Executive Summary

This report describes the environmental changes resulting from the Great Lakes Legacy Act (GLLA) sediment remediation project of the Ashtabula River conducted between September 2006 and October 2007. The remediation work occurred between the Upper Turning Basin and the 5th Street Bridge to address environmental degradation and contamination in the Ashtabula River Area of Concern (AOC). The GLLA project set out to remove as much contaminant mass feasible given constructability constraints, restore navigational use of the river, and create a depositional zone for newly deposited sediments to reduce surficial contamination concentrations. This Remedy Effectiveness Assessment (REA) was conducted to provide pre-and post-remedy comparisons using multiple lines of evidence through a combination of quantitative and qualitative metrics to assess environmental changes resulting from the GLLA remediation.

Lines of Evidence (LOE)

Remedial actions may have multifaceted environmental impacts that span physical, biological, and chemical conditions. Therefore, data collected from all three lines of evidence can help identify the broad range of environmental impacts of the remediation.

Physical Line of Evidence

Physical LOE indicators reflect changes to sediment, hydrodynamics, and geomorphology, impacting the overall water depth, flow, and sediment composition. Changes in water depth resulting from dredging and habitat quality measured by the Qualitative Habitat Evaluation Index (QHEI) are common tools for assessing physical changes. The key physical LOE indicators for this project are:

- A total of nearly 500,000 cubic yards of contaminated sediment was dredged from the project area.
- In 2009 and 2010, under the GLLA, restoration work was completed along an 800-foot stretch of the eastern bank to reestablish the in-water littoral shoreline habitat.
- Before remediation, the QHEI was 50.5. By 2013, the QHEI score was 56.6, surpassing the target score of 55 or higher.
- The water depth of the river increased to approximately 16 feet from the pre-dredging depth of 8 feet, resulting in a more navigable river for recreational and commercial boats.

Overall, the physical changes resulted in 91% of contaminated sediment by volume removed and an increased boat draft resulting in increased navigability. Additionally, the QHEI score increased after completion of the project, indicating improved aquatic habitat quality.

Biological Line of Evidence

Biological LOE indicators demonstrate the biological community response to remedial and restoration actions and inform biologically focused clean-up goals. Biological assays of organisms assess biological responses, determine contaminant concentrations, and inform whether clean-up goals were met. Additionally, the Ohio EPA used the Index of Biotic Integrity (IBI) and Modified Index of Well-being (MIwb) to evaluate the health of the fish community. These measurements reflect the composition of native fish species, pollutant intolerant and tolerant species composition, and overall fish health. The

higher the measures, the healthier the community. The key biological LOE indicators for this project are:

- By 2011, the polychlorinated biphenyl (PCB) concentrations in sport fish, such as smallmouth bass, common carp, and freshwater drum fillets, had been reduced and were not significantly different from background Lake Erie fish of similar size and species.
- Between 1989 and 2005, the average IBI ranged from 31.6 to 42.0, and MIwb ranged from 5.53 to 8.76.
- By 2011, the IBI was 42.7 and MIwb was 9.21, surpassing the Ohio EPA minimum target values of 38 and 8.2.
- Average total PCB congener concentrations in macroinvertebrates were less in 2011 compared to 2006.

Before remediation, the Ashtabula River AOC carried a Restrictions on Fish and Wildlife Consumption Beneficial Use Impairment (BUI) due to the PCB levels. By 2011, lower PCB concentrations in sport fish were not significantly different from background Lake Erie fish of similar size and species, which eventually led to the removal of the Restrictions on Fish and Wildlife Consumption BUI in 2014. Additionally, since completing the remedial action, the IBI and MIwb scores surpassed their targets. The increase in IBI and MIwb scores and decrease in total PCB concentrations within macroinvertebrates suggests that sediment remediation has reduced contaminant uptake by the biota and increased fish diversity.

Chemical Line of Evidence

Typical metrics for chemical LOE include the concentration of contaminants in surface sediments and the mass of chemical contaminants removed. Sediment surface concentrations, expressed as a surface weighted average concentration (SWAC), are a common tool to monitor bioaccumulative compounds such as PCBs. The target of the remediation was to remove as much contaminant mass as possible and achieve a short and long-term PCB SWAC value. The key chemical LOE indicators for this project are:

- In 2007, the immediate post-dredge total PCB SWAC value was 1.35 mg/kg and in 2009 further declined to 0.39 mg/kg.
- In 2018, the long-term 10-year post-dredge SWAC goal of 0.25 mg/kg was achieved, with the SWAC value determined to be 0.16 mg/kg for total PCB congeners.

In total, this remedial project removed 14,324 lbs (6,497 kg) of PCBs from the project site. There was a significant decrease in the average surficial PCB concentration from 2006 to 2011 within the study area. A majority of PCB mass removed was in deeper historic sediments.

Conclusions

The GLLA remediation project achieved the remedial goals. The remedial action removed nearly 500,000 cubic yards of contaminated sediments with an associated 14,300 lbs of PCB mass and created 800 feet of improved aquatic and riparian habitat. Additionally, the SWAC value has achieved the 10-year post dredge target along with a significant decrease in surficial PCB concentrations. The project area surpassed IBI and MIwb targets, suggesting an increased fish and invertebrate diversity. Therefore, this report concludes that the 2006-2007 GLLA remediation in the Ashtabula River AOC successfully achieved its remedial goals and improved the environmental quality of the aquatic ecosystem.