in treated water, at least one violation of an applicable Maximum Contaminant Level[3] occurs during the most recent four years of readily available data. or, Closure to use as a drinking-water resource (cannot be treated to allow for use).

Source: IEPA 2021 (Table C-21).

(1) Includes only the untreated-water results that were available in the primary computer database at the time data were compiled for these assessments.

(2) 35 Ill. Adm. Code 302.304, 302.306. (https://pcb.illinois.gov/SLR/IPCBandIEPAEnvironmentalRegulationsTitle35).

(3) 35 Ill. Adm. Code 611.300, 611.301, 611.310, 611.311, 611.325.

(4) Some waters were assessed as Fully Supporting based on treated-water data only.

For the PFPWS use, one of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10%) because this threshold represents the true risk of impairment better than does a single exceedance of a water quality criterion. Assessment guidelines also recognize situations in which water treatment that consists only of "*...coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes*" (35 Ill. Adm. Code 302.303; hereafter called "conventional treatment") may be insufficient for reducing potentially harmful levels of some substances. For this study of the Vermilion River watershed, nitrate impairs the PFPWS use in segments IL_DS-06 and IL_DS-10 of the Vermilion River, and nitrate is not readily reducible by conventional treatment.

As part of the use support determination process for the PFPWS use, to determine if a Safe Drinking Water Act Maximum Contaminant Level (MCL) violation in treated water would likely occur if treatment additional to conventional treatment were not applied (see 35 Ill. Adm. Code 302.305), the concentration of the potentially harmful substance in untreated water is examined and compared to the MCL threshold concentration. If the concentration in untreated water exceeds an MCL-related threshold concentration, then an MCL violation could reasonably be expected in the absence of additional treatment. For this study of the Vermilion River watershed, the Safe Drinking Water Act MCL for nitrate is 10 mg/L as nitrogen (40 CFR 141.62), which is equivalent to Illinois's numeric criterion for nitrate to protect the PFPWS use (35 Ill. Adm. Code 302.304).

Compliance with an MCL for treated water is based on a running 4-quarter (i.e., annual) average, calculated quarterly, of samples collected at least once per quarter (Jan.-Mar., Apr.-Jun., Jul.-Sep., and Oct.-Dec.). However, for some untreated-water intake locations sampling occurs less frequently than once per quarter; therefore, statistics comparable to quarterly averages or running 4-quarter averages cannot be determined for untreated water. Rather, for substances not known to vary regularly in concentration in Illinois surface waters (untreated) throughout the year, a simple arithmetic average concentration of all available results is used to compare to the MCL threshold. For substances known to vary regularly in concentration in surface waters during a typical year (e.g., nitrate), average concentrations in the relevant sub-annual (e.g., quarterly) periods are used.

3 Watershed Characterization

The Vermilion River watershed is a categorized by the U.S. Geologic Survey (USGS) as a *subbasin* hydrologic unit with a hydrologic unit code (HUC) of 07130002. The watershed is 853,201 acres (1,333.1 square miles) and includes parts of seven counties (Table 6). Waters flow from this watershed into the Illinois River and eventually to the Mississippi River.

Table 6. County areas within the Vermilion Watershed.

County	Area (Square Miles)	Relative Area (%)
Livingston	829	62.2%
LaSalle	261	19.5%
Ford	127	9.6%
McLean	65	4.9%
Iroquois	25	1.9%
Woodford	24	1.8%
Marshall	2	<1%
Total	**1,333**	**100%**

Areas are rounded to the nearest square mile and nearest one-tenth percent.

3.1 Population

Population was calculated based on U.S. Census tract population estimates for 2020. The approximate total population for the Vermilion River watershed is 54,981. The 2020 estimates indicate a declining population for cities in recent years. Populations for Streator and Pontiac are provided in Table 7. (U.S. Census Bureau 2020).

Table 7. Populations for larger cities

City	2000 Census	2010 Census	2020 Population Estimate	Percent Change (2010-2020)
Streator	14,190	13,710	12,933	-5.7%
Pontiac	11,864	11,931	11,176	-6.3%

3.2 Climate and Precipitation

Climate data are available from the National Oceanic and Atmospheric Administration's Climate Data Online portal (NOAA 2017). Station 116910 is in Pontiac, Illinois, and was used for climate summaries for the watershed. Historical data from this station were available through May of 2017.

Table 8. Climate summary for Pontiac Station (1960-2017).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High (°F)	31	36	48	63	74	82	85	83	78	65	50	36
Average low (°F)	15	19	29	40	51	61	64	62	55	43	33	21
Mean temperature (°F)	23	28	39	52	63	72	75	73	67	54	42	29
Average precipitation (in)	1.8	1.4	2.5	3.4	4.0	3.9	4.0	3.4	3.4	2.7	2.6	2.3

Note: Pontiac Station (ID: 116910) is located at the coordinates 40.8777° North, 88.6364° West at 198.1-meters elevation.

There is not a drastic change of precipitation year-to-year, but the monthly precipitation shows variance (Figure 3 shows monthly variations the most recent ten years of available data). Precipitation results in surface runoff, which can convey what is on the ground to the streams in both rural and urban areas.

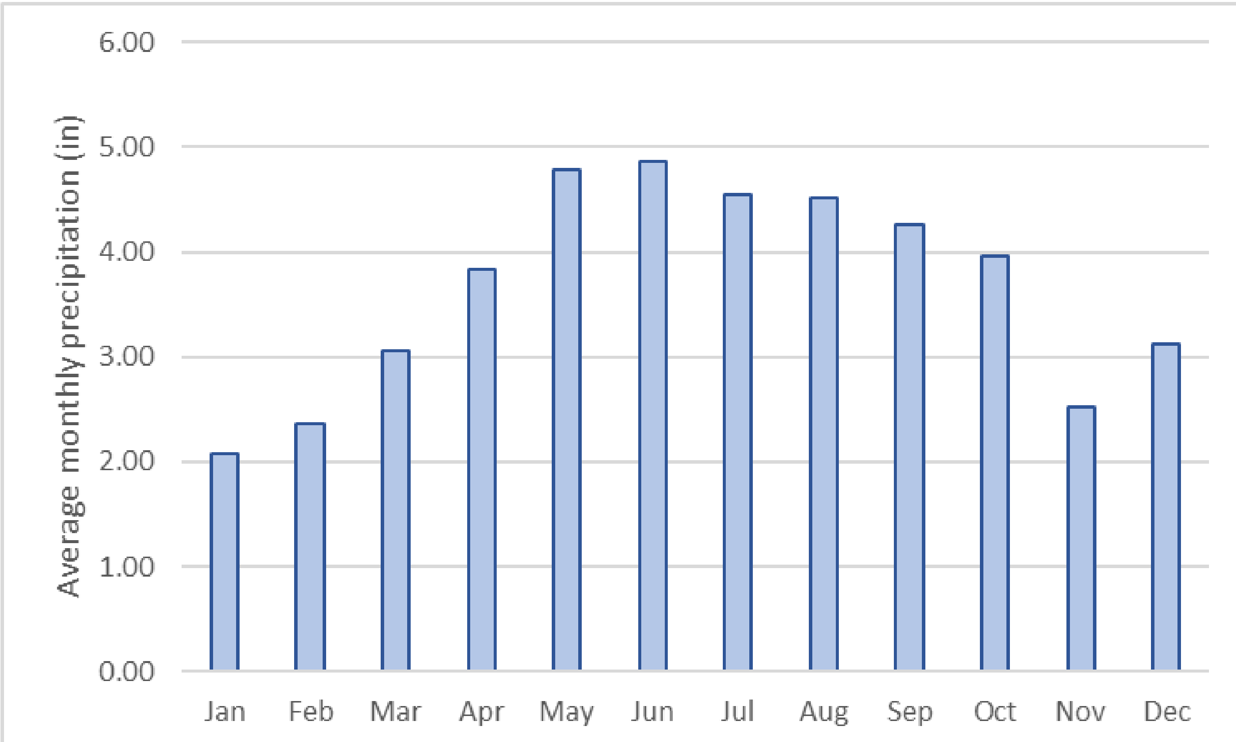

Figure 3. Monthly Precipitation for Pontiac 2008-2017.

3.3 Land Use and Land Cover

Approximately 90% of the watershed is agricultural, including 87% in cropland and almost 3% in grassland/pasture. Corn and soybeans make up almost all of the cropland in the watershed. Developed areas make up approximately 6% of the watershed (Table 9 and Figure 4). Land cover (2020) is from the *Cropland Data Layer* provided by the National Agricultural Statistics Service (NASS) of the U.S. Department of Agriculture (USDA) (NASS 2021).

Table 9. Land cover distribution in the Vermilion River watershed

Map Name	Area (square miles)	Relative area (%)
Corn	581.9	43.6%
Soybeans	565.2	42.4%
Other cropland	13.6	1.0%
Developed	83.9	6.3%
Forested	39.7	3.0%
Grassland/Pasture	36.6	2.7%
Open Water	6.0	0.4%
Other	6.2	0.5%
Total	**1,331.1**	**100%**

Based upon: 2020 Cropland Data Layer (NASS 2021).
Areas are rounded to the nearest one-tenth mile and one-tenth percent.

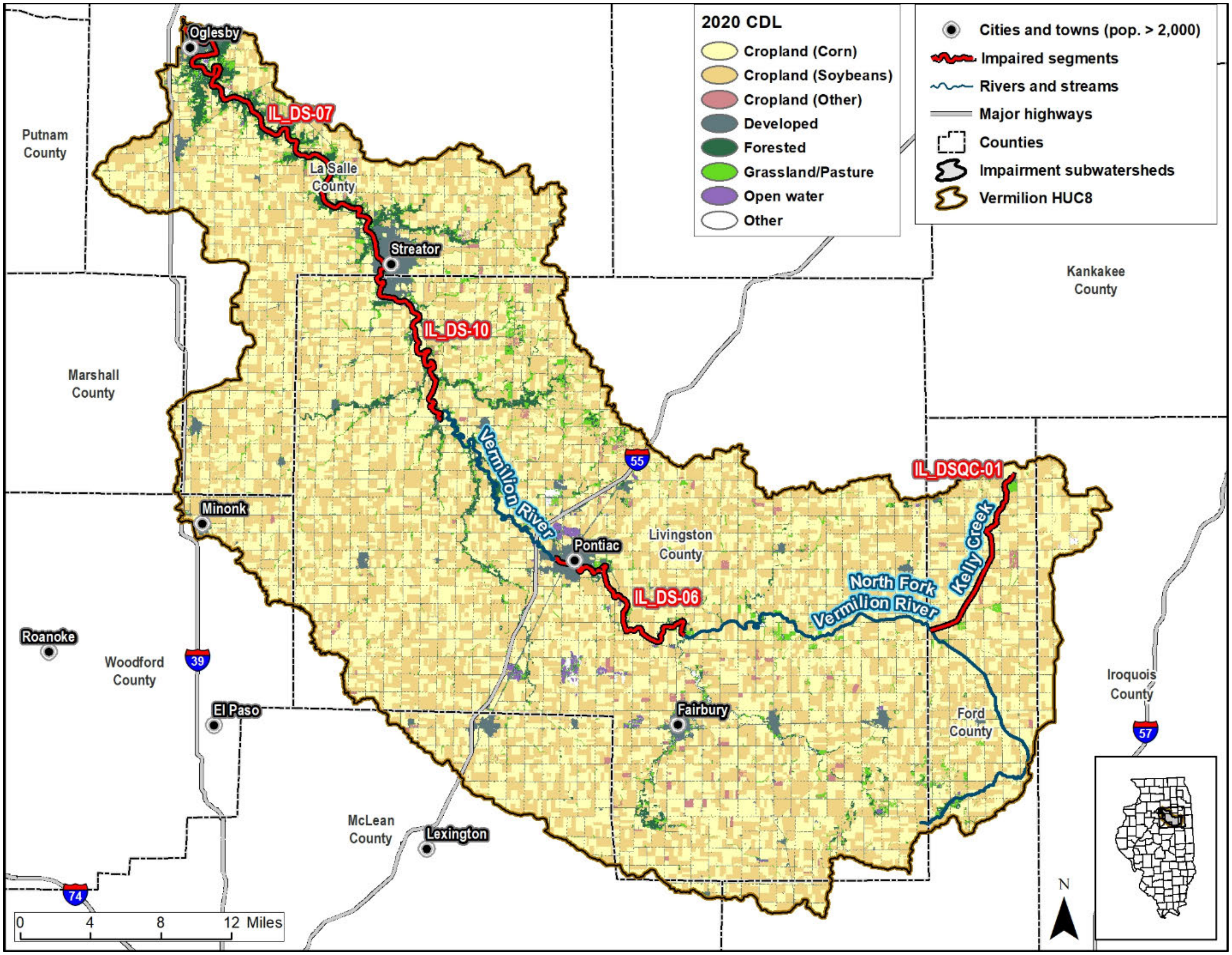

Figure 4. Land cover distribution in the Vermilion River watershed.

3.4 Topography

Topography is an important factor in watershed management because stream types, precipitation, and soil types can vary dramatically by slope and elevation. The watershed varies in elevation from 448 to 848 feet (Figure 5). The Vermilion River water elevation varies from 803 feet to 456 feet and is 112 miles long, resulting in a stream gradient of 3.1 feet per mile. The water elevation of Kelly Creek varies from 707 feet to 640 feet and is 11.4 miles long, resulting in a stream gradient of 5.9 feet per mile.

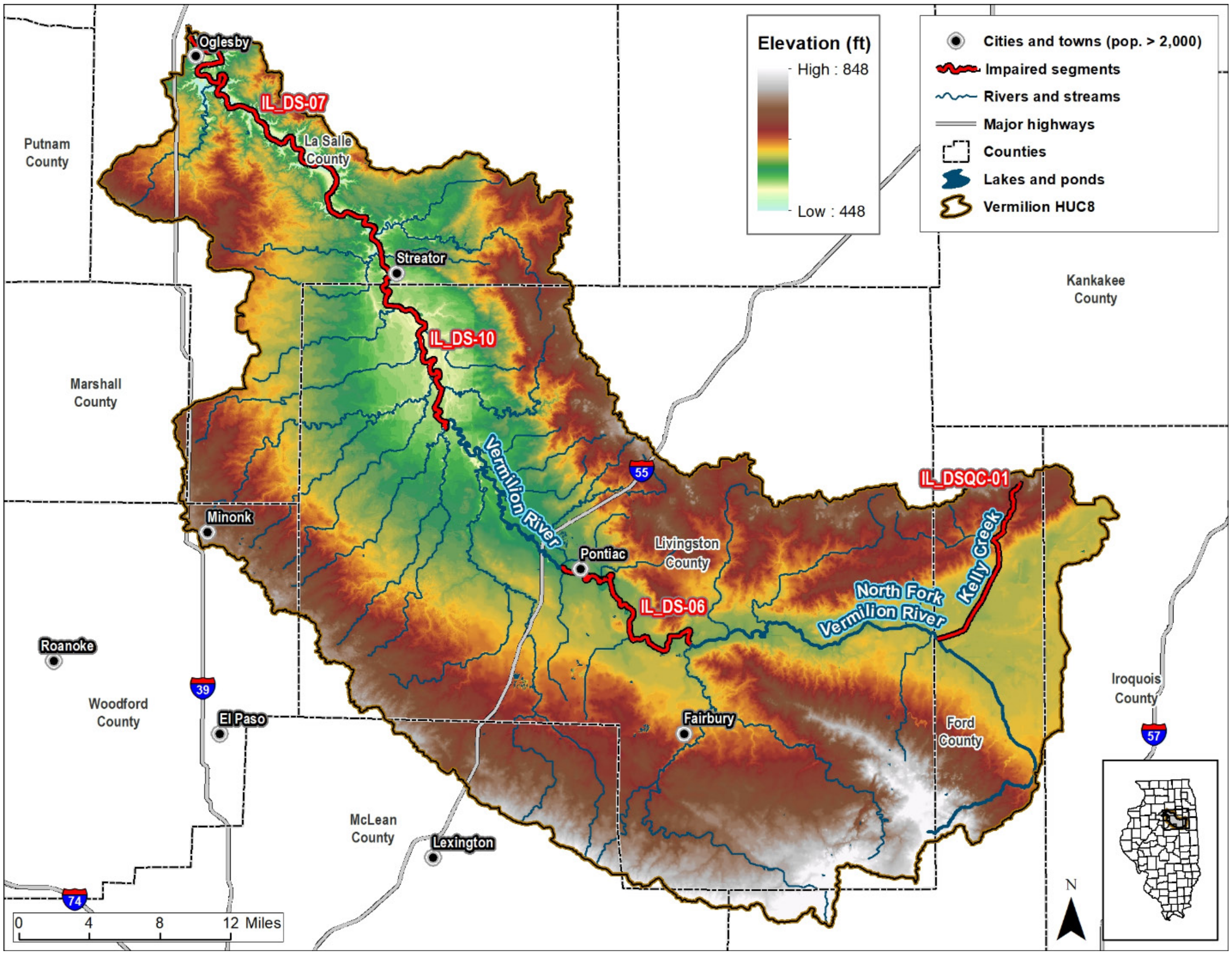

Figure 5. Topography in the Vermilion River watershed.

3.5 Soils

The National Cooperative Soil Survey publishes soil surveys for each county within the United States. These soil surveys contain predictions of soil behavior for selected land uses. The surveys also highlight limitations and hazards inherent in the soil, general improvements needed to overcome the limitations, and the impact of selected land uses on the environment. The soil surveys are designed for many different uses, including land use planning, the identification of special practices needed to ensure proper performance, and mapping of hydrologic soil groups (HSGs).

HSGs refer to the grouping of soils according to their runoff potential. Soil properties that influence the HSGs include depth to seasonal high water table, infiltration rate and permeability after prolonged wetting, and depth to a slower permeable layer (e.g., finer grained). There are four HSGs: Groups A, B, C, and D (Table 10 and Figure 6).

In the Vermilion River watershed, soils are predominantly HSGs B and B/D in the southwestern part of the watershed and transition to HSGs C and D type soils east of the Vermilion River. The high proportion of HSG B/D type soils coupled with agricultural land uses (e.g., corn and soybean crops) and low slope indicate a likelihood of subsurface tile drainage.

Table 10. Hydrologic soil group descriptions

HSG	Group Description
A	Sand, loamy sand or sandy loam types of soils. Low runoff potential and high infiltration rates even when thoroughly wetted. Consist chiefly of deep, well to excessively drained sands or gravels with a high rate of water transmission.
B	Silt loam or loam. Moderate infiltration rates when thoroughly wetted. Consist chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.
C	Soils are sandy clay loam. Low infiltration rates when thoroughly wetted. Consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.
D	Soils are clay loam, silty clay loam, sandy clay, silty clay, or clay. Group D has the highest runoff potential. Low infiltration rates when thoroughly wetted. Consist chiefly of clay soils with a high swelling potential, soils with a permanently high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.
A/D B/D C/D	Dual Hydrologic Soil Groups. Certain wet soils are placed in group D based solely on the presence of a water table within 24 inches of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups (A/D, B/D, and C/D) based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition.

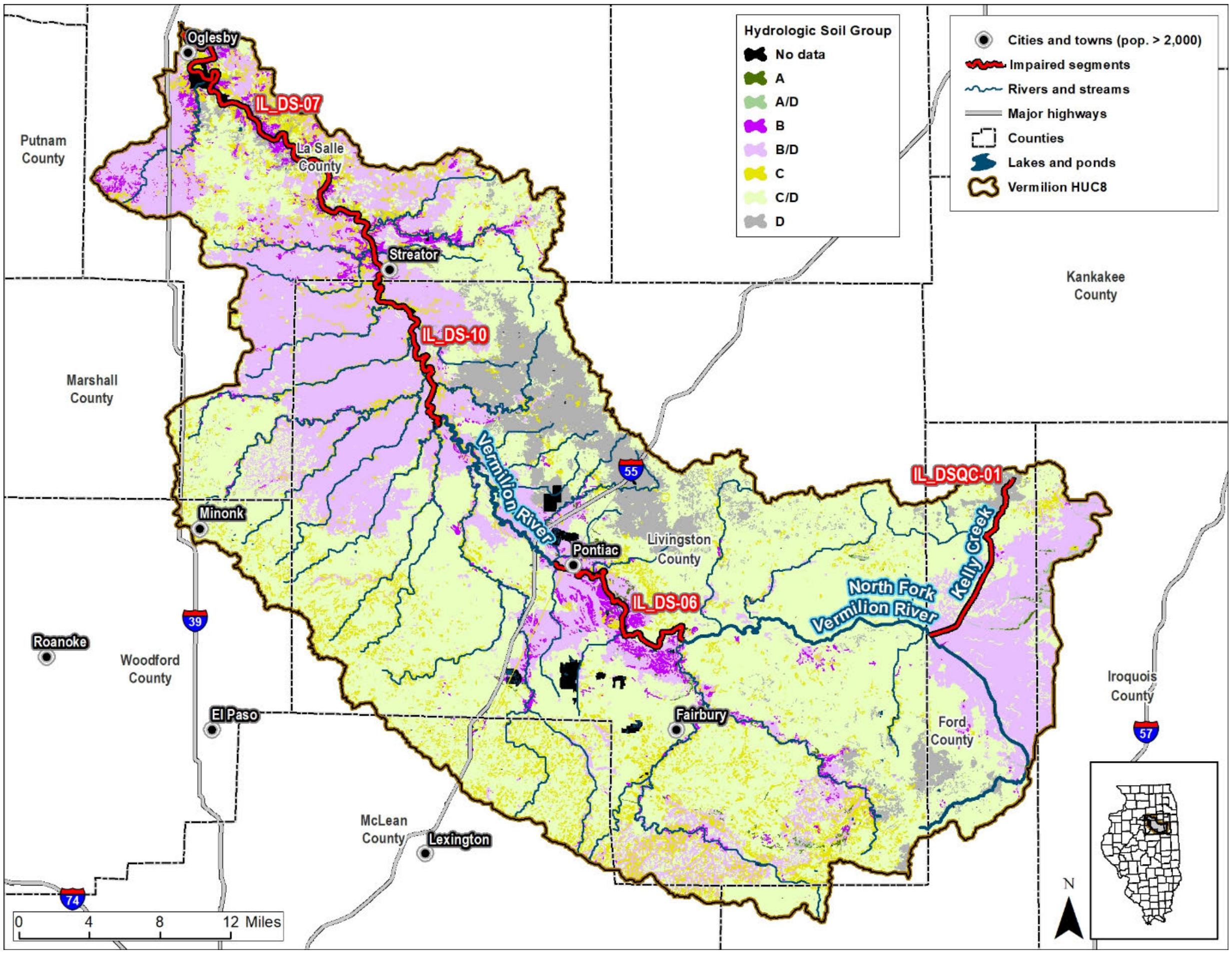

Figure 6. Hydrologic soil group classifications for Vermilion River watershed.

Waters in this watershed drain into the Illinois River and then into the Mississippi River. This area of the state is extensively tiled for agricultural purposes to facilitate drainage because much of the area is relatively flat and corn and soybean are grown on the land. Pooling and wet soils can occur after precipitation events when row crop land is flat.


Figure 7. Drain tile discharging into the North Fork Vermilion Tributary.

When a field is tile-drained, rainwater will move much more rapidly to a watershed outlet when compared to water in the natural soil matrix. Most streams in this watershed are channelized. Channelization straightens, deepens, and can widen a stream. Water flows much faster through the altered channel, which can result in increased erosion and flooding downstream. The straightened channel also moves more gravel and sediment downstream.

In addition, channelizing can strip streambanks of vegetation, making them more prone to erosion. Natural streams have pools and riffles. Pools help protect streambanks from erosion by absorbing some of the energy of the flowing water. By removing pools, riffles and deep holes, channelizing can harm fish and other aquatic life in the stream. Although channelization may appear to solve a problem in the short term, the stream will constantly work to return to its natural course. This short-term solution can result in long-term problems and high, recurring costs in the watershed.

A commonly used soil attribute use to evaluate erosion is the K-factor. The distribution of K-factor values in the watershed ranges from 0.02 to 0.49 (Figure 8). The higher values indicate higher potential for erosion and are primarily located along the mainstem of the river and in the surrounding drainage area in the lower half of the watershed.

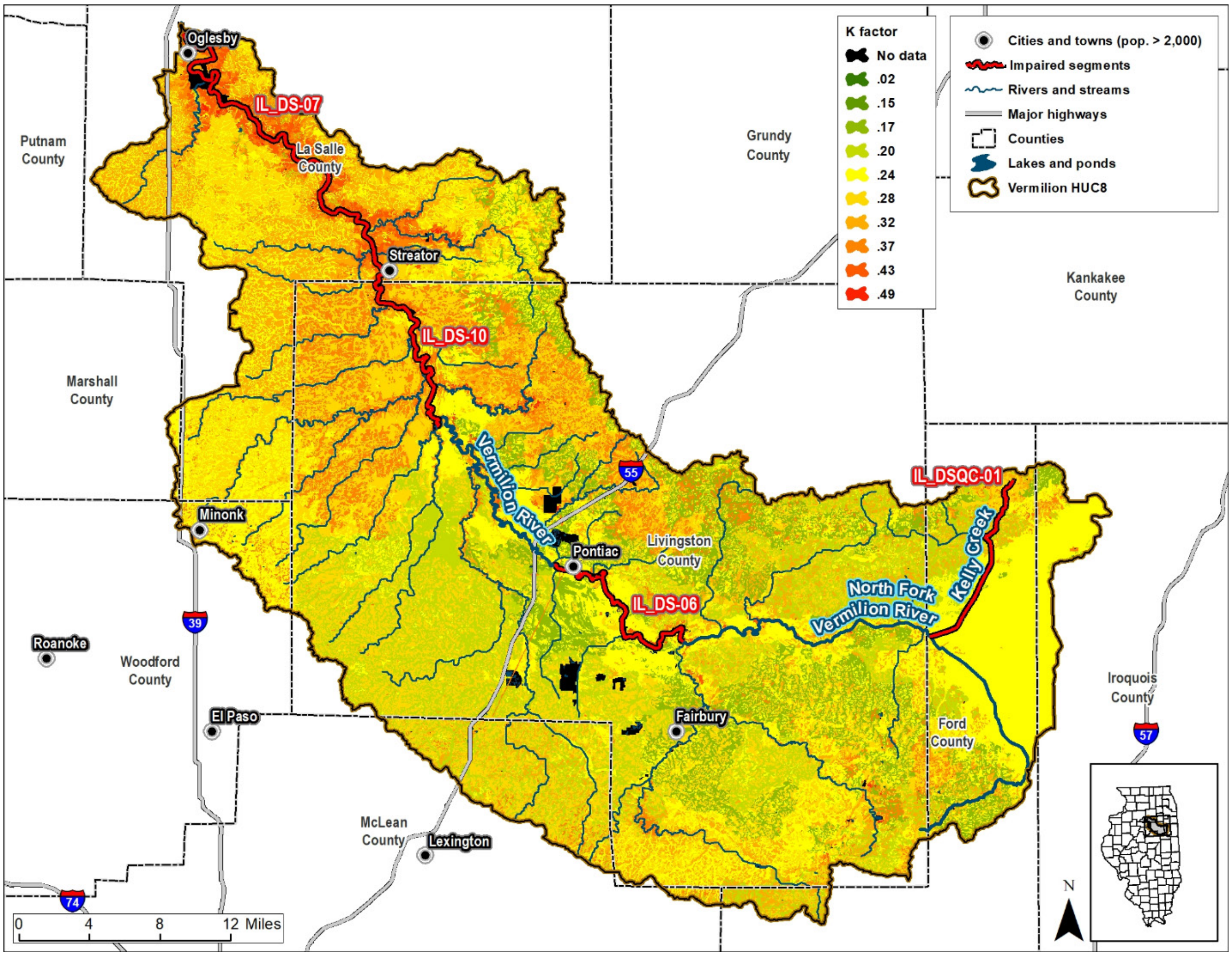

Figure 8. Distribution of K factor values in the Vermilion River watershed.

3.6 Hydrology and Water Quality

Hydrology plays an important role in evaluating water quality. The hydrology of the Vermilion River watershed is driven by local climate conditions and the landscape. USGS and IEPA have has been collecting data in this watershed for many years.

3.6.1 USGS Flow and Water Quality Monitoring Data

In the Vermilion River watershed (HUC 07130002), USGS has operated six continuously recording flow gages, collected instantaneous flows from seven sites, and collected water quality samples from nine sites (Table 11).

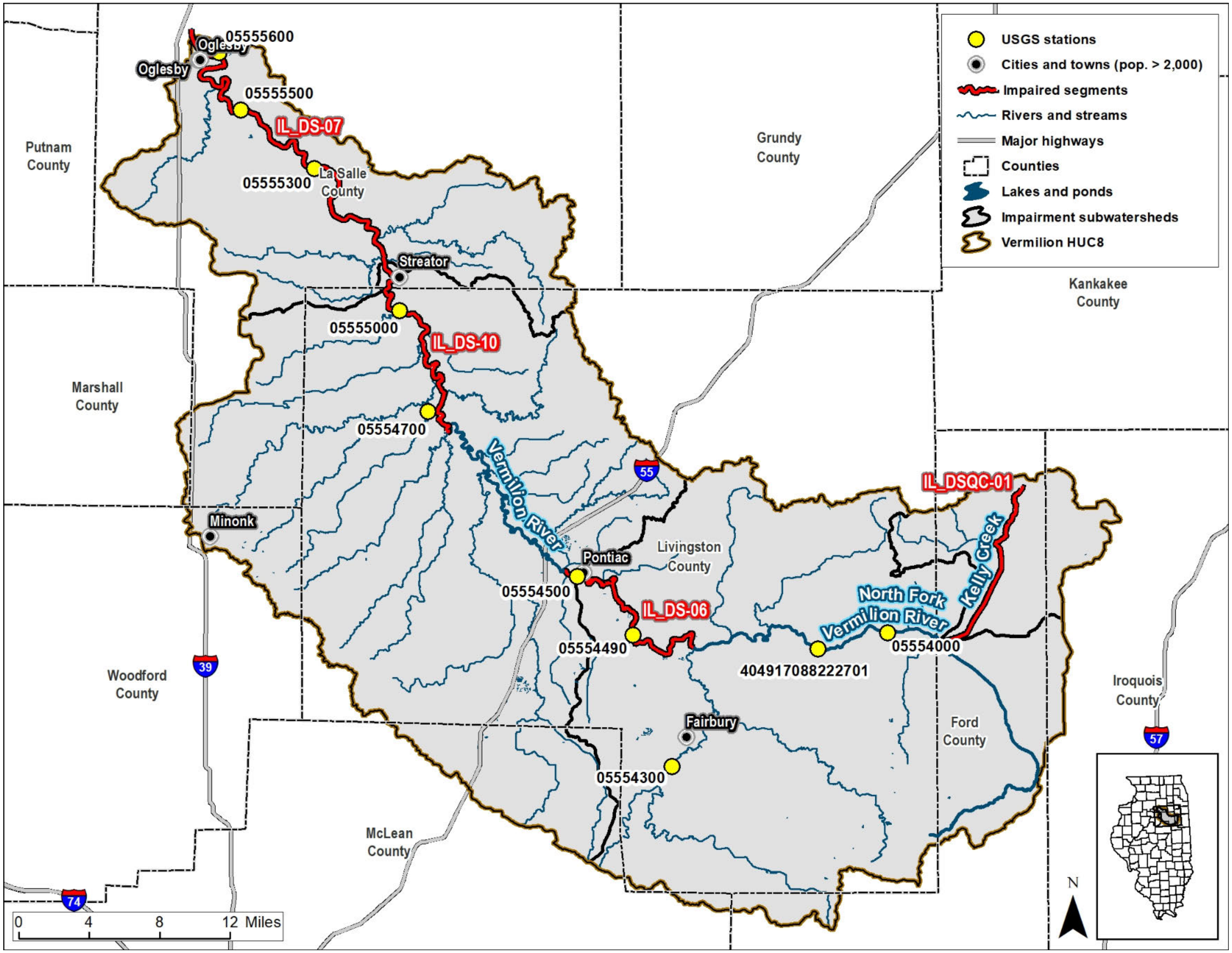

Figure 9. U.S. Geological Survey monitoring sites.

Table 11. USGS gages and sites in the Vermilion subbasin (HUC 07130002)

Gage ID or Site ID	Gage or site name	Drainage Area (sq. mi.)	Daily flow	Instantaneous flow		Water Quality	
			Period of Record (water years)	No. of flows	Period of Record (water years)	No. of samples	Period of Record (water years)
05554000	North Fork Vermilion River near Charlotte, IL	186	1943-1962	240	1942-2020	5	1973-1997
05554300	Indian Creek near Fairbury, IL	67.5	2012[a]-2018[b]	54	2011-2019	41	2012-2018
05554490	Vermilion River at McDowell, IL	551	--	1	1997	197	1978-2021
05554500	Vermilion River at Pontiac, IL	579	1943-2020	403	1951-2021	203	1957-1983
05554700	Mole Creek near Cornell, IL	21.3	--	0	--	1	1981
05555000	Vermilion River at Streator, IL	1,080	1915[a]-1931	4	1981-1989	8	1970-1981
05555300	Vermilion River near Leonore, IL	1,251	1932[a]-2020	413	1971-2021	392	1974-2021
05555500	Vermilion River at Lowell, IL	1,278	1932-1971	0	--	0	--
05555600	Vermilion River at Oglesby, IL	1,329	--	0	--	2	1980-1981
404917088222701	North Fork Vermilion River near Wing	--	--	4	2013	29	2013

Provisional data from water year 2021 are excluded.

A double dash ("--") indicates that the drainage area was not reported or that no flow data in the specified field are available at the specified gage.

[a] Daily flow data are available for a portion of the water year that precedes the specified water year.

[b] Daily flow data are available for a portion of the water year that follows the specified water year.

3.6.2 IEPA Water Quality Monitoring

IEPA sampled 30 monitoring sites in the Vermilion River (Illinois Basin) watershed in 2014-2020. IEPA also collected data prior to 2014; however, the focus of this TMDL is water quality in 2014-2020.

- **Fecal coliform**: IEPA collected 21 samples from 3 monitoring sites on the Vermilion River (DS-01, DS-06, and DS-19) during the summer recreation season that were evaluated for fecal coliform. Five samples were collected within a 30-day period at only two monitoring sites (DS-01 and DS-19). Refer to Section 5.1 and Section 5.4 for the evaluations of these data with geometric mean criterion of Illinois's fecal coliform WQS.
- **Inorganic nitrogen (nitrate + nitrite)**: IEPA collected 432 samples from 28 monitoring sites that were evaluated for inorganic nitrogen. IEPA most frequently evaluated inorganic nitrogen from samples collected in the Vermilion River, Indian Creek, and an unnamed tributary to Indian Creek. Refer to Section 5.2 and Section 5.3 for evaluations of inorganic nitrogen monitoring data with Illinois's nitrate WQS.
    - *Vermilion River*: Monitoring sites DS-06 (n=57) and DS-07 (n=54) in 2014-2020.
    - *Indian Creek*: Monitoring sites DSPA-01 (n=47), DSPA-02 (n=43), DSPA-03 (n=47), and DSPA-04 (n=40) in 2014-2015.
    - *Unnamed tributary to Indian Creek*: DSPAA-01 (n=42) in 2014-2015.
- **Iron (dissolved)**: IEPA collected 173 samples from 24 monitoring sites that were evaluated for iron (total and dissolved). IEPA most frequently evaluated iron from samples in the Vermilion River (monitoring sites DS-06 [n=57] and DS-07 [n=50] in 2014-2020). Only 3 samples were collected and evaluated from Kelly Creek, which is listed for iron. Refer to Section 5.5 for an evaluation of these iron monitoring data with Illinois's dissolved iron WQS.

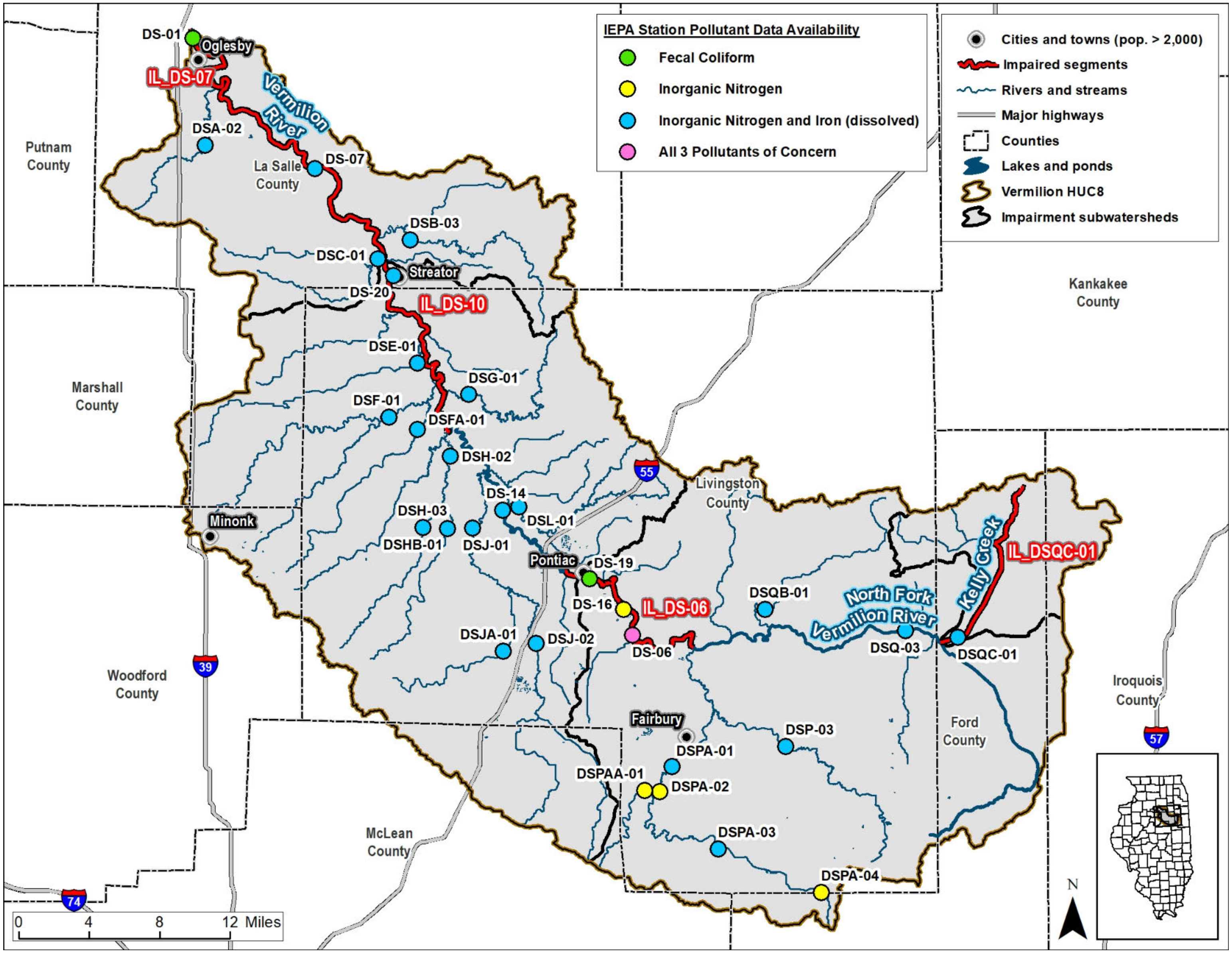

Figure 10. IEPA monitoring sites.

3.7 Watershed Studies and Other Watershed Information

This section describes several of the studies that have been completed in the watershed.

- **The Vermilion River Basin (In the Illinois River Watershed) – An Inventory of the Region's Resources** (Illinois Department of Natural Resources [DNR] 2004)

  This report provides a broad overview of the natural resources and wildlife present in the Vermilion River watershed. This includes identified locations of key natural areas and wildlife habitats, examples of existing conservation efforts, and a description of key species native to the area. Available at: https://www2.illinois.gov/dnr/publications/documents/00000722.pdf

- **Vermilion River Watershed Rapid Watershed Assessment Report** (Natural Resources Conservation Service [NRCS] 2008)

  This assessment provides an estimate of potential recommended implementation activities in the watershed and identifies targeted locations to maximize investments in conservation. It also includes assessments and inventories of wetlands, biologically significant streams, soil types, and other watershed characteristics. Available at: https://mcleanwater.org/wp-content/uploads/sites/3/2012/07/Illinois-Vermillion-River-Watershed-Rapid-Watershed-Assessment-Report.pdf

- **Vermilion River Watershed (IL Basin) TMDL Report** (IEPA 2009)

  This previous draft TMDL report provides information on nutrient and bacteria loading to several segments of the Vermilion River. It also identifies potential sources of pollutants and outlines watershed characteristics. Available at: https://www2.illinois.gov/epa/Documents/epa.state.il.us/water/tmdl/report/vermilion-river/vermilion-final.pdf

4 Watershed Source Assessment

Source assessments are an important component of water quality management plans and TMDL development. This section provides a summary of potential sources that contribute listed pollutants to the Vermilion River watershed.

4.1 Pollutants of Concern

Pollutants of concern evaluated within this source assessment include fecal coliform, nitrate nitrogen, and iron. These pollutants can originate from an array of sources, including point and nonpoint sources. Point sources typically discharge at a specific location from pipes, outfalls, and conveyance channels. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters, particularly overland runoff. This section provides a summary of potential point and nonpoint sources that contribute pollutants to the impaired waterbodies.

4.2 Point Sources

Point source pollution is defined by the Federal Clean Water Act §502(14) as:

> *any discernible, confined and discrete conveyance, including any ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation [CAFO], or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agriculture storm water discharges and return flow from irrigated agriculture.*

Point sources can include facilities such as municipal wastewater treatment plants (WWTPs), industrial facilities, concentrated animal feeding operations (CAFOs), or regulated storm water including municipal separate storm sewer systems (MS4s). Under the CWA, all point sources are regulated under the National Pollutant Discharge Elimination System (NPDES) program.

Facilities covered by NPDES permits in the Vermilion River (Illinois Basin) watershed are discussed in the subsections below and plotted on a map in Figure 11. There are no permitted CAFOs or MS4s in the watershed.

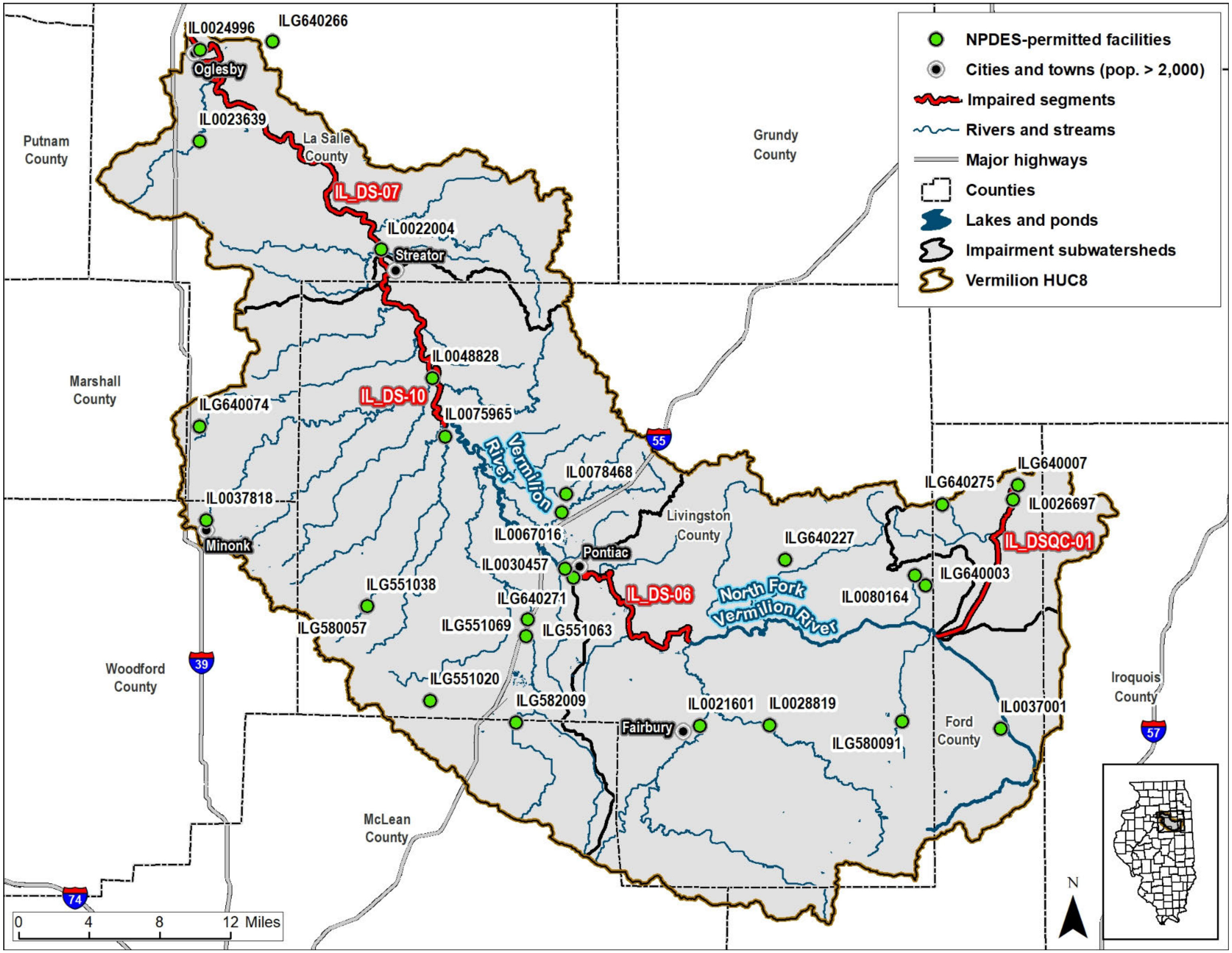

Figure 11. Permitted facilities in the Vermilion River (Illinois Basin) watershed.

4.2.1 Facilities Covered by Individual NPDES Permits

A municipality, industry, or operation must apply for an NPDES permit if an activity at that facility discharges wastewater to surface water. In the Vermilion River (Illinois Basin) watershed, 13 facilities are covered by individual NPDES facilities (Table 12). Ten facilities are sewage treatment plants (STPs) that discharge treated sanitary wastewater. Bacteria and nutrients can be found in these discharges. Facilities that discharge stormwater, pit pumpage, and hydrostatic test water are not sources of bacteria or nutrients; facilities with such discharges are presented in Table 12 but do not receive wasteload allocations.

Table 12. Facilities covered by individual NPDES permits.

NPDES	Facility	Effluent type	DAF (mgd)	DMF (mgd)
IL0021601	Fairbury STP, City of	Treated sanitary	0.66	2.4
IL0022004	Streator STP, City of	Treated sanitary	4.0	11.4
IL0023639	Tonica STP, Village of	Treated sanitary	0.100	0.250
IL0024996	Oglesby STP, City of	Treated sanitary	0.879 [a]	1.224 [a]
IL0026697	Stelle Community Association STP	Treated sanitary	0.02	0.04
IL0028819	Forrest STP, Village of	Treated sanitary	0.35	0.88
IL0030457	Pontiac WWTP, City of	Treated sanitary	3.5	8.5
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	0.008	0.032
IL0037818	Minonk STP, City of	Treated sanitary	0.34	0.85
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	0.012	0.03
IL0067016	Livingston Landfill	Stormwater	--	--
IL0075965	Shale Quarry II	Stormwater, Pit pumpage	0.105	--
IL0078468	Flanagan Terminal	HST	2.88	--

DAF = design average flow.
DMF = design maximum flow.
HST = hydrostatic test water.
mgd = million gallons per day.
STP = sewage treatment plant.
WWTP = wastewater treatment plant.

[a] The city of Oglesby is under administrative orders on consent with U.S. EPA for the construction and operation of a new STP. Scheduled to be operational in 2028, the permit will be transferred to the new STP.

4.2.2 Combined Sewer Overflows Covered by Individual NPDES Permits

Combined sewer overflow (CSO) discharges occur when combined sewage, which is comingled sanitary sewage and stormwater, is discharged from a combined sewer system. CSO discharges occur through CSO outfalls that can be located throughout the combined sewer system or at CSO outfalls located at a sewage treatment system. CSO discharges typically occur when the volume of combined sewage exceeds the capacity of the combined sewer system or capacity of the STP. The combined sewage that exceeds capacity then bypasses the combined sewer system or STP and is discharged to a surface waterbody through a CSO outfall.

CSO discharges in combined sewer systems are regulated by the Clean Water Act through the NPDES permitting authority. In the Vermilion River watershed, five municipalities operate combined sewer systems. Their CSO discharges are regulated, under specific conditions, by the individual NPDES permits for the STPs and WWTP serving these municipalities (Table 13). Uncontrolled CSO events that may cause or contribute to exceedances of water quality standards (in receiving waterbodies or downstream waterbodies) are managed through state-approved long-term control plans (LTCP). The LTCP provides an enforceable framework for improvements that are implemented through the individual NPDES permits and other BMPs.

The following subsections present available information for each municipality that operates a combined sewer system. Refer to Appendix A for summaries of CSO events by outfall for each permittee.

Table 13. CSOs covered by individual NPDES permits.

NPDES	Facility	CSO outfalls	Receiving waterbodies
IL0021601	Fairbury STP, City of	7[a]	Indian Creek
IL0022004	Streator STP, City of	13	Coal Run Creek, Prairie Creek, Pumpkin Creek, Vermilion River
IL0024996	Oglesby STP, City of	5	Vermilion River and its small tributaries
IL0030457	Pontiac WWTP, City of	5	Vermilion River and a tributary
IL0037818	Minonk STP, City of	2	Long Point Creek

STP = sewage treatment plant.

WWTP = wastewater treatment plant.

[a] Five of the seven CSO outfalls were eliminated in 2019 and 2020.

4.2.2.1 City of Fairbury (IL0021601)

The city of Fairbury operates a combined sewer system (CSS) with one STP and seven CSO outfalls. Once the design maximum flow is reached at the STP, the facility may begin to use outfall 002 for treated combined sewage discharge (i.e., influent bypasses most of the treatment process and is only disinfected before discharge). Outfall 002 has an effluent limitation of a daily maximum of 400 cfu/100 mL.

The LTCP calls for the City of Fairbury to reduce the number of CSO discharges to no more than 4 CSO events from each CSO outfall within one calendar year by December 31, 2022. In 2019 and 2020, the city completed two phases of its LTCP. Outfalls 004, 005, and 006 were eliminated on October 4, 2019; outfall 011 was eliminated on February 10, 2020; and outfall 013 was eliminated on October 5, 2020. Three additional phases are:

- Phase C (south interceptor) by December 31, 2021.
- Phase D (Timber Ridge pump station improvements) by December 31, 2022.
- Phase E (CTS pump station improvements) by December 31, 2022.

Combined sewage routed through CSO outfall 002 is disinfected. CSO outfall 002 discharged during 47 months in 2011 through 2020. Based upon DMR data, monthly total overflow volumes ranged from 0.37 million gallons (MG) to 33.5 MG and averaged 8.0 MG.

Combined sewage routed through outfalls 003 and 008 and formerly through closed outfalls 004, 005, 006, 011, and 013 was not treated or disinfected. Refer to Appendix A for summaries of CSO data:

- Table A - 1: Number of CSO events in 2011 through 2020 (IEPA)
- Table A - 2: Estimated CSO event volumes in January 2016 through January 2018, calculated from monthly total CSO volume data provided by Fairbury (2021)
- Table A - 3: CSO event volumes in February 2019 through August 2021 (Fairbury 2021).

Only CSO outfalls 003 (STP plant bypass) and 008 (South Seventh Street B) are still in operation. In the DMR data compiled by IEPA, during 2011-2020, CSO outfalls 003 and 008 discharged 58 and 61times (respectively), including 36 and 38 times (respectively) during the summer recreation season. In data provided by the city, during 2021 (through August), following the elimination of five CSO outfalls from the CSS, outfall 003 discharged thrice (1.5 MG on June 26th, 4.0 MG on August 8th, and 5.2 MG on August 24th) and outfall 008 discharged once (0.155 MG on June 26th).

No fecal coliform density data are available for these outfalls. While Indian Creek is not impaired for its recreation use, the Vermilion River segment IL_DS-06 is impaired for its recreation use about 8 miles downstream from the city of Fairbury.

4.2.2.2 City of Streator (IL0022004)

The city of Streator operates a CSS with one STP, three CSO treatment facilities, and 13 CSO outfalls. Each of these four facilities must treat effluent to a daily maximum of 400 cfu/100 mL. Seven of its 13 permitted CSO outfalls reported no CSO events in 2011 through 2020 (Table 14; Appendix A, Table A - 4). Except for one CSO event reported for the Court Street Pump Station (CSO outfall 009), all of the CSO events were reported as originating from three CSO treatment facilities.

Table 14. Summary of combined sewer overflow outfalls in Streator

Combined sewer overflow outfall				Summer Recreation Season Discharges	
General location	**ID**	**Type**	**Status**	**IEPA Data 2011-2020**	**City Data 2017-2020**
Coal Run Creek CSO Treatment Facility	024	Treated	Active	Yes	Yes
	A24, C24	Untreated	Active	Yes	Yes
Kent Street CSO Treatment Facility	C01	Treated	Active	Yes	Yes
	026	Untreated	Active	Yes	Yes
Prairie Creek CSO Treatment Facility	A01	Treated	Active	Yes	No
	025	Untreated	Active	No	No
Combined sewer system	003, 018, 019, 021, 027	Untreated	Closed	--	--
	009	Untreated	Active	Yes	Yes
	020, 023	Untreated	Active	No	No
	022	Untreated	Eliminated	--	--

Note: All 16 outfalls are authorized under Streator's NPDES permit. Refer to the body text in this section for explanations of each outfall's discharges.

- The **Coal Run Creek CSO Treatment Facility** discharges treated effluent through outfall 024, untreated wet well overflow through CSO outfall A24, and untreated first flush tank overflow through CSO outfall C24. All three outfalls discharge to Coal Run Creek.[1]

  Outfall 024 (treated): In the DMR data provided by IEPA, during 2011 through 2020, no discharge was reported in the DMR for 74 months (62%) at outfall 024. For the 46 months with reported discharges, the monthly total flow ranged from 0.585 to 58 million gallons, while the median and average monthly total flows were 6.0 and 11 million gallons. Fecal coliform concentrations ranged from 1 to 600,000 cfu/100 mL.

  In the data provided by the city, during 2017 through 2021, 42 CSO events occurred, overflow volumes ranged from 0.36 to 16.8 MG, and fecal coliform concentrations ranged from 2 to 230,000 cfu/100 mL (Palm 2021); annual summaries are presented in Table A - 5 in Appendix A.

  Outfall A24 (untreated): In the DMR data, during 2011 through 2020, 2 CSO events were reported (July 2014 and February 2018).

  Outfall C24 (untreated): In the DMR data, during 2011 through 2020, 31 CSOs events were reported, including 7 CSO events during the summer recreation season.[2]

[1] Flow of 3.02 mgd or less is routed to the STP for treatment. Flow of 3.02 to 4.12 mgd is captured in a lagoon and eventually routed to the STP for treatment. Flow of 4.12 to 14.92 mgd receives primary clarification and disinfection before discharging Coal Run Creek. Flow greater than 14.92 mgd discharge from the primary splitter (CSO outfall C24) and flows greater than 43.2 mgd bypass the influent wet well (CSO outfall A24).

[2] CSO events at outfall C24 occurred in the following months: May 2011 (n=1), June 2011 (n=1), November 2011 (n=4), May 2012 (n=2), April 2013 (n=16), July 2014 (n=1), August 2014 (n=1), December 2015 (n=1), April 2017 (n=1), February 2019 (n=1), September 2019 (n=1), and April 2020 (n=1).

- The **Kent Street CSO Treatment Facility** discharges treated effluent through outfall C01 and untreated bypass through outfall 026.[3] Both outfalls discharge to the Vermilion River.

  Outfall C01 (treated): During May 2020, 7.83 million gallons were discharged at outfall C01. No discharge was reported for the other months in 2020, and no pre-2020 data are reported in the DMR.

  In the data provided by the city, during 2017 through 2021, 34 CSO events occurred, overflow volumes ranged from 0.36 to 8.8 MG and fecal coliform concentrations ranged from 2 to 830,000 cfu/100 mL (Palm 2021); annual summaries are presented in Table A - 5 in Appendix A.

  Outfall 026 (untreated): In the DMR data, during 2011 through 2020, 19 CSOs events were reported: May 2011 (n=1), June 2011 (n=1), April 2013 (n=16), and April 2017 (n=1).

- The **Prairie Creek CSO Treatment Facility** discharges treated effluent through outfall A01 and untreated bypass through outfall 025.[4] Both outfalls discharge to the Vermilion River.

  Outfall A01 (treated): In the DMR data provided by IEPA, during 2011 through 2020, CSO volumes were reported at outfall A01 for only 3 months: 0.63 MG in June 2011, 0.441 MG in May 2012, and 7.15 MG in April 2013. The city reported no CSOs in 2017 through 2021.

  Outfall 025 (untreated): In the DMR data provided by IEPA, during 2011 through 2020, 12 CSO events at outfall 025 occurred in April 2013. The city reported no CSOs in 2017 through 2021.

In its sensitive areas review (Palm 2020), the city identified four CSO outfalls that discharge to sensitive areas (outfalls 020, 023, 025, and 026) and nine CSO outfalls that do not (outfalls 003, 009, 018, 019, 021, 022, 027, A24, and C24): The sensitive areas review also reported that

- Outfalls 003, 018, 019, 021, and 027 do not discharge because valves are closed, and discharges are not possible; the city intends on removing these five outfalls from the city's NPDES permit during the next renewal cycle.[5]
- Outfall 022 was eliminated during the Center Street Sewer Project.
- Outfalls 020 and 023 have not discharged in 5 years, and the city expects to eliminate them during the Coal Run Creek interceptor basin breakout projects over the next few years.

Discharges from the city's three CSO treatment facilities meet the NPDES permit limits that are based upon Illinois fecal coliform standards; as such, these discharges are not the primary cause of impairment, but they do contribute bacteria loads. No nitrate data are available to evaluate these facilities contributions to the nitrate impairments.

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[3] Flow of 8.05 mgd or less is routed to the STP for treatment. Flow of 8.05 to 9.40 mgd is captured in a lagoon and eventually routed to the STP for treatment. Flow of 9.40 to 13.83 mgd receives primary treatment and disinfection before discharging to the Vermilion River. Flow greater than 13.83 mgd bypasses the Kent Street CSO Treatment Facility (CSO outfall 026).

[4] Flow of 4.84 mgd or less is routed to the STP for treatment. Flow of 4.84 to 5.64 mgd is captured in a lagoon and eventually routed to the STP for treatment. Flow of 5.64 to 13.83 mgd receives primary treatment and disinfection before discharging to the Vermilion River. Flow greater than 13.83 mgd bypasses the Prairie Creek CSO Treatment Facility (CSO outfall 025).

[5] Jeremy Palm, P.E. (Streator city engineer), personal communication (telephone), October 26, 2021.

Bypasses (untreated) of at the city's three CSO treatment facilities and untreated CSO events from around the city contribute bacteria and nitrate loads to the Vermilion River. A total of 67 untreated CSO events were reported for the city of Streator in 2011 through 2020 but only 11 untreated CSO events occurred during the summer recreation season. Given the infrequency of CSO events and the annual persistence of elevated fecal coliform and nitrate levels in the Vermilion River, city of Streator CSOs are not likely the main source of impairment to Vermilion River segment IL_DS-07.

4.2.2.3 City of Oglesby (IL0024996)

The city of Oglesby operates a CSS with one STP, 15 miles of combined sewer piping, and five CSO outfalls. Two CSO outfalls are near the STP (outfalls A01 and B01), one CSO outfall is a STP bypass (C01), and two outfalls are within the combined sewer system (outfalls 003 and 005). The city formerly operated five additional CSO outfalls that are now permanently closed (002, 004, 007, 009, and 010).[6]

The city is composed of three separated sewer system areas and five CSS areas, with two separated sewer system areas discharging to CSS areas (Chamlin & Associates 2020); the combined sewer service areas are summarized in Table 15.

Table 15. Combined sewer service areas in the city of Oglesby

CSSA	Areas (acres)	Land use
A	108.7	Residential
B [a]	118.4	Residential
C	68.8	Residential & commercial
D	179.5	Residential
E	232.7	Residential & commercial

Source: Chamlin & Associates 2020.

CSSA = combined sewer service area.

[a] Sewer separation projects and other projects have eliminated combined sewer overflows from CSSA-B.

The city of Oglesby is working on an administrative order on consent with U.S. EPA to construct and operate a new STP to meet its NPDES permit fecal coliform effluent limits and to address the CSO LTCP.

CSO outfalls A01 and B01 each discharged thrice during the ten years from 2011 through 2020 but only one discharge from each outfall was during the summer recreation season. Similarly, CSO outfalls 003 and 005 each only discharged once during those ten years and the CSO event was not during the summer recreation season. The STP plant bypass (CSO outfall C01) discharged 115 times from 2011 through 2020 and 71 CSO events occurred during the summer recreation season.

Chamlin & Associates has been monitoring CSO volumes in 2021 to support the development of a LTCP. Available overflow volume data are summarized in Table 16.

Table 16. CSO volumes in Oglesby

CSO outfall	1-month, 12-hour storm (million gallons)	1.5-year, 3-hour storm (gallons)
003	628,000	1,500,000
005	90,000	283,000
STP bypass [a]	6,600,000	2,700,000

Source: Don Bixby, Chamlin & Associates, electronic mail, October 22, 2021.

[a] This CSO outfall monitoring represents CSO outfalls A01, B01, and C01.

[6] Don Bixby (Chamlin & Associates, Inc.; contracted city engineer), telephonic communication, October 20, 2021.

4.2.2.4 City of Pontiac (IL0030457)

The city of Pontiac operates a CSS served with one WWTP and five CSO outfalls. Outfalls A02, 002, and 003 discharge directly to the Vermilion River, within impaired segment IL_DS-06. Outfalls 004 and 005 discharge to North Ditch, which is a tributary to the Vermilion River.

The city's 2010 LTCP[7] is to achieve four or fewer CSO events per CSO outfall per year. The city is in the process of updating its LTCP for its NPDES permit renewal; the new LTCP will be digital. Over the next 5 years, the city will separate sewers (removing thousands of stormwater inlets from the sanitary sewers and constructing new storm sewers), line 20,000 lineal feet of sanitary sewers, and eliminate CSO outfall 003.[8] Additionally, the city is aware that sump-pumps are connected to the combined sewers.[9]

Outfall A02 discharged most frequently in 2011 through 2020: 59 times with 41 times during the summer recreation season. Outfall 003 discharged least, only discharging twice in 2011 through 2020: May 2013 and July 2014. As presented in Appendix A, the other three outfalls (002, 004, and 005) discharged 13 to 20 times in 2011 through 2020, with 10 to 16 times during the summer recreation season.

The city reported no CSOs in 2017 (Kinkade 2021a), two CSO events in 2018 (Kinkade 2018), and three CSO events in 2021 (Kinkade 2021b); these data are summarized in Table 17. Only duration (i.e., not overflow volume) data are available for 2019 and 2020.

Table 17. CSO volumes in Pontiac

Date	Rainfall		CSOs			CSS volume (MG)
	Depth (inches)	Duration (hours)	Outfall	Volume (MG)	Duration (hours)	
06/10/2018	2.23	8	A02	1.4	23.5	1.625
			002	0.225	1.5	
06/26/2018	3.59	16	A02	7.232	n/a	7.907
			004	0.450	n/a	
			005	0.225	n/a	
06/07/2021	2.0	2	002	0.27	1.5	0.48
			004	0.12	0.5	
			005	0.09	0.5	
06/26/2021	5.87	120	A02	19.11	96.5	19.96
			004	0.44	3.65	
			005	0.41	4.5	
08/25/2021	0.94	2	002	0.045	0.5	0.045

Based upon: Kinkade 2018, 2021a,b.

No fecal coliform density or nitrate concentration data are available for these outfalls. As these outfalls discharged to the Vermillion River or a tributary, Pontiac CSOs likely contribute to impairments in segment IL_DS-06 of the Vermilion River.

[7] No electronic version of the 2010 LTCP is available for review. The city only has hardcopies of the 2010 LTCP.

[8] Jake Kinkade, Pontiac WWTP Superintendent, personal communication (telephone), October 26, 2021.

[9] Ibid.

4.2.2.5 City of Minonk (IL0037818)

The city of Minonk operates a CSS served with one STP and two CSO outfalls. The CSS was constructed prior to the 1950s (Foster et al. 2020), and about 85% of the collection system is combined sewers (Minonk 2019). The STP was originally constructed in 1955 and upgraded several times, including recently in 2018 (Foster et al. 2020; Minonk 2019). The installation of inceptors has eliminated all but two of the CSO outfalls (Foster et al. 2020). CSO outfall 002 is a STP bypass when inflow exceeds 4.25 mgd, and CSO outfall 003 is an overflow manhole at Millenia Park (Foster et al. 2020). Historical observation indicates that outfall 003 only begins to discharge after discharge has begun at outfall 002 (Foster et al. 2020).

CSO outfall 002 (STP bypass) discharged 13 times in 2011 through 2020, including 11 times during the summer recreation season. Similarly, CSO outfall 003 discharged 8 times, including 7 times during the summer recreation season. The city of Minonk provided CSO overflow volumes for CSO outfall 002 (STP bypass), which are presented in Table 18; the city is not required to monitor overflow volume from CSO outfall 003 (Millennia Park manhole overflow).

Table 18. CSO volumes in Minonk

Date	CSO Overflow Volume (MG)	Date	CSO Overflow Volume (MG)
9/28/2019	2.351	7/16/2020	1.159
9/29/2019	1.100	7/17/2020	0.200
9/30/2019	0.511	7/20/2020	0.840
10/1/2019	0.077	9/13/2020	0.061
10/31/2019	0.164	5/9/2021	0.177
4/30/2020	0.523	6/27/2021	0.442
5/1/2020	0.139	10/25/2021	0.137

Source: Garber 2021.

While the fecal coliform densities of these CSO events are unknown, these infrequent CSO events discharging 26 miles upstream of the Vermilion River cannot be the cause of persistently high fecal coliform densities observed in the Vermilion River.

4.2.3 Facilities Covered by General NPDES Permits

An additional 13 facilities are covered by five general NPDES permits (Table 19):

- **ILG551**: Discharge of wastewater from an existing, non-publicly owned domestic lagoon system with a single pipe discharge serving a population of 2,500 or less.
- **ILG580**: Discharge of wastewater from an existing, publicly owned domestic lagoon system with a single pipe discharge serving population of 2,500 or less.
- **ILG582**: Discharge of wastewater from an existing, publicly owned domestic lagoon system with a single pipe discharge serving population of greater than 2,500 but less than 5,000.
- **ILG620**: Discharge of new or replacement surface water discharging private sewage disposal systems. The untreated domestic sewage waste load must be less than 1,500 gallons per day.
- **ILG640**: Discharge of wastewaters generated by existing public water supply (PWS) facilities. In the Vermilion River (Illinois Basin) watershed, these PWS are permitted for (1) clarifier sludge blowdown, particulate filter backwash, or lime softener wastewater, (2) iron filter backwash wastewater, and zeolite softener backwash wastewater.

Bacteria and nutrients can be found in the discharges from domestic lagoons and septic systems. Thus, fecal coliform and nitrate can be in the effluent from ILG551, ILG580, ILG582, and ILG620. Discharges from PWS do not include appreciable levels of bacteria or nutrients because PWS backwash wastewater is the result of water treatment for potable use. PWS discharges do include iron.

Table 19. Facilities covered by general NPDES permits.

NPDES	Facility	Effluent type	DAF (mgd)	DMF (mgd)
ILG551: Non-Publicly Owned Domestic Lagoon Serving a Population Less than 2,500				
ILG551020	Meadows Mennonite Retirement Community	Treated sanitary	0.045	0.1125
ILG551038	Salem Children's Home	Treated sanitary	0.011	0.03
ILG551063	Illinois DOT I-55 Livingston Co N STP	Treated sanitary	0.0155	0.0465
ILG551069	Illinois DOT I-55 Livingston Co S STP	Treated sanitary	0.0155	0.0465
ILG580: Publicly Owned Domestic Lagoon Serving a Population of Less than 2,500				
ILG580057	Flanagan STP	Treated sanitary	0.128	0.320
ILG580091	Chatsworth STP	Treated sanitary	0.184	0.460
ILG582: Publicly Owned Domestic Lagoon Serving a Population of 2,500 to 5,000				
ILG582009	Chenoa WWTP, City of	Treated sanitary	0.263	0.658
ILG620: Private Sewage Disposal System				
ILG620223	Cody Harris [a]	Treated sanitary	0.001500	--
ILG640: Public Water Supply				
ILG640003	Cullom Water Treatment Plant PWS	PWS backwash	0.0027	--
ILG640007	WTP of Stelle Community Association	PWS backwash	0.0016	--
ILG640074	Rutland WTP	PWS backwash	0.005	--
ILG640227	Saunemin WTP	PWS backwash	0.008	--
ILG640275	Kempton Water Treatment Plant	PWS backwash	0.015	--

DAF = design average flow.
DMF = design maximum flow.
DOT = department of transportation.
HTW = hydrostatic test water.
mgd = million gallons per day.
PWS = public water supply.
STP = sewage treatment plant.
WTP = water treatment plant.
WWTP = wastewater treatment plant

General permit coverage for the Pontiac Correctional Center PWS (ILG640271) was terminated on July 21, 2021, and the facility now discharges to the Pontiac WWTP (IL0030457).

[a] The Cody Harris Private Sewage Disposal system was previously covered by individual permit IL0080164.

4.3 Nonpoint Sources

4.3.1 Cropland

During wet-weather events (snowmelt and rainfall), pollutants are incorporated into runoff and can be delivered to downstream waterbodies. The resultant pollutant loads are linked to the land uses and practices in the watershed. Agricultural areas can have significant effects on water quality if proper BMPs are not in place. The main pollutants of concern associated with agricultural runoff are sediment, nutrients, pesticides, and bacteria. Runoff from agricultural areas can also be contaminated with oil, grease, chlorides, pesticides, herbicides, nutrients, viruses, bacteria, metals, and sediment.

Cropland agriculture (particularly the cultivation of corn and soybeans) is a major economic contributor in the Vermilion River watershed. While cultivated cropland comprises 87% of total land cover in the watershed, the number of farms in the area has dropped significantly in recent years (Illinois DNR 2004).

Agricultural tile drainage systems are common in the Vermilion River watershed due to the prevalence of hydric (poorly drained) soils in the region. According to the Vermilion River Watershed Rapid Watershed Assessment Report, 87% of soils in the watershed classified as “Somewhat poorly drained”, “Poorly drained”, or “Very poorly drained” (NRCS 2008). Drain tile systems transport agricultural runoff directly to ditches and streams, whereas runoff flowing over the land surface may infiltrate to the subsurface and flow through riparian areas. Drain tile systems can also result in increased peak flows and runoff volumes and decreased base flow as a result of reduced ground water discharge. These more powerful flows have the potential to increase streambank erosion which may result in downstream sedimentation after the in-stream flow decreases and slows down.

4.3.2 Stormwater Runoff

Stormwater runoff from developed areas can rapidly transport pollutants from impervious surfaces, such as parking lots and roads, to nearby waterbodies. Land use changes and increased development can alter the hydrology of a watershed, increase peak flows and runoff volumes, and detrimentally impact habitat and biological health. Depending on the surrounding land cover, the condition of stormwater infrastructure, and the existence of stormwater management practices, stormwater can be contaminated with oil, grease, chlorides, pesticides, herbicides, nutrients, viruses, bacteria, metals, and sediment. In some areas, connections to storm sewers can be illicit, which includes residences and businesses that discharge untreated wastewater to the storm sewers.

Pets living in developed areas can also contribute bacteria, nutrients, antibiotics, and other chemicals to nearby waterbodies. The number of pets in the watershed was estimated based on U.S. Census data and information from the American Veterinary Medical Association. According to the American Veterinary Medical Association, 36% of households have dogs and 32% of households have cats and there are approximately 11,951 dogs and 6,639 cats in the watershed. Waste generated by pets has the potential to add fecal contaminants to waters through surface runoff. Pet waste can be transported from yards and open spaces to streams via overland flow and storm sewer connections.

4.3.3 Wildlife

Wildlife can contribute bacteria and nutrients to nearby waterbodies via overland flow. Wildlife populations in Illinois are often concentrated in wetland, forested, and riparian areas with dense vegetation and commonly include deer, squirrels, raccoons, bats, and migratory and resident waterfowl.

According to an inventory conducted by the Illinois DNR in 2004, 45 of the 59 species of mammals known in Illinois (76%) can be found in the Vermilion River watershed, as can 11 species of amphibians and 12 species of reptiles. Approximately 256 species of birds are found in the basin, 85% of the total number of bird species in Illinois (Illinois DNR 2004). White-tailed deer populations are also significant. An area-weighted estimate of deer in the watershed is provided in Table 20 based on historical county-level deer population from Illinois DNR (IEPA 1999). More recent data on deer populations could not be found.

Table 20. County-level deer populations and area-weighted total for the Vermilion River watershed.

County	County Deer Population	Area-Weighted Deer Population in Watershed
Ford	936	234
Iroquois	4,769	95
LaSalle	7,845	1,804
Livingston	2,459	1,943
Marshall	3,688	37
McLean	4,744	285
Woodford	4,453	223
	Total	**4,621**

Source: IEPA 1999

4.3.4 Stream Erosion

Various forms of erosion are a common source of sediment and associated pollutants. Bank and channel erosion refer to the wearing away of the banks and channel of a stream or river. High rates of bank and channel erosion can often be associated with water flow and sediment dynamics that are out of balance. This can result from land use activities that either alter flow regimes, adversely affect the floodplain and streamside riparian areas, or a combination of both. The Illinois Nutrient Loss Reduction Strategy (NLRS) notes that severely eroding stream banks can contribute as much as 30%-50% of sediment entering waterways from all sources (IEPA and IDOA 2015).

Erosion may contribute to impairments because iron is often sorbed to sediment. In areas where iron-bearing materials are naturally occurring in rock and mineral formations, erosion and sedimentation are a common source of iron in surface and groundwater. Iron is an abundant constituent of the sedimentary rocks of the Pennsylvanian system which underly the Vermilion River watershed (Munger 2016). Surface-mining processes increase the amount of iron available by exposing more surface area of iron-bearing minerals to weathering conditions. Erosion of iron bearing materials and the resulting sedimentation in surface waters can be exacerbated by agricultural practices and development activities.

4.3.5 Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems (e.g., septic systems) are small-scale systems that treat domestic, sanitary waste. Systems that are properly designed and maintained should not serve as a source of contamination to surface waters. However, onsite systems do fail for a variety of reasons. Common soil-type limitations which contribute to failure include seasonally high water tables, compact glacial till, bedrock, and fragipan. When these septic systems fail hydraulically (surface breakouts) or hydrogeologically (inadequate soil filtration) there can be adverse effects to surface waters (Horsely and Witten 1996). Septic systems contain all the water discharged from homes and business and can be significant sources of pollutants, including fecal coliform and nitrate.

County health departments were contacted for information on septic systems and unsewered communities. The following information was provided:

- Ford County reported that since 1981, a total of 746 septic systems have been installed. Ford County also reported that since 2014, 18 leaking septic systems have been identified and 122 systems have been inspected by the county.

- La Salle County reported 8,343 septic permits since 1988. However, most of these systems are likely located outside of the Vermilion River watershed. Septic systems are inspected on a complaint basis. La Salle County indicated that there are typically 3-4 complaints per year which result in system repair or replacement.
- Livingston County reported approximately 6,000 septic systems. Inspections occur on a complaint basis. There are around eight unsewered communities (with 2,000 to 3,000 residents) in the county which have discharges into the Vermilion River watershed.
- McLean County reported 9,709 active septic systems as of January 1, 2019. This includes 7,741 subsurface discharging systems and 1968 surface discharging systems. McLean County does not document maintenance, but systems installed after January 1, 2014 are required to have documented evaluation by the Illinois Department of Public Health Sewage Code and yearly notices are sent to those systems which are due for inspection.

Based an area-weighted estimate of these values, approximately 3,500 onsite wastewater treatment systems are in the Vermilion River watershed. Approximately 700 of these systems are failing or non-compliant, assuming a 20% failure rate.

4.3.6 Livestock and Animal Feeding Operations (AFOs)

Livestock are potential sources of bacteria, nutrients, and sediment (indirectly) to streams, particularly when direct access to waterways is not restricted or where feeding structures/areas are adjacent to or connected to riparian areas.

Pastured livestock with unrestricted access to surface waters may deposit waste directly into streams. While moving along the banks and into streams, hoof shear may loosen soil that is then transported downstream by the creek. Livestock moving along the stream banks may trample or consume vegetation, which contributes to bank instability, and ultimately, downstream sedimentation. Livestock that have restricted access to surface waters may still contribute bacteria and nutrients to streams if sufficient practices are not implemented to limit runoff from livestock pasture areas.

Grazing patterns and the types of animal operations influence the bacteria, nutrient, and sediment loads that livestock contribute to surface waters. Since livestock grazing patterns vary by season, the pollutant loads derived from livestock vary by season. Runoff from an actively grazed pasture during the spring will yield higher loads than those generated from an unused pasture in the winter when the livestock are in barns.

Animal feeding operations that are not classified as CAFOs are known as animal feeding operations (AFOs) in Illinois. Non-CAFO AFOs are considered nonpoint sources by U.S. EPA. AFOs in Illinois do not have state permits. However, they are subject to state livestock waste regulations and may be inspected by the IEPA, either in response to complaints or as part of the Agency's field inspection responsibilities, to determine compliance by facilities subject to water pollution and livestock waste regulations.

The animals raised in AFOs produce manure that is stored in pits, lagoons, tanks, and other storage devices. The manure is then typically applied to area fields as fertilizer. When stored and applied properly, this beneficial re-use of manure provides a natural source for crop nutrition. It also lessens the need for fuel and other natural resources that are used in the production of fertilizer. AFOs, however, can pose environmental concerns, including the following:

- Manure can leak or spill from storage pits, lagoons, tanks, etc.
- Improper application of manure can contaminate surface or ground water.
- Manure over application can adversely impact soil productivity.

Actual counts of livestock in the Vermilion River watershed are not available. The numbers of livestock were estimated are based on county-wide data from the Census of Agriculture (NASS 2017). Table 11 displays area -weighted livestock populations for the Vermilion River watershed in 2012 and 2017.

Table 21. Area-weighted livestock populations in the Vermilion River watershed

Livestock Type	2012	2017
Cattle and Calves	13,553	13,454
Chickens (Layers)	>12,186	>2,985
Hogs and Pigs	>237,251	>137,605
Horses and Ponies	482	439
Sheep and Lambs	931	1,351

Based upon: NASS 2017.

Greater than (>) values are used to estimate data withheld in the NASS census to avoid disclosing data for individual farms.

5 Data Analysis and Linkage Analysis

An important step in the TMDL development process is the review of water quality conditions, particularly data and information used to list segments. Examination of water quality monitoring data is a key part of defining the problem that the TMDL is intended to address. This section provides a brief review of available water quality information provided by the IEPA and USGS. Each data point was reviewed to ensure the use of quality data in the analysis below.

The Illinois Streamflow Assessment Model (ILSAM; see box to the right; https://www.isws.illinois.edu/data/ilsam/;) was used to support the data analysis and linkage analysis. ILSAM estimates streamflow statistics at ungaged sites using basin charactertics at ungaged and gaged sites, along with monitored flows at gaged sites.

ILSAM was used to estimate flow duration intervals and the 7-day average flow at a 10-year recurrence interval (7Q10) to support the linkage analysis. Under lower flow conditions, some streams in the Vermilion River (Illinois basin) run dry. Generally, during lower flow conditions, pollutant loads from point and nonpoint sources do not migrate downstream when streams run dry.

ILSAM

ILSAM produces statistical estimates of flow quantity in Illinois streams. The ILSAM flow estimates are representative of long-term climatic conditions, with base periods covering the past 50 years or more, but also account for recent man-made modifications to the flow amount such as have been caused by reservoirs, water-supply withdrawals, and discharges from wastewater treatment plants. Flow estimates may be obtained for thousands of stream locations within each major watershed.
(Illinois State Water Survey 2021)

5.1 Vermilion River (IL_DS-06) Fecal Coliform

Segment IL_DS-06 of the Vermilion River begins at the confluence of the North and South Forks of the Vermilion River and its outlet is within the city of Pontiac. The 580 square mile subwatershed that drains to the outlet of segment IL_DS-06 is predominantly rural and agricultural. The subwatershed includes the cities of Fairbury and Pontiac; the villages of Cullom, Forest, Kempton, Piper City, Saunemin, and Strawn; the town of Chatsworth; and the unincorporated communities of Cropsey, Stelle, and Weston. The municipalities are typically served by public sewer systems with wastewater treatment facilities. The cities of Fairbury and Pontiac are served by combined sewer systems.

5.1.1 In-Stream Water Quality Data

IEPA collected nine samples from monitoring site DS-06 in 2014 through 2017 and six samples from monitoring site DS-19 in 2020 were evaluated for fecal coliform. At site DS-06, samples ranged from 36 to 350 cfu/100 mL, with a multi-year geomean of 105 cfu/100 mL. At site DS-19, samples ranged from 8 to 344 cfu/100 mL, with a 30-day 2020 geomean of 41 cfu/100 mL. Neither criterion of the fecal coliform standard was violated.

At site 05554490, which is along impaired segment IL_DS-06, USGS collected 130 samples in 1978 through 1996 (Figure 12) and six samples in 2019 and 2020 (86 to 360 cfu/100mL). USGS did not collect samples at a sufficient frequency to evaluate Illinois's geometric mean criterion. Between 1978 and 1996, during the recreation season 13 samples (19%) exceeded 400 org./100mL. No samples in 2019 or 2020 exceeded 400 cfu/100mL.

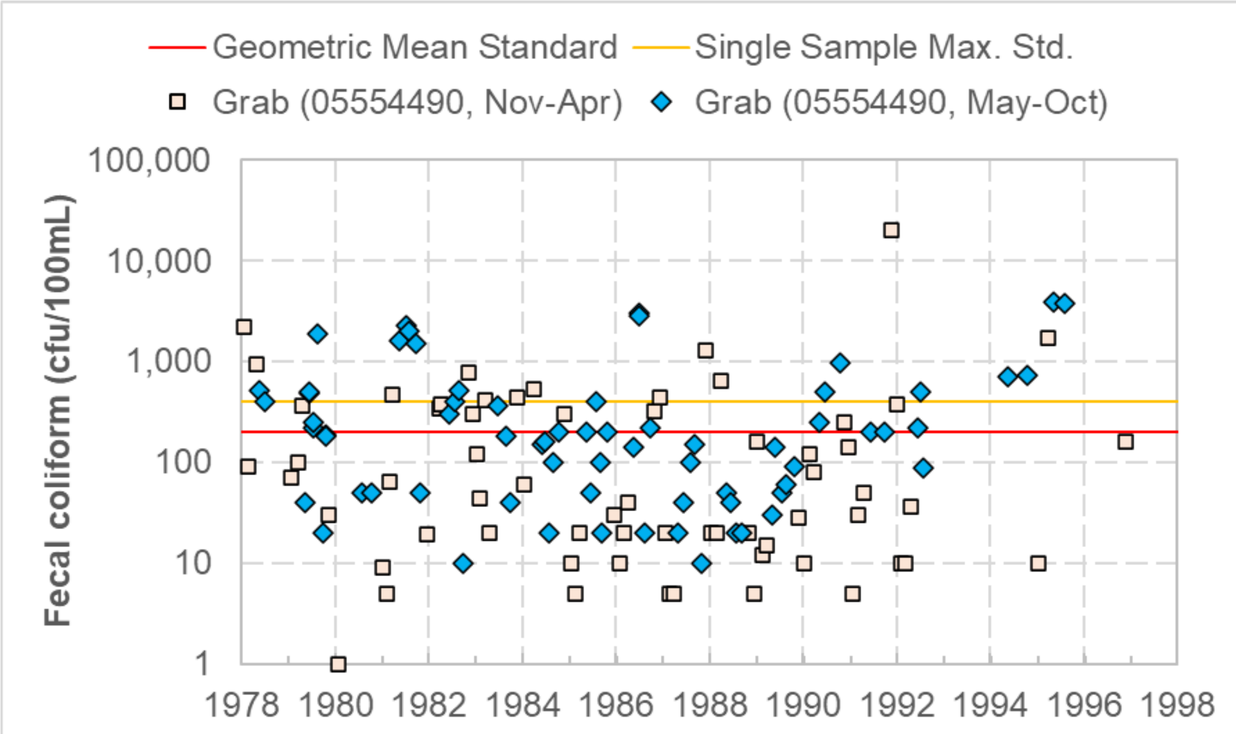

Figure 12. Fecal coliform concentration at site 05554490 (1978-1996).

5.1.2 Point Sources

Seven facilities to treat domestic and sanitary wastewater that are permitted to discharge fecal coliform are within the subwatershed draining to the Vermilion River segment IL_DS-06; refer back to Figure 11 for a map that includes all permitted facilities in the Vermilion River watershed. Table 22 presents summaries of permit information and of DMR data (i.e., current conditions) and identifies the four facilities with disinfection exemptions. The maximum and average (arithmetic means) fecal coliform concentration of treated effluent at most facilities was greater than 400 cfu100 mL.

The Chatsworth STP, Piper City Rehab and Living Center STP, and Stelle Community Association STP are not the primary cause of impairment of segment IL_DS-06:

- The STPs are over 23, 24, and 27 miles (respectively) upstream of the impaired segment.
- ILSAM indicated that Kelly Creek at river mile (RM) 7.3, just downstream of the Stelle Community Association STP, and Chatsworth STP tributary at RM 3.1, just downstream of the STP, ran dry under lower flow conditions.
- The facilities DMFs (<0.8 cfs) are insignificant compared to ILSAM-estimated flows for the upstream terminus of the Vermilion River segment IL_DS-06 at RM 75.9 (ILSAM mean annual flow is 377 cfs and 95th duration interval flow is 2.9 cfs).

The Forrest STP likely contributes to the impairment of segment IL_DS-06 but also is not a main cause of impairment. The STP discharges to the South Fork Vermilion River, which is perennial, over 10 miles upstream of the impaired segment. The STPs DMF and DAF are small fractions of the flow estimated for the Vermilion River at RM 75.9. Given the distance from the impaired segment, the relatively small effluent flow (compared to in-stream flow in the impaired segment), and range of fecal coliform concentration in the effluent (Table 22), this facility is likely a minor contributor of fecal coliform load to the impairment.

The Fairbury STP and CSOs discharge to Indian Creek about 8 river miles upstream of impaired segment IL_DS-06. Fecal coliform data for treated effluent (outfall 001) and treated combined sewage (outfall 002) are presented in Table 22. From 2012 through 2020, the limit of 400 org./100 mL was exceeded in 33 months at outfall 001 and in 1 month at outfall 002. No fecal coliform data are available for the CSO events. However, the city of Fairbury completed two phases of its LTCP in 2019 and 2020 and eliminated five of its seven CSO outfalls. Given the distance from the impaired segment and the relatively small effluent flow (compared to in-stream flow in the impaired segment) [10], treated effluent and CSOs from this facility are likely minor contributors to the impairment.

Pontiac WWTP discharges directly to impaired segment IL_DS-06. Additionally, three of the five CSO outfalls in Pontiac are to the Vermilion River, and the other two outfalls discharge to a ditch tributary to the Vermilion River. The treated effluent contributes to the fecal coliform impairment:

- The DAF (5.4 cfs) and DMF (13.2 cfs) are a small fraction of in-stream flows at the outlet of impaired segment IL_DS-06 during mid-range (117 to 291 cfs) through high flows (1,232 to 12,067 cfs). During low flows (<1 to 11 cfs), effluent flow can become relatively significant.
- IEPA's two recent monitoring sites (DS-06 and DS-19) on impaired segment IL_DS-06 are upstream of Pontiac. Generally, the ranges of fecal coliform were similar between upstream, in-stream flows and the monthly DMRs for treated effluent that roughly corresponded with the in-stream sample dates.

No CSO volume or fecal coliform data are available. CSOs are assumed to contribute to the impairment, especially the three outfalls directly discharging to the impaired segment of the Vermilion River.

The impact of the Pontiac WWTP and CSOs upon in-stream water quality is unknown because no in-stream samples from downstream of the WWTP and CSOs were available for analysis. Generally, an evaluation of DMR data and upstream, in-stream data indicate that the WWTP is not likely a significant source during higher flow conditions but could become significant during lower flow conditions. A similar evaluation with limited CSO data indicates that CSOs may be significant during higher flow conditions.

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[10] At the Fairbury, STP, daily maximum flow of treated effluent (outfall 001) ranged from 0.38 to 2.00 mgd (0.59 to 3.09 cfs). During CSO events at high flow conditions, treated combined sewage (outfall 002) ranged from 0.37 to 33.52 million gallons per month (0.02 to 1.70 cfs). As previously discussed, using ILSAM, the mean annual flow and 95th duration interval flow for the Vermilion River at RM 75.9 are 377 and 2.9 cfs, respectively. Thus, volumes of treated effluent and treated combined sewage at the Fairbury STP are insignificant compared to flow in the Vermilion River at RM 75.9.

Table 22. Summary statistics of fecal coliform results reported in the DMRs for STPs and WWTPs in the IL_DS-06 subwatershed

Permit Information				Summary of DMR Results					
NPDES ID	Facility	DAF (mgd)	DMF (mgd)	Fecal coliform (cfu/100 mL)					
				Outfall	Period	n	Min.	Max.	Avg.
Individual Permits									
IL0021601 [a]	Fairbury STP, City of	0.66	2.4	001	2012-2020	54	16	**5,800**	**1,398**
				002	2012-2020	47 [b]	1 [c]	**3,900**	223
IL0026697	Stelle Community Association STP	0.02	0.04	001	2011-2020	58	44	**1,004,000**	**32,636**
IL0028819 [a]	Forrest STP, Village of	0.35	0.88	001	2012-2020	51	1 [c]	**950**	101
				A01	2012-2020	27 [d]	1 [c]	264	20
IL0030457	Pontiac WWTP, City of	3.5	8.5	001	2011-2020	60	3	**728**	129
IL0037001 [a]	Piper City Rehab and Living Center STP	0.008	0.032	001	2012-2020	48	18	**120,000**	**15,185**
General Permit ILG580 (Domestic Lagoon System)									
ILG580091 [a]	Chatsworth STP	0.184	0.460	001	2014-2020	41	11	**14,000**	**1,900**
General Permit ILG620 (Private Sewage Disposal System)									
ILG620223	Cody Harris	0.0015	--	--	--	--	--	--	--

Avg. = average.
cfu/100 mL = colony forming units per 100 milliliters.
DAF = design average flow.
DMF = design maximum flow.
DMR = discharge monitoring report.
Max. = maximum
Min. = minimum.
n = number of records.
NPDES = National Pollutant Discharge Elimination System
STP = sewage treatment plant.
WWTP = wastewater treatment plant.
Bolded exceed 400 cfu/100 mL.

[a] Facility has a disinfection exemption.

[b] No discharge reported for 73 monthly DMRs for outfall 002 that is treated combined sewage discharge.

[c] A DMR of 0 cfu/100 mL was reported, assumed to be a non-detect, and assigned a value of 1 cfu/100 mL to calculate the minimum, maximum, and average.

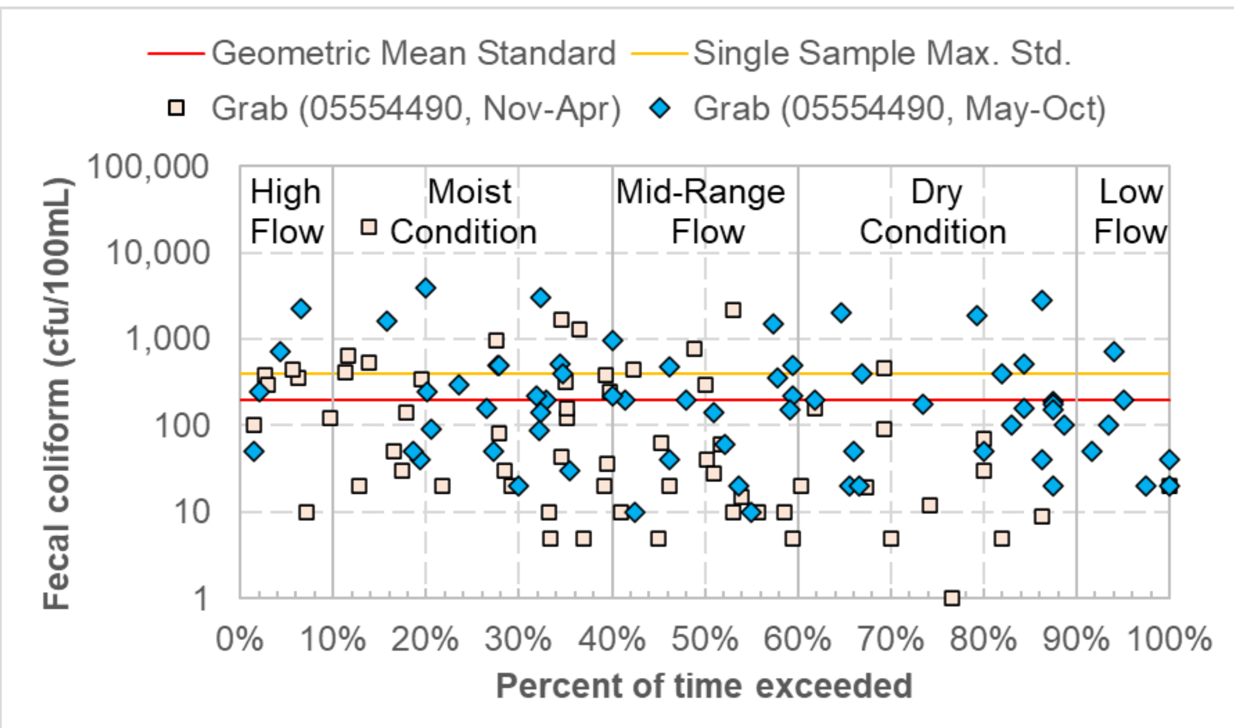
[d] No discharge reported for 92 monthly DMRs for outfall A01 that is excess flow discharge.

5.1.3 Nonpoint Sources

Nonpoint source data (e.g., stormwater, livestock, septic systems) are only available at a coarse-scale and loading data for individual nonpoint sources are not available. Thus, it is not possible to pinpoint exact locations of nonpoint sources or determine their relative impact upon in-stream loading along the impaired segment. However, sufficient historic in-stream fecal coliform data are available to generally evaluate the types of nonpoint sources that may contribute to impairment.

A visual analysis of fecal coliform by flow duration interval (water years 1975-2000), for the 1978 through 1996 fecal coliform dataset, generally indicates that higher fecal coliform concentrations occurred more frequently during wetter flow conditions and lower concentrations occurred more frequently during drier flow conditions (Figure 13). The ranges of concentrations between the summer recreation season and November through April were similar; though, the lowest concentrations were reported in November through April during the high flow through dry conditions. These results indicate that historic fecal coliform concentrations in the Vermilion River were associated with flow and were likely derived from precipitation-based sources.

Flow duration interval analysis of the 2019-2020 USGS data was limited, as only six samples were collected. Three samples were collected during dry conditions (86 to 230 cfu/100 mL), and three samples were collected during moist conditions (120-360 cfu/100 mL). Like the IEPA 2020 data, none of the USGS 2019-2020 data exceeded 400 cfu/100 mL.



Flows are from USGS gage 05554500 for water years 1975 through 2000.

Figure 13. Fecal coliform concentration by flow duration interval at site 05554490 (1978-1996).

5.2 Vermilion River (IL_DS-06) Nitrate Nitrogen

A brief narrative description of segment IL_DS-06 was presented at the beginning of Section 5.1.

5.2.1 In-Stream Water Quality Data

Fifty-seven samples collected at monitoring site DS-06 in 2014 through 2020 and two samples collected at monitoring site DS-16 in 2014 were evaluated for inorganic nitrogen, which is nitrate and nitrite. At site DS-06, samples ranged from 0.1 to 17.0 mg/L, with six samples (11%) of samples exceeding the MCL of 10 mg/L. At site DS-16, samples were 2.2 and 12.0 mg/L, with one sample (50%) exceeding the MCL.

5.2.2 Point Sources

Eleven facilities covered by individual or general NPDES permits are in the subwatershed draining to segment IL_DS-06 (Table 23); refer back to Figure 11 for a map of all permitted facilities in the Vermilion River watershed. The Pontiac Correctional Center PWS (ILG640271) formerly discharged directly to the Vermilion River but now routes wastewater to the Pontiac WWTP (IL0030457). None of the facilities have effluent permit limits for nitrate, and only the Pontiac WWTP has nitrate monitoring requirements.

Table 23. Permitted facilities in the IL_DS-06 subwatershed

NPDES ID	Facility	Effluent Type	DAF (mgd)	DMF (mgd)	Dist. Upst. [a]
Individual Permits					
IL0021601	Fairbury STP, City of	Treated sanitary	0.66	2.4	8
		Treated CSO	--	--	
		Untreated CSO	--	--	
IL0026697	Stelle Community Association STP	Treated sanitary	0.02	0.04	27
IL0028819	Forrest STP, Village of	Treated sanitary	0.35	0.88	11
		Excess flow	--	--	
IL0030457	Pontiac WWTP, City of	Treated sanitary	3.5	8.5	0
		Untreated CSO	--	--	
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	0.008	0.032	24
General Permit: ILG580 (Domestic Lagoon System)					
ILG580091	Chatsworth STP	Treated sanitary	0.184	0.460	23
General Permit ILG620 (Private Sewage Disposal System)					
ILG620223	Cody Harris	Treated sanitary	0.0015	--	19
General Permit ILG640 (PWS)					
ILG640003	Cullom Water Treatment Plant PWS	PWS backwash	0.0027	--	18
ILG640007	WTP of Stelle Community Association	PWS backwash	0.0016	--	27
ILG640227	Saunemin WTP	PWS backwash	0.008	--	12
ILG640275	Kempton Water Treatment Plant	PWS backwash	0.015	--	28

CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
mgd = million gallons per day.
PWS = public water supply.
STP = sewage treatment plant.
WTP = water treatment plant.

[a] Distance the facility discharges upstream of segment IL_DS-06, in miles.

Most facilities do not likely contribute significantly to impairment in segment IL_DS-06, especially during lower flow conditions:

- 10 facilities are 10 or more river miles upstream of the impaired segment (Table 23)
- 8 facilities have design flows less than 0.2 mgd (<0.3 cfs) and their reported DMR flows are even smaller. These design average/maximum and reported flows are insignificant relative to the Vermilion River flows at the upstream terminus of the impaired segment (ILSAM for the Vermilion at RM 75.9: mean annual flow is 377 cfs and 95th duration interval flow is 2.9 cfs).
- 4 facilities discharge to receiving waterbodies run dry during lower flow conditions. Refer back to Section 5.1.2 for a discussion of ILSAM-estimated flows.
    - Kelly Creek subwatershed: Kempton Water Treatment Plant, Stelle Community Association STP, WTP of Stelle Community
    - Chatsworth STP Tributary: Chatsworth STP
- 4 facilities are PWS (ILG640) and are not expected to discharge appreciable levels of nitrate.

The Pontiac WWTP discharges directly to the impaired segment. Nitrate+nitrite (as nitrogen) was reported for Pontiac WWTP treated effluent for 60 monthly records in 2016 through 2020. Nitrate+nitrite ranged from 6.2 to 29 mg/L and 57 records (95%) exceeded 10 mg/L.

In 2021, the city of Pontiac collected 7 water samples from the Vermilion River upstream and downstream of the WWTP and from the WWTP effluent (see Table A - 8 in Appendix A). Effluent nitrate concentrations were less than upstream nitrate concentrations in two samples (29%) and greater than upstream nitrate concentrations in five samples (71%). In three samples (43%), where effluent nitrate concentrations were greater than upstream nitrate concentrations, the downstream nitrate concentrations were less than or equal to upstream nitrate concentrations (i.e., effluent did not affect in-stream concentrations).

No in-stream nitrate data were collected by IEPA in or downstream of Pontiac; thus, effluent and in-stream loading cannot be compared. However, as discussed in Section 5.1.2, the Pontiac WWTP treated effluent flow is insignificant relative to the in-stream flow in the Vermilion River, except during lower flow conditions.

As discussed in Section 5.1.2, given the distance from the Fairbury STP and CSOs to impaired segment IL_DS-06 (about 8 miles; Table 23 and Figure 11) and the relatively small effluent flow (compared to in-stream flow in the impaired segment), treated effluent and CSOs from this facility are likely minor contributors to the impairment. The Pontiac WWTP and CSOs discharge directly to the impaired segment. Pontiac WWTP effluent during low flows in the Vermilion River may be significant. No CSO volume or nitrate data are available to evaluate the relative loading of Pontiac CSOs to the Vermilion River.

Except for the Pontiac WWTP during lower flow conditions and potentially the Pontiac CSOs during higher flow conditions, point sources are not likely significant contributors to nitrate-impairment to segment IL_DS-06. Most facilities discharge insignificant flow volumes (relative to the impaired segment) and are located 11 to 27 miles upstream of the impairment. Additionally, several facilities discharge to tributaries of the Vermilion River that run dry.

5.2.3 Nonpoint Sources

Limited nonpoint source data (e.g., fertilizer application) are available, and loading data for individual nonpoint sources are not available. Thus, it is not possible to pinpoint exact locations of nonpoint sources or determine their relative impact upon in-stream loading along the impaired segment. However, sufficient historic in-stream nitrate data are available to generally evaluate the types of nonpoint sources that may contribute to impairment.

A weight-of-evidence analysis of several datasets generally indicate that higher inorganic nitrogen (and likely nitrate) concentrations are associated with higher flow conditions. Nitrate sources are likely precipitation-driven (i.e., runoff, tile-drainage). Given the predominance of row crop agriculture and the association of nitrate with flow, cropland is likely a key source. In a few isolated cases, higher concentrations are not associated with higher flow or precipitation. The lines of evidence are briefly summarized below.

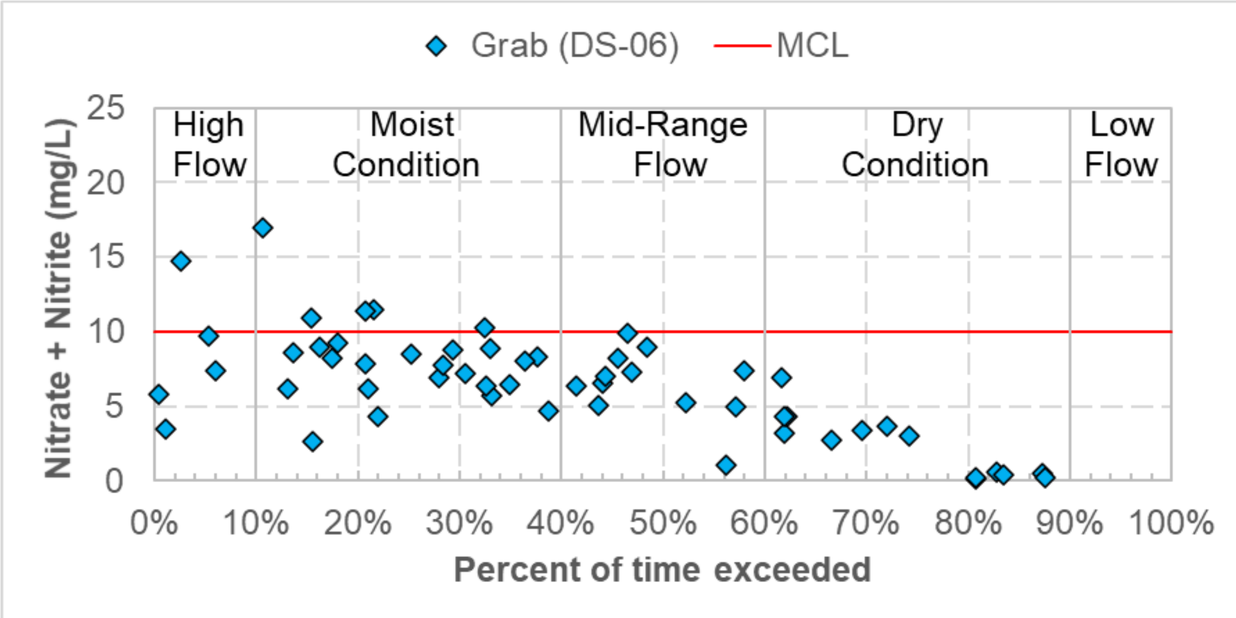
- **Inorganic nitrogen and flow timeseries**: Seven timeseries charts (one for each calendar year) that plot inorganic nitrogen results with daily flow monitored at IEPA site DS-06 (Appendix B, Figure B - 1, Figure B - 2, and Figure B - 3) were visually evaluated for temporal trends and association with flow. Under very low flow conditions, inorganic nitrogen concentrations are less than 1 mg/L. Many concentrations greater than 3 mg/L occur following an increase in flow that is likely due to a precipitation event. However, some such concentrations are not associated with an increase in flow. All of the exceedances occurred during or following increased flow.
- **Seasonal box-and-whisker charts of inorganic nitrogen**: Visual analysis of seasonal inorganic nitrogen concentration (Figure B - 4) and load (Figure B - 5) at IEPA monitoring site DS-06 generally indicates that inorganic nitrogen concentrations and loads are highest in the spring (April - June) and lowest in the summer (July - August). These results are consistent with historic results at USGS monitoring site 05554490 (Figure B - 6).
- **Synoptic inorganic nitrogen maps**: Inorganic nitrogen results for IEPA monitoring sites across the Vermilion River (Illinois Basin) watershed collected on certain dates in 2014 were plotted in maps (Appendix B, Figure B - 7 through Figure B - 11) that were then visually evaluated for spatial trends for sites upstream of segment IL_DS-06.

  Elevated concentrations were detected at all sites in May (>15 mg/L) and June (>10 mg/L). The highest concentrations were detected from Indian Creek (DSPA-01 through -04; 14.5 to 32.7 mg/L). Concentrations above 10 mg/L were also detected in the North and South Forks of the Vermilion River (DSQ-01 and DSP-03) and Fivemile Creek (DSQB-01). In August, concentrations were all less than 5 mg/L, except for Indian Creek (DSPA-01; 9.4 mg/L) and South Fork Vermilion River (DSP-03; 7.5 mg/L). No pattern was apparent with the September data, when all concentrations were low.

  Synoptic maps were also evaluated with precipitation data from Pontiac, Illinois. Inorganic nitrogen concentrations were high in May and June when sampling occurred during or following precipitation events[11]. Concentrations were low in August and September, with little to no rain[12].
- **Water quality duration analysis**: Visual analysis of water quality duration curves of inorganic nitrogen concentration and flow duration interval for IEPA monitoring site DS-06 (Figure 14) and USGS monitoring site 05554490 (Figure 15) datasets indicate that higher inorganic nitrogen concentrations occurred more frequently with increasing flow. These results generally indicate that much of the inorganic nitrogen in the Vermilion River historically was and recently is associated with runoff-based sources.

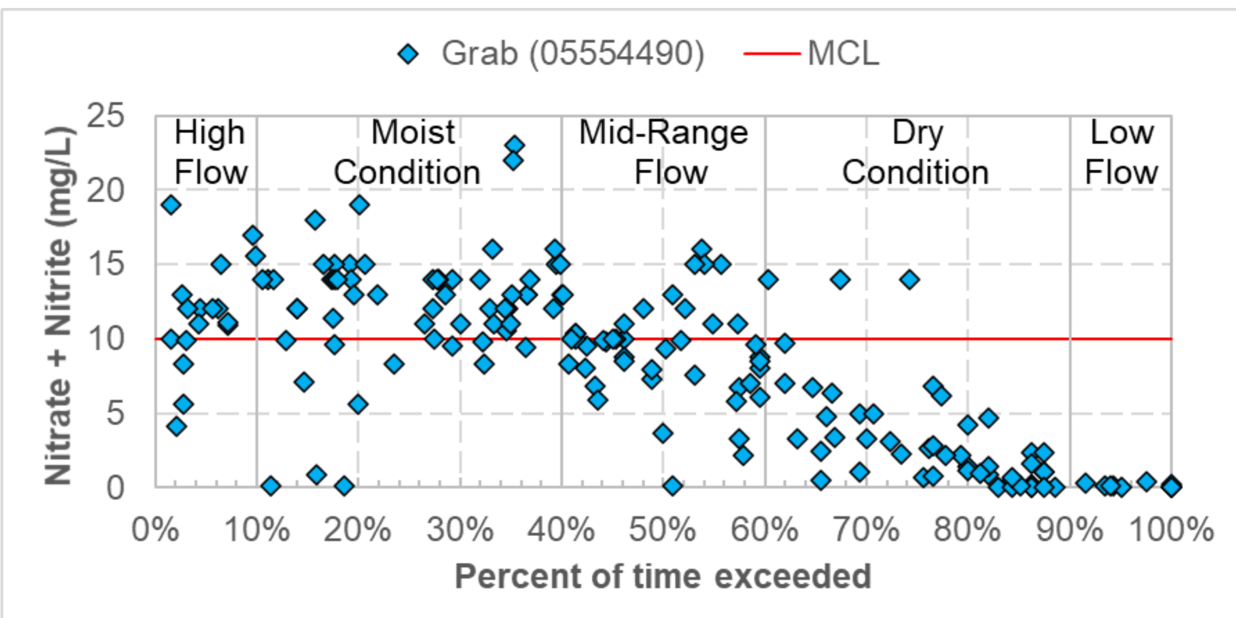
[11] Sampling on May 13-15, 2014, occurred during a 2.7-inch precipitation event lasting from May 12-15, 2014. Sampling on June 2-5 occurred with a 0.36-inch rain on June 2 and a 0.62-inch rain on June 4, 2014.

[12] Sampling on August 4-7, 2014 occurred with a 0.16-inch rain on August 5, 2014. Sampling on September 22-24, 2014 occurred with no rain those three days; the most recent appreciable rain was 0.42-inch on September 16, 2014.



Flows are from USGS gage 05554500 for water years 1995 through 2020.

Figure 14. Inorganic nitrogen concentration by flow duration interval at IEPA monitoring site DS-06 (2014-2020).



Flows are from USGS gage 05554500 for water years 1975 through 2000.

Figure 15. Inorganic nitrogen concentration by flow duration interval at USGS monitoring site 05554490 (1978-1996).

5.3 Vermilion River (IL_DS-10) Nitrate Nitrogen

Segment IL_DS-10 of the Vermilion River begins at the confluence of Scattering Point Creek with the Vermilion River and its outlet is within the city of Streator, at the confluence of Eagle Creek. The 1,157 square mile subwatershed is predominantly rural and agricultural. Excluding the municipalities draining to segment IL_DS-06 (refer back to Section 5.1), this subwatershed includes the cities of Minonk and Streator; the villages of Cornell, Dana, Flanagan, Long Point, and Rutland; and the unincorporated communities of Ancona, Blackstone, Cayuga, Graymont, Leeds, and Manville. The municipalities are typically served by public sewer systems with wastewater treatment facilities. The cities of Minonk and Streator are served by combined sewer systems.

5.3.1 In-Stream Water Quality Data

Five samples collected at monitoring site DS-20 in 2014 were evaluated for inorganic nitrogen (Table 24). Samples ranged from 3.19 to 10.3 mg/L, with one sample (20%) exceeding the MCL.

Table 24. Inorganic nitrogen results at monitoring site DS-20

Date	Inorganic nitrogen (milligram/Liter)
5/13/2014	8.85
6/4/2014	**10.3**
8/5/2014	3.19
8/6/2014	3.3
9/23/2014	6.7

Bolded value exceeds the water quality standard.

5.3.2 Point Sources

Twenty-four facilities covered by individual or general NPDES permits are in the subwatershed draining to segment IL_DS-10. Eleven[13] of the facilities are in the subwatershed draining to segment IL_DS-06 (Table 23); the other 13 facilities are summarized in Table 25. None of the facilities have effluent permit limits for nitrate, and only the Pontiac WWTP has nitrate monitoring requirements.

[13] A twelfth facility was the Pontiac Correctional Center PWS (ILG640271) that formerly discharged directly to the Vermilion River; the facility now routes wastewater to the Pontiac WWTP (IL0030457)

Table 25. Permitted facilities in the IL_DS-10 subwatershed downstream of segment IL_DS-06

NPDES ID	Facility	Effluent Type	DAF (mgd)	DMF (mgd)	Dist. Upst. [a]
Individual Permits					
IL0022004	Streator STP, City of	Treated sanitary	4.0	11.4	0
		Untreated CSO	--	--	
IL0037818	Minonk STP, City of	Treated sanitary	0.34	0.85	26
		Untreated CSO	--	--	
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	0.012	0.03	1
IL0067016	Livingston Landfill	Stormwater	--	--	16
IL0075965	Shale Quarry II	Stormwater, Pit	0.105	--	1
IL0078468	Flanagan Terminal	HST	2.88	--	13
General Permits ILG551, ILG580, and ILG582 (Domestic Lagoon Systems)					
ILG551020	Meadows Mennonite Retirement Community	Treated sanitary	0.045	0.1125	31
ILG551038	Salem Children's Home	Treated sanitary	0.011	0.03	16
ILG551063	Illinois DOT I-55 Livingston Co N STP	Treated sanitary	0.0155	0.0465	23
ILG551069	Illinois DOT I-55 Livingston Co S STP	Treated sanitary	0.0155	0.0465	23
ILG580057	Flanagan STP	Treated sanitary	0.128	0.320	12
ILG582009	Chenoa STP, City of	Treated sanitary	0.263	0.658	32
General Permit ILG640 (PWS)					
ILG640074	Rutland WTP	PWS backwash	0.005	--	20

CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
HST = hydrostatic test waters.
mgd = million gallons per day.
Pit = pit water pumpage.
PWS = public water supply.
STP = sewage treatment plant.
WTP = water treatment plant.
[a] Distance the facility discharges upstream of segment IL_DS-10, in miles.

Most facilities do not likely contribute significantly to impairment in segment IL_DS-10, especially during lower flow conditions:

- 12 facilities drain to segment IL_DS-06 (Table 23)
  - Most of these facilities do not likely contribute significantly to the nitrate impairment in segment IL_DS-06 (refer back to Section 5.2.2).
  - These 12 facilities are 18 to 59 river miles upstream of nitrate-impaired segment IL_DS-10.
  - Upstream unimpaired segment IL_DS-14 is between nitrate-impaired segments IL_DS-010 and IL_DS-06.
- 10 facilities are 10 or more river miles upstream of the impaired segment (Table 25)
- 6 lagoons covered by general NPDES permits (ILG551, ILG580, and ILG581) have design flows less than 0.3 mgd and their reported DMR flows are even smaller. These design and reported flows are insignificant relative to the Vermilion River flows in the impaired segment.
- 4 facilities discharge stormwater, pit water pumpage, hydrostatic test waters, or PWS backwash that are not expected to contain appreciable levels of nitrate.

The city of Streator is located in the lower reaches of segment IL_DS-10 of the Vermilion River. Treated effluent from the STP discharges at the outlet of segment IL_DS-10; thus, the STP itself cannot be the cause of impairment to segment IL_DS-10. Additionally, 7 of 13 CSO outfalls are downstream of monitoring site DS-20 that indicates nitrate impairment; thus, these CSO outfalls cannot be the cause of impairment.

Six CSO outfalls in the city of Streator are upstream of monitoring site DS-20. No nitrate data were available for the CSO outfalls. In-stream nitrate data collected in summer 2014 from monitoring site DS-20 indicated impairment. DMR data for only one CSO outfall indicate CSO events in 2014. Four CSO events occurred in the summer of 2014 at CSO outfall 024. Thus, CSOs may contribute to the nitrate impairment but insufficient data are available to confirm contribution.

The Minonk STP discharges to Long Point Creek, about 26 miles upstream of the confluence of Long Point Creek with impaired segment IL_DS-10 of the Vermilion River. Evaluation of 2011-2015 summer recreation seasons treated effluent flows in the DMR (0.28 to 5.71 mgd; 0.43 to 8.83 cfs), indicates that effluent flows are relatively insignificant compared to the Vermilion River (ILSAM for the Vermilion River at RM 37.1 [just below the confluence of Long Point Creek]: mean annual flow is 747 cfs and 99^{th} duration interval flow is 5.7 cfs).

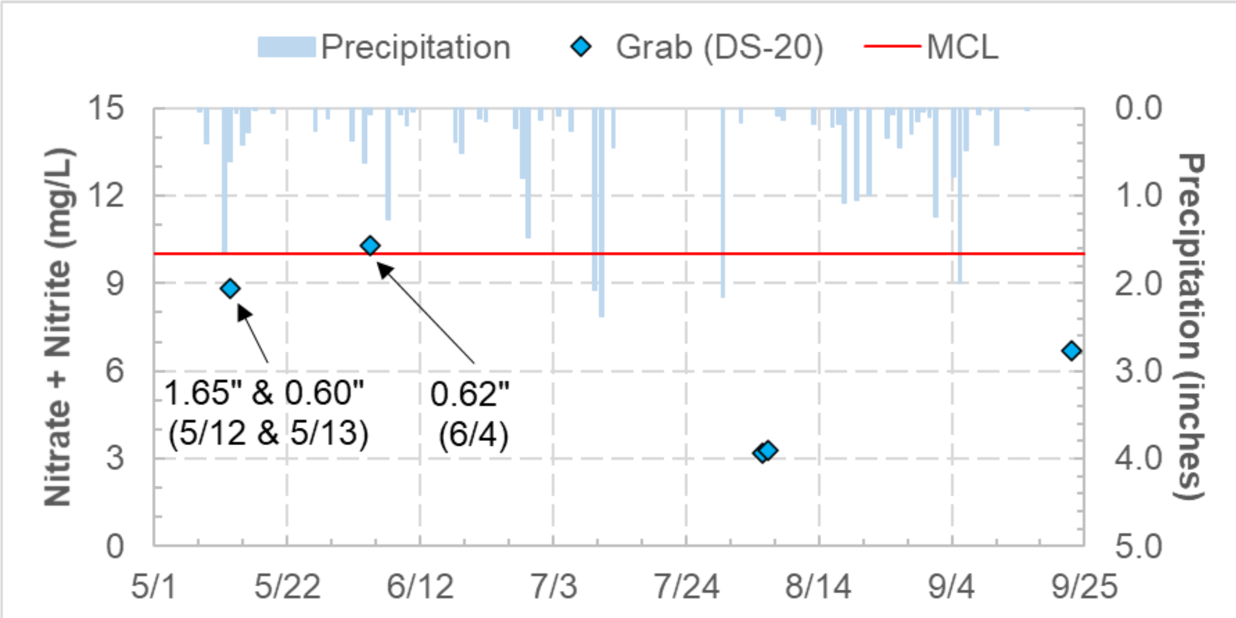
Minonk also infrequently discharges through two CSO outfalls. Given the distance from the impaired segment and the relatively small effluent flow (compared to in-stream flow in the impaired segment), treated effluent and CSOs from this facility are likely minor contributors to the impairment.

Point sources are not primary contributors to the nitrate-impairment to segment IL_DS-10. Most facilities discharge tiny flow volumes (relative to the impaired segment) and are located 12 to 59 river miles upstream of the impairment.

5.3.3 Nonpoint Sources

Limited nonpoint source data (e.g., fertilizer application) are available, and loading data for individual nonpoint sources are not available. Thus, it is not possible to pinpoint exact locations of nonpoint sources or determine their relative impact upon in-stream loading along the impaired segment. However, sufficient historic in-stream nitrate data are available to generally evaluate the types of nonpoint sources that may contribute to impairment.

As discussed in Section 5.3.1, the most recently collected data are five samples from 2014. An evaluation of inorganic nitrogen concentration and precipitation was inconclusive. In some cases, higher inorganic nitrogen concentrations were monitored on a day that it rained (Figure 16).



Note: Daily average precipitation in Pontiac, Illinois.

Figure 16. Inorganic nitrogen concentration at IEPA monitoring site DS-20 and precipitation at Pontiac.

Inorganic nitrogen results for IEPA monitoring sites across the Vermilion River (Illinois Basin) watershed collected on certain dates in 2014 were plotted in maps (Appendix B, Figure B - 7 through Figure B - 11) that were then visually evaluated for spatial trends for sites upstream of segment IL_DS-10.

Elevated concentrations were detected in May and June (associated with precipitation events) and low concentrations were detected in July, August, and September (not associated with precipitation events). In addition to elevated concentrations the Vermilion River (DS-14 and DS-16) upstream of segment IL_DS-10, elevated concentrations in May and June were also detected in Scattering Point Creek, its tributary Moorhouse Creek, Roots Creek, and its tributary Pike Creek. In July through September, no spatial pattern was apparent with the lower concentrations. Generally, elevated inorganic nitrogen concentrations appear to be associated with precipitation events and occur throughout the watershed draining to IL_DS-10.

During the Stage 1 process, IEPA (2009) reviewed in-stream nitrate concentrations observed in the Vermilion River (IL_DS-10) and its tributaries. These data were collected in 1990, 1999, 2004, and 2007. Nitrate (as nitrogen) concentrations in several tributaries regularly exceed 10 mg/L: Prairie Creek (IL_DSE-01; range: 9.7-24 mg/L, n=7), Long Point Creek (IL_DSF-01; range: 12.0-21.7 mg/L, n=7), Scattering Point Creek (IL_DSH-01; range: 11.6-20.9 mg/L, n=9). IEPA (2009) concluded that the high nitrate concentrations in the tributaries are likely contributing to the PFPWS impairment.

5.4 Vermilion River (IL_DS-07) Fecal Coliform

Segment IL_DS-07 of the Vermilion River begins at the confluence of Eagle Creek within the city of Streator, its outlet is the mouth of the Vermilion River on the Illinois River. The 1,333 square mile subwatershed is predominantly rural and agricultural. Excluding the municipalities draining to segments IL_DS-10(refer back to Section 5.3) and IL_DS-06 (refer back to Section 5.1), this subwatershed includes the city of Oglesby; the villages of Kangley, Leonore, and Tonica; and the unincorporated communities of Altmar, Jonesville, Lowell, Ticona, and Wilsman. The municipalities are typically served by public sewer systems with wastewater treatment facilities. The city of Oglesby is served by a combined sewer system.

5.4.1 In-Stream Water Quality Data

Six samples collected at monitoring site DS-01 in 2020 were evaluated for fecal coliform. Samples ranged from 123 to 9,680 counts/100 mL (Table 26), with a 30-day 2020 geomean of 1,208 counts/100 mL that exceeds the geometric mean criterion of 126 cfu/100 mL. Five samples were collected in a 30-day period in 2020 and all five samples exceeded 400 cfu/100 mL (i.e., 100% exceedance rate versus 10% allowable exceedance rate). Both criteria of the fecal coliform standard were violated.

Table 26. Fecal coliform results at monitoring site DS-01

Date	Fecal coliform (colony forming unit/100 milliliters)
8/3/2020	123
8/24/2020	**523**
8/31/2020	**2,190**
9/8/2020	**9,680**
9/14/2020	**435**
9/21/2020	**533**

Note: **Bolded** values are greater than the single sample maximum water quality standard.

5.4.2 Point Sources

Twenty-seven facilities in the Vermilion River watershed are covered by individual or general NPDES permits. Two facilities are in the subwatershed draining to segment IL_DS-07; the city of Tonica has a disinfection exemption. Of the other 25 facilities, 12 are in the subwatershed draining to segment IL_DS-06 (Table 23) and 13 facilities are in the subwatershed draining to segment IL_DS-10 (Table 25).

Table 27. Permitted facilities in the IL_DS-07 subwatershed downstream of segment IL_DS-10

NPDES ID	Facility	Effluent Type	DAF (mgd)	DMF (mgd)	Dist. Upst. [a]
Individual Permits					
IL0023639 [b]	Tonica STP, Village of	Treated sanitary	0.100	0.250	6
IL0024996	Oglesby STP, City of	Treated sanitary	0.879	1.224	0
		Untreated CSO	--	--	
General Permits					
(none)					

CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
mgd = million gallons per day.
STP = sewage treatment plant.

[a] Distance the facility discharges upstream of segment IL_DS-07, in miles.

[b] Facility has a disinfection exemption.

Most facilities in the subwatersheds of segments IL-DS-06 and IL_DS-10 do not likely contribute significantly to impairment in segment IL_DS-07, especially during lower flow conditions. Refer back to Section 5.1.2 for a discussion of fecal coliform and facilities that drain to segment IL_DS-06. Refer back to Section 5.3.2 for a discussion of nitrate and facilities that drain to segment IL_DS-06; that analysis is relevant because STPs and WWTPs are sources of both nitrate and fecal coliform.

The city of Streator STP discharges to the upstream terminus of segment IL_DS-07. DMR data indicate that fecal coliform in treated effluent ranged from 21 to 380 cfu/100 mL, with a median and average of 118 and 153 cfu/100 mL, respectively. These fecal coliform levels are significantly lower than the in-stream exceedances reported in the IEPA and USGS datasets. Thus, the STP likely contributed fecal coliform to impaired segment IL_DS-07 but was not the main cause of impairment.

Most of the city of Streator CSO outfalls infrequently discharged (refer to Section 4.2.2.2 and Table A - 4). As such, these CSOs cannot be the source of persistently elevated fecal coliform levels monitored in the Vermilion River. However, bypasses at the Kent Street and Coal Run Creek CSO treatment facilities were significant. According to data provided by the city, during the 2017 through 2021 summer recreation season, the total overflow volumes ranged from 0.36 to 17 MG (average 6.7 MG) and fecal coliform concentrations ranged from 1 to 830,000 cfu/100 mL (average 44,724 cfu/100 mL). Summer recreation season fecal coliform loads calculated from the overflow volume and bacteria concentration data ranged from 890 million to 86 trillion cfu/day (average 4.6 trillion cfu/day).

IEPA monitoring in 2020 occurred during mid-range to dry conditions; fecal coliform loads ranged from 530 billion to 33 trillion cfu/day. With no IEPA monitoring during high flow conditions, when CSOs likely occur, a direct comparison between Streator CSO loads and in-stream loads in the Vermilion River is not possible. Without in-stream high flow conditions data, the relative impact of CSOs on in-stream loading cannot be determined. Thus, based upon 2020 data, all that can be concluded is that Streator CSOs contribute fecal coliform load to the impaired segment IL_DS-07.

The city of Streator (2013) conducted a water quality study in 2011 and 2012 that included fecal coliform monitoring of the Vermilion River, Prairie Creek, and Coal Run Creek; monitoring sites were located upstream and downstream of the city's treated effluent and CSO outfalls. With the Vermilion River, the city found that the SSM standard was exceeded downstream of the city in four months over two recreation seasons. The SSM standard was also exceeded upstream of the city.

The village of Tonica STP discharges to Bailey Creek about 6 river miles upstream of Vermilion River segment IL_DS-07. DMR data from the 2012 through 2020 recreation seasons indicate that fecal coliform in treated effluent ranged from <10 to 1,970 cfu/100 mL. Despite occasional large fecal coliform concentrations, loads from the STP were insignificant compared to fecal coliform loading in the Vermilion River due to the very small effluent flows reported for the STP (0.041 to 0.334 mgd, which is 0.06 to 0.52 cfs). Thus, the STP likely contributed fecal coliform load to impaired segment IL_DS-07 but was not the main cause of impairment.

The city of Oglesby STP discharges to the Vermilion River in the lower reaches of segment IL_DS-07. Analysis of fecal coliform DMR data indicate that treated effluent occasionally exceeds 400 cfu/100 mL.[14] Analysis of flow DMR data (0.30 to 2.61 mgd; 0.5 to 4.0 cfs) indicated that the STP effluent flow volumes are very small relative to the Vermilion River (ILSAM at RM 1.8: mean annual flow is 979 cfs and 99th duration interval flow is 8.2 cfs). Thus, the STP contributed fecal coliform to impaired segment IL_DS-07 but was not likely the main cause of impairment because effluent flow was a tiny fraction of in-stream flow in the Vermilion River.

[14] Fecal coliform data from the 2011 through 2017 recreation seasons range from 0 to 3 org./100 mL. Data from the 2018 recreation season range from 120 to 270cfu/100 mL. Data were only reported for two months in the 2019 summer recreation season: <400 and 1,340 cfu/100 mL. Data from the 2020 recreation season ranged from 10 to 460 cfu/100 mL.

Four of the city's five CSO outfalls cannot be the primary cause of impairment because they rarely discharged: during the 2011 through 2020 summer recreation seasons, CSO outfalls A01 and B01 discharge once and CSO outfalls 003 and 005 did not discharge. However, CSO outfall C01 (STP bypass) discharged 115 times in 2011 through 2020, including 71 times during the summer recreation season. In-stream data at monitoring site DS-01 (n=6) and DMR data were reviewed; however, the review was very limited due to the few in-stream samples. DMR data indicate one CSO event in September 2020 that may correspond to elevated fecal coliform concentrations at monitoring site DS-01 in September 2020 (refer back to Table 26 for results at site DS-01). Without fecal coliform data for CSO outfall C01, it is not possible to quantify its loading or compare its relative loading to the loading in the Vermilion River. Regardless, assuming that the CSO discharges are similar or greater in concentration than the exceedances in the treated effluent (outfall 001) and given the frequency of CSO events, it is apparent that discharges from CSO outfall C01 are contributing to the impairment of segment IL_DS-07 of the Vermilion River.

5.4.3 Nonpoint Sources

Nonpoint source data (e.g., livestock, septic systems) are only available at a coarse-scale and loading data for individual nonpoint sources are not available. Thus, it is not possible to pinpoint exact locations of nonpoint sources or determine their relative impact upon in-stream loading along the impaired segment. However, sufficient historic in-stream fecal coliform data are available to generally evaluate the types of nonpoint sources that may contribute to impairment.

At site 05555300, which is along impaired segment IL_DS-07, USGS collected 122 samples in 1977 through 1995 and 46 samples in 2009 through 2020 (Figure 17). USGS did not collect samples at a sufficient frequency to evaluate Illinois's geometric mean criterion. Between 1977 and 1995, during the recreation season, 40 samples (58%) exceeded 400 cfu/100mL. Between 2009 and 2020, all the samples were collected in the recreation season and 8 samples (17%) exceeded 400 cfu/100mL.

A visual analysis of fecal coliform by flow duration interval, for both the 1977 through 1996 and the 2009 through 2020 datasets, shows a general trend towards high fecal coliform concentrations occurring frequently across all flow conditions (Figure 18). Additionally, summer recreation season and non-summer season fecal coliform vary over the same range. These results likely indicate that historic and recent fecal coliform concentrations in the Vermilion River are and were derived from multiple sources, some of which are likely runoff-based.

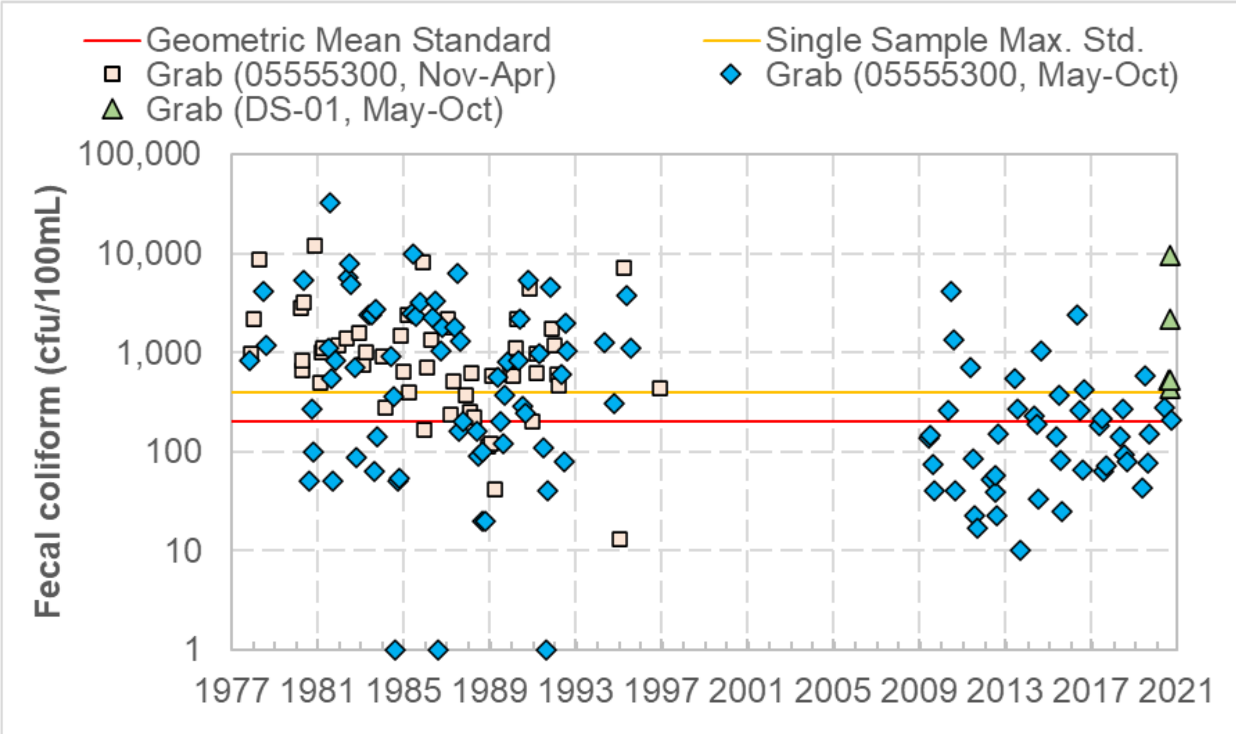
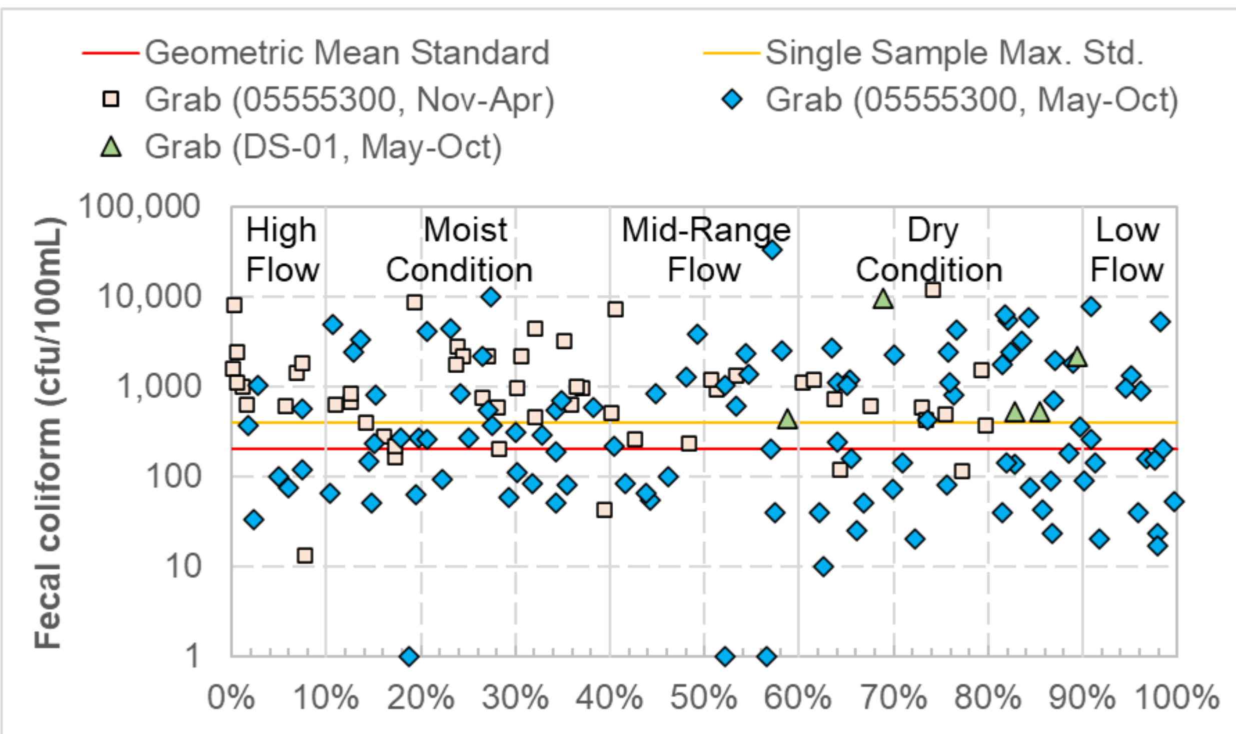


Figure 17. Fecal coliform concentration at USGS monitoring site 05555300 (1977-1996, 2009-2020) and IEPA monitoring site DS-01 (2020).



Note: Flows are from USGS gage 05555300 for water years 1975 through 2000 and for 1995-2020.

Figure 18. Fecal coliform concentration by flow duration interval at USGS monitoring site 05555300 (1977-1996, 2009-2020) and IEPA monitoring site DS-01 (2020).

5.5 Kelly Creek (IL_DSQC-01) Iron

The Kelly Creek subwatershed is rural and agricultural. The predominant land use is row crop agriculture (see Section 3.3). Many properties include homes and other residential structures adjacent to the land under cultivation. The village of Kempton and unincorporated community of Stelle are in the Kelly Creek subwatershed. Both towns operate WTPs with NPDES permits that authorize iron backwash. Prairie Materials operates Aggregate Materials Yard #99 (Ashkum, Illinois) with a quarry that supplies limestone products (e.g., limestone rock, sand, and agricultural lime).

5.5.1 In-Stream Water Quality Data

Three samples each in 2004, 2009, and 2014 were collected from monitoring site DSQC-01 on Kelly Creek and evaluated for dissolved iron (Table 28). Samples ranged from below detection limits to 1,400 µg/L. Only one of the nine samples exceeded the standard (1 mg/L).

Table 28. Dissolved iron results at monitoring site DSQC-01

Date	Dissolved iron (microgram/Liter)	Sample Result Qualifier
6/3/2004	10	Estimated
7/20/2004	--	Below detection limit
10/5/2004	--	Below detection limit
5/19/2009	651	--
7/8/2009	**1,400**	--
9/14/2009	24	Estimated
5/15/2014	30.9	Estimated
7/7/2014	4.1	Estimated
9/24/2014	4.37	Estimated

Note: **Bolded** value exceeds the water quality standard.

5.5.2 Point Sources

The Kempton WTP discharges to an unnamed tributary of Kelly Creek, while the WTP of the Stelle Community Association discharges directly to Kelly Creek. DMR data were not available for 2009 when in-stream iron (dissolved) exceeded standards. Both facilities regularly discharge iron (Table 29). Only 2 result (2%) at the Kempton WTP exceeded 1,000 µg/L iron (total), while 30 results (26%) at the WTP of the Stelle Community Association exceeded 1,000 µg/L iron (total).

Table 29. Total iron results at WTPs in the Kelly Creek subwatershed

NPDES ID	Facility	DAF (mgd)	Total Iron (µg/L)				
			Period	n	Min.	Max.	Avg.
Individual Permits							
(none)							
General Permit ILG640 (PWS)							
ILG640007	WTP of Stelle Community Association	0.0016	2011-2020	116	16	2,060	761
ILG640275	Kempton WTP	0.015	2014-2020	84	<5.1	2,100	167

Avg. = average.
DAF = design average flow.
DMF = design maximum flow.
Max = maximum.
mgd = million gallons per day.
Min. = minimum.
n = number of records.
NPDES = National Pollutant Discharge Elimination System.
PWS = public water supply.
µg/L = microgram per liter.
WTP = water treatment plant.

To determine if effluent flow from the WTPs migrates downstream to the mouth of Kelly Creek, at monitoring site DSQC-01, the Illinois Streamflow Assessment Model (ILSAM) was run for Kelly Creek at river mile 7.3, which is downstream of the WTPs and 7.3 river miles upstream of the monitoring site. Refer to Section 6.1 for additional discussion of ILSAM.

At this location, the mean annual flow is 23 cfs and the stream runs dry a quarter of the time. The 7Q10 low-flow is also 0 cfs. Under dry conditions, effluent flow does not migrate downstream, as Kelly Creek runs dry. Under very low flowing conditions, Kempton WTP's design flow is <1% of the flow in Kelly Creek at river mile 7.3 and the WTP of Stelle Community Association is <0.1%. At mean annual flow, the facilities' design flows are <0.1% and 0.01% (respectively) of the flow in Kelly Creek. These facilities may contribute a tiny fraction of iron (dissolved) load to the impairment observed at site DSQC-01, but the WTPs are not a significant cause of impairment.

5.5.3 Nonpoint Sources[15]

Stream erosion (iron-sorbed to sediment) and weathering of iron-bearing minerals and rocks can be significant sources of iron to surface waters. Erosion and weathering can be exasperated by anthropogenic activities like agricultural operations that alter stream channels and hydrology and mining that exposes iron-bearing rocks and minerals.

Row crop agriculture and channelized streams located within the Kelly Creek watershed likely increase stream erosion and contribute to the sediment impairment. No coal mines are known to have existed in the Kelly Creek subwatershed.[16]

Iron (dissolved) results for IEPA monitoring sites across the Vermilion River watershed from certain dates in 2014 were plotted in maps (Appendix B, Figure B - 12 through Figure B - 14) that were then visually evaluated. Generally, across the watershed, iron (dissolved) concentrations were higher during or following precipitation than during dry periods. These results generally indicate that sources of iron in the Vermilion River watershed are likely stream erosion and weathering of iron-bearing minerals and rocks.

[15] Industrial effluent, acid mine drainage, refining of iron ores, corrosion of iron-containing metals, sewage, and landfill leachate may also contribute iron to surface water (British Columbia Groundwater Association 2007). However, none of these sources are known to exist in the Kelly Creek subwatershed.

[16] Runoff from coal mines can be a source of iron. A review of aerial imagery found that the Kelly Creek subwatershed is mostly composed of agricultural land. A crushed stone quarry (Prairie Material, #99 Aggregate) was identified on N 200 East Road near Ashkum, IL, but this quarry is not considered to be a significant source of iron.

6 TMDL Derivation Approach

The first stage of this project included an assessment of available data, followed by evaluation of their credibility. The types of data available, their quantity and quality, and their spatial and temporal coverage relative to impaired segments or watersheds drive the approaches used for TMDL model selection and analysis. Credible data are those that meet specified levels of data quality, with acceptance criteria defined by measurement quality objectives, specifically their precision, accuracy, bias, representativeness, completeness, and reliability. The following sections describe the methods used to derive TMDLs.

A waterbody's LC represents the maximum rate of pollutant loading that can be assimilated without violating water quality standards (40 CFR 130.2(f)). Establishing the relationship between in-stream water quality and source loading is an important component of TMDL development. It allows the determination of the relative contribution of sources to total pollutant loading and the evaluation of potential changes to water quality resulting from implementation of various management options. The following section describes the methodology used in this analysis; results are then presented by waterbody in Section 7.

A TMDL is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant. TMDLs are composed of the sum of individual wasteload allocations (WLAs) for regulated sources and load allocations (LAs) for unregulated sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), which is expressed either implicitly (e.g., a conservative assumption used in modeling) or explicitly (a value such as 10% of the TMDL), that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody and may contain a reserve capacity (RC) for the future if needed. Conceptually, this is defined by the equation:

$$\textbf{TMDL} = \sum \textbf{WLAs} + \sum \textbf{LAs} + \textbf{MOS} + \textbf{RC}$$

6.1 Loading Capacity and Reductions

A duration curve approach is used to evaluate the relationships between hydrology and water quality. Load duration curves (LDC) are used to determine pollutant LC. The primary benefit of duration curves in TMDL development is the insight it provides into patterns associated with hydrology and water quality concerns. The duration curve approach is particularly applicable because water quality is often a function of stream flow. The use of duration curves in water quality assessment creates a framework that enables data to be characterized by flow conditions. The method provides a visual display of the relationship between stream flow and water quality.

Streamflow for all impairments was estimated from USGS gauges within the watershed. Streamflow data for all relevant USGS gauges were downloaded from the National Water Information System (NWIS; https://waterdata.usgs.gov/nwis) and area-weighted using the gauges' watershed area relative to the impairment watershed area. The streamflow estimation source for all impairments is presented in Table 30. Flow duration curves for 25 years of daily flow data (water years 1996 through 2020) from both USGS gages presented in Table 30 are plotted in Figure 19.

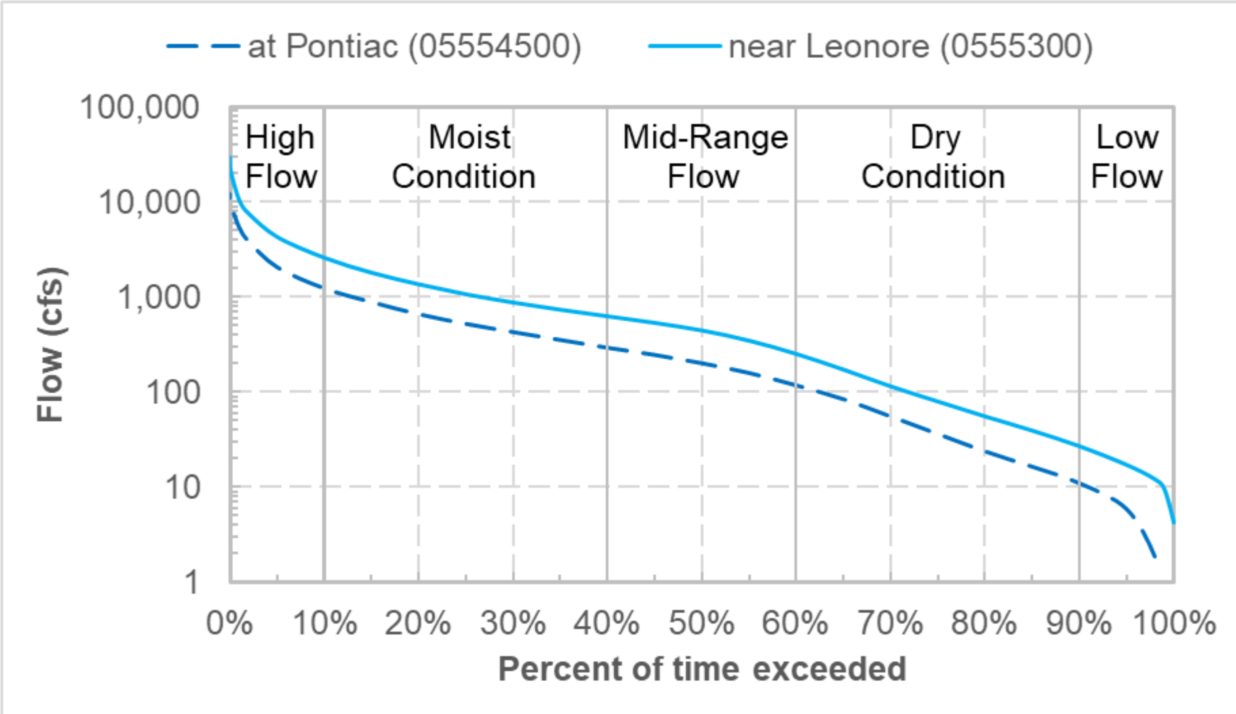


Figure 19. Flow duration curves for the two gages on the Vermilion River (Illinois Basin).

The impaired segments along the Vermilion River have USGS gages in close proximity and within contributing drainage areas (refer back to Figure 9 for a map of USGS gages and impaired segments); the impaired segments' drainage areas are between 93% and 107% of the gauges' drainage areas.

Table 30. USGS gauges used to estimate streamflow for impairments

Gage ID	Location	Impaired Segment(s)
05554500	Vermilion River at Pontiac, IL	IL_DS-06, IL_DSQC-01
05555300	Vermilion River near Leonore, IL	IL_DS-07, IL_DS-10

Flow for the impaired segment of Kelly Creek was estimated using the gauge on the Vermilion River at Pontiac and the impaired segment's drainage area was only 12% of the gauge's drainage area. While the drainage area ratio is typically not recommended for a drainage area ration of less than 50%, the method was determined to be appropriate for Kelly Creek. The Illinois Streamflow Assessment Model (ILSAM; https://www.isws.illinois.edu/data/ilsam/) was used to develop a flow duration curve for Kelly Creek. The ILSAM flow duration curve was very similar to a flow duration curve developed using the drainage area ratio method (Figure 20).

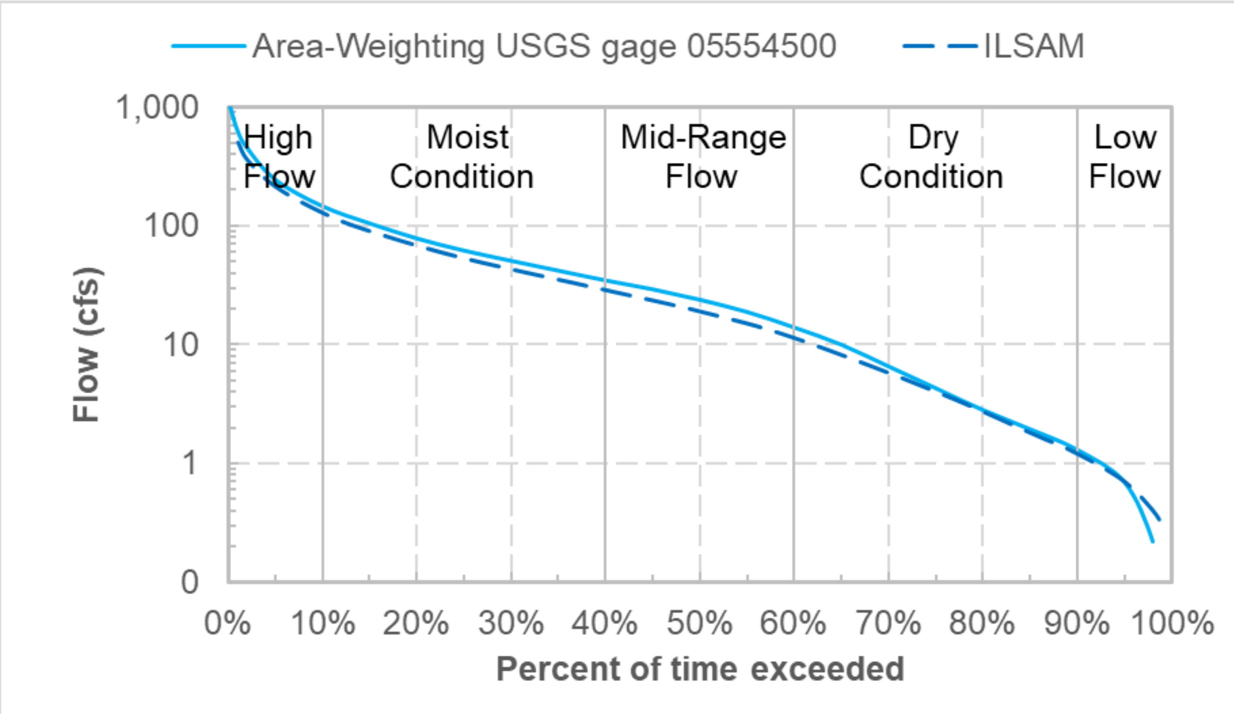


Figure 20. Flow estimation for Kelly Creek.

The LDC approach involves calculating the LC over the range of flow conditions expected to occur in the impaired stream. Discussions of load duration curves are presented in *An Approach for Using Load Duration Curves in the Development of TMDLs* (U.S. EPA 2007). This approach involves taking the following steps:

1. A flow duration curve for the stream is developed by generating a flow frequency table and plotting the data points to form a curve (Figure 20). The data reflect a range of natural occurrences from extremely high flows to extremely low flows.
2. The flow duration curve is translated into a LDC by multiplying each flow value (in cubic feet per second) by the water quality standard/target for a contaminant (mg/L or cfu/100 mL), then multiplying by conversion factors to yield results in the proper unit (i.e., pounds per day or cfu/day). The resulting points are plotted to create a LDC.
3. Each water quality sample is converted to a load by multiplying the water quality sample concentration by the average daily flow on the day the sample was collected. Then, the individual loads are plotted as points on the TMDL graph and can be compared to the water quality standard/target, or LDC.
4. Points plotting above the LDC represent deviations from the water quality standard/target and the daily LC. Those plotting below the LDC represent compliance with standards and the daily LC. Further, it can be determined which locations contribute loads above or below the water quality standard/target.
5. The area beneath the LDC is interpreted as the loading capacity of the stream. The difference between this area and the area representing the current loading conditions is the load that must be reduced to meet water quality standards/targets.
6. The final step is to determine where reductions need to occur. Those exceedances at the right side of the graph occur during low flow conditions and may be derived from sources such as illicit sewer connections. Exceedances on the left side of the graph occur during higher flow events and may be

derived from sources such as runoff. Using the load duration curve approach allows IEPA to determine which implementation practices are most effective for reducing loads on the basis of flow regime. If loads are considerable during wet-weather events (including snowmelt), implementation efforts can target those BMPs that will most effectively reduce stormwater runoff.

The stream flows displayed on load duration curves may be grouped into various flow regimes to aid with interpretation of the load duration curves. The flow regimes are typically divided into 10 groups, which can be further categorized into the following five hydrologic zones (U.S. EPA 2007):

- High flow zone: stream flows that plot in the 0 to 10-percentile range, related to flood flows
- Moist zone: flows in the 10 to 40-percentile range, related to wet weather conditions
- Mid-range zone: flows in the 40 to 60-percentile range, median stream flow conditions
- Dry zone: flows in the 60 to 90-percentile range, related to dry weather flows
- Low flow zone: flows in the 90 to 100-percentile range, related to drought conditions

The fecal coliform TMDLs are based on compliance with both the single sample maximum standard (400cfu/ 100 mL) and the geomean standard (200cfu/100 mL). The fecal coliform TMDLs are set to a concentration of 200cfu/100 mL, which is equivalent to the value of the geomean standard, and thus meet the single sample maximum standard. Reductions are calculated using the maximum observed load per flow zone and comparing that value with the loading capacity at the midpoint of the flow zone.

The duration curve approach helps to identify the issues surrounding the impairment and to roughly differentiate between sources. Table 31 summarizes the general relationship between the five hydrologic zones and potentially contributing source areas (the table is not specific to any individual pollutant). For example, the table indicates that impacts from point sources are usually most pronounced during dry and low flow zones because there is less water in the stream to dilute their loads. In contrast, impacts from channel bank erosion is most pronounced during high flow zones because these are the periods during which stream velocities are high enough to cause erosion to occur.

Table 31. Relationship between duration curve zones and contributing sources

Contributing source area	Duration Curve Zone				
	High	Moist	Mid-range	Dry	Low
Point sources				M	H
Livestock direct access to streams				M	H
On-site wastewater systems	M	M-H	H	H	H
Riparian areas		H	H	M	
Stormwater: Impervious		H	H	H	
Stormwater: Upland	H	H	M		
Field drainage: Tile system	H	H	M-H	L-M	
Bank erosion	H	M			

H = High.
L = Low.
M = Medium.
Potential relative importance of source area to contribute loads under given hydrologic condition.

6.2 Load Allocations

Load allocations represent the portion of the LC that is reserved for nonpoint sources and natural background conditions. The load allocations are based on subtracting the WLAs and the MOS from the LC. The load allocations are summarized in Section 7 for each of the waterbody pollutant combinations along with the existing, baseline loads and WLAs.

6.3 Wasteload Allocations

NPDES facilities within the watershed are presented in Table 12 (individual permits) Table 13 (CSOs), and Table 19 (general permits) in Section 4.2. The data analysis and linkage analysis (Section 5) identified the NPDES facilities with the potential to discharge pollutants that potentially cause or contribute to impairments. As required by the CWA, individual WLAs were developed for these facilities as part of the TMDL development process. Each facility's design maximum flow was used to calculate the WLA for the high flow zone and the design average flow was used to calculate WLAs for the other four flow zones (moist conditions, mid-range flows, dry conditions, and low flows). Illinois assumes that facilities will have to discharge at their maximum flow during high flows based on the following:

> *For municipal NPDES permits in Illinois, page 2 of the NPDES permit lists 2 design flows: a design average flow (DAF) and a design maximum flow (DMF). These are defined in 35 Ill. Adm. Code 370.211(a) and (b). Since rain (and to a certain extent, high ground water) causes influent flows to wastewater treatment facilities to increase and precipitation also leads to higher river levels, a correlation between precipitation and treatment flows exists. The load limits in these permits gives a tiered load limit, one based on DAF for flows of DAF and below, and another load limit in the permit for flows above DAF through DMF.*

Fecal coliform WLAs are based on compliance with the geometric mean fecal coliform water quality standard of 200 cfu/100 mL and the instantaneous water quality standard of 400 cfu/100 mL, with a 10% exceedance rate. Instantaneous water quality standard requiring that no more than 10% of the samples shall exceed 400 cfu/100 mL is also required to be met at the closest point downstream where recreational use occurs in the receiving water or where the water flows into a fecal coliform impaired segment.

Thirteen facilities in the watershed have disinfection exemptions (Table 32 and Figure 21). Disinfection exemptions are either seasonal (November-April) or year-round and allow a facility to discharge without disinfection. Facilities with disinfection exemptions are required to meet the in-stream water quality standard at the end of the exempted reach (i.e., geometric mean of 200 cfu/100 mL. WLAs for facilities with disinfection exemptions were based on the design flows for each facility multiplied by the water quality target. The resulting WLAs apply at the end of their respective disinfection exemption reaches (Figure 21). Facilities with year-round disinfection exemptions may be required to provide IEPA with updated information to demonstrate compliance with these requirements, and facilities directly discharging into a fecal impaired segment may have their year-round disinfection exemption reviewed through future NPDES permitting actions.

Table 32. Facilities with year-round disinfection exemptions

NPDES ID	Permittee Name
Individual Permits	
IL0021601	city of Fairbury
IL0023639	village of Tonica
IL0028819	village of Forest
IL0037001	Palmwood Health Care Center (currently known as Piper City Rehab and Living Center)
IL0037818	city of Minonk
IL0048828	Woodland School District #5
General Permits ILG551, ILG580, and ILG582 (Domestic Lagoon Systems)	
ILG551020	Meadows Mennonite Home
ILG551038	Salem Children's Home
ILG551063	Illinois Department of Transportation I-55 North Livingston County
ILG551069	Illinois Department of Transportation I-55 South Livingston County
ILG580091	town of Chatsworth
ILG580057	village of Flanagan

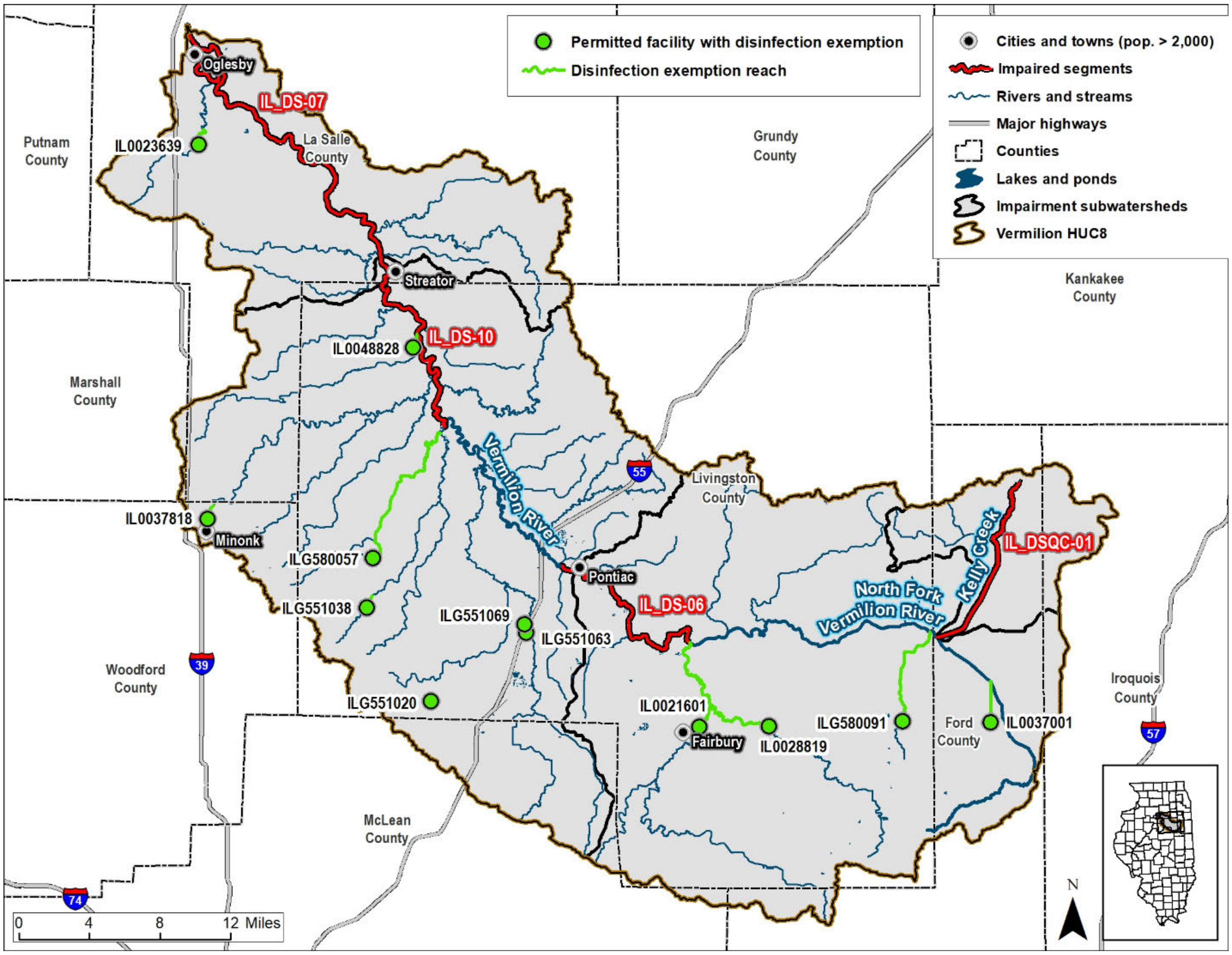


Figure 21. Facilities with disinfection exemption draining to fecal coliform impaired streams.

WLAs for treated CSOs are allocated using the largest bypass volume monitored during the past few years (Table 33). For CSO outfalls that discharge partially treated combined wastewater with disinfection, the overflow volumes were provided by IEPA in either (1) the NPDES permits (when they specified a maximum flow for disinfected combined sewage) or (2) the DMRs (where the maximum of the DMR overflow volumes was selected).

The target concentration for the treated CSO WLAs is the TMDL target of 400 cfu/100mL, which is the single sample maximum standard and the limit established in the NPDES permits. CSOs are infrequent and unpredictable; application of the geometric mean standard that requires 5 samples within 30-days is not feasible for CSOs. Treated CSO WLAs are only allocated to high flow conditions because CSOs should only occur during and following precipitation events; dry weather CSOs are prohibited by the NPDES permits.

Table 33. Treated CSO volumes to develop WLAs

NPDES ID	City	Outfalls	Summary of CSO Volume Determination	CSO Volume (MG)
IL0021601	Fairbury	002	The NPDES permit specified the design maximum flow as 5,104 gallons per minute.	7.3
IL0022004	Streator	024, A01, C01	The largest CSO volume during the summer recreation season reported by the city occurred on May 2, 2017.	17.0

CSO = combined sewer overflow
MG = million gallons

6.4 Margin of Safety

The CWA requires that a TMDL include a margin of safety (MOS) to account for uncertainties in the relationship between pollutants loads and receiving water quality. U.S. EPA guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

A 10% explicit MOS has been applied to each TMDL. A moderate MOS was specified because the use of load duration curves is expected to provide accurate information on the loading capacity of the stream, but this estimate of the loading capacity may be subject to potential error associated with the method used to estimate flows.

The MOS for fecal coliform is also implicit because (1) the load duration analysis does not address die-off and (2) the 30-day geometric mean criterion is applied as a daily target.

6.5 Reserve Capacity

A reserve capacity (RC) is set aside to accommodate future growth in the watershed; this allocation can then be assigned to the appropriate permitted facility as needed. The population is expected to grow in the future, and with this growth additional flow is expected from the WWTPs. A 10% reserve capacity is set aside to accommodate future growth.

6.6 Critical Conditions and Seasonality

The CWA requires that TMDLs take into account critical conditions for streamflow, loading, and water quality parameters as part of the analysis of loading capacity. Through the load duration curve approach it was determined that load reductions are needed for specific flow conditions; however, the critical conditions (the periods when the greatest reductions are required) vary by location and are inherently addressed by specifying different levels of reduction according to flow.

The CWA also requires that TMDLs be established with consideration of seasonal variations. Seasonal variations are addressed in the TMDLs by assessing conditions only during the seasons when the water quality standard applies (May through October) for fecal coliform. The load duration approach also accounts for seasonality by evaluating LC on a daily basis over the entire range of observed flows and by presenting daily LC that vary by flow.

7 Allocations

This section presents the TMDLs in graphic and tabular form.

7.1 Vermilion River (IL_DS-06) Fecal Coliform TMDL

Fecal coliform TMDLs have been developed for Vermilion River segment IL_DS-06 to address impairment of the recreation beneficial use. Figure 22 presents the fecal coliform LDCs set to the value of the geometric mean standard (200 cfu/100 mL) and to the value of the single sample maximum (400 cfu/100 mL). Table 34 and Table 36 summarize the TMDLs and required reductions for the TMDLs set to targets representing the geometric mean and single sample maximum standards, respectively. Pollutant reductions are needed under moist and dry conditions to meet the LDC set to the geometric mean standard. Table 36 summarizes the individual WLAs for NPDES-permitted facilities.

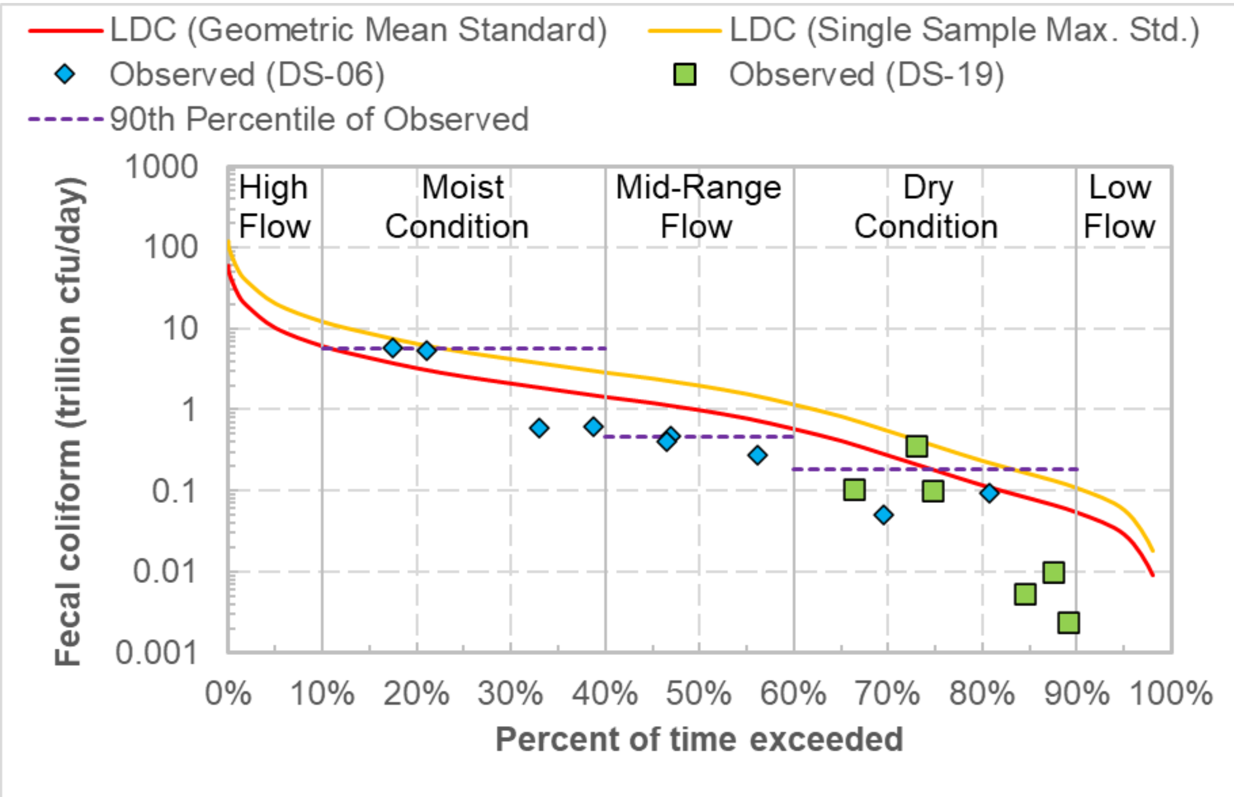


Figure 22. Fecal coliform TMDL for the Vermilion River (IL_DS-06).

Table 34. Fecal coliform TMDL summary and allocations (geometric mean standard) for the Vermilion River (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.093	0.035	0.035	0.035	-- [a]
LA	8.0	2.0	0.75	0.11	-- [a]
MOS (10%)	1.0	0.25	0.098	0.018	0.0029
RC (10%)	1.0	0.25	0.098	0.018	-- [a]
Loading capacity	**10**	**2.5**	**0.98**	**0.18**	**0.029**
Existing concentration [b]	41				
Necessary reduction	0%				

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (200 cfu/100 mL). The allowable concentration is based on the water quality standard.

[b] The existing concentration is a geometric mean of 5 samples collected in a 30-day period from August 24 through September 21, 2020 at monitoring station DS-19. No other data collected at monitoring sites DS-06 or DS-19 included 5 samples within a 30-day period.

Table 35. Fecal coliform TMDL summary and allocations (single sample maximum standard) for the Vermilion River (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.19	0.072	0.072	0.072	-- [a]
LA	16	4.0	1.5	0.21	-- [a]
MOS (10%)	2.0	0.51	0.20	0.035	0.0057
RC (10%)	2.0	0.51	0.20	0.035	-- [a]
Loading capacity	**20**	**5.1**	**2.0**	**0.35**	**0.057**
Existing load [b]	--	5.6	0.46	0.18	--
Necessary reduction	--	9%	0%	0%	--

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (400 cfu/100 mL). The allowable concentration is based on the water quality standard.

[b] The existing load is the 90th percentile of observed loads in each flow zone.

Table 36. Individual fecal coliform WLAs for the Vermilion River (IL_DS-06)

Permit ID	Facility name	Design flows (mgd)		TMDL target (200 and 400 cfu/100mL) [a]	Fecal coliform WLA (Billion-cfu/day)	
		DAF	DMF		High Flow using DMF (GM / SSM)	Mid-Range to Low Flow using DAF (GM / SSM)
Individual Permits - Untreated CSOs						
IL0021601	Fairbury (003, 008)	--	--	--	-- / 0 [b]	-- / --
IL0030457	Pontiac (A02, 002-005)	--	--	--	-- / 0 [b]	-- / --
Individual Permits - Treated Effluent						
IL0021601	Fairbury STP, City of (001)	0.66	2.4	200 / 400	18 / 36	5 / 10
	Treated combined sewage (002)	--	7.3 [c]	400	-- / 110	-- / --
IL0026697	Stelle Community Association STP	0.02	0.04	200 / 400	0.30 / 0.61	0.15 / 0.30
IL0028819	Forrest STP, Village of (001)	0.35	0.88	200 / 400	6.7 / 13	2.6 / 5.3
	Excess flow (A02)	--	2.35 [d]	400	-- / 36	-- / --
IL0030457	Pontiac WWTP, City of (001)	3.5	8.5	200 / 400	64 / 129	26 / 53
IL0037001	Piper City Rehab and Living Center STP	0.008	0.032	200 / 400	0.24 / 0.48	0.061 / 0.12
General Permit ILG580 (Domestic Lagoon System)						
ILG580091	Chatsworth STP	0.184	0.460	200 / 400	3.5 / 7.0	1.4 / 2.8
General Permit ILG620 (Private Sewage Disposal System)						
ILG620223	Cody Harris	0.0015		200 / 400	0.011 / 0.23	

cfu = colony forming unit (fecal coliform).
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
GM = geometric mean standard.
mgd = million gallons per day.
mL = milliliters.
PWS = public water supply.
SSM = single sample maximum standard.
STP = sewage treatment plant.
WLA = wasteload allocation.
WTP = water treatment plant.
WWTP = wastewater treatment plant.

Four PWS are not authorized to discharge fecal coliform in their effluent, and thus, do not receive WLAs: Cullom Water Treatment Plant PWS (ILG640003), Kempton Water Treatment Plant (ILG640275), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

[a] A TMDL target of 200 cfu/100 mL is set to represent the geometric mean standard and a TMDL target of 400 cfu/100 mL is set to represent the single sample maximum standard. For treated CSO outfalls and excess flow outfalls, only the TMDL target of 400 cfu/100 mL is applicable.

[b] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[c] As described in Section 6.3, treated combined sewage is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[d] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

7.2 Vermilion River (IL_DS-06) Nitrate Nitrogen TMDL

A nitrate (nitrogen) TMDL has been developed for Vermilion River segment IL_DS-06 to address impairment of the PFPWS beneficial use. Figure 23 presents the nitrate LDC and Table 37 summarizes the TMDL and required reductions. Pollutant reductions are needed under high flow through mid-range flow to meet the numeric standard. Table 38 summarizes the individual WLAs for NPDES-permitted facilities.

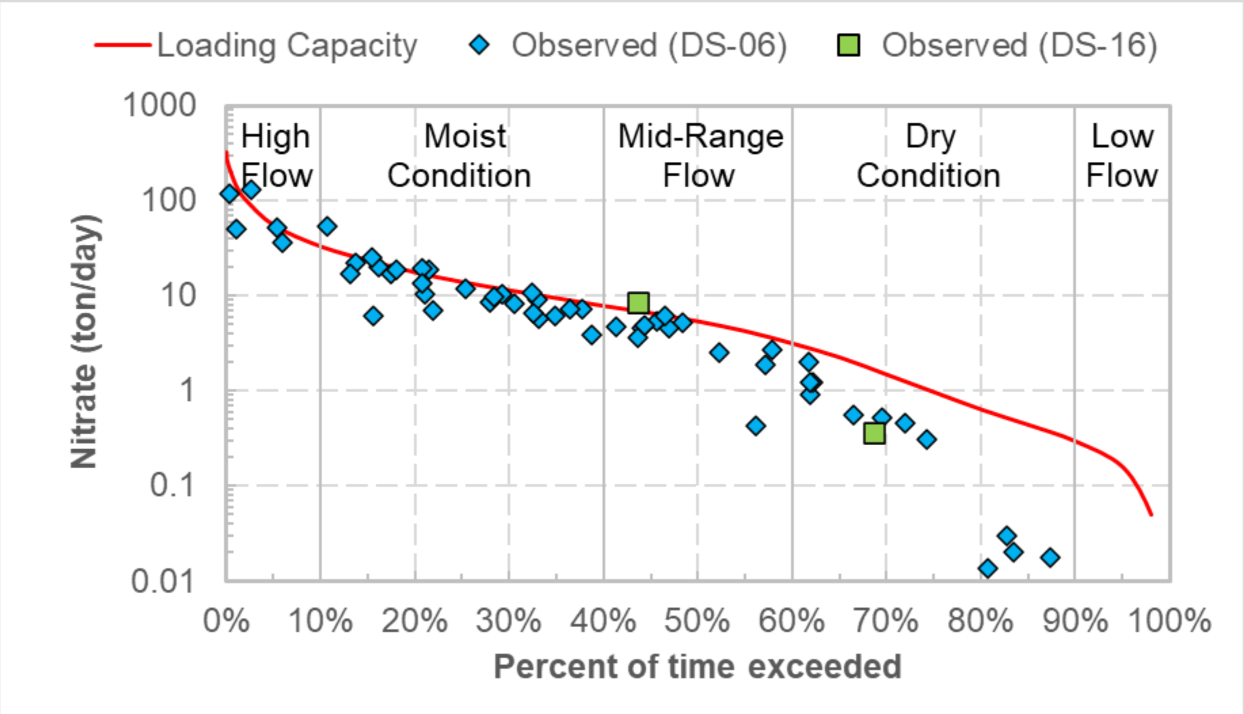


Figure 23. Nitrate (nitrogen) TMDL for the Vermilion River (IL_DS-06).

Table 37. Nitrate (nitrogen) TMDL summary and allocations for the Vermilion River (IL_DS-06)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.92	0.20	0.20	0.20	a
LA	44	11	4.1	0.58	a
MOS (10%)	5.6	1.4	0.54	0.097	0.016
RC (10%)	5.6	1.4	0.54	0.097	a
Loading capacity	**56**	**14**	**5.4**	**0.97**	**0.16**
Existing load [b]	129	54	8.4	2.0	--
Necessary reduction [c]	18%				

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation

Allocations are in tons of nitrate (as nitrogen) per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (10 mg/L). The allowable concentration is based on the water quality standard.

[b] The existing load is the maximum observed load in each flow zone.

[c] The reduction is the average of the individual reductions for samples that exceeded the TMDL target (10 mg/L).

Table 38. Individual nitrate (nitrogen) WLAs for the Vermilion River (IL_DS-06)

Permit ID	Facility name	Design flows (mgd)		TMDL target (mg/L)	Nitrate WLA (lb/day)	
		DAF	DMF		Using DMF	Using DAF
Individual Permits - Untreated CSOs						
IL0021601	Fairbury (003, 008)	--	--	--	0 [a]	--
IL0030457	Pontiac (A02, 002-005)	--	--	1--	0 [a]	--
Individual Permits - Treated Effluent						
IL0021601	Fairbury STP, City of (001)	0.66	2.4	10	200	55
	Treated combined sewage (002)	--	7.3 [b]	10	609	--
IL0026697	Stelle Community Association STP	0.02	0.04	10	3.3	1.7
IL0028819	Forrest STP, Village of (001)	0.35	0.88	10	73	29
	Excess flow (A02)	--	2.35 [c]	10	196	--
IL0030457	Pontiac WWTP, City of (001)	3.5	8.5	10	709	292
IL0037001	Piper City Rehab and Living Center STP	0.008	0.032	10	2.7	0.67
General Permit ILG580 (Domestic Lagoon System)						
ILG580091	Chatsworth STP	0.184	0.460	10	38	15
General Permit ILG620 (Private Sewage Disposal System)						
ILG620223	Cody Harris	0.001500		10	0.13	

CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lb/d = pound per day.
mgd = million gallons per day.
mg/L = milligram per liter as nitrogen.
PWS = public water supply
STP = sewage treatment plant.
WLA = wasteload allocation.
WTP = water treatment plant
WWTP = wastewater treatment plant.

Four PWS are not authorized to discharge nitrate in their effluent, and thus, do not receive WLAs: Cullom Water Treatment Plant PWS (ILG640003), Kempton Water Treatment Plant (ILG640275), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

[a] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[b] As described in Section 6.3, treated combined is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[c] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

7.3 Vermilion River (IL_DS-10) Nitrate Nitrogen TMDL

A nitrate (nitrogen) TMDL has been developed for Vermilion River segment IL_DS-10 to address impairment of the PFPWS beneficial use. Figure 24 presents the nitrate (nitrogen) LDC and Table 39 summarizes the TMDL and required reductions. Pollutant reductions are needed under mid-range flows to meet the numeric standard. Table 40 summarizes the individual WLAs for NPDES-permitted facilities.

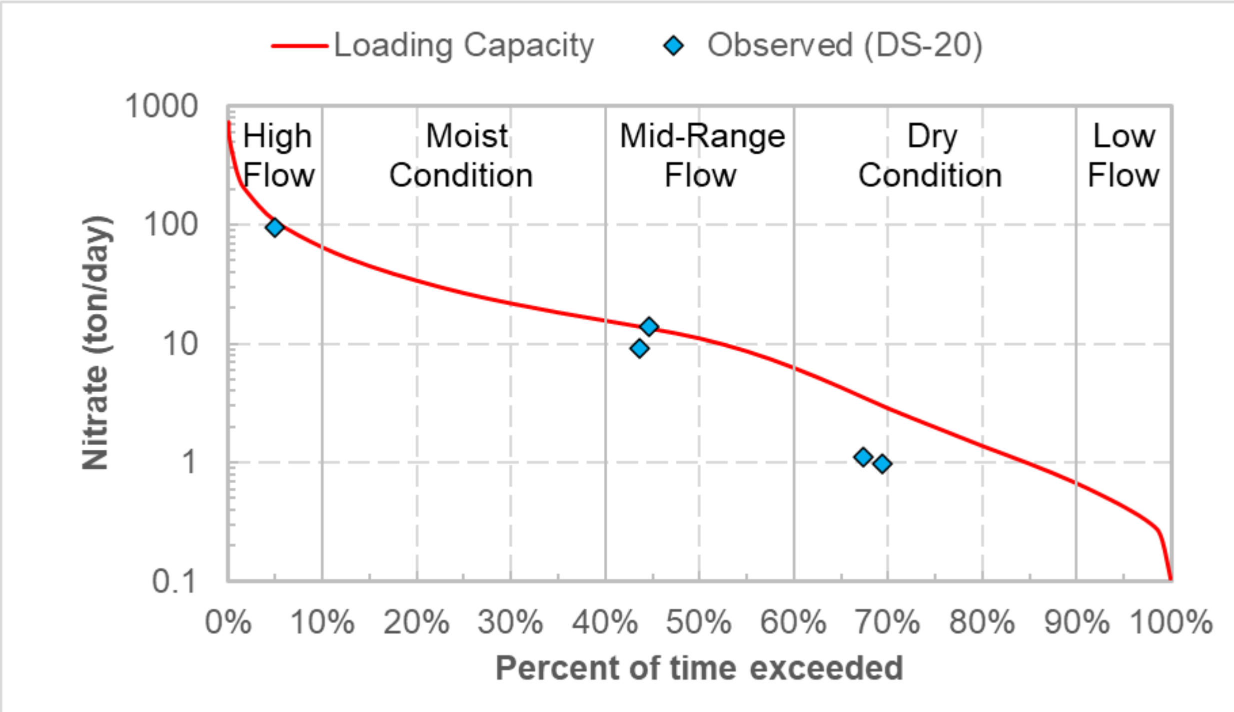


Figure 24. Nitrate (nitrogen) TMDL for the Vermilion River (IL_DS-10).

Table 39. Nitrate (nitrogen) TMDL summary and allocations for the Vermilion River (IL_DS-10)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	2.4	0.40	0.40	0.40	-- [a]
LA	82	20	8.4	1.2	-- [a]
MOS (10%)	11	2.6	1.1	0.20	0.042
RC (10%)	11	2.6	1.1	0.20	-- [a]
Loading capacity	**106**	**26**	**11**	**2.0**	**0.42**
Existing load [b]	96	--	14	1.1	--
Necessary reduction [c]	3%				

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in tons of nitrate (as nitrogen) per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (10 milligrams per liter). The allowable concentration is based on the water quality standard.

[b] The existing load is the maximum observed load in each flow zone.

[c] The reduction is the average of the individual reductions for samples that exceeded the TMDL target (10 milligrams per liter).

Table 40. Individual nitrate (nitrogen) WLAs for the Vermilion River (IL_DS-10)

Permit ID	Facility name	Design flows (mgd)		TMDL target (mg/L)	Nitrate WLA (lb/day)	
		DAF	DMF		Using DMF	Using DAF
Individual Permits - Untreated CSOs						
IL0021601	Fairbury (003, 008)	--	--	--	0 [a]	--
IL0022004	Streator (003, 018-023, 027)	--	--	--	0 [a]	
	Streator (009, 025, 026, A24, C24)	--	--	--	0 [a]	--
IL0030457	Pontiac (A02, 002-005)	--	--	--	0 [a]	--
IL0037818	Minonk (002, 003)	--	--	--	0 [a]	--
Individual Permits - Treated Effluent						
IL0021601	Fairbury STP, City of (001)	0.66	2.4	10	200	55
	Treated combined sewage (002)	--	7.3 [b]	10	609	--
IL0022004	Streator STP, City of (B01)	4.0	11.4	10	951	334
	Treated combined sewage (024, A01, C01)	--	17 [b]	10	1,419	--
IL0026697	Stelle Community Association STP	0.02	0.04	10	3.3	1.7
IL0028819	Forrest STP, Village of (001)	0.35	0.88	10	73	29
	Excess flow (A01)	--	2.35 [c]	10	196	--
IL0030457	Pontiac WWTP, City of (001)	3.5	8.5	10	709	292
IL0037001	Piper City Rehab and Living Center STP	0.008	0.032	10	2.7	0.67
IL0037818	Minonk STP, City of (B01)	0.34	0.85	10	71	28
	Excess flow (A01)	--	4.25 [d]	10	355	--
IL0048828	Woodland School CU District 5 - STP	0.012	0.03	10	2.5	1.0
General Permits ILG551, ILG580, and ILG582 (Domestic Lagoon Systems)						
ILG551020	Meadows Mennonite Retirement Community	0.045	0.1125	10	9.4	3.8
ILG551038	Salem Childrens Home	0.011	0.03	10	2.5	9.2
ILG551063	Illinois DOT I-55 Livingston Co N STP	0.0155	0.0465	10	3.9	1.3
ILG551069	Illinois DOT I-55 Livingston Co S STP	0.0155	0.0465	10	3.9	1.3
ILG580057	Flanagan STP	0.128	0.320	10	27	11
ILG580091	Chatsworth STP	0.184	0.460	10	38	15
ILG582009	Chenoa STP, City of	0.263	0.658	10	55	22
General Permit ILG620 (Private Sewage Disposal System)						
ILG620223	Cody Harris	0.0015		10	0.13	

CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lb/d = pound per day.
mgd = million gallons per day.
mg/L = milligram per liter as nitrogen.
PWS = public water supply
STP = sewage treatment plant.
WLA = wasteload allocation.
WTP = water treatment plant.
WWTP = wastewater treatment plant.

Five PWS are not authorized to discharge nitrate in their effluent, and thus, do not receive WLAs: Cullom Water Treatment Plant PWS (ILG640003), Kempton Water Treatment Plant (ILG640275), Rutland WTP (ILG640074), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

Three additional facilities are not authorized to discharge nitrate in their effluent, and thus, do not receive WLAs: Livingston Landfill (IL0067016; stormwater), Shale Quarry II (IL0075965, stormwater and pit pumpage), and Flanagan Terminal (IL0078468; hydrostatic test water).

[a] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[b] As described in Section 6.3, treated combined sewage is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[c] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

[d] After the main treatment facility reaches its DMF, excess flow is routed for treatment at a rate of 590 to 2,951 gallons per minute (0.850 to 4.25 mgd).

7.4 Vermilion River (IL_DS-07) Fecal Coliform TMDL

A fecal coliform TMDL has been developed for Vermilion River segment IL_DS-07 to address impairment of the recreation beneficial use. Figure 25 presents the fecal coliform LDCs set to the value of the geometric mean standard (200 cfu/100 mL) and to the value of the single sample maximum standard (400 cfu/100 mL). Table 41 and Table 42summarize the TMDLs and required reductions set to targets representing the geometric mean and single sample maximum standards, respectively. Pollutant reductions are needed under mid-range flows and dry conditions to meet the LDC set to the geometric mean standard and under dry conditions to meet the LDC set to the single sample maximum standard. Table 43 summarizes the individual WLAs for NPDES-permitted facilities.

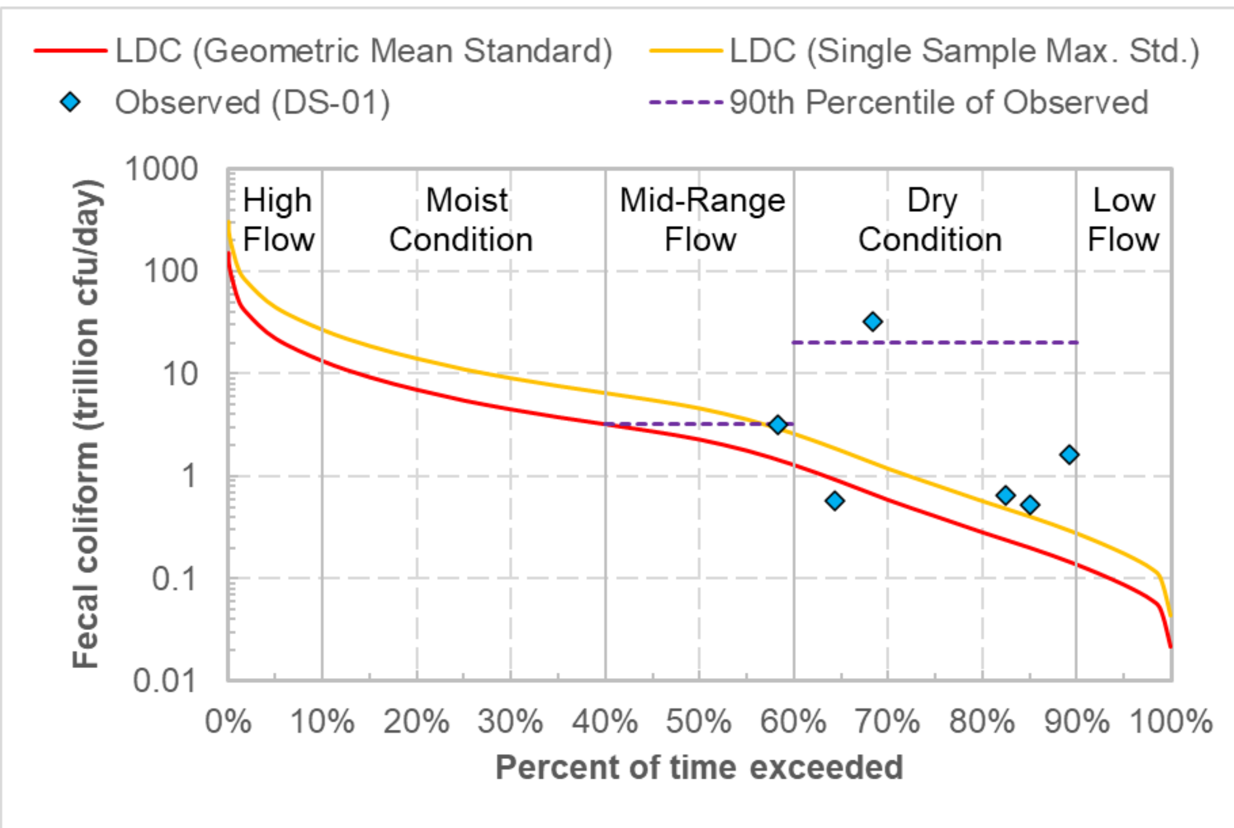


Figure 25. Fecal coliform TMDL for the Vermilion River (IL_DS-07).

Table 41. Fecal coliform TMDL summary and allocations (geometric mean standard) for the Vermilion River (IL_DS-07)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.24	0.080	0.080	0.080	a
LA	17	4.3	1.8	0.25	a
MOS (10%)	2.2	0.55	0.23	0.041	0.089
RC (10%)	2.2	0.55	0.23	0.041	a
Loading capacity	**22**	**5.5**	**2.3**	**0.41**	**0.089**
Existing concentration [b]	1,208				
Necessary reduction [c]	83%				

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (200 cfu/100 mL). The allowable concentration is based on the water quality standard.

[b] The existing concentration is a geometric mean of 5 samples collected in a 30-day period from August 24 through September 21, 2020 at monitoring station DS-01. No other data included 5 samples within a 30-day period.

Table 42. Fecal coliform TMDL summary and allocations (single sample maximum standard) for the Vermilion River (IL_DS-07)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.48	0.16	0.16	0.16	a
LA	35	8.7	3.5	0.50	a
MOS (10%)	4.4	1.1	0.46	0.082	0.018
RC (10%)	4.4	1.1	0.46	0.082	a
Loading capacity	**44**	**11**	**4.6**	**0.82**	**0.18**
Existing load [b]	--	--	3.2	20	--
Necessary reduction	--	--	0%	96%	--

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in trillion colony forming units per day.

[a] The permitted wastewater treatment facility design average flows exceed the long-term monitored streamflow in the low flow zone. NPDES-permitted facilities can discharge under these flow conditions if meeting permit conditions. To account for these unique situations only, the allocations are expressed as an equation rather than an absolute number: WLA, LA, or RC = (flow contribution from a given source) x (400 cfu/100 mL). The allowable concentration is based on the water quality standard.

[b] The existing load is the 90^{th} percentile of observed loads in each flow zone.

Table 43. Individual fecal coliform WLAs for the Vermilion River (IL_DS-07)

Permit ID	Facility name	Design flows (mgd)		TMDL target (200 and 400 cfu/100mL) [a]	Fecal coliform WLA (Billion-cfu/day)	
		DAF	DMF		High Flow using DMF (GM / SSM)	Mid-Range to Low Flow using DAF (GM / SSM)
Individual Permits - Untreated CSOs						
IL0021601	Fairbury (003, 008)	--	--	--	-- / 0 [a]	-- / --
IL0022004	Streator (003, 018-023, 027)	--	--	--	-- / 0 [a]	-- / --
	Streator (009, 025, 026, A24, C24)	--	--	--	-- / 0 [a]	-- / --
IL0024996	Oglesby (A01, B01, C01, 003, 005)	--	--	--	-- / 0 [a]	-- / --
IL0030457	Pontiac (A02, 002-005)	--	--	--	-- / 0 [a]	-- / --
IL0037818	Minonk (002, 003)	--	--	--	-- / 0 [a]	-- / --
Individual Permits - Treated Effluent						
IL0021601	Fairbury STP, City of (001)	0.66	2.4	200 / 400	18 / 36	5.0 / 10
	Treated combined sewage (002)	--	7.3 [b]	400	-- / 110	--
IL0022004	Streator STP, City of (B01)	4.0	11.4	200 / 400	86 / 172	30 / 60
	Treated combined sewage (024, A01, C01)	--	17 [b]	400	-- / 258	-- / --
IL0023639	Tonica STP, Village of	0.100	0.250	200 / 400	1.9 / 3.8	0.76 / 1.5
IL0024996	Oglesby STP, City of (001)	0.879	1.224	200 / 400	9.3 / 19	6.7 / 13
IL0026697	Stelle Community Association STP	0.02	0.04	200 / 400	0.30 / 0.61	0.15 / 0.30
IL0028819	Forrest STP, Village of (001)	0.35	0.88	200 / 400	6.7 / 13	2.6 / 5.3
	Excess flow (A01)	--	2.35 [c]	400	-- / 36	-- / --
IL0030457	Pontiac WWTP, City of (001)	3.5	8.5	200 / 400	64 / 129	26 / 53
IL0037001	Piper City Rehab and Living Center STP	0.008	0.032	200 / 400	0.24 / 0.48	0.061 / 0.12
IL0037818	Minonk STP, City of (001)	0.34	0.85	200 / 400	6.4 / 13	2.6 / 5.1
	Excess flow (A01)	--	4.25 [d]	400	-- / 64	--
IL0048828	Woodland School CU District 5 - STP	0.012	0.03	200 / 400	0.23 / 0.45	0.091 / 0.18
General Permits ILG551, ILG580, and ILG582 (Domestic Lagoon Systems)						
ILG551020	Meadows Mennonite Retirement Community	0.045	0.1125	200 / 400	0.85 / 1.7	0.34 / 0.68
ILG551038	Salem Childrens Home	0.011	0.03	200 / 400	0.23 / 0.45	0.083 / 0.17
ILG551063	Illinois DOT I-55 Livingston Co N STP	0.0155	0.0465	200 / 400	0.35 / 0.70	0.12 / 0.23
ILG551069	Illinois DOT I-55 Livingston Co S STP	0.0155	0.0465	200 / 400	0.35 / 0.70	0.12 / 0.23

Permit ID	Facility name	Design flows (mgd)		TMDL target (200 and 400 cfu/100mL) [a]	Fecal coliform WLA (Billion-cfu/day)	
		DAF	DMF		High Flow using DMF (GM / SSM)	Mid-Range to Low Flow using DAF (GM / SSM)
ILG580057	Flanagan STP	0.128	0.320	200 / 400	2.4 / 4.8	0.97 / 1.9
ILG580091	Chatsworth STP	0.184	0.460	200 / 400	3.5 / 7.0	1.4 / 2.8
ILG582009	Chenoa STP, City of	0.263	0.658	200 / 400	5.0 / 10	2.0 / 4.0
General Permit ILG620 (Private Sewage Disposal System)						
ILG620223	Cody Harris	0.0015		200 / 400	0.011 / 0.023	

cfu = colony forming unit.
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
mgd = million gallons per day.
mL = milliliter.
PWS = public waters supply.
STP = sewage treatment plant.
WLA = wasteload allocation.
WTP = water treatment plant.
WWTP = wastewater treatment plant.

Five PWS are not authorized to discharge fecal coliform in their effluent, and thus, do not receive WLAs: Cullom Water Treatment Plant PWS (ILG640003), Kempton Water Treatment Plant (ILG640275), Rutland WTP (ILG640074), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

Three additional facilities are not authorized to discharge nitrate in their effluent, and thus, do not receive WLAs: Livingston Landfill (IL0067016; stormwater), Shale Quarry II (IL0075965, stormwater and pit pumpage), and Flanagan Terminal (IL0078468; hydrostatic test water).

[a] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[b] As described in Section 6.3, treated combined sewage is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[c] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

[d] After the main treatment facility reaches its DMF, excess flow is routed for treatment at a rate of 590 to 2,951 gallons per minute (0.850 to 4.25 mgd).

7.5 Kelly Creek (IL_DSQC-01) Iron TMDL

An iron (dissolved) TMDL has been developed for Kelly Creek segment IL_DSQC-01 to address impairment of the aquatic life beneficial use. Figure 26 presents the iron (dissolved) LDC and Table 44 summarizes the TMDL and required reductions. Pollutant reductions are needed under mid-range flow to meet the numeric standard. Table 45 summarizes the individual WLAs for NPDES-permitted facilities; one facility (Stelle Community Association STP, IL0026697) did do not receive a WLA because the STP is not expected to discharge appreciable levels of iron.

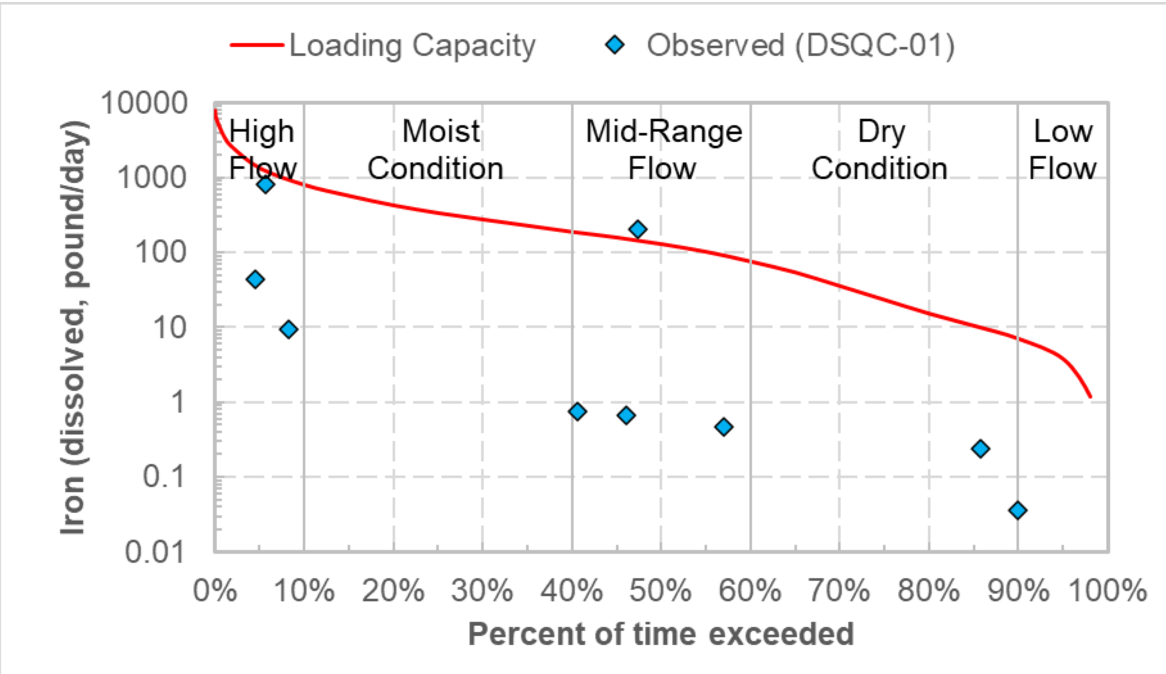


Figure 26. Iron (dissolved) TMDL for Kelly Creek (IL_DSQC-01).

Table 44. Iron (dissolved) TMDL summary and allocations for Kelly Creek (IL_DSQC-01)

TMDL component	High flow	Moist conditions	Mid-range flows	Dry conditions	Low flow
WLAs	0.14	0.14	0.14	0.14	0.14
LA	1,065	267	103	18	2.9
MOS (10%)	133	34	13	2.3	0.38
RC (10%)	133	34	13	2.3	0.38
Loading capacity	**1,331**	**335**	**129**	**23**	**3.8**
Existing load [a]	795	--	202	0.24	0.036
Necessary reduction [b]	29%				

LA = load allocation
MOS = margin of safety
RC = reserve capacity
TMDL = total maximum daily load
WLA = wasteload allocation
Allocations are in pounds per day of dissolved iron.

[a] The existing load is the maximum observed load in each flow zone.

[b] The reduction is the average of the individual reductions for samples that exceeded the TMDL target (1,000 µ/L).

Table 45. Individual iron (dissolved) WLAs for the Kelly Creek (IL_DSQC-01)

Permit ID	Facility name	Design flow (mgd)	TMDL target (mg/L)	Iron (dissolved) WLA (lb/day)
General Permit ILG640 (PWS)				
ILG640007	WTP of Stelle Community Association	0.0016	4	0.013
ILG640275	Kempton Water Treatment Plant	0.015	4	0.13

lb/d = pound per day.
mgd = million gallons per day.
mg/L = milligram per liter.
WLA = wasteload allocation.
WTP = water treatment plant.

8 Reasonable Assurance

The recommendations made in this TMDL report will be carried out if the appropriate entities work to implement them. In particular, activities that do not fall under regulatory authority require that state and local agencies, governments, and private groups mount a committed effort to carry out or facilitate such actions. For successful implementation, adequate resources must also be available.

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the WLAs contained in the TMDL will be achieved. This is because title 40 of the *Code of Federal Regulations* section 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with the assumptions and requirements of any available WLA in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources and the WLA is based on an assumption that nonpoint source load reductions will occur, U.S. EPA TMDL guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions. To that end, IEPA coordinates with organizations and programs that have an important role or can provide assistance for meeting the goals and recommendations of this TMDL. Efforts specific to this watershed are described below.

Under adaptive management, the Vermilion River implementation efforts should use an iterative approach; one that continues while better data are collected, results analyzed, and the implementation plan enhanced. In this way, implementation activities can focus on a cumulative reduction in loadings under a plan that is flexible enough to allow for refinement, reflects the current state of knowledge about the system, and is able to incorporate new innovative techniques.

In addition to focusing future management decisions, with established assessment milestones and benchmarks, adaptive management can include a reassessment of the TMDLs. Reassessment of a TMDL is particularly relevant when completion of key studies, projects or programs result in data showing load reductions or the identification/quantification of alternative sources. If chemical water quality does not show improvement or waterbodies are still not attaining water quality standards after implementation has been carried out, a TMDL revision would be initiated. Reopening/reconsidering the TMDLs may include refinement or recalculation of load reductions and allocations.

8.1 Point Sources

Generally, permitted point source discharges are reasonably assured to meet pollutant load reductions because the NPDES permits assign WLAs derived from water quality standards and TMDLs. Discharges from permitted point sources must comply with their NPDES permits and noncompliant discharges must be reported to IEPA. Both U.S. EPA and IEPA can take enforcement actions, including issuing orders, to ensure that point sources comply with their NPDES permits. NPDES permits and agency oversight and enforcement provide reasonable assurance that permitted point sources will meet pollutant load reductions.

For the Vermilion River watershed, the TMDL targets for facilities covered by individual and general NPDES permits are provided in Table 46 and Table 47. IEPA will ensure that future renewals of NPDES permits in this watershed are consistent with the TMDLs. For facilities in the subwatersheds that drain to the Vermilion River segments impaired by nitrate (IL_DS-06 and IL_DS-10) and the Kelly Creek segment impaired by dissolved iron (IL_DSQC-01), future effluent monitoring of nitrates (as nitrogen) and dissolved iron concentrations may provide greater certainty to the relative impact of point sources on these impairments.

For NPDES permittees in the watershed, in order to meet assigned nitrate (as nitrogen) WLAs (TMDL endpoints), the recommendation is taking a phased approach as follows:

Phase I

Major NPDES permittees (DAF >1.0 mgd) in the watershed with assigned nitrate-nitrogen TMDL WLAs will be required to monitor in their effluent for this parameter in the next NPDES permits renewal cycle. The TMDL report also recommends for major dischargers in the watershed to evaluate and develop a range of measures for reducing nitrate-nitrogen discharges from wastewater treatment plants (develop Nitrogen-Nitrate Discharge Optimization Plan), including possible source reduction measures, operational improvements, and major/minor facility modifications to optimize reductions in nitrate-nitrogen discharges from wastewater treatment facilities.

Phase II

Minor NPDES permittees (DAF <1.0 mgd) in the watershed with assigned nitrate-nitrogen TMDL WLAs will be required to monitor their effluent for this parameter in the next NPDES permits renewal cycle. Minor dischargers will be required to monitor for nitrate-nitrogen in the receiving stream, upstream and downstream of the discharge point to confirm the outcome of nonpoint source BMPs that have been implemented as outlined in the TMDL report, and document if the WLA is being met.

In addition to the above monitoring IEPA encourages NPDES permittees and other stakeholders in the watershed to create a watershed workgroup to address the TMDL recommendations.-IEPA will work with the workgroup, to evaluate DMR data for nitrate-nitrogen WLAs as outlined in the TMDL report. The workgroup members and the local stakeholders may also consider implementing BMPs to address the nonpoint source load allocation and document the nitrate-nitrogen load reductions in the watershed to meet the TMDL endpoints.

CSO discharges from communities with combined sewer systems are also covered by NPDES permits. However, U.S. EPA has developed unique policy for controlling CSOs, including the development of LTCPs. Generally, due to the need for large capital improvements that are expensive, CSO communities are allowed many years to implement LTCPs. In Illinois, IEPA approves LTCPs and incorporates LTCP requirements into individual NPDES permits. The combination of U.S. EPA CSO control policy, NPDES permits, and LTCPs provides reasonable assurance that CSO discharges will eventually meet pollutant load reductions.

8.2 Nonpoint Sources

Nonpoint source controls are voluntary. State and federal agencies, local governments, and nongovernmental organizations contribute to reasonable assurance through the implementation, maintenance, and evaluation of nonpoint source controls. A TMDL implementation plan is presented in Section 9.

Numerous federal and state programs (see Table 56) are available which provide technical and financial support for recommended practices. IEPA contributes to reasonable assurance through the agency's monitoring and nonpoint source programs. IEPA maintains a water quality monitoring program, and data collected through this program can be evaluated to determine if impairments persist and if water quality is improving. The Illinois Nutrient Reduction Loss Strategy and nonpoint source programs at state agencies (e.g., IEPA/Bureau of Water/Watershed Management Section/Nonpoint Source Unit) work with collaborating entities to implement nonpoint source controls. IEPA contributes to reasonable assurance by funding grants for demonstration projects, BMPs, education, and other implementation activities.

Implementation assistance in the watershed is provided by six NRCS Field Offices, seven county SWCDs, and two Resource Conservation and Development offices. SWCDs in the Vermilion River watershed have a history of collaborating on water quality projects.

Local zoning is typically controlled at the county or municipality level. Local zoning can be a useful tool for implementing some recommendations of the TMDL, such as implementing ordinances to promote stormwater management and address pet waste.

Reasonable assurance for nonpoint sources in the Vermilion River watershed is also ensured by the activities of watershed groups, initiatives, and funding opportunities which will support successful attainment of the WQS outlined in this implementation plan. Examples of relevant efforts are summarized here:

Vermilion Headwaters Watershed Partnership: The Partnership is a group of stakeholders supported by American Farmland Trust, working to reduce nutrient loss and increase adoption of conservation practices on farmlands in the Vermilion River. The Partnership has a history of leveraging partnerships with NRCS as part of the Mississippi River Basin Initiative, local SWCDs, non-profit organizations, and state agencies to fund implementation in the watershed and since 2015 has invested more than $1.7 million in the watershed. Nutrient management, cover crops, and reduced tillage are the focus of this initiative. The American Farmland Trust was awarded a “Partner of Conservation” in 2022 for their efforts in the watershed.

Indian Creek Watershed Project: Indian Creek is a tributary to the Vermilion River and was the focus of a 6-year project to improve water quality that focused on working directly with producers. Between 2010 and 2016, conservation systems and practices were put in place on 57% of the Indian Creek watershed. The Livingston County SWCD and the NRCS in Illinois led the project with support from the Conservation Technology Information Center.

Agricultural Water Quality Partnership Forum: Comprised of a diverse range of public, private, and non-profit partners, the Forum steers and coordinates outreach and educational efforts to help farmers address nutrient loss and implement BMPs recommended in the Illinois NLRS. The partners also support BMP tracking, cost-share coordination, and development of tools to support local efforts.

9 Implementation Plan

The objective of this implementation plan is to identify and recommend activities that stakeholders could consider to reduce pollutant loads and improve the conditions of the Vermilion River watershed in a cost-effective and timely manner. These implementation activities can help to achieve reductions and attain water quality standards and will result in a cleaner, healthier watershed for the people who depend on the resources of the watershed for their livelihood now and in the future.

This implementation plan combines actions that provide reasonable assurance (i.e., enforceable implementation through permits, or fully funded actions that are currently underway and are likely to reduce pollutant loading to impaired waterbodies) and actions watershed stakeholders may use to guide implementation of BMPs to address TMDLs in the Vermilion River watershed. The framework is flexible and incorporates adaptive management to allow watershed stakeholders to adjust the implementation plan to align with their priorities and limitations. This flexibility is necessary because the implementation of nonpoint source controls is voluntary. As more data are collected to better understand the nature of pollutant loading in the watershed and to evaluate BMP effectiveness, the steps outlined in this implementation plan may need to be modified to account for results.

9.1 NPDES Permitted Sources

NPDES permitted facilities have been give WLAs based on water quality standards (see Section 7) for fecal coliform and nitrate (as nitrogen). NPDES permits must be consistent with the WLA for all individual and general NPDES permits that authorize the discharge of fecal coliform and nitrate (nitrogen) (Table 46 and Table 47).

WLAs for Kelly Creek's iron impairment are equal to the existing allowable load for the facility because these facilities are not considered to be a significant contributor to the dissolved iron impairment.

Table 46. TMDL targets for facilities covered by individual NPDES permits

NPDES	Facility	Effluent Type	Fecal Coliform (cfu/100 mL)		Nitrate (as Nitrogen) (mg/L)	
			Existing Permit Requirement	TMDL Target	Existing Permit Requirement	TMDL Target
IL0021601	Fairbury STP, City of	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
		Treated combined	400 daily max.	400 daily max.	(none)	10 daily max.
IL0022004	Streator STP, City of	Treated sanitary	400 daily max.	400 daily max. & 200 monthly GM	(none)	10 daily max.
		Treated combined	400 daily max.	400 daily max.	(none)	10 daily max.
IL0023639	Tonica STP, Village of	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	(none) [c]
IL0024996	Oglesby STP, City of	Treated sanitary	400 daily max.	400 daily max. & 200 monthly GM	(none)	(none) [c]
IL0026697	Stelle Community Association STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
IL0028819	Forrest STP, Village of	Treated sanitary	monitor [b]	400 daily max. & 200 monthly GM	(none)	10 daily max.
		Excess flow	400 daily max.	400 daily max.	(none)	10 daily max.
IL0030457	Pontiac WWTP, City of	Treated sanitary	400 daily max.	400 daily max. & 200 monthly GM	monitor [a]	10 daily max.
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
IL0037818	Minonk STP, City of	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
		Excess flow	400 daily max.	400 daily max.	(none)	10 daily max.
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.

cfu/100 mL = colony forming units per 100 milliliters
GM = geometric mean
max. = maximum
mg/L = milligram per liter
STP = sewage treatment plant.
WWTP = wastewater treatment plant.

Flanagan terminal (IL0078468; hydrostatic test water), Livingston Landfill (IL0067016; stormwater), and Shale Quarry II (IL0075965; stormwater, pit pumpage water) are not sources of fecal coliform or nitrate.

[a] The existing NPDES permit requires a sample frequency of one sample per month.

[b] The existing NPDES permit requires a sample frequency of two samples per month.

[c] The receiving water for these facilities (Vermilion River segment IL_DS-07) is not designated for the public food processing and water supply use.

Table 47. TMDL targets for facilities covered by general NPDES permits

NPDES	Facility	Effluent Type	Fecal Coliform (cfu/100 mL) Existing Permit Requirement	Fecal Coliform (cfu/100 mL) TMDL Target	Nitrate (as Nitrogen) (mg/L) Existing Permit Requirement	Nitrate (as Nitrogen) (mg/L) TMDL Target
ILG551: Non-Publicly Owned Domestic Lagoon Serving a Population Less than 2,500						
ILG551020	Meadows Mennonite Retirement Community	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG551038	Salem Children's Home	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG551063	Illinois DOT I-55 Livingston Co N STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG551069	Illinois DOT I-55 Livingston Co S STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG580: Publicly Owned Domestic Lagoon Serving a Population of Less than 2,500						
ILG580057	Flanagan STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG580091	Chatsworth STP	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG582: Publicly Owned Domestic Lagoon Serving a Population of 2,500 to 5,000						
ILG582009	Chenoa WWTP, City of	Treated sanitary	monitor [a]	400 daily max. & 200 monthly GM	(none)	10 daily max.
ILG620: Private Sewage Disposal System						
ILG620223	Cody Harris	Treated sanitary	400 daily max.	400 daily max. & 200 monthly GM	(none)	10 daily max.

cfu/100 mL = colony forming units per 100 milliliters
GM = geometric mean
max. = maximum
mg/L = milligram per liter
STP = sewage treatment plant.
WWTP = wastewater treatment plant.

Public waters supplies (PWS) covered by general NPDES permit ILG640 are not sources of fecal coliform or nitrate. The following five PWS are covered by ILG640: Cullom Water Treatment Plant PWS (ILG6400003), Kempton Water Treatment Plant (ILG640275), Rutland WTP (ILG640074), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

[a] The existing NPDES permit requires a sample frequency of one sample per month.

9.2 Clean Water Act Section 319 Eligibility

An important factor for implementation of the recommended BMPs is access to technical and financial resources. One potential source of funding is the CWA Section 319 Nonpoint Source Management grants. Section 319 grant funding supports implementation activities including technical and financial assistance, education, training, demonstration projects, and monitoring to assess the success of nonpoint source implementation projects. To be eligible for these funds, watershed management plans must address nine elements identified by U.S. EPA (2008, revised 2014) as critical for achieving improvements in water quality. These nine elements include:

- Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve load reductions estimated within the plan
- Estimate of the load reductions expected from management measures
- Description of the nonpoint source management measures that will need to be implemented to achieve load reductions estimated in element 2 and identification of critical areas
- Estimate of the amounts of technical and financial assistance needed, associated costs, and the sources and authorities (e.g., ordinances) that will be relied upon to implement the plan
- An information and public education component; early and continued encouragement of public involvement in the design and implementation of the plan
- Implementation schedule
- A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented
- Criteria to measure success and reevaluate the plan
- Monitoring component to evaluate the effectiveness of the implementation efforts over time

The Vermilion River watershed TMDL report, including this implementation plan, provides much of the information needed to meet U.S. EPA's nine elements. Table 48 illustrates which sections of the document contain information relevant to U.S. EPA's nine elements.

Table 48. Comparison of TMDL Study and Implementation Plan to U.S. EPA's Nine Elements

Section 319 Nine Elements	Applicable Section of the TMDL/Implementation Plan
1. Identification of **causes of impairment and pollutant sources** or groups of similar sources that need to be controlled to achieve **load reductions** estimated within the plan.	Section 9.3
2. Estimate of the **load reductions expected from management measures**	Section 9.5
3. Description of the **nonpoint source management measures** that will need to be implemented to **achieve load reductions** estimated in element 2; and identification of **critical areas**	Sections 9.6 and 9.4.
4. Estimate of the amounts of **technical and financial assistance needed**, associated **costs**, and the **sources and authorities** (e.g., ordinances) that will be relied upon to implement the plan.	Section 9.7
5. An **information and public education component**; early and continued encouragement of public involvement in the design and implementation of the plan.	Section 9.8
6. **Implementation schedule**	Section 9.9

Section 319 Nine Elements	Applicable Section of the TMDL/Implementation Plan
7. A description of **interim, measurable milestones** for determining whether nonpoint source management measures or other control actions are being implemented.	Section 9.9
8. Criteria to **measure success** and **reevaluate** the plan	Section 9.10
9. **Monitoring component** to evaluate the effectiveness of the implementation efforts over time	Section 9.11

9.3 Causes of Impairments and Pollutant Sources

*This section, along with Section 3, contains the requirements for U.S. EPA's **element one** of a watershed plan: identification of causes of impairments and pollutant sources.*

The implementation plan for the Vermilion River watershed will focus on addressing the primary pollutants and sources described in Section 4 and summarized in Table 49. While pollutants contributing to impairments in the Vermilion River watershed may originate from a combination of point and nonpoint sources, only nonpoint sources will be further evaluated in this plan.

Table 49. Summary of Vermilion River watershed TMDLs and associated nonpoint sources

Segment (AUID)	Designated Uses	TMDL Pollutant	Needed Reductions [a]	Nonpoint Sources [b]
Vermilion River (IL_DS-06)	Primary Contact Recreation	Fecal coliform	40%	Stormwater runoff, livestock
	Public and Food Processing Water Supply	Nitrate (nitrogen)	18%	Cropland (tile drainage)
Vermilion River (IL_DS-10)	Public and Food Processing Water Supply	Nitrate (nitrogen)	3%	Cropland (tile drainage)
Vermilion River (IL_DS-07)	Primary Contact Recreation	Fecal coliform	73%	Stormwater runoff, onsite wastewater treatment systems, livestock
Kelly Creek (IL_DSQC-01)	Aquatic Life	Iron (dissolved)	29%	Cropland runoff, stream erosion

[a] The reduction is the average of the individual reductions for samples that exceeded the TMDL target determined for each pollutant.

[b] Nonpoint sources summarized from linkage analysis in Section 5.

9.3.1 Fecal Coliform Sources

Two segments of the Vermilion River (IL_DS-06 and IL_DS-07) are impaired for fecal coliform. Nonpoint sources of fecal coliform in the Vermilion River watershed include stormwater runoff, livestock (e.g., animal feeding operations), and onsite wastewater treatment systems.

Bacteria loading to IL_DS-06 is linked to precipitation-driven sources (i.e., runoff events), while loading to IL_DS-07 is occurring during all flow conditions (see Section 5). Precipitation-drive sources likely include stormwater runoff from developed areas (including the communities of Oglesby, Fairbury, and Pontiac) and runoff from livestock operations. Table 50 summarizes the estimated number of animals and total animal units that are potentially contributing to fecal coliform impairments in the Vermilion River watershed (total animal count for all areas can be found in Section 4.3). Cattle and hogs are the primary types of livestock in the areas draining to these impaired segments. Dry weather sources of bacteria may include leaky wastewater infrastructure and private onsite wastewater treatment systems. It is unlikely that dry weather sources are contributing to fecal coliform impairments in IL_DS-06.

Table 50. Estimated livestock and animal units contributing to impairments

Impaired Segment (AUID)	Number of Animals					Total Animal Units
	Cattle and Calves	Chickens (Layers)	Hogs and Pigs	Horses and Ponies	Sheep and Lambs	
Vermilion River (IL_DS-06)	5,003	1,293	63,496	116	442	**70,349**
Vermilion River (IL_DS-07)	1,860	303	1,219	136	318	**3,838**

Source: 2017 Census of Agriculture (Illinois)

Note: Estimates are provided for the direct drainage area only as this area is potentially contributing to the fecal coliform impairment. Animal units are converted from the number of animals.

9.3.2 Nitrate (Nitrogen) Sources

Two segments of the Vermilion River (IL_DS-06 and IL_DS-10) are impaired for nitrates (nitrogen). Relative nitrogen contributions from different land cover types were estimated using the *Spreadsheet Tool for the Estimation of Pollutant Load* (STEPL) model (version 4.4b). STEPL provides a simplified simulation of precipitation-driven runoff and nutrient delivery and has been used extensively in U.S. EPA Region 5 for watershed plan development and in support of watershed studies. STEPL model results for nitrogen loading are shown in Figure 27.

Cropland is the primary source of nitrogen loading to the Vermilion River watershed. The prevalence of tile drainage in the watershed is likely exacerbating nitrogen loading from cropland areas. A sampling program conducted in by Illinois State University in the nearby Lake Bloomington watershed concluded that the majority of nitrate loading from watershed sources was delivered via tile drained cropland (Lake Bloomington Watershed Planning Committee 2008).

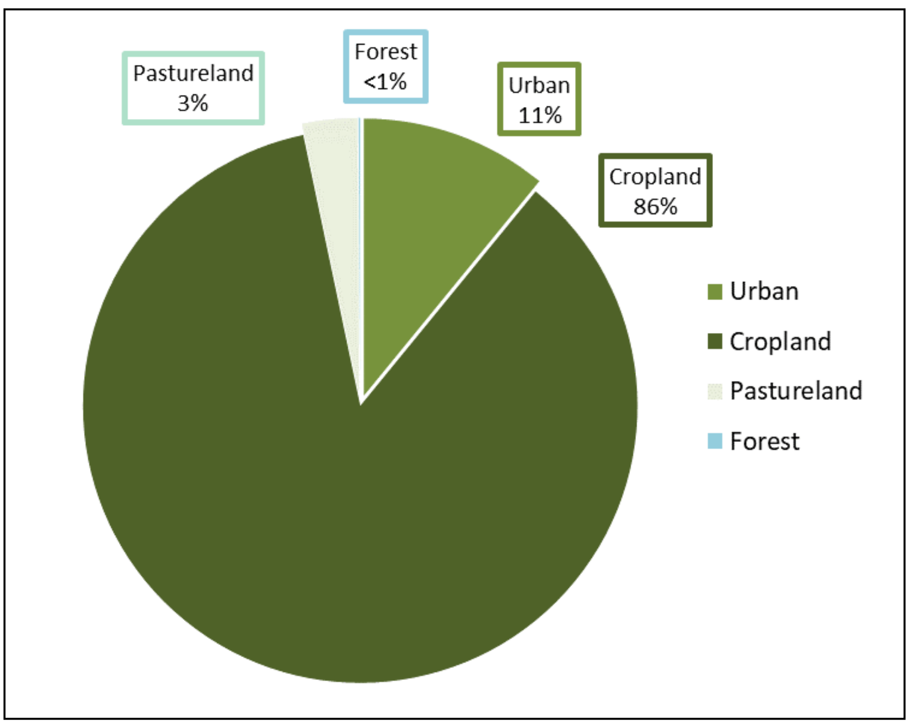


Figure 27. Relative nitrogen loading by land use type from the drainage areas to nitrate impaired segments (IL_DS-06 and IL_DS-10) (STEPL v4.4b).

9.3.3 Iron Sources

Iron loading in Kelly Creek (IL_DSQC-01) is most likely a result of the erosion and weathering of iron-rich sediment, minerals, and rocks in the stream channel and the surrounding landscape. High iron concentrations in surfaces waters can occur when natural levels of soil erosion are intensified by anthropogenically altered landscapes, such as cultivated cropland and development activities. Sediment loading in the Vermilion River watershed serves as a proxy for iron loading.

The relative contribution of iron-rich sediment from different land cover types was estimated using the STEPL model (see Section 9.3.2 for additional information on the STEPL model). STEPL model results for sediment loading are shown in Figure 28. Cropland runoff is the primary source of sediment loading to Kelly Creek.

Streambank erosion was also identified as a potential source of iron-rich sediment loading in Kelly Creek. Based on a review of aerial imagery, much of Kelly Creek's mainstem is channelized and several areas of stream channel instability were noted. Streambank erosion is likely also contributing to sediment loading in the area.

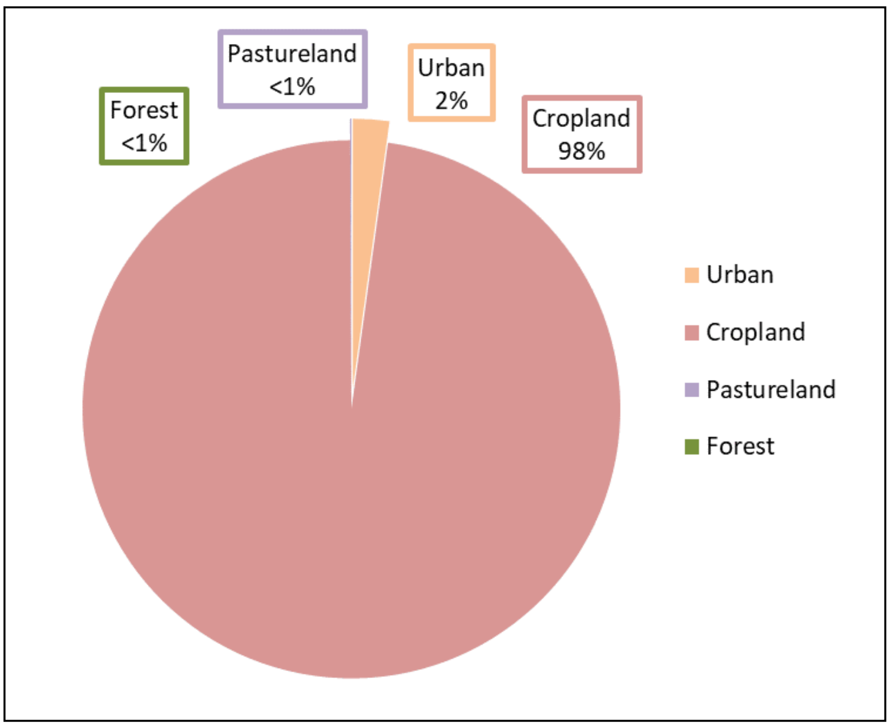


Figure 28. Relative sediment loading by land use type from the drainage area to Kelly Creek (IL_DSQC-01) (STEPL v4.4b). Sediment is a proxy for iron.

9.4 Critical Areas

This section contains one of the requirements for U.S. EPA's ***element three:*** *identification of critical areas.*

Successful implementation begins with identifying and focusing resources in critical areas for implementation. Critical areas are the focus of outcome-based plans because they represent those locations where project funding will provide the greatest environmental benefit. Upon identification of critical areas, BMPs can be evaluated and determined to address the needs of each area.

Critical area selection, as defined in U.S. EPA's *Critical Source Area Identification and BMP Selection: Supplement to Watershed Planning Handbook* (2018) (Figure 29) is an iterative process (U.S. EPA 2018). When all information is not known or more information is needed, use of an adaptive management approach (outlined in Section 9.10) will help to determine what areas to target for implementation.

Critical areas are identified for each priority pollutant and are targeted for initial implementation activities.

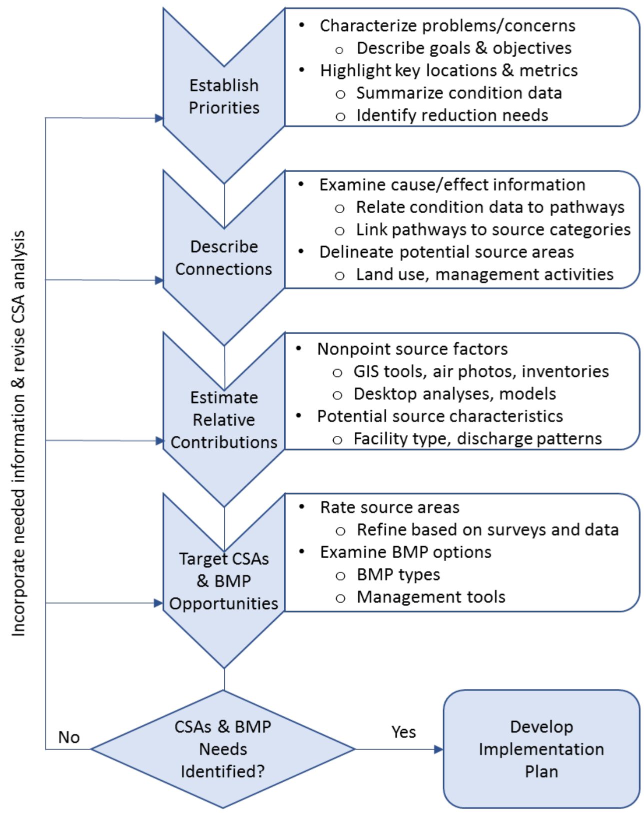


Figure 29. Critical area selection process (U.S. EPA 2018). (CSA = critical source area)

9.4.1 Fecal Coliform Critical Areas

Critical areas were identified to prioritize implementation of conservation practices that address precipitation-based sources of fecal coliform to impaired segments. As the nature of fecal coliform loading in the Vermilion River watershed is unknown, the following qualitative approach was used.

Practices which address bacterial loading to impaired streams are prioritized in areas with significant concentrations of livestock operations, in developed areas with limited source controls or stormwater ordinances, and in unsewered communities. The exact locations and densities of livestock operations and feedlots in fecal coliform-impaired subwatersheds are unknown. Using the *Cropland Data Layer* to derive the relative significance of pastureland and grasslands, four HUC12 subwatersheds were identified which could be prioritized for implementation where livestock is grazed and may have stream access. These HUC12 subwatersheds are presented in Table 51 and identified in Figure 30. Additional analysis should be conducted to target individual operations within these HUC12 subwatersheds.

Table 51. Critical areas for livestock BMP implementation

Order of Priority [a]	HUC12 Watershed 07130002	HUC12 Watershed Name
Highest	09 06	Town of Oglesby – Lower Vermilion River
↓	09 04	Farm Ridge – Lower Vermilion River
	02 01	Turtle Pond – South Fork Vermilion River
Lowest	03 03	Pleasant Ridge – North Fork Vermilion River

[a] Order of priority is based on the relative significance of pastureland within each HUC12 subwatershed. Highest priority is given to HUC12 subwatersheds with the greatest relative quantity of pastureland.

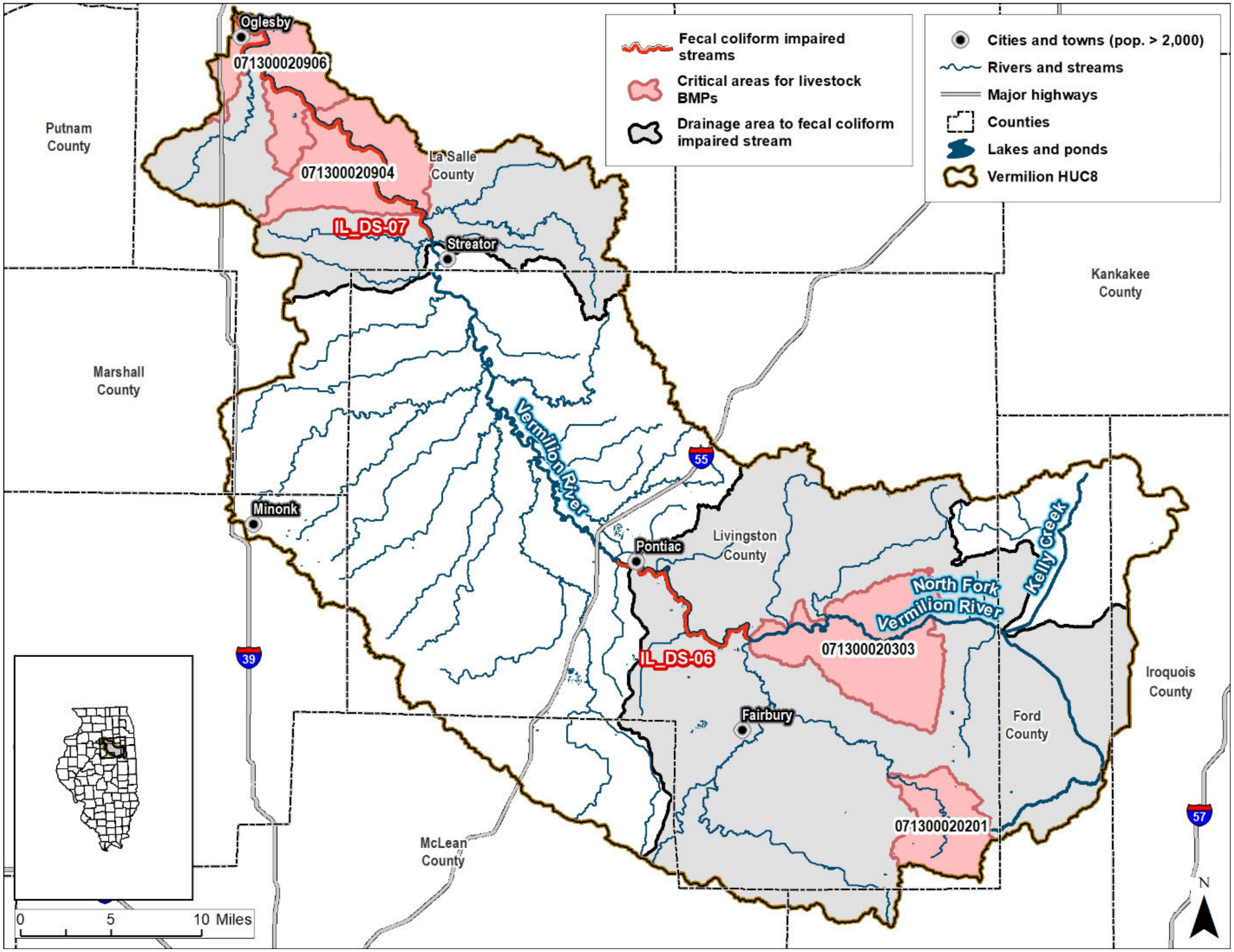


Figure 30. Critical areas for implementation of livestock BMPs to address fecal coliform loading in the Vermilion River.

Note: Grey areas draining directly to fecal coliform impaired streams are areas where activities are recommended in the implementation scenario (see Section 9.6).

In addition to the prioritized HUC12 watersheds for livestock BMPs, a narrative approach was used to determine critical areas for the implementation of stormwater management practices and onsite wastewater treatment system practices. Stormwater management practices, such as source control practices, should be prioritized in developed communities, as identified in Figure 4. Onsite wastewater treatment system practices should be prioritized in unsewered communities in IL_DS-07, based on available information from county health departments (Section 4.3.5). Additional assessment should be conducted to target communities in need of enhanced stormwater management and source controls, and to identify failing or noncompliant onsite wastewater treatment systems.

9.4.2 Nitrate Critical Areas

Critical areas were developed to target implementation of conservation practices that address nitrate in impaired segments of the Vermilion River. Nitrogen monitoring data were used to identify HUC12 subwatersheds that should be prioritized for implementation.

As discussed in Section 5.2.3, inorganic nitrogen monitoring data were evaluated with precipitation and in-stream flow data. Visual analysis of graphical plots of timeseries, box-and-whiskers, and water quality duration curves indicated that inorganic nitrogen varies by flow condition. Additional visual analysis of maps of synoptic inorganic nitrogen data (Appendix B), under different precipitation conditions, indicated that in-stream inorganic nitrogen levels increase considerably during and following precipitation events, with larger precipitation events resulting in larger in-stream inorganic nitrogen levels. Synoptic data are only available from 2014.

Limited nitrogen data are available from permitted point sources. Evaluation of DMR flow data and design maximum and average flows indicated that only under very low flow conditions would permitted point sources contribute a significant portion of in-stream flows. However, monitored inorganic nitrogen levels were typically lowest during drier flow conditions.

This weight-of-evidence analysis determined that runoff from predominantly agricultural land is the main source of nitrates causing impairment. As such, the critical areas target HUC12 subwatersheds predominated by agricultural land use. The maps of synoptic inorganic nitrogen data (Appendix B), under different precipitation conditions, were further evaluated to identify the areas upstream of each nitrate-impaired segment of the Vermilion River that had the highest in-stream inorganic nitrogen levels:

- The **Indian Creek subwatershed** exhibited the highest in-stream inorganic nitrogen levels, during or following precipitation (Appendix B, Figure B - 7 and Figure B - 8), in the entire Vermilion River watershed. Indian Creek is tributary to the South Fork Vermilion River, and the nitrate-impaired segment IL_DS-06 of the Vermilion River begins at the confluence of the North and South forks of the Vermilion River. The Indian Creek subwatershed was also the subject of an intensive project between 2010 and 2016 that focused on improving water quality (see Section 9.2). This effort can be further leveraged to continue focused watershed management and evaluate improvements over time.
- The **Scattering Point Creek subwatershed** (notably, Scattering Point Creek and Morehouse Creek) exhibited the highest in-stream organic nitrogen levels, during or following precipitation (Appendix B, Figure B - 7 and Figure B - 8), of all the tributaries discharging to the Vermilion River downstream of nitrate-impaired segment IL_DS-06 (i.e., downstream of the city of Pontiac) and upstream of nitrate-impaired segment IL_DS-10. The mouth of Scattering Point Creek on the Vermilion River is the beginning of nitrate-impaired segment IL_DS-10.

Critical areas for nitrates are presented in Figure 31.

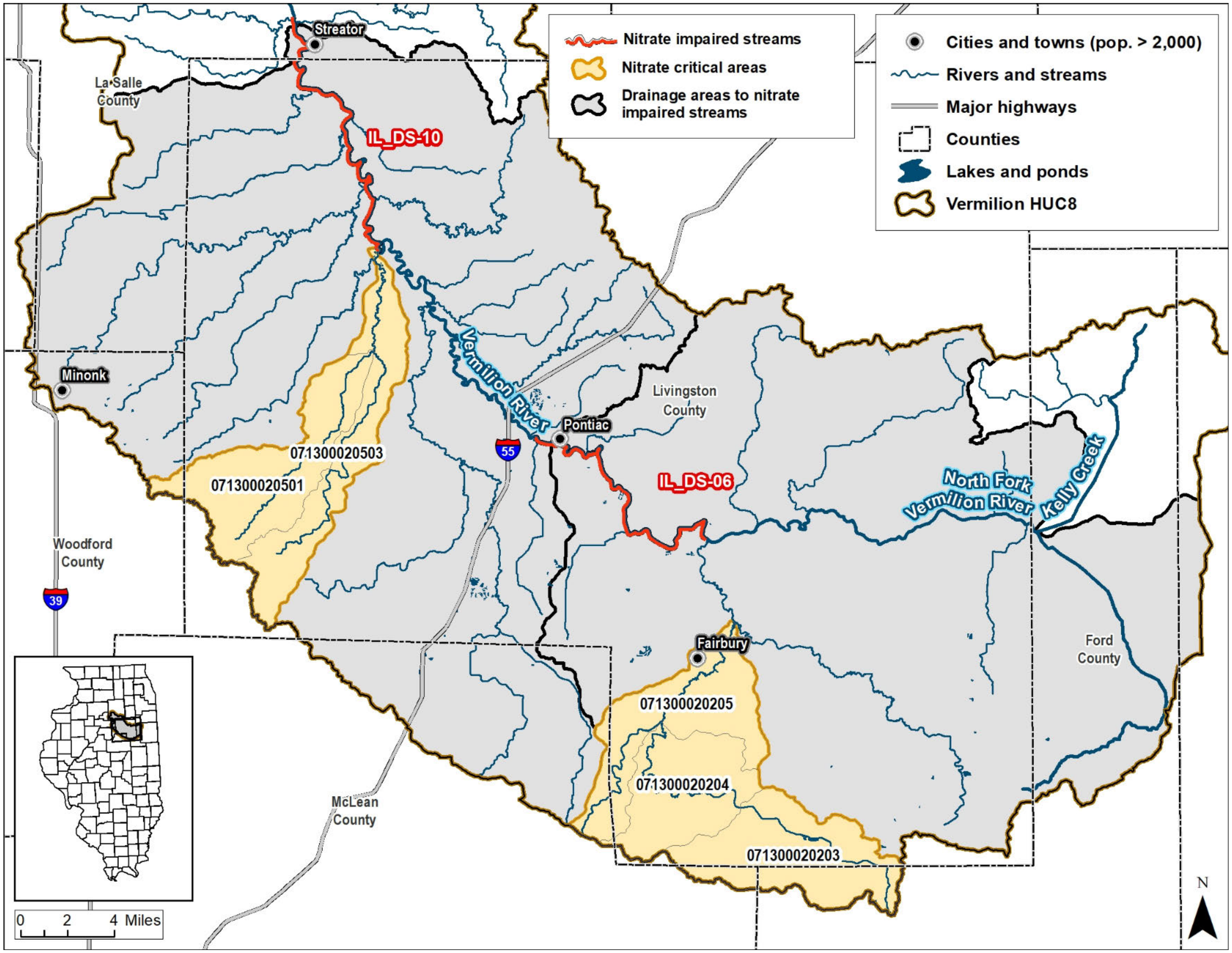


Figure 31. Critical areas for cropland BMPs to address nitrate loading in the Vermilion River.

Note: The two nitrate impaired segments of the Vermilion River (IL_DS-06 and IL_DS-10) are connected by Vermilion River segment IL_DS-14. While no TMDL has been developed for IL_DS-14 in this study, previous water quality monitoring data have exceeded WQS for nitrates. To ensure that required reductions are achieved, the drainage area to Vermilion River IL_DS-14 is included in the larger drainage area to IL_DS-10 and implementation of nitrate-reducing practices is recommended.

9.4.3 Iron (Sediment) Critical Areas

Riparian areas within a quarter mile of Kelly Creek's main channel are critical areas for the implementation of cropland BMPs and streambank restoration practices. Additional assessment of critical riparian areas (Figure 32) should be conducted to further identify specific implementation needs.

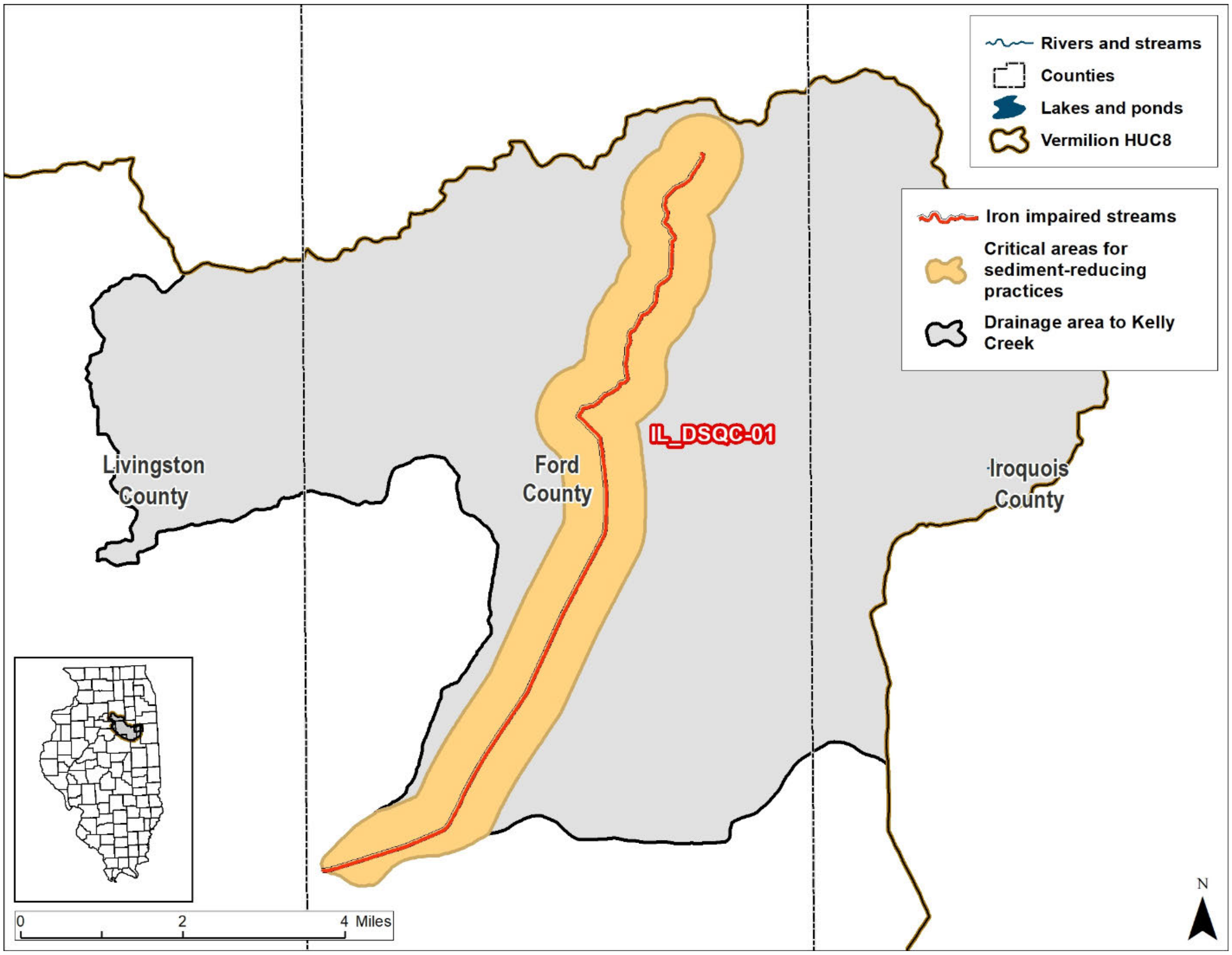


Figure 32. Critical area for implementation of sediment-reducing practices to address iron loading in Kelly Creek.

Note: grey areas draining directly to fecal coliform impaired streams are areas where activities are recommended in the implementation scenario (see Section 9.6).

9.5 Best Management Practices

*This section contains the requirements for U.S. EPA's **element two** of a watershed plan: Estimate of the load reductions expected from management measures.*

Within the watershed planning framework, candidate BMPs are identified and then evaluated to determine which BMPs will best address the causes and sources of pollutant loads. The practices presented in this section have the potential to address fecal coliform, nitrate, and sediment (to reduce iron) in the Vermilion River watershed.

9.5.1 Cropland BMPs

Cropland is an important source of nitrate and sediment loading to impaired segments in the Vermilion River watershed. A selection of cropland BMPs are described in the following subsections and estimated reductions are summarized in Table 52.

Cropland BMPs recommended in this implementation plan are a subset of those provided in the Illinois NLRS and by the Illinois Council on Best Management Practices (CBMP). Additional information is available in the NLRS and updates and on the Illinois CBMP website (http://illinoiscbmp.com/).

Table 52. Removal Efficiencies for Recommended Cropland BMPs

Cropland BMP	Nitrate Removal Efficiency	Sediment Removal Efficiency	Per Unit Costs
Conservation tillage	15 - 25% [a]	40 - 77% [a]	($17.00) per acre treated
Cover crops	30%	10 - 20% [a]	$29 per acre treated
Nutrient and fertilizer management	9 - 18%	--	($8) - $18 per acre treated
Vegetated buffer and filter strips	90%	53 - 65% [a]	$1.63/lb. of nitrogen removed [b]
			$60 - $435 per acre (herbaceous) [c]
			$600 - $1,200 per acre (forested) [c]
Drainage water management	39 - 82% [d]	--	$30 - $75 per acre treated [e]
Denitrifying bioreactor	25%	--	$17 per acre treated
Saturated buffer	40%	--	$10 per acre treated

Removal efficiencies from Illinois Nutrient Loss Reduction Strategy Biennial Report (IEPA and IDOA (2021)), unless noted.

[a] Source: U.S. EPA STEPL.

[b] Note: cost per pound of nitrogen removed used to estimate cost of buffer strips implemented to treat nitrogen from non-tile drained croplands. Other values used to estimate costs of buffers implemented to treat sediment from croplands and fecal coliform impairments on pastureland.

[c] Source: Estimated from EQIP 2020

[d] Source: IEPA and IDOA 2015

[e] Lake Bloomington Planning Committee 2008

9.5.1.1 Conservation Tillage

The Illinois NLRS identifies reduce d or conservation tillage as a primary BMP to control pollutant loading to waters. The *Illinois Agronomy Handbook* (*IAH*) defines conservation tillage as any tillage practice that results in at least 30% coverage of the soil surface by crop residuals after planting (University of Illinois Extension 2021). Several practices are commonly used to maintain the suggested 30% cover:

- **No-till** systems disturb only a small row of soil during planting, and typically use a drill or knife to plant seeds below the soil surface.
- **Strip till** operations leave the areas between rows undisturbed but remove residual cover above the seed to allow for proper moisture and temperature conditions for seed germination.
- **Ridge till** systems leave the soil undisturbed between harvest and planting: cultivation during the growing season is used to form ridges around growing plants. During or prior to the next planting, the top 0.5- to 2.0-inches of soil, residuals, and weed seeds are removed, leaving a relatively moist seed bed.
- **Mulch till** systems include any tillage regime that results in at least 30% residual surface cover, excluding no-till and ridge till systems.

Corn residues are more durable and capable of sustaining the required 30% cover required for conservation tillage. Soybeans generate less residue, the residue degrades more quickly, and supplemental measures or special care may be necessary to meet the 30% cover requirement. Based on 2018 satellite imagery, less than half of the cropland acres in the Vermilion River watershed (HUC 07130002) had residue greater than 30% (Applied Geosolutions LLC et al. 2019).

9.5.1.2 Cover Crops

Winter cover crops are identified in the NLRS as an important management practice (IDOA and IEPA 2015). According to NRCS (2020a), cover crops

> have the potential to provide multiple benefits in a cropping system. They can prevent soil and wind erosion, improve soil's physical and biological properties, supply nutrients, suppress weeds, improve the availability of soil water, and break pest cycles along with various other benefits. The species of cover crop selected along with its management determine the benefits and returns.

There are many different species being used for cover crops, including various grasses and legumes. Based on 2018 satellite imagery, cover crops are planted on less than 2% of the cropland acres in the Vermilion River watershed (HUC 07130002) (Applied Geosolutions LLC et al. 2019).

9.5.1.3 Nutrient and Fertilizer Management

Proper application of fertilizer (both commercial and manure) to cropland can greatly reduce nitrogen levels in agricultural runoff. Nutrient and fertilizer management practices should address application rates, methods, and timing as described in the NRLS and according to the 4Rs – **R**ight Source, **R**ight Rate, at the **R**ight Time, and in the **R**ight Place. The NRLS identify changes in nitrogen fertilizer application practices that could reduce nitrate-nitrogen including:

- Applying nitrogen fertilizer according to MRTN rate (maximum return to nitrogen)
- Using nitrification inhibitors for fall-applied fertilizers
- Applying fall fertilizer after the soil temperature 4 inches deep is below 50 degrees F
- Switching from fall to spring applications
- Splitting fertilizer applications to align with when plant uptake is greatest

Developing a comprehensive nutrient management plan can be a useful tool to document current and future nutrient and fertilizer management strategies on a farm-by-farm basis. Compliance with the Illinois Livestock Management Facilities Act establishes requirements for the design, construction and operation of livestock management and livestock waste-handling facilities.

Fertilizer transport, storage, and disposal practices should also be monitored to reduce potential pollution in runoff. Commercial fertilizers should be stored at least 100 feet from nearby surface waters and should not be stored underground or in pits. Application equipment should be cleaned, inspected, and calibrated regularly, and excess fertilizer from wash water should be recovered for reuse. Disposal of commercialized fertilizers should follow manufacturer guidelines. Improvements to storage and disposal practices may require improvements to existing equipment or storage infrastructure to reduce potential leakages.

9.5.1.4 Vegetated Buffers and Filter Strips

Vegetated buffers and filter strips provide many benefits and can effectively address water quality degradation. Buffers that include perennial vegetation and trees can filter runoff from adjacent cropland and the root structure of the vegetation in a buffer enhances subsequent trapping of pollutants. However, buffers are only effective in this manner when the runoff enters the buffer as a slow moving, shallow “sheet”; concentrated flow in a ditch or gully and quickly passes through the buffer offering minimal opportunity for retention and uptake of pollutants. This management practice is not appropriate for drain tiled fields because flow from these fields will typically bypass buffers and filter strips. The Illinois NRCS electronic Field Office Technical Guide recommends the minimum width of a riparian buffer should be 2.5 times the width of the stream (at bank-full elevation) or 35-feet for water bodies to achieve additional water quality improvements (NRCS 2017a).

Filter strips are a strip of permanent vegetation located between disturbed land (cropland or pasture) and environmentally sensitive areas that can effectively address water quality degradation from nutrient loading while also enhancing habitat (NRCS 2017b). Filter strips provide many of the same benefits as vegetated buffers but are also subject to the same design considerations. Determining adequate filter strip widths depends on the slope of the land. Table 53 summarizes the minimum and maximum flow lengths for filter strips according to Illinois NRCS standards.

Table 53. Minimum and Maximum Filter Strip Length for Land Slope (NRCS 2017b).

Slope (%)	0.5	1.0	2.0	3.0	4.0	5.0 or Greater
Minimum (feet)	36	54	72	90	108	117
Maximum (feet)	72	108	144	180	216	234

Depending on the nature of pollutant loading in individual watersheds, vegetated buffers and filter strips may reduce pollutant loading from cropland, pasture, stormwater, and feedlots. Implementation of buffers and filter strips in riparian areas adjacent to pastureland and livestock operations can reduce loading bacteria in streams. Planting buffers and filter strips with a drainage area to buffer ratio of 20:1 is typical (Helmers et al. 2015). Herbaceous buffers may cost from $60-$400 per acre, while forested buffers can cost from $600 - $4,000 per acre (estimated from EQIP 2020).

9.5.1.5 Tile Drainage Management Practices

- **Drainage water management**, or controlled drainage, refers to the management of the drainage volume and water table elevation under an agricultural field. Drainage water management is applicable to areas with high water tables and hydric soils where tile drains are common, such as in the Vermilion River watershed. Implementation of drainage water management involves controlling the quantity of water discharged from the outlet structure of a tile drainage system. This often involves the elevation of a drain or use of water control structures to store water prior to being discharged through an outlet (NRCS 2020b). While controlled drainage structures do not directly remove nitrate from cropland sources, they can provide significant flow volume reduction which reduces the quantity of water traveling directly to nearby waterbodies. However, the effectiveness of this practice at scale is uncertain and needs further consideration (IDOA and IEPA 2015).

- **Denitrifying bioreactors** are structures that improve water quality by reducing the nitrate content of subsurface agricultural drainage flow, such as flow from tile drainage systems. Bioreactors are composed of a below ground media chamber containing woodchips or another carbon media that filters nitrogen from cropland runoff. NRCS (2020c) recommends that bioreactors be designed for a minimum of a 10-year lifespan.
- **Saturated buffers** are practices installed on agricultural land where subsurface tile drainage systems are present. Saturated buffers are underground, perforated pipes used to distribute tile flow beneath the length of an installed vegetated buffer. These tile drainage treatment practices control flow volumes from tile drain outlets and spread tile drainage across a vegetated area to increase soil saturation before it leaves the system to reduce pollutants, including nitrates, in shallow subsurface flows.

9.5.2 Livestock BMPs

Proper management of runoff and waste is important to improving water quality and reducing bacteria and nutrient loading to the watershed. Animal operations are typically either pasture-based or confined, or sometimes a combination of the two. The operation type dictates the practices needed to manage manure and soil erosion from the facility. A pasture or open lot system with a relatively low density of animals (1 to 2 head of cattle per acre [U.S. EPA 2003]) may not produce manure in quantities that require management for the protection of water quality. If excess manure is produced, then the manure will typically be stored which can then be land applied. Application of manure should be at agronomic rates, taking into account commercial fertilizer application, when the ground is not frozen and precipitation forecasts are low. Rainfall runoff should be diverted around storage facilities with berms or grassed waterways.

Confined facilities (typically dairy cattle, swine, and poultry operations) often collect manure in storage pits. Wash water used to clean the floors and remove manure buildup combines with the solid manure to form a liquid or slurry in the pit. Final disposal of waste usually involves land application on the farm or transportation to another site.

Livestock BMPs generally seek to contain manure and manure wastewater; contain and treat runoff contaminated with manure or manure wastewater; divert clean water; and prevent runoff following manure land application. The following feedlot and pasture BMPs are recommended:

- **Compliance with the Illinois Livestock Management Facilities Act**
- **Composting manure structures and manure management**. Composting manure structures contain manure and other organic materials as they are broken down through aerobic microbial processes. Once decomposed, the organic materials are suitable for storage, on farm use, and application to land as a soil amendment. Composting facilities typically consist of a concrete floor separated by stalls, cover such as a roof or loose tarp is recommended to maintain an environment conducive to aerobic digestion (NRCS 2017c). Other manure management practices include:
    - Grading, earthen berms, and such to collect, direct, and contain manure
    - Installation of concrete pads
- **Runoff management** (runoff from production areas)
    - Grading, earthen berms, and such to collect and direct manure-laden runoff
    - Filter strips
    - Storage ponds
- **Clean water diversion**
    - Roof runoff management
    - Grading, earthen berms, and such to collect and direct uncontaminated runoff

- **Manure land application**
    - Development and implementation of a Comprehensive Nutrient Management Plan that includes a water quality-focused nutrient management strategy (e.g., the 4Rs: **R**ight Source, **R**ight Rate, **R**ight Time, **R**ight Place), see Nutrient and Fertilizer Management
    - Application at agronomic rates, taking into account commercial fertilizer application, when the ground is not frozen and precipitation forecasts are low

In addition, BMPs for alternative water systems and exclusion fencing can be used to reduce nutrients and fecal coliform from livestock with access to streams. Livestock exclusion practices limit or eliminate livestock access to a stream or waterbody and are expected to cost around $1.78 per foot (EQIP 2020). Fencing can be used with controlled stream crossings to allow livestock to cross a stream while minimizing disturbance to the stream channel and streambanks. Providing alternative water supplies for livestock allows animals to access drinking water away from the stream, thereby minimizing the impacts to the stream and riparian corridor. U.S. EPA (2003) studied the impacts of providing alternative watering sites without structural exclusions and found that cattle spend 90% less time in the stream when alternative drinking water is furnished. U.S. EPA (2003) estimates that fecal coliform reductions from 29-46% can be expected.

Based on EQIP payment rates, the cost of implementation of livestock BMPs (including manure management plans, waste storage facilities, and clean water diversions) is estimated to be $350/animal unit.

9.5.3 Stormwater Management Practices

The management and treatment of stormwater can reduce pollutant loading, especially in areas with high levels of imperviousness. Structural stormwater management practices include a wide range of practices which control, filter, and promote the infiltration of stormwater runoff. Examples of structural practices include rain gardens, green roofs, permeable pavement, stormwater ponds, swales, and constructed wetlands. Some of these practices, such as constructed wetlands, may remove up to 35% of nitrates from stormwater flows (Crumpton et al. 2020). The ability of stormwater BMPs to effectively reduce bacterial loading from impervious cover is still uncertain and is dependent on the nature of the bacterial source.

Source control practices, such as pet waste management, trash management, and fertilizer management practices can also reduce pollutant loadings in developed areas. Successful source control programs are often composed of (1) the development of a codified ordinance (i.e., pet waste ordinances which penalize illicit deposition of pet feces or street sweeping ordinances), and (2) public outreach and installations in key areas (i.e., development of materials to improve fertilizer application practices or installation of trash receptacles in public areas).

9.5.4 Onsite Wastewater Treatment System Practices

BMPs to reduce pollutant loading from wastewater sources include the maintenance and inspection of private onsite wastewater treatment systems in unsewered areas. The most effective BMP for managing loads from onsite wastewater treatment systems, or septic systems, is regular maintenance. U.S. EPA recommends that septic tanks be pumped every 3 to 5 years depending on the tank size and number of residents in the household (U.S. EPA 2002b). When not maintained properly, septic systems can cause the release of pathogens, as well as excess nutrients, into surface water. Annual inspections, in addition to regular maintenance, ensure that systems are functioning properly. An inspection program can identify those systems that are currently connected to tile drain systems or storm sewers. Inspections also help to determine if systems discharge directly to a waterbody ("straight pipe") and can recommend alternative solutions.

Education and outreach are a crucial component of reducing pollution from septic systems and can occur through public meetings, mass mailings, and radio and television advertisements. An inspection program can also help with public education because inspectors can educate owners about proper operation and maintenance during inspections. Education and outreach programming should also be utilized to collect data on wastewater characteristics in the watershed, including numbers of failing systems, locations of unsewered communities, and additional private wastewater management practices that might implicate water quality. Data collection should support a centralized system of information that can be used for future implementation and watershed planning efforts.

Upgrading or replacing a non-compliant or failing septic system is expected to cost between $10,000 to $15,000 per system. The cost of implementing education and outreach programs to unsewered communities vary depending on the number of septic systems in the area and existing community perceptions of septic maintenance.

9.5.5 Stream Restoration Practices

Channelization, erosion, and destabilization of stream channels has been identified as a source of sediment in the watershed. A variety of practices can be implemented in riparian areas which can restore these streambank and streambed conditions:

- **Stream channel natural design methods** establish meanders and natural flow complexity and connect the stream channel with the floodplain.
- **Engineering controls** include armoring with materials, deflection of the water course with rock or log structures, and removal of debris to restore flows. Example practices include stone toes, stream barbs and removal of any problematic log jams that contribute to erosion. Levee maintenance and improvements may be needed; and scour along infrastructure such as bridges may need engineering controls.
- **Vegetative stabilization and restoration of riparian areas** can reduce peak flows from runoff areas and channel velocities directing runoff. Using vegetative controls also enhances infiltration, which reduces high flows that cause erosion. Selection of BMPs and costs will depend on location-specific factors.

In advance of implementation, a stream assessment should be completed to determine key areas of erosion, sedimentation, or instability. Local partners and stakeholders should collaborate to identify where work is needed, select appropriate restoration activities, explore funding opportunities, and implement the selected practices. Depending on the level of restoration required, streambank restoration practices may cost $250 to $400 per linear foot.

9.6 Best Management Practice Implementation

This section contains one of the requirements for U.S. EPA's ***element three:*** *description of nonpoint management measures needed to achieve load reductions.*

An important aspect of the implementation plan is to identify and encourage activities that can be implemented and produce measurable results. While there are many different BMP scenarios that could be used to achieve pollutant load reductions, this plan provides one potential scenario. The estimated benefits and costs associated with this scenario may increase or decrease as management activities are evaluated and monitored through the adaptive management process.

Implementation of the following scenarios should be prioritized in critical areas, as identified in Section 9.4. An estimate of the costs associated with these scenarios is provided in Section 9.7.

9.6.1 Implementation Scenario for Fecal Coliform Reductions

Fecal coliform reductions are required to attain WQS in Vermilion River segments IL_DS-06 and IL_DS-07. The exact nature of fecal coliform loading in the Vermilion River watershed is unknown and BMP removal efficiencies for fecal coliform are extremely variable.

The following approach for stormwater, onsite wastewater treatment systems, and livestock was developed to address significant nonpoint sources of fecal coliform bacteria from the contributing watershed. Note that these recommendations do not account for existing implementation on the landscape:

- Evaluate and implement programmatic activities, such as pet waste and trash management practices, to reduce fecal coliform loads from stormwater.
- Conduct inventory of livestock in direct drainage areas to both impairments. Implement livestock BMPs for approximately 37,000 identified animal units, or 50% of all animal units in areas draining directly to Vermilion River IL_DS-06 and IL_DS-07 (see Table 50).
- Install 64 acres of vegetated buffers and filter strips to treat 25% (1,300 acres) of grazed pastureland located in fecal coliform critical areas.
- Conduct inventory to identify where livestock have direct access to riparian areas. Implement livestock exclusion practices on 10% (24 miles) of streams in the direct drainage area to Vermilion River IL_DS-07 (see Figure 30).
- Develop an inspection program to identify failing or non-compliant onsite wastewater treatment systems. 100% of failing systems draining directly to Vermilion River segment IL_DS-07 should be upgraded or replaced. Based on area-weighted estimates, approximately 110 failing or non-compliant systems are currently located in this direct drainage area. (Note: as dry weather sources were not linked to bacteria loading in IL_DS-06, no implementation of onsite wastewater treatment systems is recommended for areas draining directly to that segment).

Both ambient water quality and BMP effectiveness monitoring throughout implementation will further refine and direct the level of BMP implementation needed to achieve necessary load reductions in the watershed.

9.6.2 Implementation Scenario for Nitrate and Iron (Sediment) Reductions

Nitrate reductions are required in two segments of the Vermilion River (IL_DS-06 and IL_DS-10) to attain water quality standards and a reduction in sediment loading (in order to achieve water quality standards for iron) is also required in Kelly Creek (IL_DSQC-01). Cropland is the primary nonpoint source of both nitrate and sediment in the Vermilion River watershed. The implementation scenario provided in Table 54 is recommended for cropland areas draining directly to both nitrate and sediment impairments (see Figure 27).

Table 54. Vermilion River implementation scenario for nitrate and sediment reductions

BMP	Total Acres Treated by BMP	Estimated Percent Load Reductions	
		Nitrate Reduction in Vermilion River (IL_DS-06)	Sediment Reduction in Kelly Creek (IL_DSQC-01)
Conservation tillage (reduced till) [a]	145,600 acres treated	8%	19%
Cover crops	11,400 acres treated	1%	1%
Nutrient and fertilizer management	192,000 acres treated	7%	--
Vegetated buffers and filter strips (cropland only)	33,300 acres treated	1%	5%
Tile drainage management practices [b]	5,100 acres treated	1%	--
Total load reduction from existing conditions		**18%**	**25%**

[a] Available cropland acres accounts for estimated existing implementation of conservation tillage in the watershed (see Section 9.5.1.1 for more information).

[b] Implementation scenario includes equal implementation of either drainage water management, denitrifying bioreactors, or saturated buffers to treat runoff from tile drained cropland.

Implementation of cropland runoff practices in this scenario account for the required 18% reduction in nitrate concentrations from existing conditions in Vermilion River IL_DS-06, which is also sufficient to provide for the 3% nitrate reduction required downstream in Vermilion River IL_DS-10. Therefore, no additional nitrogen reductions from nonpoint sources are required downstream of IL_DS-06, however, additional efforts in this part of the watershed would help to further reduce nitrate.

The required sediment reductions in the Kelly Creek watershed are not achieved through implementation which solely addresses cropland sources. Implementation of stream restoration practices are also recommended along 1.5 miles of Kelly Creek and its tributaries in sediment-reducing critical areas. The exact nature of sediment loading from streambanks is unknown in the Kelly Creek watershed and load reductions have not been quantified. Additional assessment and data collection are recommended to focus implementation.

9.7 Technical and Financial Assistance

This section contains the requirements for U.S. EPA's ***element four:*** *technical and financial assistance needed, associated costs, and the sources and authorities that will be relied upon for implementation.*

A significant portion of this implementation plan focuses on voluntary efforts as opposed to permit requirements. As a result, technical and financial assistance are essential to successful implementation over time. This section provides an estimate of costs associated with plan implementation and identifies sources of funding and technical assistance. This section also identifies the watershed partners who will likely play a role in implementation.

9.7.1 Implementation Costs

The total cost to implement the Vermilion River Watershed TMDL is estimated in Table 55 over a 25-year timeframe for fecal coliform impairments, and over a 20-year timeframe for nitrate and iron (sediment) impairments. Estimated costs for individual BMPs are provided in Section 9.5 and in Table 52. These costs are derived from a variety of sources including the Illinois NLRS, the 2020 EQIP schedule, and other regional cost data.

Table 55. Plan cost estimate

BMP	Cost Estimate
Cropland BMPs [a]	($2,880,000) - $6,328,000
Livestock BMPs [b]	$13,000,000
Vegetated buffers and filter strips (pastureland only) [c]	$16,000 – $60,000
Livestock exclusion practices [d]	$224,000
Onsite wastewater treatment practices [e]	$1,100,000 – $1,652,000
Stream restoration practices [f]	$1,980,000 – $3,168,000
Local capacity to implement the plan [g]	$2,000,000 - $3,000,000
Total	**$15,440,000 - $27,384,000**

[a] Cropland practices included in this cost estimate are identified in Table 54.

[b] Estimate includes livestock BMP implementation for 50% (37,000) animal units draining to fecal coliform impairments.

[c] Estimate includes 64 acres of vegetative buffers and filter strips to treat 25% (1,300 acres) of pastureland located in fecal coliform critical areas. Cost to implement vegetated buffers and filter strips on cropland is included separately under cropland practices.

[d] Estimate includes 24 miles of livestock exclusion fencing (10% of streams draining directly to Vermilion River (IL_DS-07)).

[e] Estimate includes upgrades or replacements of 110 failing or noncompliant onsite wastewater treatment systems in unsewered communities draining to Vermilion River (IL_DS-07).

[f] Estimate includes 1.5 miles of stream restoration practices in sediment-reducing critical areas.

[g] Local capacity estimates the staff time and resources necessary to implement recommended programmatic BMPs over a 25-year period. This also includes costs associated with recommended monitoring, assessment, education, and outreach components.

9.7.2 Financial Assistance

There are many existing financial assistance programs that may assist with funding implementation activities. Many involve cost sharing, and some may allow the local contribution of materials, land, and in-kind services (such as construction and staff assistance) to cover a portion or the entire local share of the project. Several of these programs are presented in Table 56. In addition to these programs, local government partnerships can help to leverage funds.

Table 56. Potential Funding Sources

Funding Program	Type of Funding	Entity	Eligibility Criteria	Available Funding	Website
Federal Programs					
Agricultural Conservation Easement Program (ACEP)	Payments	NRCS	ACEP offers landowners the opportunity to protect, restore, and enhance agricultural lands and wetlands on their property. Land can be placed into an agricultural land easement or wetland reserve easement for a minimum of 30 years. Technical support is available.	Up to 50% of land value for agricultural land, up to 100% of land value for wetland reserves.	http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/easements/acep/
Conservation Innovation Grants (CIG)	Grants	NRCS	CIG provides funding for on-farm innovation and soil health demonstration grants. NRCS and partners support the implementation of conservation practices and evaluate their impact on soil health. Producers receive payments to offset the risk of innovative approaches. Producers involved in CIG funded projects must be EQIP eligible.	Average annual national CIG funding is $20 million	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/
Conservation Reserve Program (CRP)	Payments	NRCS	CRP is a land conservation program which removes environmentally sensitive areas from agricultural production for 10-15 years (or longer). The program aims to reestablish land cover in order to improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.	Yearly rental payments vary by contract	https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/index
Conservation Stewardship Program (CSP)	Payments	NRCS	CSP provides payments to agricultural producers who want to enhance existing conservation practices on their land. Two types of contract payments are available: payments to maintain existing conservation activities, and payments to implement additional conservation activities.	Minimum annual payment is $1,500	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/
Environmental Education (EE) Grants	Grant	U.S. EPA	Environmental education programs that promote environmental awareness and stewardship and provide communities with the skills to take action toward environmental protection goals. Local and state agencies, colleges or universities, non-profit 501(c)(3) organizations, tribal agencies, and other educational entities are eligible.	$2-$3.5 million are distributed annually	https://www.epa.gov/education/environmental-education-ee-grants
Environmental Quality Incentive Program (EQIP)	Cost-share	NRCS	Farmers in livestock, agricultural, or forest production who utilize NRCS approved conservation practices are eligible for cost share up to 75% of project cost. Contracts are typically 3+ years. Approved conservation practices must be constructed according to NRCS practice standards.	Up to 75% of project cost	https://www.nrcs.usda.gov/wps/portal/nrcs/il/programs/financial/eqip/

Funding Program	Type of Funding	Entity	Eligibility Criteria	Available Funding	Website
Healthy Watersheds Consortium Grant (HWCG)	Grant	U.S. EPA, NRCS, U.S. Endowment for Forestry and Communities	Funding available to protect healthy watersheds. Support available to implement existing watershed protection plans, improve organizational and social capacity for implementation, and the develop new approaches to improve the state of practice for watershed protection.	$50,000-50,000 per project (no funding available for the 2020 grant cycle)	https://www.epa.gov/hwp/healthy-watersheds-consortium-grants-hwcg
National Water Quality Initiative (NWQI)	Cost-share	NRCS	NWQI provides targeted financial and technical assistance in small watersheds where implementation of conservation practices is most needed.	Over $30 million invested nationally in 2021	https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/?cid=stelprdb1047761
Regional Conservation Partnership Program (RCPP)	Grants	NRCS	RCPP funds projects to restore, protect, and implement conservation actions on agricultural or private forest land. Non-profits, state government agencies, local and municipal governments, tribal governments, and educational institutions are eligible for funding.	Grant requests must not exceed $100,000, requires a 1-1 partner contribution	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/rcpp/
Tax Incentive Filter Strip Program	Tax incentive	NRCS	Property tax reduction incentives are provided to landowners who install vegetative filter strips between farm fields and waterbodies in need of protection. Technical assistance is available from local SWCDs.	Reduced property tax assessment (1/6th of cropland value)	See local SWCD websites for more information
State and Federal Partnerships					
Conservation Reserve Enhancement Program (CREP)	Payments	USDA FSA; SWCDs	CREP is an enhancement of the Conservation Reserve Program which pays producers an annual rental rate in exchange for removing frequently flooded and environmentally sensitive land from agricultural production and installing conservation practices to improve water quality and enhance critical habitat.	Annual payments; cost-share funds also available for implementation	https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-enhancement/index
Nonpoint Source Management Program (319)	Grant	U.S.EPA, IEPA	Grants available to support the implementation of corrective and preventative BMPs on a watershed scale, and the development of information/education nonpoint source pollution control programs. Projects that meet requirements of a NPDES permit are not eligible for 319 funding. Units of government and other organizations are eligible.	Approximately $3,000,000 available annually, divided between approximately 15 projects (up to 60% project cost share)	https://www2.illinois.gov/epa/topics/water-quality/watershed-management/nonpoint-sources/Pages/grants.aspx
Clean Water State Revolving Fund (CWSRF)	Low-interest financing	U.S. EPA, IEPA	CWSRF provides financial assistance for water infrastructure projects. Using a combination of federal and state funds, state CWSRF programs provide loans to construct municipal wastewater facilities, control nonpoint sources of pollution, create green infrastructure projects, and fund other water quality projects.	Loans available for a maximum of 20 years; quantity of funding available varies	https://www.epa.gov/cwsrf

Funding Program	Type of Funding	Entity	Eligibility Criteria	Available Funding	Website
Partners for Fish and Wildlife Program	Technical and financial support	USFWS	Collaborations and partnerships with private landowners to improve fish and wildlife habitat on their lands. Voluntary, community-based stewardship for fish and wildlife conservation.	Support available for private landowners, varies per project/partners	https://www.fws.gov/program/partners-fish-and-wildlife
State Programs					
Ag Invest Agricultural Loan Program	Low-interest loans	Illinois State Treasury Office	Ag Invest provides annual or long-term, low-interest loans to assist farmers with implementation of soil and water conservation practices, Funds can be used for construction, farm equipment, and other costs related to agricultural activities.	Loan limits are between $300,000 and $400,000 per year.	https://illinoistreasurer.gov/Invest_in_Illinois/Ag_Invest
Cover Crops Premium Discount Program	Insurance premium discount	IDOA	Premium discounts available to farmers planting a cover crop before an insurable crop. Eligible acres cannot be enrolled in other state or federal programs.	Applicants receive a $5/acre discount on the following year's insurance invoice.	https://www2.illinois.gov/sites/agr/Resources/LandWater/Pages/Cover-Crops-Premium-Discount-Program.aspx
Green Infrastructure Grant Opportunities Program	Grant	Illinois EPA	Funds are available to support the construction of BMPs, particularly those which address stormwater runoff. Units of government and organizations, colleges and universities, conservation/park districts are eligible.	Reimbursement for a total of $5,000,000 annually starting in 2021.	https://www2.illinois.gov/epa/topics/grants-loans/water-financial-assistance/Pages/gigo.aspx
Illinois Buffer Partnership	Cost share, technical assistance	Trees Forever	Eligible projects include installations of streamside buffer plantings on projects including riparian buffers, livestock buffers, streambank stabilization projects, wetland development, pollinator habitat, rain gardens, and agroforestry projects.	Up to $2,000 (max of 50% of expenses remaining after other grants applied).	http://www.treesforever.org/Illinois_Buffer_Partnership.
Land and Water Conservation Fund (LWCF)	Grant	U.S. Department of the Interior, Illinois DNR	Federal funds support the establishment of recreation and conservation areas and the protection of existing natural landscapes.	Max of $750,000 (up to 50% of project costs).	www.doi.gov/lwcf
Open Space Lands Acquisition and Development Grant	Grant	Illinois DNR	Funds available to support acquisition and/or development of land for public parks, recreation areas, and other open spaces for conservation purposes. Grants are available to local units of government.	Max of $750,000 for acquisitions, $400,000 for development (up to 50% of costs).	https://www.dnr.illinois.gov/aeg/pages/openspacelandsaquisitiondevelopment-grant.aspx
Partners for Conservation Program	Cost-share; grants	Illinois DNR, IDOA, IEPA	Cost-share funds available under the Conservation Practice Program, Sustainable Agriculture Grant Program, and the Streambank Stabilization Restoration Program.	Current program status unknown	https://www2.illinois.gov/dnr/conservation/pfc/Pages/default.aspx

9.7.3 Partners and Key Stakeholders

There are several partners within the Vermilion River watershed that may provide technical or financial assistance to promote successful TMDL implementation and watershed management:

American Farmland Trust
Aqua Illinois
County public health departments
Ecology Action Center
Farm Service Agency
Illinois Buffer Partnership
Illinois Certified Crop Adviser Program
Illinois CBMP
Illinois Council on Food and Agriculture Research
IDOA
Illinois DNR
Illinois Department of Public Health
Illinois EPA
Illinois Farm Bureau
Illinois Rural Water Association
Illinois State Water Survey
Livingston County Environmental Association
Local and regional governments
NRCS
Parklands Foundation
SWCDs
University of Illinois (and extension units)
U.S. EPA Region 5
Vermilion River Ecosystem Partnership

9.8 Public Education and Outreach

This section contains the requirements for U.S. EPA's ***element five*** *of a watershed plan: information and education component.*

Raising stakeholders' awareness about issues in the watershed and developing strategies to change stakeholders' behavior is essential to promoting voluntary participation. Successful implementation in the Vermilion River watershed will rely heavily on effective public education and outreach activities that will encourage participation and produce changes in behavior. This section presents recommendations related to developing and implementing coordinated watershed-wide education and outreach.

The first step to a successful information and education strategy is to identify target audiences and to determine how to best reach these audiences. Potential audiences in the Vermilion River watershed may include riparian landowners, local municipalities, pet owners, row crop producers, certified crop advisors, livestock producers, and other local stakeholders. Consideration should be given to the complexity of the water resource concerns of each of these groups. Whenever possible, stakeholder attitudes and preferences should be considered in the implementation of protection activities and should influence message development, selection of outreach platforms, and other aspects of information and education.

Keeping in line with the adaptive nature of a nine element plan, engagement and outreach strategies should also be flexible to accommodate future changes in stakeholder awareness and behaviors. A pre- and post-implementation survey can be used to measure these changes, and the results of these surveys should be shared between local partners. These surveys can be used to measure changes in the level of stakeholder knowledge and involvement and will help watershed outreach campaign organizers to further develop tailored outreach messages. Other measures of change might include the number of producers signing up for cost-share programs or participating in field days or demonstration projects. Results from these outreach activities should be used to inform potential changes and adaptations to this implementation plan.

Resources exist which are relevant to key stakeholders. Training and education programs for crop and livestock producers are effective methods of increasing implementation and long-term maintenance of agricultural BMPs. Additional implementation assistance is provided by entities identified in Section 9.7.3 and in Table 56. The University of Illinois Extension has several units within the Vermilion River watershed. Each unit has extensive education and outreach programs in place that range in topic from commercial agriculture, horticulture, energy, and health that can provide meaningful resources to the information and education effort in the watershed.

- Livingston, McLean, Woodford Extension Unit
    - https://extension.illinois.edu/lmw
- Champaign, Ford, Iroquois, Vermilion Extension Unit
    - https://extension.illinois.edu/cfiv
- Bureau, LaSalle, Marshall, Putnam Extension Unit
    - https://extension.illinois.edu/blmp

9.9 Schedule and Milestones

This section contains the requirements for U.S. EPA's element ***six and seven*** *of a watershed plan: implementation schedule and a description of interim measurable milestones.*

A key part of U.S. EPA's nine-elements is interim milestones that provide meaningful evaluation points and a focus for program activities. Interim milestones are steps that demonstrate that implementation measures are being executed in a manner that will ensure progress over time. Milestones are not changes in water quality. Measurable milestones are an important tool for directing limited resources towards the array and number of sources and nonpoint source pollution problems across the watershed.

Table 57. Schedule and milestones for TMDL implementation

TMDL Pollutant	Watershed	Pollutant Source	Milestones [a]		
			Short-Term	Mid-Term	Long Term
All	All	All	Conduct public education and outreach to key target audiences (unsewered communities, livestock producers, riparian landowners, homeowners, and pet owners) Evaluate and implement programmatic activities, such as pet waste management, trash management practices, and local guidance for lawn fertilization practices Conduct additional monitoring and assessment to focus implementation activities		
Fecal coliform	Vermilion River (IL_DS-06, IL_DS-07)	Livestock	Conduct inventory of livestock in direct drainage areas to both impairments	Implement livestock BMPs for 20,000 animal units, beginning in critical areas	Implement livestock BMPs for 37,000 animal units
				Install vegetated buffers and filter strips to treat 650 acres of pasture, beginning in critical areas	Install vegetated buffers and filter strips to treat 1,300 acres of pasture, beginning in critical areas
	Vermilion River (IL_DS-07)	Livestock	Conduct inventory to identify where livestock have direct access to riparian areas.	Implement livestock exclusion practices on 10 miles of streams, beginning in critical areas.	Implement livestock exclusion practices on 24 miles of streams.
		Onsite wastewater treatment systems	Develop education and inspection program to identify failing or non-compliant systems	50% of failing or noncompliant systems upgrade/replaced	100% of failing or noncompliant systems upgraded/replaced
Nitrates and iron (sediment)	Vermilion River (IL_DS-06) and Kelly Creek (IL_DSQC-01)	Cropland	Treat 29,000 acres of cropland with conservation tillage, beginning in critical areas	72,000 acres of cropland treated with conservation tillage	145,600 acres cropland treated with conservation tillage
			Treat 2,300 acres of cropland with cover crops beginning in critical areas	5,700 acres of cropland treated with cover crops	11,400 acres cropland treated with cover crops
			Treat 6,700 acres of cropland with vegetated buffers and filter strips, beginning in critical areas	16,700 acres of cropland treated with vegetated buffers and filter strips	33,300 acres cropland treated with vegetated buffers and filter strips
Nitrates	Vermilion River (IL_DS-06)	Cropland	Treat 38,300 acres of cropland with nutrient and fertilizer management, beginning in critical areas	96,000 acres of cropland treated with nutrient and fertilizer management	192,000 acres of cropland treated with nutrient and fertilizer management
			Treat 1,000 acres of tile-drained cropland with tile drainage management practices, beginning in critical areas	2,600 acres of tile drained cropland treated with tile drainage management practices	5,100 acres of tile drained cropland treated with tile drainage management practices
Iron (sediment)	Kelly Creek (IL_DSQC-01)	Streambank erosion	Conduct assessment of stream conditions in impaired subwatershed	Implement streambank restoration practices on 1 mile of streams, beginning in critical areas	Implement streambank restoration practices on 1.5 miles of streams

[a] Milestones are not cumulative. Milestones for nitrates and iron (sediment) may occur earlier than fecal coliform due to relative size of required reductions.

9.10 Progress Benchmarks and Adaptive Management

*This section contains the requirements for U.S. EPA's **element eight** of a watershed plan: a set of criteria that can be used to determine whether loading reductions are being achieved over time.*

To guide plan implementation through each of the three phases using adaptive management, water quality benchmarks are identified to track progress towards attaining WQS. Progress benchmarks (Table 58) are intended to reflect the time it takes to implement management practices, as well as the time needed for water quality indicators to respond.

Table 58. Progress benchmarks.

TMDL Pollutant	In-Stream Target	Segments	Timeframe	Progress Benchmark
Fecal coliform	200 cfu/100 mL and 400 cfu/100 mL	Vermilion River (IL_DS-06; IL_DS-07)	Short-Term	20% of load reductions
			Mid-Term	50% of load reductions
			Long-Term	Full attainment of water quality standards
Nitrate	10 mg/L	Vermilion River (IL_DS-06; IL_DS-10)	Short-Term	20% of load reductions
			Mid-Term	50% of load reductions
			Long-Term	Full attainment of water quality standards
Iron (dissolved)	1.0 mg/L	Kelly Creek (IL_DSQC-01)	Short-Term	20% of load reductions
			Mid-Term	50% of load reductions
			Long-Term	Full attainment of water quality standards

To ensure management decisions are based on the most recent knowledge, the implementation plan follows the form of an adaptive and integrated management strategy and establishes milestones and benchmarks for evaluation of the implementation program. U.S. EPA (2008) recognizes that the processes involved in watershed assessment, planning, and management are iterative and that actions might not result in complete success during the first or second cycle. For this reason, it is important to remember that implementation will be an iterative process, relying upon adaptive management.

Adaptive management is a commonly used strategy to address natural resource management that involves a temporal sequence of decisions (or implementation actions), in which the best action at each decision point depends on the state of the managed system. As a structured iterative implementation process, adaptive management offers the flexibility for responsible parties to monitor implementation actions, determine the success of such actions and ultimately, base management decisions upon the measured results of completed implementation actions and the current state of the system. This process, depicted in Figure 33, enhances the understanding and estimation of predicted outcomes and ensures refinement of necessary activities to better guarantee desirable results. In this way, understanding of the resource can be enhanced over time, and management can be improved.

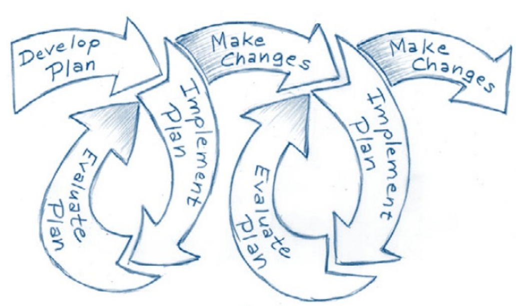


Figure 33. Adaptive management iterative process (U.S. EPA 2008).

The implementation phases, milestones, and benchmarks will guide the adaptive management process, helping to determine the type of monitoring and implementation tracking that will be necessary to gauge progress over time. Evaluation for adaptive management can include a variety of evaluation components to gain a comprehensive understanding of implementation progress. An implementation evaluation determines if non-structural and structural activities are put in place and maintained by implementation partners according to schedule; this is often referred to as an output evaluation. An outcome evaluation focuses on changes to behaviors and water quality as a result of implementation actions. This type of evaluation looks at changes in stakeholder behavior and awareness (i.e., non-structural BMP effectiveness), structural BMP performance, and changes to ambient water quality.

9.11 Follow-Up Monitoring

*This section contains the requirements for U.S. EPA's **element nine** of a watershed plan: a monitoring component to evaluate the effectiveness of the implementation efforts over time.*

The ultimate measure of success will be documented changes in water quality, showing improvement over time (see Table 58 for progress benchmarks). In addition, long-term monitoring of the overall health and quality of the watershed is important. Monitoring will help determine whether the implementation actions have improved water quality and support future resource management decisions. In addition, monitoring will help determine the effectiveness of various BMPs and indicate when adaptive management should be initiated. The primary goal of the monitoring plan is to assess the effectiveness of source reduction strategies for attaining WQS and designated uses.

9.11.1 Water Quality Monitoring

Progress towards achieving WQS will be determined through ambient monitoring by IEPA. The state conducts studies of ambient conditions by evaluating watersheds on a rotating basis, collecting measurements of physical, chemical, and biological parameters. This ambient monitoring program will continue as the Vermilion River TMDL is implemented with a particular focus on impaired sites and increasing the understanding of pollutant sources. Water quality monitoring efforts may also be supported through volunteer citizen monitoring efforts that typically allow for more frequent monitoring at a lower cost and the formation of a monitoring committee may help streamline efforts.

Monitoring in the watershed, as relates to TMDL implementation, should initially focus on identifying sources of pollutants (fecal coliform, nitrates, sediment, and iron). Synoptic sampling, such as was conducted in 2014, is a useful tool to identify areas that are disproportionately contributing to downstream impairments. Sampling for fecal coliform and nitrates upstream and downstream of point sources will also provide information on the effect of those point sources on impairments. Sampling of nitrates during baseflow conditions, and also tile drainage will help to better understand the sources and fate and transport of nitrogen in the watershed.

Continued monitoring in the Indian Creek subwatershed is also recommended to track the effect of focused implementation and demonstrate the effectiveness of conservation practices.

Increased monitoring along IL_DS-10 (nitrate) and IL_DS-07 (fecal coliform) is needed to better define the impairment, particularly during different flow regimes. Sampling during different flow regimes is critical to understanding sources and effectively targeting implementation activities. Monitoring flow is also recommended for each stream site when water quality samples are taken. The Illinois NLRS Biennial Report (IEPA and IDOA 2019) recommends increasing the frequency of sampling practices, especially during high flow conditions.

9.11.2 Microbial Source Tracking

Sources of bacteria are widespread and often intermittent. Some sources pose a greater risk to human health than others. Understanding the different source contributions and their potential risk to human health is important to overall TMDL implementation and prioritizing implementation activities that address the recreational use impairments due to fecal coliform. Microbial source tracking (MST) is a useful tool to help differentiate sources of fecal indicator bacteria. Human markers along with a variety of other bird and animal markers can be identified. While human sources of fecal pollution are critical to eliminate, it is also important to minimize other sources that can cause illness in humans, although the actual risk associated with these other sources may fall within “acceptable” levels of risk. MST can help inform selection of BMPs for fecal coliform to best align with the pollution source.

Fecal Bacteroidetes, or fecal indicator bacteria, are used in MST. Two common types of testing are available for bacterial source tracking, quantification tests and presence/absence tests. While presence/absence tests are typically less expensive than a quantification test, they do not measure the relative amount of DNA from various fecal sources, which might be used to estimate the relative abundance of those sources. Neither test, however, can determine exact source location (i.e., this farm is contributing the most fecal coliform loads). Best professional judgement from site surveys and local knowledge can help determine source locations. MST monitoring and sample collection methods are similar to fecal coliform sampling procedures. They should include both dry and wet (samples taken within at least 24-hours of a rainfall of 0.5-inches or more) samples, and target areas with high levels of fecal coliform. Topography, watershed delineations, and other factors may also influence sample design.

9.11.3 BMP Effectiveness Monitoring

Multiple BMPs will be needed to address the water quality impairments in the Vermilion River watershed. There are limited local data on the effectiveness of many BMPs; therefore, monitoring the results of programs and representative practices are critical. BMP monitoring can include quantitative monitoring of physical components (e.g., water quality and flow) qualitative (i.e., visual) monitoring of physical components (e.g., vegetation), and monitoring of behaviors. A monitoring program should be put in place as BMPs are implemented to 1) measure success and 2) identify changes that could be made to increase effectiveness.

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Appendix A - Watershed Source Assessment

Table A - 1. Summary of CSOs at Fairbury (2011-2020)

CSO outfall	Location	Receiving waterbody	No. of CSO events	
			Total	Recreation season
003	36-inch plant bypass	Indian Creek	58	36
004 [a]	South of plant, Ash in field	Indian Creek	114	53
005 [a]	South of plant, Maple in field	Indian Creek	67	37
006 [a]	South of plant, Locust in field	Indian Creek	45	23
008	South Seventh Street B	Indian Creek	61	38
011 [b]	South Fourth Street	Indian Creek	30	20
013 [c]	South First Street	Indian Creek	67	42

Source: IEPA.

Notes

[a] These CSO outfalls were eliminated on October 4, 2019.

[b] This CSO outfall was eliminated on February 10, 2020.

[c] This CSO outfall was eliminated on October 5, 2020.

Table A - 2. Summary of CSO event volumes at Fairbury (January 2016 - January 2019)

CSO outfall	Location	No. of CSO events	Estimated CSO event volumes (gallons)			
			Min.	Median	Max.	Mean
003	36-inch plant bypass	25	2,000	175,000	1,520,000	366,941
004 [a]	South of plant, Ash in field	28	7,000	98,700	1,300,000	234,933
005 [a]	South of plant, Maple in field	28	7,000	67,417	1,077,000	163,735
006 [a]	South of plant, Locust in field	0	--	--	--	--
008	South Seventh Street B	23	2,000	146,833	1,445,500	164,848
011 [b]	South Fourth Street	7	333	11,000	32,000	9,833
013 [c]	South First Street	27	1,000	107,900	1,538,000	161,990

Based upon: Fairbury 2021.

Notes

CSO event volumes were estimated by dividing the monthly total overflow volume by the monthly total number of CSO events.

[a] These CSO outfalls were eliminated on October 4, 2019.

[b] This CSO outfall was eliminated on February 10, 2020.

[c] This CSO outfall was eliminated on October 5, 2020.

Table A - 3. Summary of CSO event volumes at Fairbury (February 2019 - August 2021)

CSO outfall	Location	No. of CSO events	CSO event volumes (gallons)			
			Min.	Median	Max.	Mean
003	36-inch plant bypass	38	800	381,500	7,583,000	1,319,942
004 [a]	South of plant, Ash in field	54	1,000	59,500	7,264,000	456,704
005 [a]	South of plant, Maple in field	30	300	23,500	1,286,000	107,910
006 [a]	South of plant, Locust in field	0	--	--	--	--
008	South Seventh Street B	35	1,000	74,000	2,357,000	248,286
011 [b]	South Fourth Street	11	1,000	18,000	1,288,000	163,364
013 [c]	South First Street	29	1,000	8,000	323,000	29,241

Based upon: Fairbury 2021.

Notes

Major construction at the STP occurred in 2019 and 2020; the number of CSO events and volumes temporarily increased when certain systems were not operational (e.g., CSO lagoon).

[a] These CSO outfalls were eliminated on October 4, 2019.

[b] This CSO outfall was eliminated on February 10, 2020.

[c] This CSO outfall was eliminated on October 5, 2020.

Table A - 4. Summary of untreated CSOs at Streator (2011-2020)

CSO outfall	Location	Receiving waterbody	No. of CSO events	
			Total	Recreation season
003	Bloomington St. @ Prairie Creek	Prairie Creek	0	0
009	Court Street Pump Station	Coal Run Creek	1	1
018	Kelly Street	Prairie Creek	0	0
019	Cedar Street @ Pumpkin Street	Pumpkin Creek	0	0
020	Illinois Street Overflow	Coal Run Creek	0	0
021	Pumpkin Street @ Vermilion River	Vermilion River	0	0
022 [a]	End of 9th Street (Northwest Avenue)	Coal Run Creek	2	0
023	Bridge Street East Pump Station	Vermilion River	0	0
025	Prairie Creek CSO Treatment Facility: Bypass	Vermilion River	12	0
026	Kent Street CSO Treatment Facility: Bypass	Vermilion River	19	2
027	Monroe Street	Coal Run Creek	0	0
A24	Coal Run Creek CSO Treatment Facility: Wet Well Overflow	Coal Run Creek	2	1
C24	Coal Run Creek CSO Treatment Facility: First Flush Tank Overflow	Coal Run Creek	31	7

Source: IEPA.

Notes

The city of Streator also reported no discharges for outfalls 010, 011, and 016 in the year 2011.

[a] Outfall 022 was eliminated during the Center Street Sewer Project.

Table A - 5. Summary of CSO event volumes and bacteria concentrations at Streator (2017-2021)

Year	No. of CSO events	CSO event volumes (million gallons)				Fecal coliform (cfu/100 mL)			
		Min.	Median	Max.	Mean	Min.	Median	Max.	Mean
Kent Street CSO Treatment Facility: Treated combined sewage(outfall C01)									
2017	7	0.36	2.52	8.82	3.11	57	6,000	71,000	18,804
2018	5	2.27	2.90	3.02	2.82	7	880	830,000	178,780
2019	15	0.65	3.02	5.29	2.87	1	921	82,000	14,253
2020	6	0.86	2.39	5.28	2.61	4,950	47,500	600,000	150,325
2021	1	2.10	2.10	2.10	2.10	22,000	22,000	22,000	22,000
Coal Run Creek Treatment Facility: Treated combined sewage (outfall 024)									
2017	8	1.16	9.91	13.98	8.54	2	804	5,000	1,633
2018	5	3.60	5.42	12.32	7.29	4	254	1,400	605
2019	18	0.58	5.07	16.76	5.93	2	2,420	210,000	28,177
2020	5	0.99	1.44	10.36	3.26	200	38,500	320,000	88,180
2021	5	0.05	0.36	2.39	0.93	8,000	32,500	270,000	85,750

Source: Palm 2021.

Table A - 6. Summary of CSOs at Oglesby (2015-2020)

CSO outfall	Location	Receiving waterbody	No. of CSO events	
			Total	Recreation season
A01	400 feet Northwest of the intersection of Florence Street and Spring Avenue	Vermilion River	3	1
B01	400 feet Northwest of the intersection of Florence Street and Spring Avenue	Vermilion River	3	1
C01	Treatment Plant Bypass	Vermilion River	115	71
003	600 feet Northwest of the intersection of Clark Street and School Avenue	Ravine tributary to Vermilion River	1	0
005	400 feet East of the intersection Jones Avenue and I.C. Railroad	Railroad ditch to ravine tributary to Vermilion River	1	0

Source: IEPA.

Table A - 7. Summary of CSOs at Pontiac (2011-2020)

CSO outfall	Location	Receiving waterbody	No. of CSO events	
			Total	Recreation season
002	CSO located across the river from STP	Vermilion River	13	10
A02	CSO located across the river from STP	Vermilion River	59	41
003	CSO located ¼ mile north of STP	Vermilion River	2	2
004	North Street CSO	North Ditch to Vermilion River	20	16
005	Locust Street CSO	North Ditch to Vermilion River	18	15

Source: IEPA.

Table A - 8. Summary of nitrate data collected by the Pontiac WWTP in 2021

Date (2021)	24-hour rainfall (inches)	Nitrate (mg/L as nitrogen)		
		Vermilion River upstream of WWTP	WWTP Effluent	Vermilion River downstream of WWTP
March 18	0.60	3.2	12.0	3.9
April 8	0.00	22.0	22.0	9.2
May 13	0.00	11.0	18.0	11.0
June 10	0.00	14.0	9.6	12.0
July 8	0.00	6.9	9.1	6.4
August 12	0.75	4.2	14.0	3.6
September 16	0.00	0.9	18.0	1.7

Source: Kinkade 2021

Table A - 9. Summary of CSOs at Minonk (2011-2020)

CSO outfall	Location	Receiving waterbody	No. of CSO events	
			Total	Recreation season
002	STP Bypass	Long Point Creek	13	11
003	Millennium Park-CSO	Long Point Creek	8	7

Source: IEPA.

Appendix B - Data Analysis and Linkage Analysis

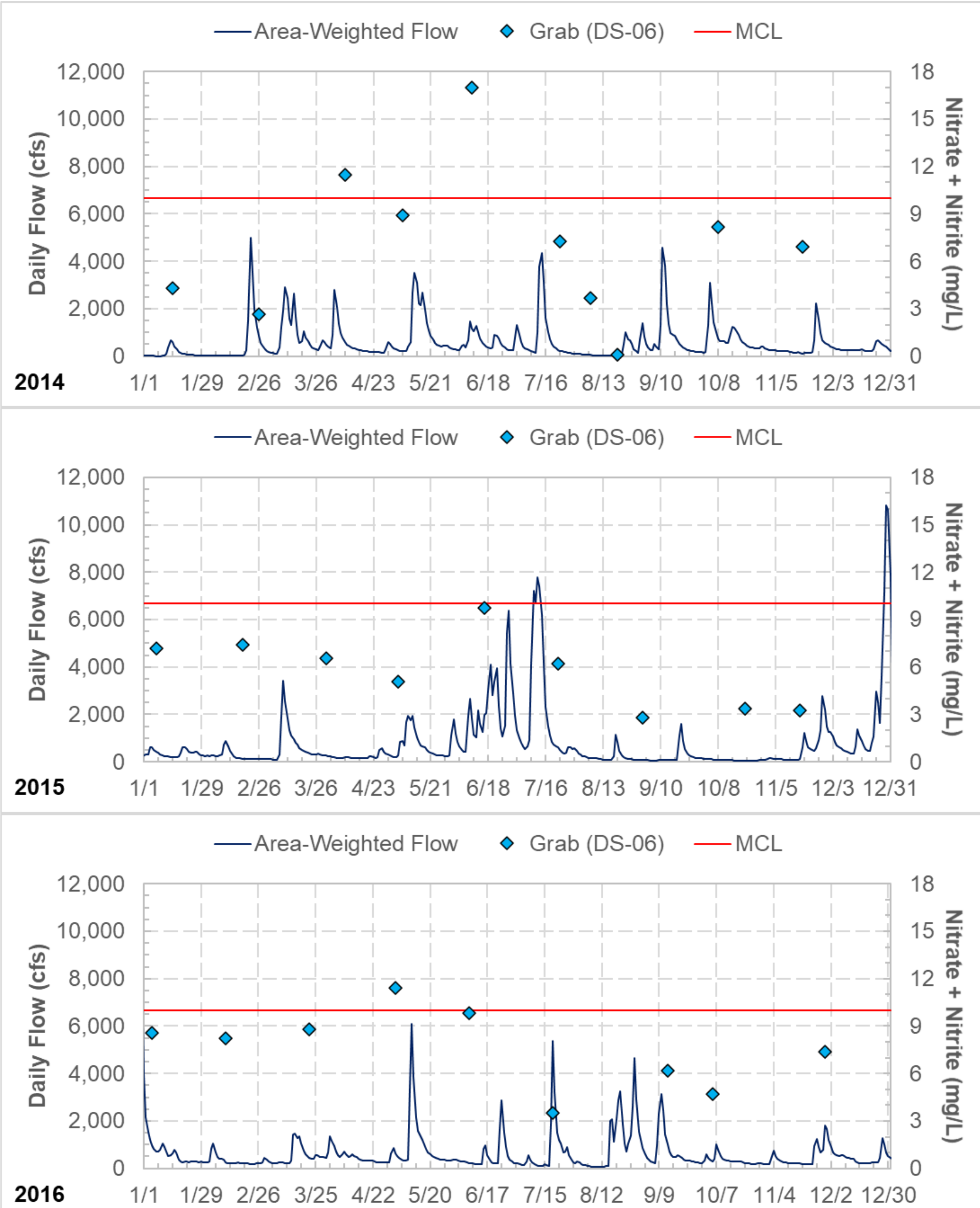

Figure B - 1. Grab inorganic nitrogen results and daily flow for IEPA monitoring site DS-06 (2014-2016).

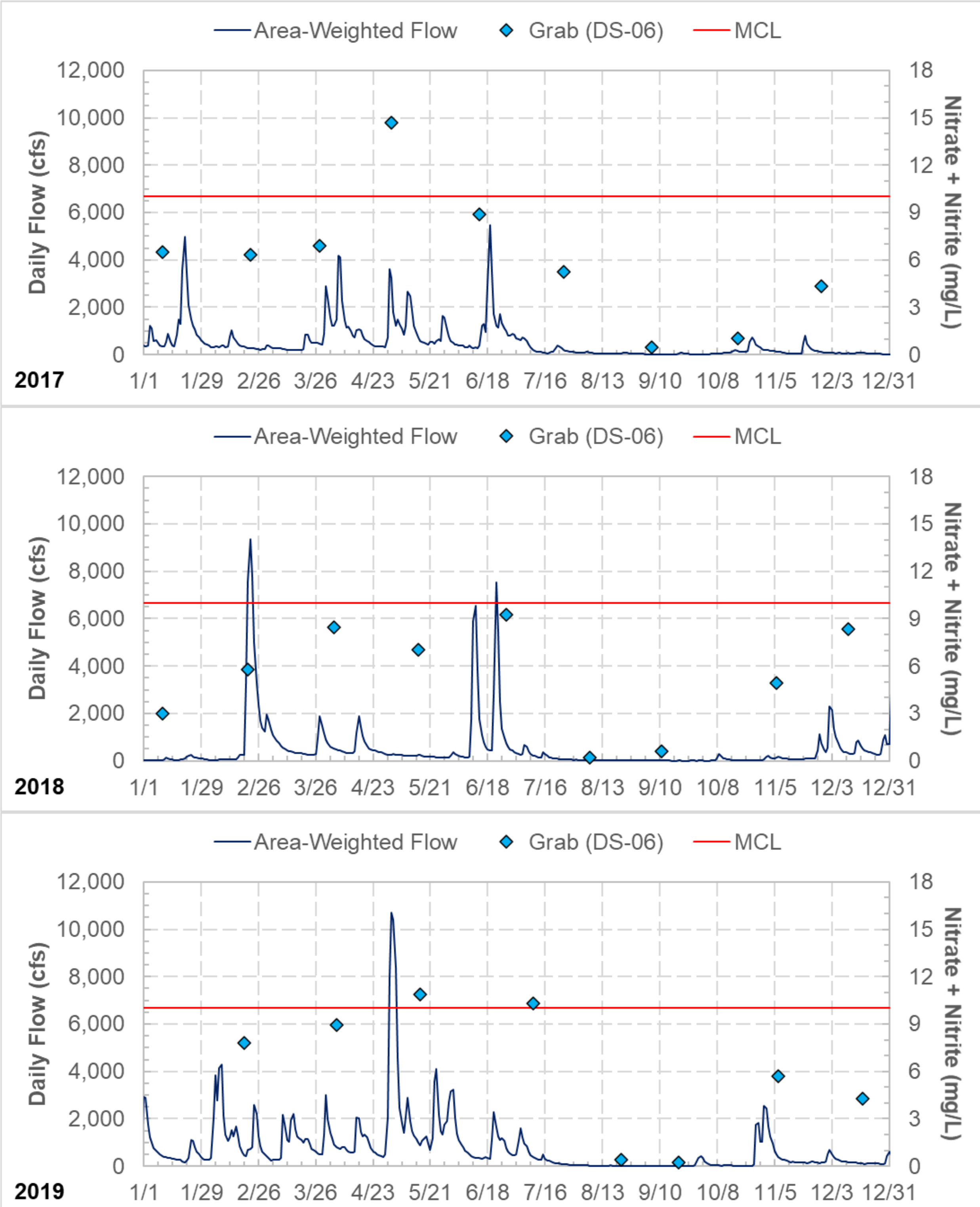

Figure B - 2. Grab inorganic nitrogen results and daily flow for IEPA monitoring site DS-06 (2017-2019).

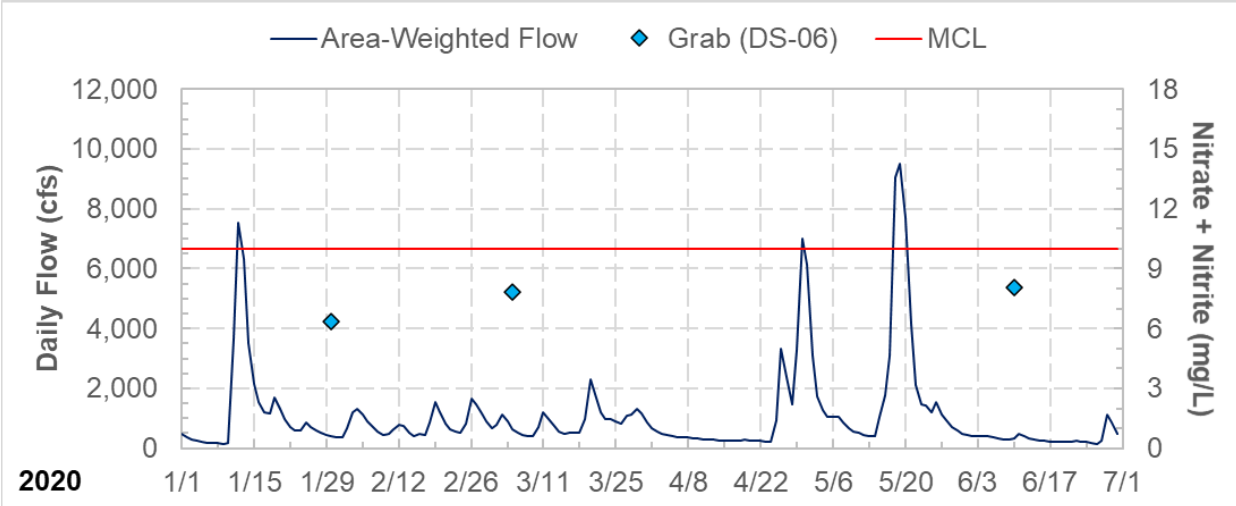

Figure B - 3. Grab inorganic nitrogen results and daily flow for IEPA monitoring site DS-06 (2020).

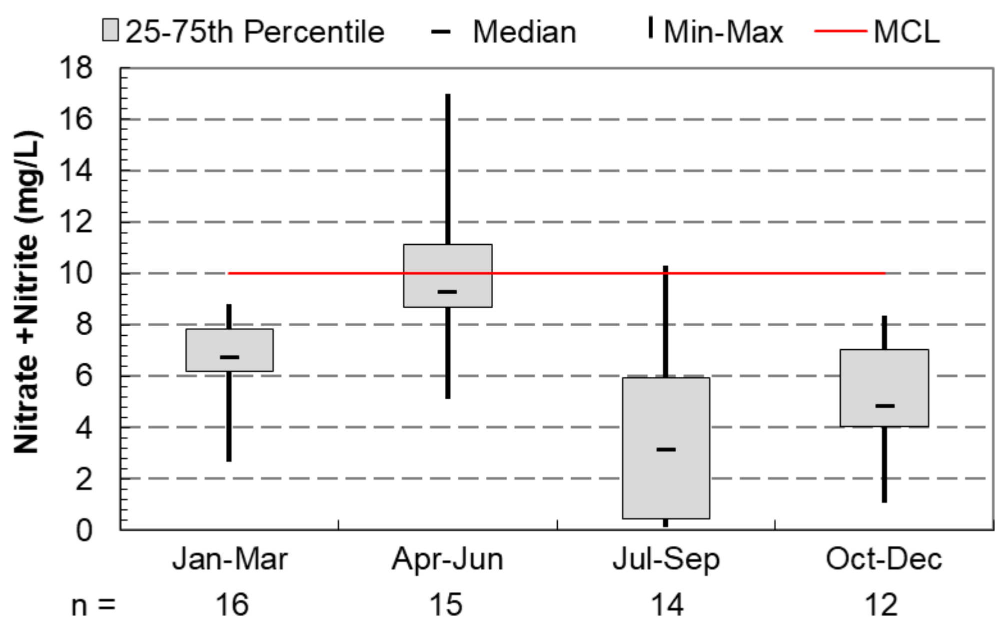

Figure B - 4. Summary of seasonal inorganic nitrogen concentrations at IEPA monitoring site DS-06.

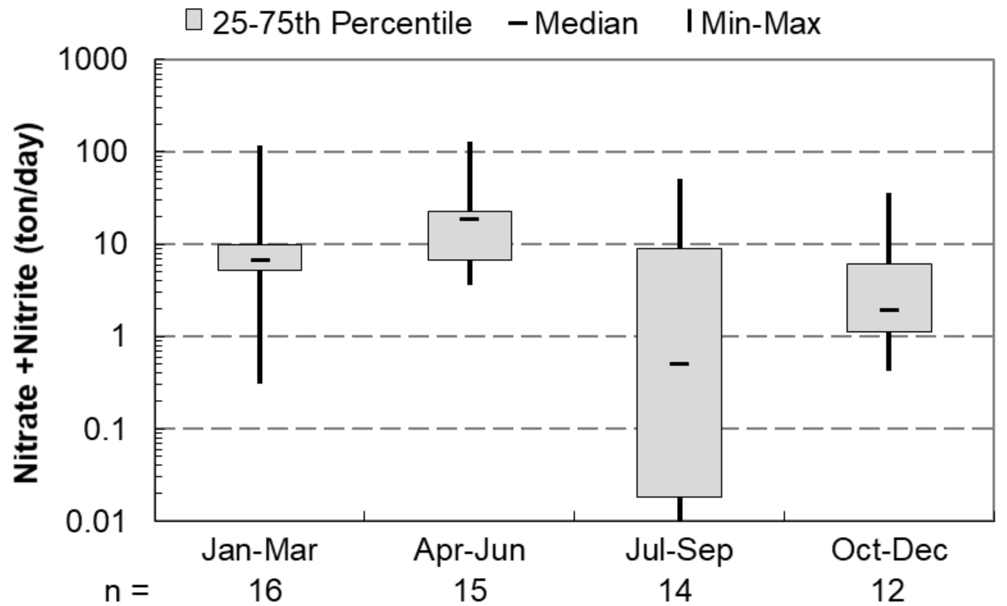

Figure B - 5. Summary of seasonal inorganic nitrogen load at IEPA monitoring site DS-06.

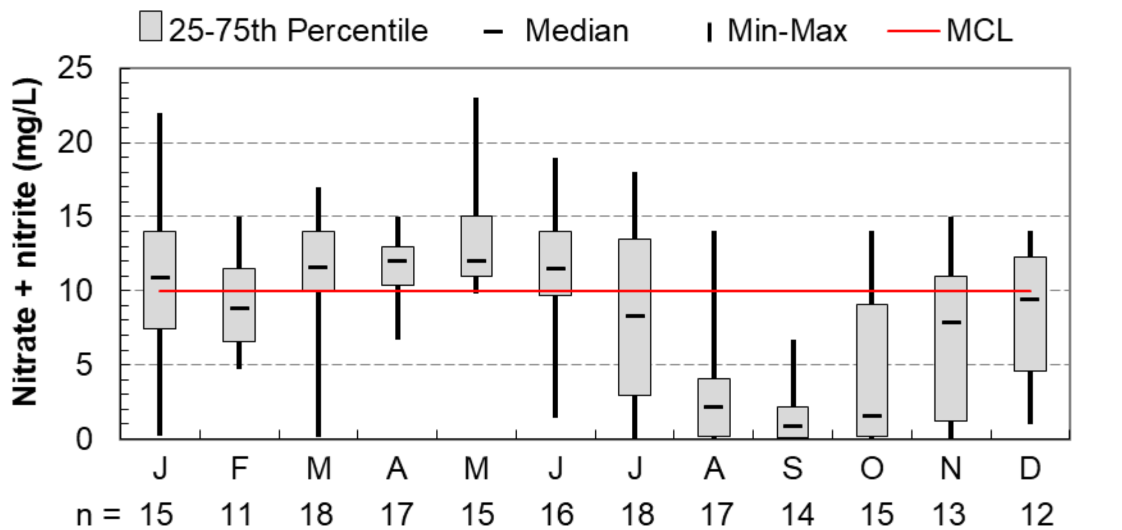

Figure B - 6. Summary of monthly inorganic nitrogen concentration at USGS monitoring site 05554490.

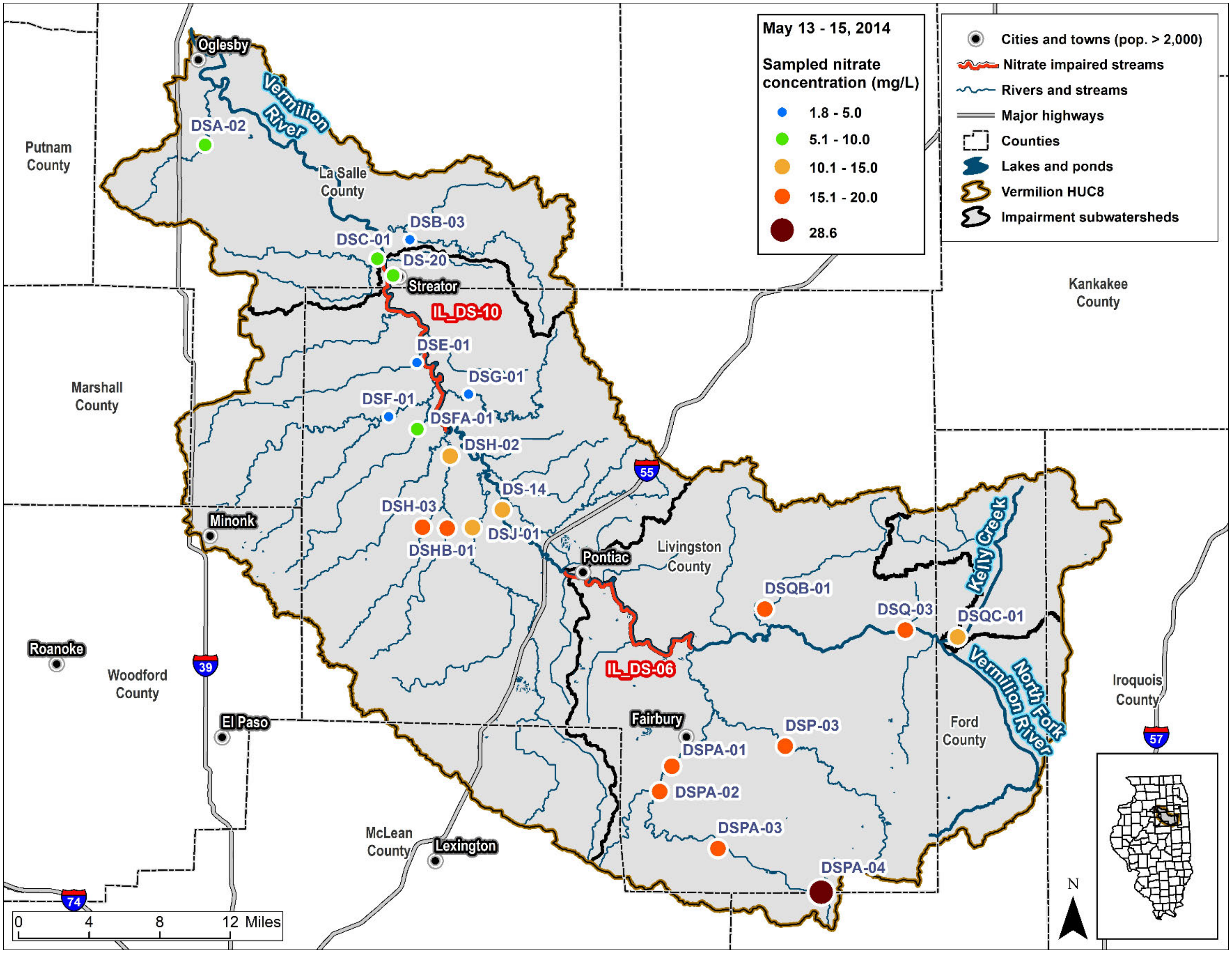

Figure B - 7. Inorganic nitrogen concentrations at IEPA monitoring sites on May 13-15, 2014.

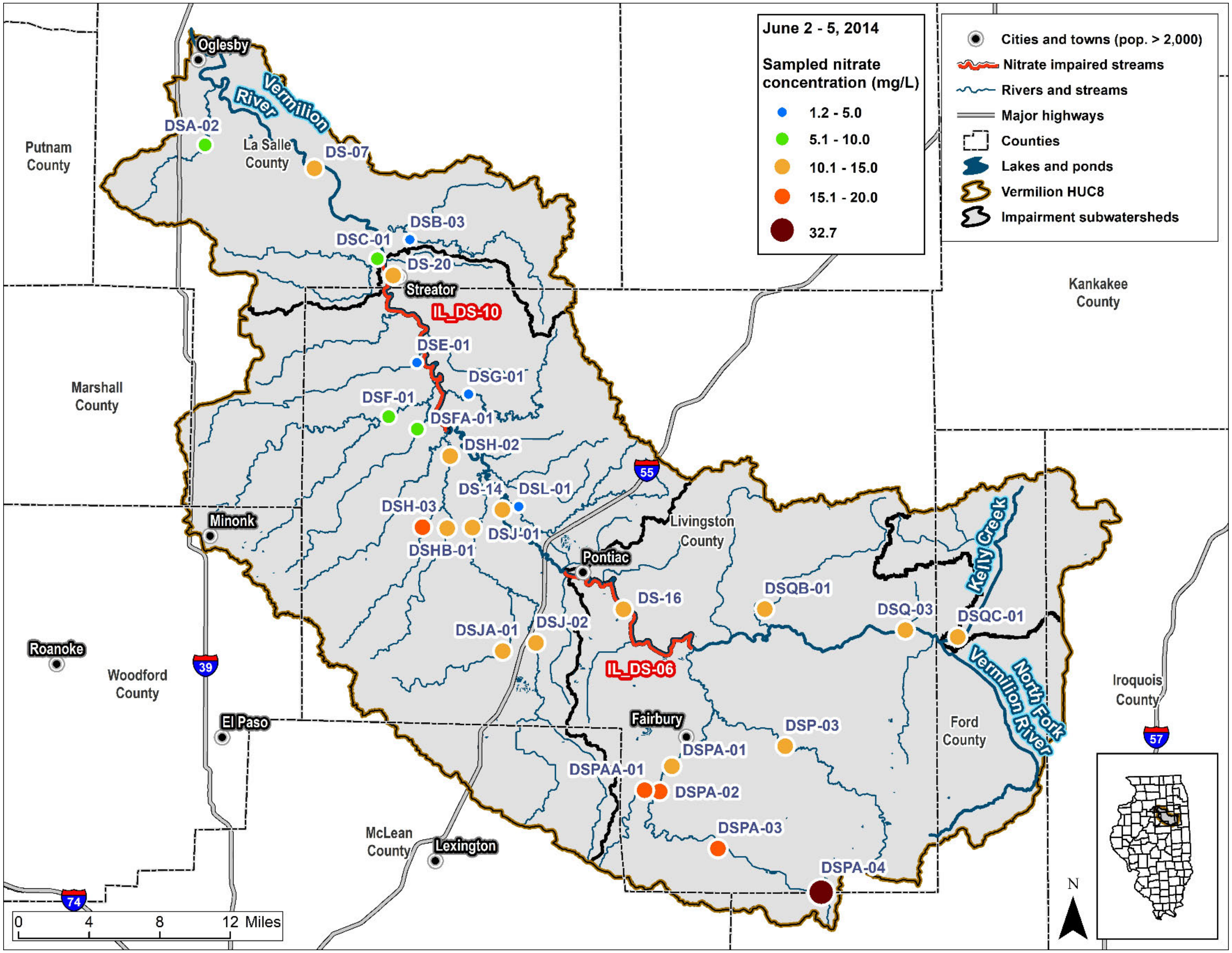

Figure B - 8. Inorganic nitrogen concentrations at IEPA monitoring sites on June 2-5, 2014.

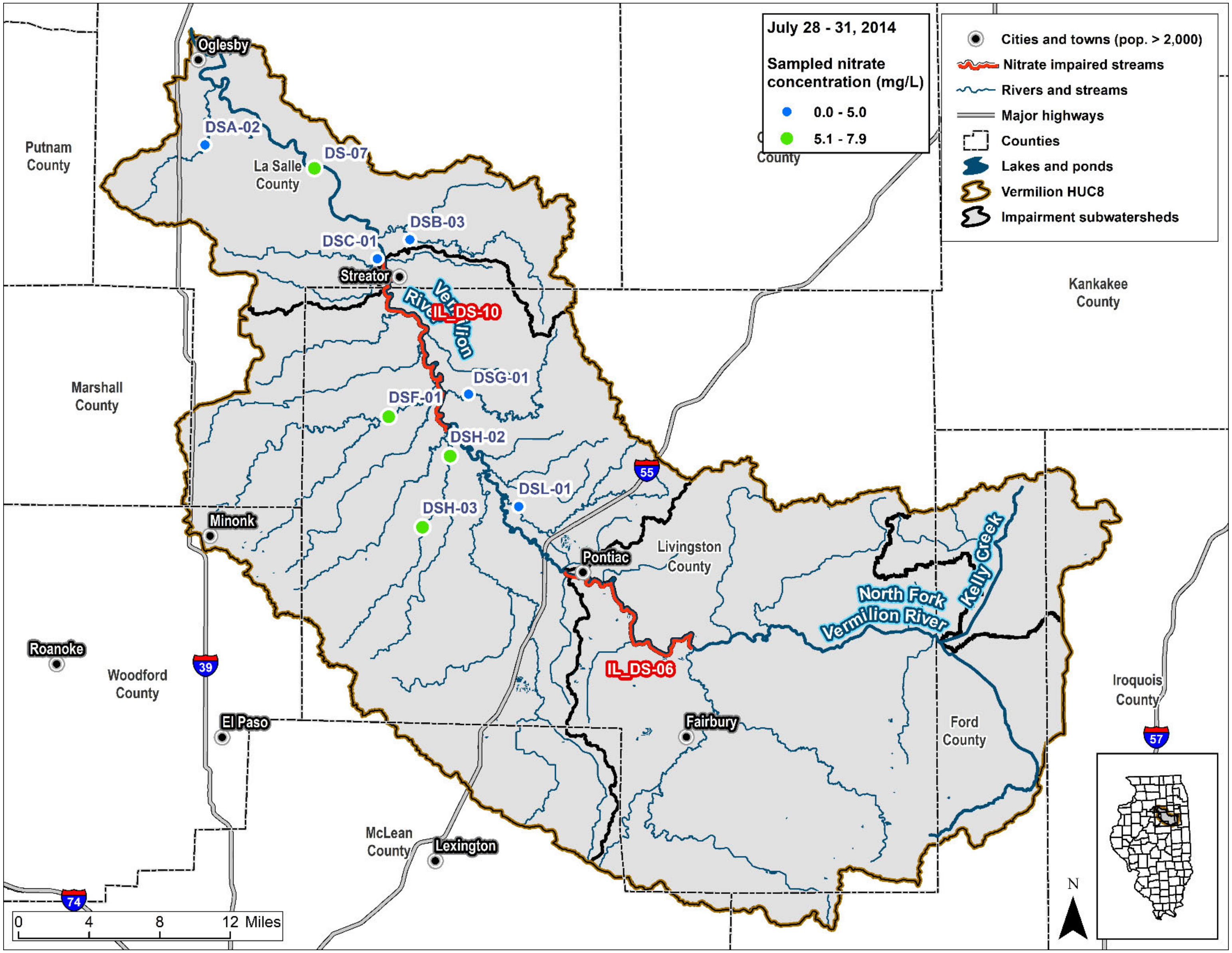

Figure B - 9. Inorganic nitrogen concentrations at IEPA monitoring sites on July 28-31, 2014.

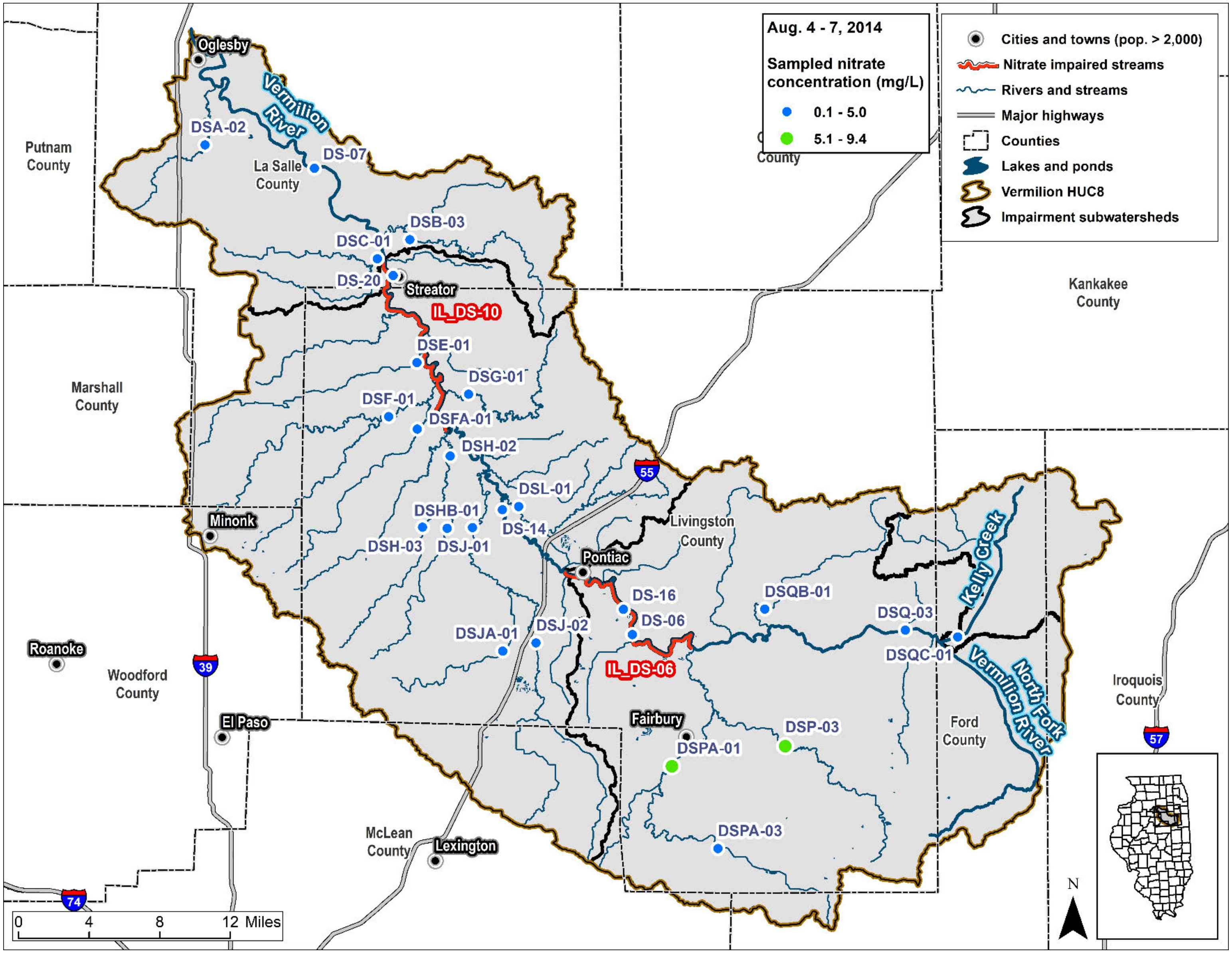

Figure B - 10. Inorganic nitrogen concentrations at IEPA monitoring sites on August 4-7, 2014.

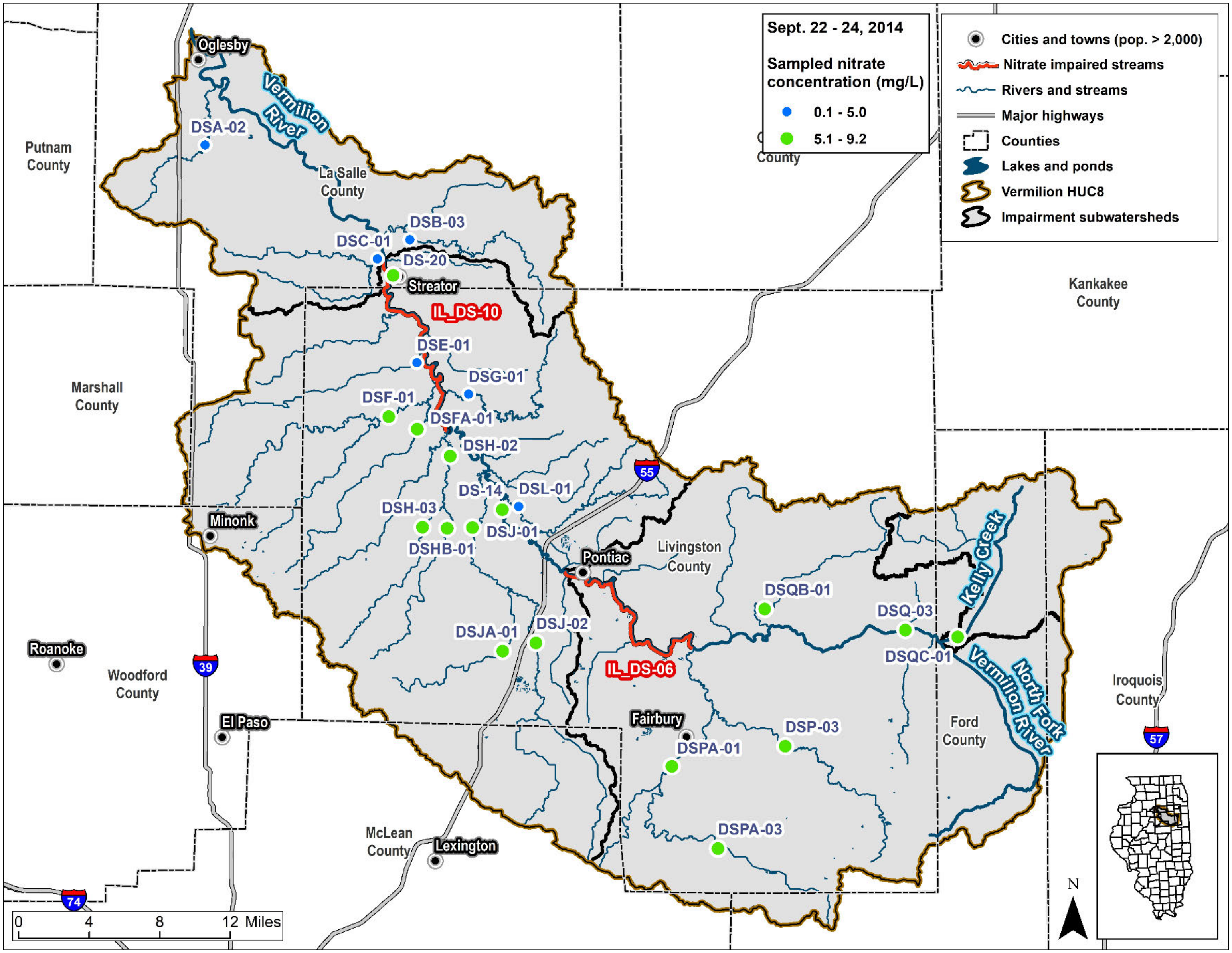

Figure B - 11. Inorganic nitrogen concentrations at IEPA monitoring sites on September 22-24, 2014.

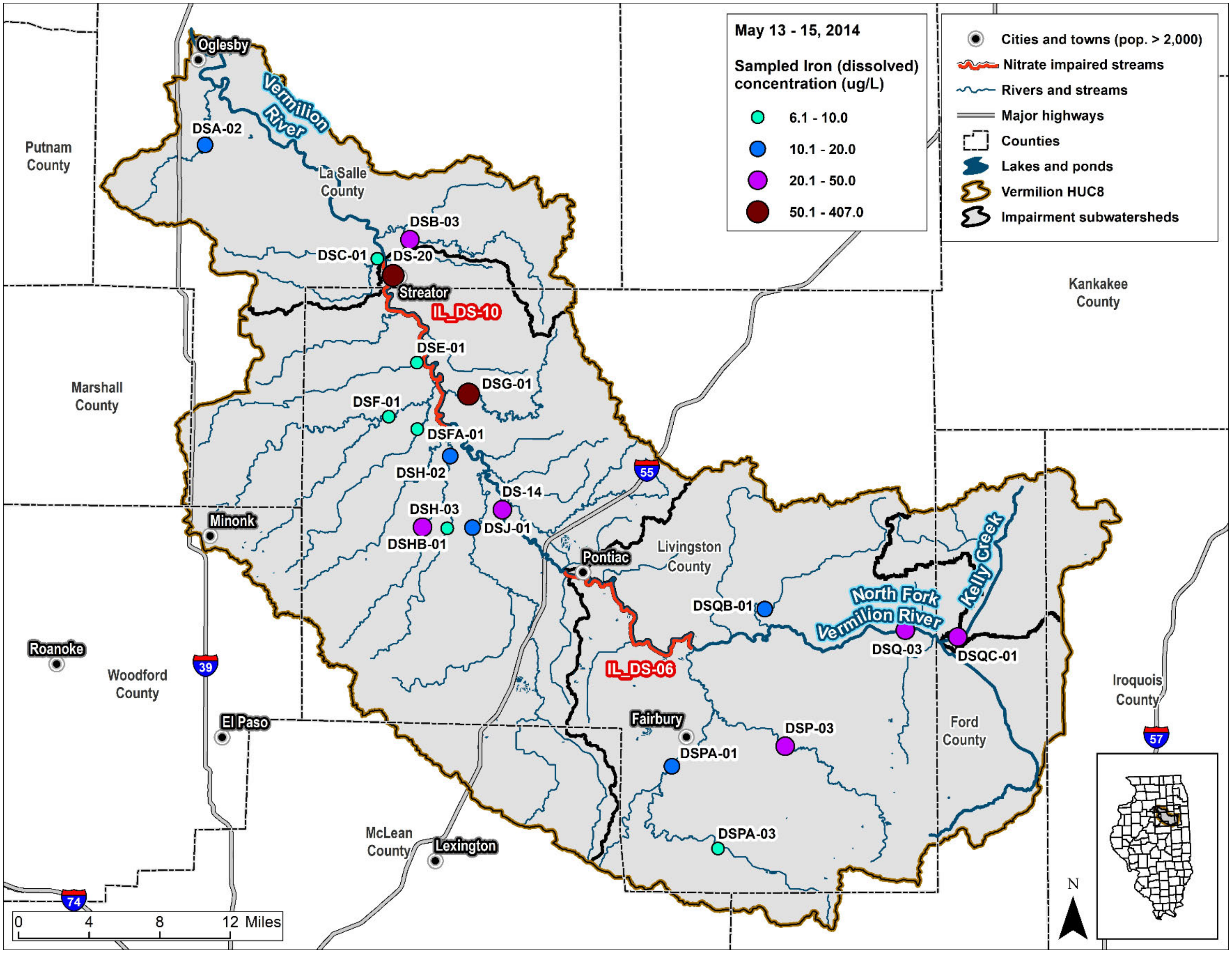

Figure B - 12. Iron (dissolved) concentrations at IEPA monitoring sites on May 13-15, 2014.

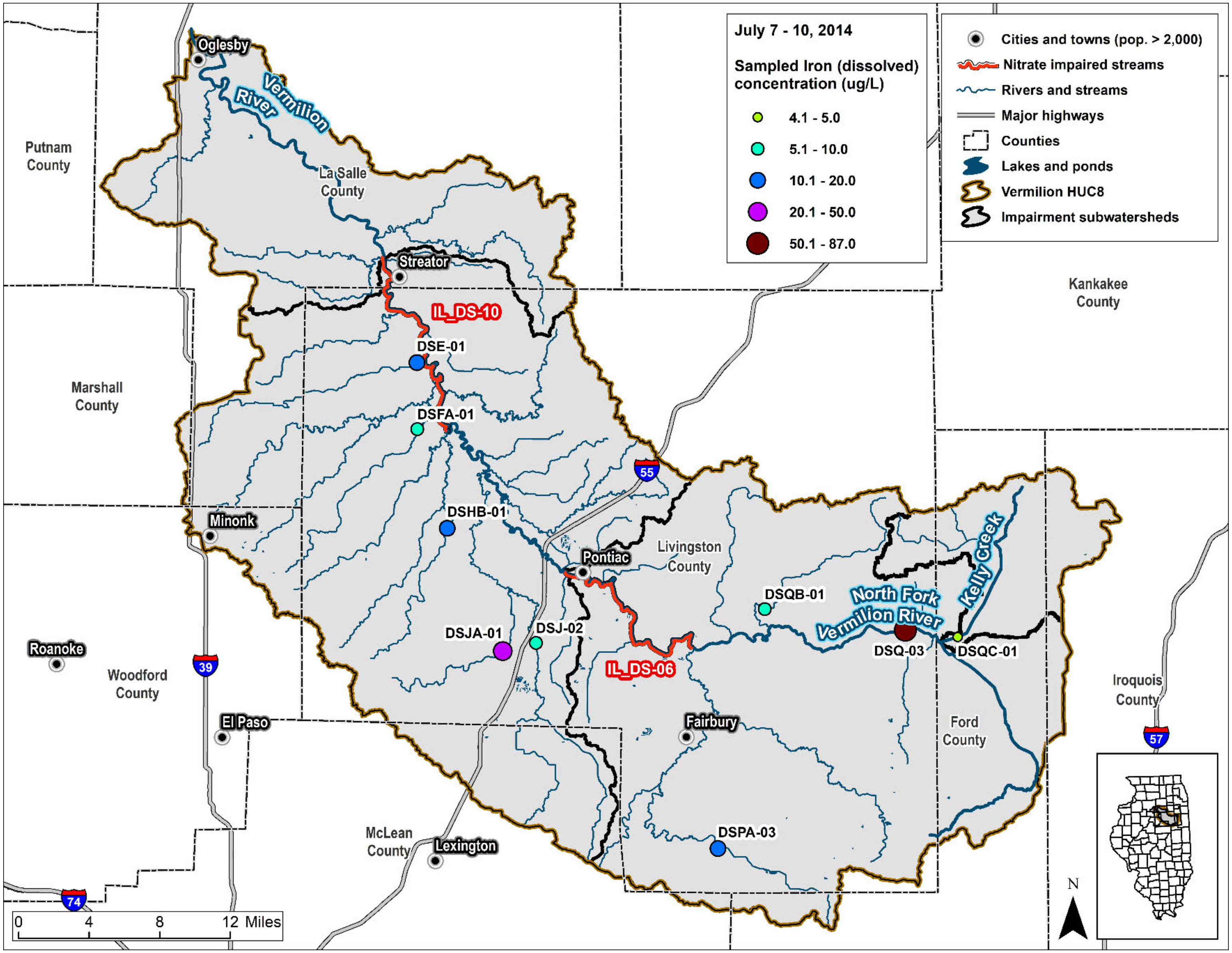

Figure B - 13. Iron (dissolved) concentrations at IEPA monitoring sites on July 7-10, 2014.

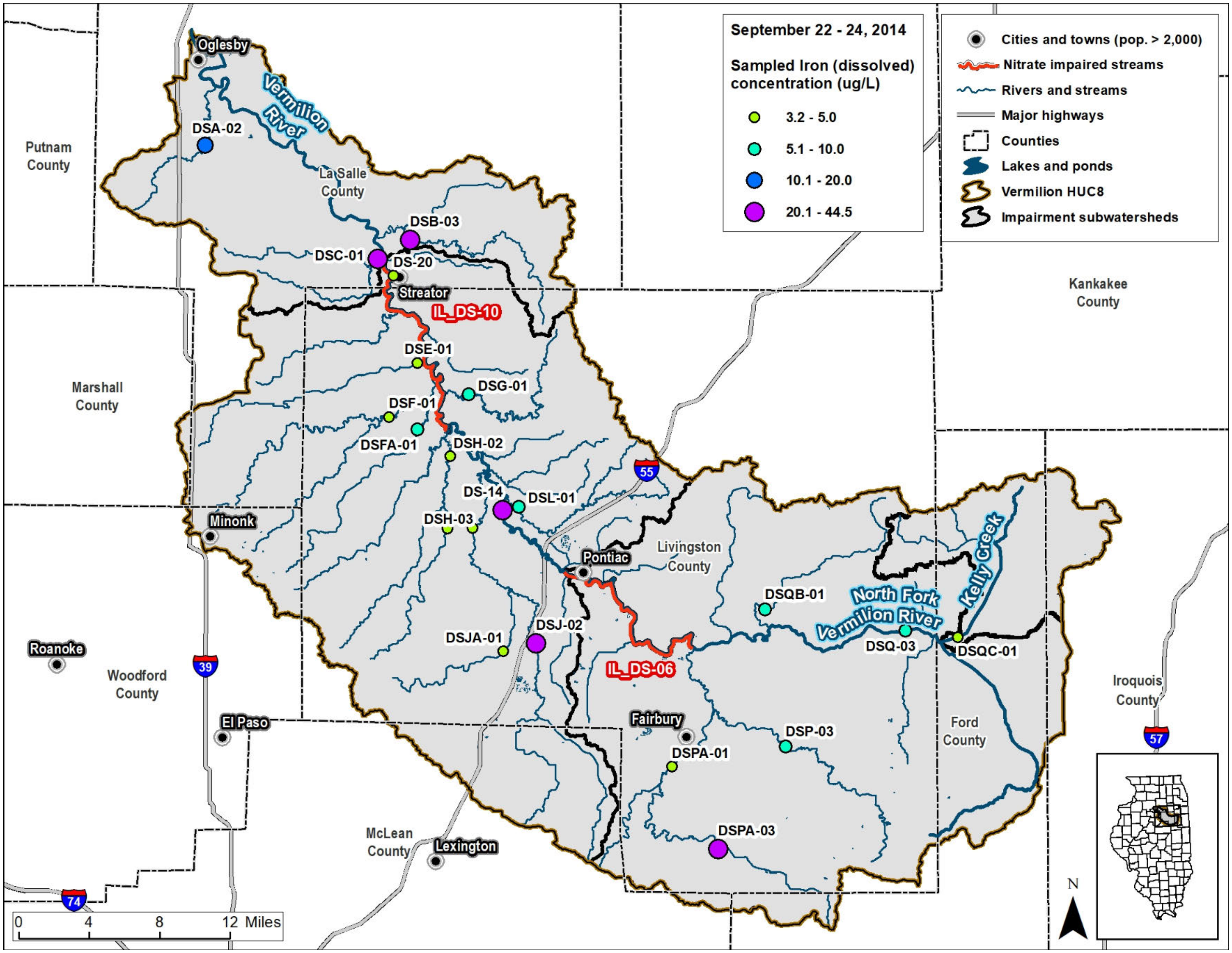

Figure B - 14. Iron (dissolved) concentrations at IEPA monitoring sites on September 22-24, 2014.

Appendix C - Wasteload Allocations

Table C - 1. Fecal coliform and nitrate WLAs for permittees covered by individual NPDES permits

NPDES	Facility	Effluent type	Design flows (mgd)		Fecal coliform (billion cfu per day)				Nitrate (lbs per day)	
					200 cfu/100 mL		400 cfu/100 mL		10 mg/L	
			DMF	DAF	DMF	DAF	DMF	DAF	DMF	DAF
IL0021601	Fairbury STP, City of	Treated sanitary (001)	2.4	0.66	18	5.0	36	10	200	55
		Treated combined (002)	7.3 [a]	--	--	--	111	--	609	--
		Untreated CSO (003, 008)	--	--	--	--	0 [b]	--	0 [b]	--
IL0022004	Streator STP, City of	Treated sanitary (B01)	11.4	4.0	86	30	173	61	951	334
		Treated combined (024, A01, C01)	17 [a]	--	--	--	257	--	1,419	--
		Untreated CSO (003, 018-023, 027)	--	--	--	--	0 [b]	--	0 [b]	--
		Untreated CSO (009, 025, 026, A24, C24)	--	--	--	--	0 [b]	--	0 [b]	--
IL0023639	Tonica STP, Village of	Treated sanitary	0.250	0.100	1.9	0.76	3.8	1.5	-- [c]	-- [c]
IL0024996	Oglesby STP, City of	Treated sanitary (001)	1.224	0.879	9.3	6.7	19	13	-- [c]	-- [c]
		Untreated CSO (A01, B01, C01, 003, 005)	--	--	--	--	0 [b]	--	-- [c]	-- [c]
IL0026697	Stelle Community Association STP	Treated sanitary	0.04	0.02	0.30	0.15	0.61	0.30	3.3	1.7
IL0028819	Forrest STP, Village of	Treated sanitary (001)	0.88	0.35	6.7	2.6	13	5.3	73	29
		Excess flow (A01)	2.35 [d]	--	--	--	36	--	196	--
IL0030457	Pontiac WWTP, City of	Treated sanitary (001)	8.5	3.5	64	26	129	53	709	292
		Untreated CSO (A02, 002-005)	--	--	--	--	0 [b]	--	0 [b]	--
IL0037001	Piper City Rehab and Living Center STP	Treated sanitary	0.032	0.008	0.24	0.061	0.48	0.12	2.7	0.67
IL0037818	Minonk STP, City of	Treated sanitary	0.85	0.34	6.4	2.6	13	5.1	71	28
		Excess flow (A01)	4.25 [e]	--	--	--	64	--	355	--
		Untreated CSO (002, 003)	--	--	--	--	0 [b]	--	0 [b]	--
IL0048828	Woodland School CU District 5 - STP	Treated sanitary	0.030	0.012	0.23	0.091	0.45	0.18	2.5	1.0

cfu = colony forming unit.
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lbs = pounds (as nitrogen).
mgd = million gallons per day.
mg/L = milligram (as nitrogen) per liter.
mL = milliliter.
NPDES = National Pollutant Discharge Elimination System.
STP = sewage treatment plant.
WLA = wasteload allocation.
WWTP = wastewater treatment plant.
-- = not applicable

[a] As described in Section 6.3, treated combined sewage is only allocated a WLA for high flow conditions. Refer back to Section 6.3 and Table 33 for a discussion of these overflow volumes.

[b] The allocation of zero is not intended to reflect an immediate requirement for zero discharge but rather reflects that the NPDES permittee shall comply with the nine minimum controls contained in the National CSO Control Policy published in the Federal Register on April 19, 1994 and the CSO Operational and Maintenance Plans outlined in their respective NPDES Permit Special Conditions to meet applicable water quality standards. These CSO discharges must comply with approved long-term control plans (LTCP), and currently, only four CSO discharges are allowed per year.

[c] The receiving water for these facilities (Vermilion River segment IL_DS-07) is not designated for the public food processing and water supply use.

[d] After the main treatment facility reaches its DMF, sewage is routed for disinfection and discharged through outfall A01. Disinfection at this outfall is for >611 gallons per minute (>0.88 mgd). The largest flow reported for outfall A01 from 2011 through 2020 was 2.35 mgd (December 2015).

[e] After the main treatment facility reaches its DMF, excess flow is routed for treatment at a rate of 590 to 2,951 gallons per minute (0.850 to 4.25 mgd).

Table C - 2. Fecal coliform and nitrate WLAs for permittees covered by general NPDES permits

NPDES	Facility	Effluent type	Design flows (mgd)		Fecal coliform (billion cfu per day)				Nitrate (lbs per day)	
					200 cfu/100 mL		400 cfu/100 mL		10 mg/L	
			DMF	DAF	DMF	DAF	DMF	DAF	DMF	DAF
ILG551: Non-Publicly Owned Domestic Lagoon Serving a Population Less than 2,500										
ILG551020	Meadows Mennonite Retirement Community	Treated sanitary	0.1125	0.045	0.85	0.34	1.7	0.68	9.4	3.8
ILG551038	Salem Children's Home	Treated sanitary	0.030	0.011	0.23	0.083	0.45	0.17	2.5	9.2
ILG551063	Illinois DOT I-55 Livingston Co N STP	Treated sanitary	0.0465	0.0155	0.35	0.12	0.70	0.23	3.9	1.3
ILG551069	Illinois DOT I-55 Livingston Co S STP	Treated sanitary	0.0465	0.0155	0.35	0.12	0.70	0.23	3.9	1.3
ILG580: Publicly Owned Domestic Lagoon Serving a Population of Less than 2,500										
ILG580057	Flanagan STP	Treated sanitary	0.320	0.128	2.4	0.97	4.8	1.9	27	11
ILG580091	Chatsworth STP	Treated sanitary	0.460	0.184	3.5	1.4	7.0	2.8	38	15
ILG582: Publicly Owned Domestic Lagoon Serving a Population of 2,500 to 5,000										
ILG582009	Chenoa WWTP, City of	Treated sanitary	0.658	0.263	5.0	2.0	10	4.0	55	22
ILG620: Private Sewage Disposal System										
ILG620223	Cody Harris	Treated sanitary	0.001500		0.011		0.023		0.13	

cfu = colony forming unit.
CSO = combined sewer overflow.
DAF = design average flow.
DMF = design maximum flow.
lbs = pounds (as nitrogen).
mgd = million gallons per day.
mg/L = milligram (as nitrogen) per liter.
mL = milliliter.
NPDES = National Pollutant Discharge Elimination System.
STP = sewage treatment plant.
WLA = wasteload allocation.
WWTP = wastewater treatment plant.

Public waters supplies (PWS) covered by general NPDES permit ILG640 are not sources of fecal coliform or nitrate; therefore, WLAs are not assigned. The following five PWS are covered by ILG640: Cullom Water Treatment Plant PWS (ILG6400003), Kempton Water Treatment Plant (ILG640275), Rutland WTP (ILG640074), Saunemin WTP (ILG640227), and WTP of Stelle Community Association (ILG640007).

Table C - 3. Iron (dissolved) WLAs for permittees covered by general NPDES permit ILG640 (PWS)

NPDES	Facility	Design flow (mgd)	Iron (dissolved) WLA (pounds per day)
ILG640007	WTP of Stelle Community Association	0.0016	0.013
ILG640275	Kempton Water Treatment Plant	0.015	0.13

mgd = million gallons per day

NPDES = National Pollutant Discharge Elimination System

PWS = public water supply

WLA = wasteload allocation

WTP = water treatment plant.

Appendix D - Responsiveness Summary

Vermilion River (Illinois Basin) Watershed
Total Maximum Daily Load

The responsiveness summary responds to questions and comments received during the public comment period from May 4, 2022, through June 2, 2022.

What is a TMDL?

A Total Maximum Daily Load (TMDL) is the sum of the allowable amount of a pollutant that a water body can receive from all contributing sources and still meet water quality standards or designated uses. The **Vermilion River (Illinois Basin) Watershed** TMDL report contains a plan detailing the actions necessary to reduce pollutant loads to the impaired water bodies and ensure compliance with applicable water quality standards. The Illinois Environmental Protection Agency (IEPA) implements the TMDL program in accordance with Section 303(d) of the federal Clean Water Act and regulations thereunder.

Background

The watershed targeted for TMDL development is Vermilion River (Illinois Basin) Watershed located in central Illinois. The watershed is approximately 853,201 acres (1,331.1 square miles) and covers land within Ford, Iroquois, LaSalle, Livingston, Marshall, McLean, and Woodford Counties. The river flows in a northerly direction and waters flow from this watershed into the Illinois River and eventually to the Mississippi River.

The Clean Water Act and U.S. Environmental Protection Agency (U.S. EPA) regulations require that states develop TMDLs for waters on the Section 303(d) List. IEPA has developed TMDLs for pollutants that have numeric water quality standards.

Therefore, fecal coliform TMDLs (IL_DS-06 and IL_DS-07) and nitrate-nitrogen TMDLs (IL_DS-06 and IL_DS-10) were developed for the Vermilion River and a dissolved iron TMDL was developed for Kelly Creek (IL_DSQC-01). These TMDLs address impairment listings on the Illinois Integrated Water Quality Report and Section 303(d) List for 2018.

U.S. EPA contracted with Tetra Tech (TMDL Consultant) to provide technical assistance to IEPA and to prepare the TMDL report for Vermilion River (Illinois Basin) Watershed TMDL project.

Public Meetings

The public meeting started at 10:00am . and concluded at 12:00 pm on Wednesday, May 4, 2022. The meeting was conducted virtually using WebEx. It was attended by approximately 25 people, with the meeting record remaining open until midnight, June 2, 2022. The draft TMDL report was available for review and comment on the IEPA's webpage: http:\\www2.illinois.gov/epa/public-notices/Pages/general-notices.aspx.**.** In addition, a direct mailing was sent to NPDES permittees and stakeholders in the watershed. The notice gave the date, time, and purpose of the meeting. The notice also provided references on how to obtain additional information about this specific project, the TMDL program, and other related information.

Questions and Comments

Question #1: In Table 40 on Page 67 of the report the City of Streator's DAF and DMF values are reversed. DAF should be 4.0 and DMF should be 11.4.

Response #1: Thank you for your comments. The table has been corrected per your comments

Question #2: Can a note be added to Section 5.3.3 "Nonpoint Sources" that references back to the 17 years (1990-2007) of data collected and utilized in Tables 15 and 17 of the 2009 report that show that the majority of the potentially harmful nitrate load for section IL_DS_10 is coming from Vermilion tributaries IL_DSE_01, IL_DSF_01, and IL_DSH_01?

Response #2: To address this comment, the following paragraph was appended to Section 5.3.3, regarding historic elevated nitrate concentrations in the tributaries:

> During the Stage 1 process, IEPA (2009) reviewed in-stream nitrate concentrations observed in the Vermilion River (IL_DS-10) and its tributaries. These data were collected in 1990, 1999, 2004, and 2007. Nitrate (as nitrogen) concentrations in several tributaries regularly exceed 10 mg/L: Prairie Creek (IL_DSE-01; range: 9.7-24 mg/L, n=7), Long Point Creek (IL_DSF-01; range: 12.0-21.7 mg/L, n=7), Scattering Point Creek (IL_DSH-01; range: 11.6-20.9 mg/L, n=9). IEPA (2009) concluded that the high nitrate concentrations in the tributaries are likely contributing to the PFPWS impairment.

Question #3: Can a note be added to Section 5.3 and Section 5.4 that notes that the City of Streator submitted a Water Quality Monitoring report to the agency in October 2013 that included fecal coliform and ammonia nitrogen testing within the Vermilion River and its tributaries in the City of Streator from March 2011 – August 2012 that concluded that fecal counts and ammonia nitrogen levels were not detrimentally impacted by the City of Streator WWTP outfall or it's CSOs? This testing found that elevated levels for both fecal coliform and ammonia nitrogen were found to exist upstream from all of the City's permitted outfalls. A copy of the report is attached and testing for a second report required by the City's NPDES permit is underway with the results to be compiled in a report in 2023.

Response #3: Thank you for your comments. IEPA has reviewed the City of Streator's *2013 Water Quality Monitoring Report for* fecal coliform and ammonia-nitrogen submitted as part of the public notice comment. As noted in the comment, the report concluded that elevated levels of fecal coliform have been found to exist upstream from the City's CSO discharges DMRs available in the IEPA's database show higher levels of fecal coliform from CSO discharges during high to mid-range flow events. Based on the available fecal coliform data and the 303(d)-impairment status, the CWA and U.S. EPA regulations require TMDL development to address the fecal coliform impairment. Please also note that, ammonia-nitrogen is not part of this TMDL report. However, nitrate-nitrogen impairments and TMDL allocation have been addressed in the TMDL report.

Please refer to *Reasonable Assurance* (Section 8) and *Implementation Plan* (Section 9) in this TMDL report that are recommendations to help the City meet the TMDL endpoints. It will be necessary for the City to continue the current monitoring program in progress discussed in the comments, and address the CSO-LTCP requirements as outlined in the City's NPDES permit.

The City of Streator's water quality study monitoring discussed in the comment has been appended to Section 5.4.2 of the TMDL Report as follows:

> The City of Streator (2013) conducted a water quality study in 2011 and 2012 that included fecal coliform monitoring of the Vermilion River, Prairie Creek, and Coal Run Creek; monitoring sites were located upstream and downstream of the City's treated effluent and CSO outfalls. With the Vermilion River, the City found that the SSM standard was exceeded downstream of the City in

four months over two recreation seasons. The SSM standard was also exceeded upstream of the City's CSO discharge points.

Question #4: Based on these reports the City also requests that the note in paragraph 5, Section 5.4.2 of the report that states, "Thus all that can be concluded is that the Streator CSOs contribute fecal coliform load to the impaired segment IL_DS_07", be amended to something such as "Based on the limited IEPA monitoring in 2020 a statement can be made that the Streator CSOs contribute fecal coliform load to the impaired segment IL_DS_07, however in-stream data previously and currently being collected by the City of Streator finds that the Streator CSO's are not the cause of impairment in the segment."

Response #4: Thank you for your comments. As discussed in Response #3, a paragraph summarizing the City of Streator's water quality study monitoring was appended to Section 5.4.2 of the TMDL Report. DMRs available in the IEPA's database show higher levels of fecal coliform from CSO discharges during high to mid-range flow events from the City's CSO discharges. As a result, all potential sources of fecal coliform impairments were considered and TMDL allocation have been developed.