NONPOINT SOURCE SUCCESS STORY

Illinois

Shoreline and Gully Stabilization in Cedar Lake Reduces Sediment Loading to Cedar Creek

Waterbody Protected

Cedar Creek serves as the outlet for the Cedar Lake-Cedar Creek watershed. It was listed as impaired for sedimentation/siltation, dissolved oxygen (DO), and total suspended solids (TSS) in the 2018 Integrated Water Quality Report and Section 303(d) List of Impaired Waters for Illinois. Cedar Lake has faced issues with shoreline and gully erosion contributing to the sediment and TSS load for the lake and Cedar Creek. Three Clean Water Act (CWA) Section 319(h) projects from 2004, 2009, and 2015 implemented BMPs to improve shoreline and gully stabilization. A 2021 CWA Section 319(h) project continued these efforts to prevent sediment and nutrient loading to Cedar Lake reducing the pollutant load received by Cedar Creek. Cedar Creek was delisted for impairments from sedimentation/siltation, DO, and TSS in 2022.

Water Quality Challenge

Cedar Creek was identified as not supporting its aquatic life designated use in the 2010 Illinois Section 303(d) list of impaired waters due in part to sedimentation/siltation, dissolved oxygen (DO) concentration, and total suspended solids (TSS) impairments caused by hydrologic modification. Cedar Lake was created in 1974 by impoundment of Cedar Creek, turning the headwaters into a reservoir that serves as a water supply for the City of Carbondale. A 2004 study completed under the Illinois Clean Lakes Program found that approximately 200,000 feet of shoreline, roughly four fifths of the shore, was classified as at least slightly eroded, with many areas of severe erosion. Since 2004, efforts have been undertaken through CWA Section 319(h) projects to stabilize shorelines and gullies within the watershed to reduce sediment loading to the lake.

To achieve delisting, Cedar Creek had to attain a DO concentration of at least 5 mg/L and pass visual inspection for offensive conditions for sediment with no more than 50% of the stream bottom comprising silt, mud, or equivalent fine sediment. TSS is similarly based on offensive conditions criteria however with a recommended maximum concentration of 116 mg/L.

Cedar Lake receives nearly all rainfall from tributaries in the Cedar Lake-Cedar Creek watershed (HUC 071401061203), including a 3.78-mile reach of Cedar Creek (IL_NA-04) headwaters that flow into the lake. Much of the land use is forest area surrounding the lake and its tributaries, farmland, and some residential land use intermixed with a concentrated residential area in the northeastern corner of the watershed. The Cedar Lake outfall flows into Cedar Creek (IL_NA-01) which exits the watershed after connecting with two other unnamed minor tributaries

Figure 1. Offshore placement of rip rap for shoreline stabilization in the 2015 project.

Project Highlights

Three CWA Section 319(h) projects from 2009, 2015, and 2021, received funding to stabilize eroding shorelines and gullies that supplied large loads of sediment and other pollutants to Cedar Lake. Gully stabilization can be challenging to accomplish in the forested area surrounding the lake. Many of the gullies originally proposed for stabilization in 2021 were inaccessible due to the terrain. As a result, more shoreline stabilization was completed to make up for the inaccessible gullies. The breakwater technique with transitional wetlands were utilized as often as possible while using traditional rip rap revetments when necessary. Gully stabilization was achieved with rock grade stabilization structures.

The 2009 project completed 10,786 feet of shoreline stabilization and 2,184 feet of gully stabilization, with one Water and Sediment Control Basin (WASCoB). The 2015 project consisted of 13,632 feet of shoreline stabilization, 7,100 feet of gully stabilization with 124 stabilization structures, and three WASCoBs implemented to stabilize 2,100 feet of agricultural gullies. The 2021 project consisted of 12,419 feet of shoreline stabilization with an additional 360 feet to replace the lost gully stabilization and 1,219 feet of gully stabilization that was still able to be completed. According to the final report for the 2021 project, the lake manager and local fishermen who use the site claim to see observable improvement in clarity and water quality for the lake.

Figure 2. Finished section of shoreline stabilization from the 2015 project.

Best Management Practice	Number Installed	Units	Comments
Water & Sediment Control Basin	2280	LINEAR FEET	2009 and 2015 project BMPs combined
Streambank & Shoreline Protection	13632	FT	
Streambank & Shoreline Protection	10786	FT	
Grade Stabilization Structure	8	INDIVIDUAL UNITS	1,219 linear feet of gully stabilization
Grade Stabilization Structure	124	INDIVIDUAL UNITS	7,100 linear feet of gully stabilization
Grade Stabilization Structure	61	INDIVIDUAL UNITS	2,184 linear feet of gully stabilization
Lake Stabilization - Structural	12419	FT	

Results

Cedar Creek (IL_NA-01) was removed from the 2020/2022 Section 303(d) list for all impairments, including sedimentation/siltation, DO, and TSS. The extensive work done on Cedar Lake and other upstream sources of NPS pollution likely served to improve this 4.38-mile section of Cedar Creek. Just downstream at Cedar Creek (IL_NA-02), after connecting with several other waterbodies draining adjacent watersheds, impairments for sedimentation and dissolved oxygen return. One of the primary differences between these two reaches is the significant work that has gone into improving the water quality at Cedar Lake. Total estimated NPS reductions for all projects were 23,658 pounds of nitrogen, 11,828 pounds of phosphorus, and 11,844 tons of sediment. Visual inspection determined offensive conditions for sediment and TSS were no longer present for Cedar Creek. TSS concentrations remained below the recommended maximum of 116 mg/L in the 2018 IEPA sampling cycle (Figure 4). DO concentration remained above the 5.0 mg/L minimum in the 2018 cycle as compared to the 2013 cycle when the creek was still impaired for DO (Figure 5).

Figure 3. Finished gully stabilization from the 2015 project.

Partners and Funding

Partner Type	Agency	Funding	Notes
Federal	IEPA CLEAN WATER ACT SECTION 319	$750,000	2021 319 Award Funds
Federal	IEPA CLEAN WATER ACT SECTION 319	$750,000	2015 319 Award Funds
Federal	IEPA CLEAN WATER ACT SECTION 319	$641,131	2009 319 Award Funds
City	CITY OF CARBONDALE	$427,420	2009 319 Match Funds
City	CITY OF CARBONDALE	$776,667	2015 319 Match Funds
City	CITY OF CARBONDALE	-	Project administration, outreach, and long-term maintenance
City	CITY OF CARBONDALE	$616,948	2021 319 Match Funds
Private Sector	HMG ENGINEERS, INC.	-	Project design, surveying, and construction.

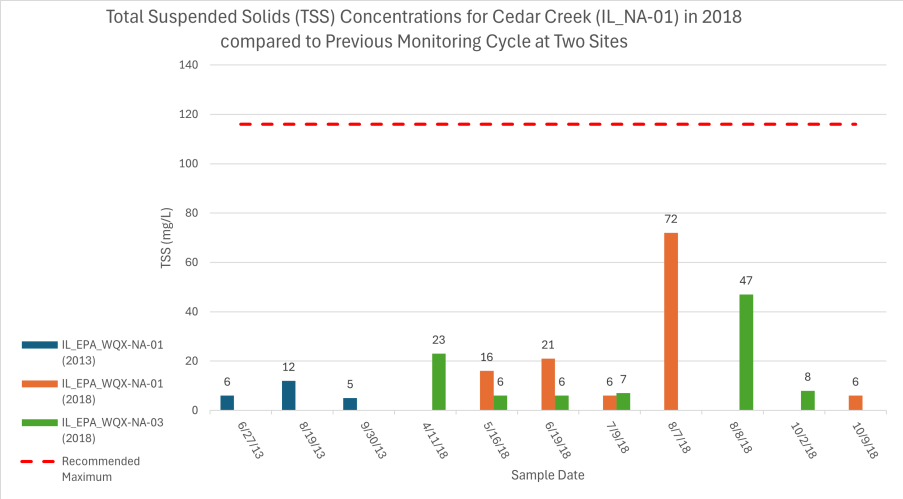

Figure 4. Total Suspended Solid (TSS) concentration of Cedar Creek from two Illinois Environmental Protection Agency monitoring sites in 2013 and 2018.

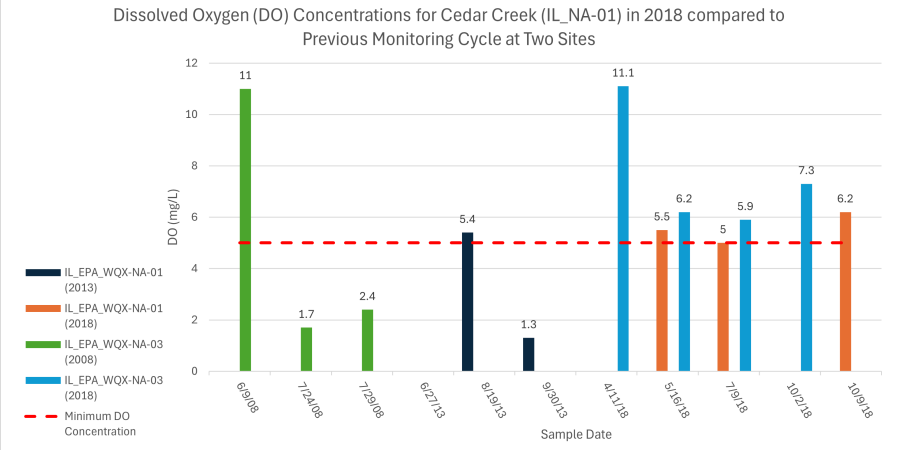

Figure 5. Dissolved Oxygen (DO) concentration of Cedar Creek from two Illinois Environmental Protection Agency monitoring sites from 2013 and 2018.

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