Sheboygan River Area of Concern Habitat Restoration Projects
Sheboygan, Wisconsin

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ABSTRACT

The Sheboygan River discharges into Lake Michigan at the City of Sheboygan, Wisconsin. In 1985, the lower Sheboygan River and Harbor was designated an Area of Concern (AOC) by the U.S. Environmental Protection Agency because of water quality and habitat problems associated with the historical discharge of pollutants into the AOC and associated adverse impacts. Efforts are underway to remove the river from the Great Lakes AOC list and

INTRODUCTION

The Sheboygan River flows 81 miles through eastern Wisconsin and discharges into Lake Michigan at the City of Sheboygan. In 1985, the lower Sheboygan River and Harbor was designated an Area of Concern (AOC) by the U.S. Environmental Protection Agency because of water quality and habitat problems associated with the historical discharge of pollutants into the AOC and associated adverse impacts. Efforts are underway to remove the river from the Great Lakes AOC list and
complete the Sheboygan River's transformation into an area of recovery. These final efforts include dredging and three habitat restoration projects.

The City of Sheboygan, Sheboygan County and the Wisconsin Department of Natural Resources (WDNR) are implementing the Sheboygan River AOC Habitat Restoration Projects to address habitat related Beneficial Use Impairments (BUIs). A Short Elliott Hendrickson (SEH) led project team was hired as the restoration design consultant, with services including: the development of conceptual, preliminary and final design documents; environmental permitting support; stakeholder coordination and public outreach; and the provision of bidding services and construction oversight. The habitat restoration projects are funded by the Great Lakes Restoration Initiative (GLRI), and are critical to overall efforts to delist the Sheboygan River AOC.

Map 1 – Sheboygan River AOC Habitat Restoration Project Locations

As provided on Map 1, three sites were targeted for restoration along the lower Sheboygan River, including: (1) the Taylor Drive / Indiana Avenue Site, (2) the Wildwood Island Site, and (3) the Kiwanis Park Site. Combined, the three project sites encompass 73 acres and nearly 2 miles of shoreline. Although degradation issues vary by location, the causes of the BUIs include stream bank erosion, sedimentation, habitat fragmentation, invasive plants, urban land use, and urban storm water impacts. Restorative measures include: re-grading to improve on-site hydrologic conditions; shoreline stabilization and development of habitat using woody debris (anchored log jams and log benches); removal of invasive plants and replacement with native species; strategic placement of boulders and gravel banks within the stream to provide fisheries habitat and address sediment issues; and the installation of targeted habitat features, including a reptile hibernaculum and numerous bird / bat houses and nesting platforms.
These habitat improvements are designed to enhance migratory and shore bird stopover and breeding, herptile breeding, warm water fisheries, and fish and wildlife populations. The overall objective of these projects is to transform degraded areas and restore the natural habitat functions of the river corridor.

TAYLOR DRIVE / INDIANA AVENUE PROJECT

The Taylor Drive / Indiana Avenue Project Site (see Map 1) extends approximately 3,960 feet along the Sheboygan River, and includes: approximately 6,670 feet of impacted shoreline; and a storm water pond (Taylor Drive Pond) located in the southwest quadrant of the Taylor Drive / Indiana Avenue intersection that had contained a degraded permanent pool. The Taylor Drive pond restoration design (Maps 2 and 3) included: (1) removal of non-native plant species that dominated the shoreline; (2) grading and placement of sufficient materials to allow for the establishment of shrub carr, floodplain forest, shallow marsh and wet meadow wetlands; and (3) placement of targeted habitat features, including a reptile hibernaculum (Figure 1), an osprey nesting platform and anchored log jams.

Map 2 – Taylor Drive Pond Wetland Grading Plan

Modifications were not made to the existing pond overflow pipe that connects to the Sheboygan River (Photo 6). However, the final pond site grading plan accounted for the observed seasonal high groundwater table, which resulted in earthen material being imported to the site in order to develop the hydrologic conditions necessary to support the desired wetland vegetation and habitat communities. Storm water inlet locations were re-graded to provide permanent pool (water quality pretreatment) areas (Photos 2 and 4); and stone-lined channels (Photo 3) were constructed to convey
runoff to a deeper permanent pool located on the west side of the pond site (Photo 5). In addition, several ephemeral ponds were developed within the pond limits to promote bio-diversity and amphibian habitat. Native plants and seeding were installed following grading operations.

Map 3 – Taylor Drive Pond Wetland Vegetation Planting Plan

Figure 1 – Taylor Drive Pond Reptile Hibernaculum Cross-Section

The Taylor Drive and Indiana Avenue Project included two other areas located on the banks of the Sheboygan River, including Esslingen Park and a fishing access area. Other restoration improvements included: (1) shoreline stabilization and habitat development using bio-engineered embankment slopes, native plant installations and strategic placement of stone structures; (2) development / enhancement of aquatic habitat features including backwater pools; and (3) development of desirable public
park features including a gravel parking lot, an improved kayak / canoe launch area, grading modifications consistent with a future bike path, an expanded gravel bar adjacent to the river suitable for pedestrian / fisherman access (Photo 1), and public walking trails to the river.

**WILDWOOD ISLAND PROJECT**

The Wildwood Island Project Site (Map 1) contains an approximately 3.4 acre main island (Maps 4 and 5), several adjacent smaller islands, and the Sheboygan River shoreline east and west of the islands. The total length of river channel within and adjacent to this grouping of islands is approximately 3,665 feet. The Wildwood Island complex has changed considerably since the 1850s. The island was originally a much larger single mid-channel island. Floodplain filling and grading reduced the island to roughly one third of its size by 1900. Subsequently, the island was split by flood flows, resulting in three channels with one passing through the middle of the island. The main island continues to erode and become smaller, and was dominated by invasive plant species, including giant reed grass and reed canary grass.

![Map 4 – Wildwood Island Site Development Plan](image)

**Map 4 – Wildwood Island Site Development Plan**

In order to create a more stable island complex, additional channel roughness was added in the form of large wood jams, which were placed at strategic locations in the northern island complex to reduce velocities and encourage fine sediment and sand deposition immediately upstream and downstream in their hydraulic shadow (Photo 8). In addition to helping to stabilize sediment, the jams provide snake hibernacula; hiding locations for fish, mammals and herptiles; home for unique macroinvertebrates; and sunning locations for turtles and perches for birds. The north bank of the main island was stabilized by the installation of an engineered log bench (Figure 2, Photo 9) that supports the extension of the bank toe to the north. A vegetated bench was installed on top of the logs, which will prevent erosion of the island. The log bench was installed below the depth of potential scour, and just above the bankfull elevation. The bench was constructed using various countermeasures against drag and buoyant forces, including driven pile snags, buried log anchors,
boulders and cables; and was packed tightly with wood slash, dirt, gravel and soil. Woody species were planted on the surface of the bench and incorporated into the structure. The bench covers the upstream end of the island and extends downstream approximately 200 feet along the north side of the island (Photo 10).

Map 5 – Wildwood Island Vegetation Plan

Other Wildwood Island Project improvements included: (1) excavation and removal of invasive plants, including giant reed grass and reed canary grass; (2) installation of fabric encapsulated soil (FES) lifts (Figure 3, Photo 7) and the installation of desirable native plants in order to provide shoreline stability on the south side of the main island; (3) development / enhancement of aquatic habitat features including in-stream riffle and pool features on the north and west side of the main island, and a backwater pool on the northwest (upstream) shoreline; (4) preservation of beneficial habitat structures such as steep embankments (suitable for kingfisher burrows); and (5) installation of targeted habitat features, including wood duck and screech owl nesting boxes (Photo 12), and Great Blue Heron nesting platforms on the main island.

Figure 2 – Wildwood Island Log Bench Detail
The Kiwanis Park Project Site (Map 1) encompasses approximately 3,600 feet of Sheboygan River shoreline, and is located about 9,300 feet upstream from Lake Michigan. The park is heavily used for softball, baseball, soccer, picnics and music events staged on the terraced sledding hill. Turf grass is managed on most of the park grounds, with the exception of the river bank slopes.

Proposed Kiwanis Park habitat restoration improvements are located within about 250 feet of the Sheboygan River shoreline, extending from the northern park boundary to the south end of park. Overall, these site improvements include: (1) removal of impervious surfaces and replacement with vegetation; (2) appropriate management of existing vegetation, including invasive species removal; (3) development of native vegetation areas, including a prairie/upland grassland; (4) removal of two storm water outfall structures and development of stone-lined open channel segments that provide backwater habitat; (5) installation of beneficial habitat structures including bird houses and in-stream fish/herptile habitat features; (6) development of desirable public park features including an improved kayak/canoe launch area, an expanded gravel bar adjacent to the river suitable for pedestrian access, use of split rail fencing and vegetation to direct pedestrian traffic and protect native planting areas; and (7) installation of two fishing platforms constructed with limestone slabs (Photo 11).

**LONG TERM VEGETATION MANAGEMENT**

To ensure long-term restoration success, strategies for vegetation management will be implemented in the newly planted areas, which will focus on promoting the growth of native plant communities and the eradication of non-native species such as giant reed grass, reed canary grass, purple loosestrife, garlic mustard, common and glossy buckthorn, and others. Management to eliminate these species is important since establishment of native plant communities will improve aquatic and terrestrial habitat conditions. A long-term post-construction management plan will be developed to address the long-term care of all plant communities within the three Project Areas.
Photo 1 (Esslingen Park Improvements): Gravel Bar for Improved Fishing Access.

Photo 2 (Taylor Dr. Pond Improvements): Permanent Pool at Pond Inlet.

Photo 3 (Taylor Dr. Pond Improvements): Stone Lined Distribution Channel and Woody Debris.


Photo 5 (Taylor Dr. Pond Improvements): Permanent Pool on West Side of Site.

Photo 6 (Taylor Dr. Pond Improvements): Pond Outlet Elevated above Permanent Pool.
Photo 7 (Wildwood Island Improvements): Fabric Encapsulated Soil (FES) Lifts.

Photo 8 (Wildwood Island Improvements): Installed Log Jam on small island.

Photo 9 (Wildwood Island Improvements): Installed Log Bench and Fabric on upstream end of Wildwood Island.

Photo 10 (Wildwood Island Improvements): Upstream End of Wildwood Island.

Photo 11 (Kiwanis Park Improvements): Limestone Slab Fishing Platform

Photo 12 (Wildlife Habitat Improvements): Bird and Bat Houses.
SCHEDULE

Construction of habitat improvements began in June 2012 with mobilization of construction equipment and materials. Construction activities in the channel and on the river banks and floodplain occurred between late summer and late fall, when water surface elevations and river discharges were relatively low. Major construction activities were substantially completed in November 2012, and included: invasive species excavation and removal, site grading, native plant installations, and development of stone / log / FES improvements. Final completion is scheduled for April 2013, which will include all remaining vegetation plantings.

ACKNOWLEDGMENTS

The authors acknowledge the significant contributions of the entire SEH Project Team including: Inter-Fluve, Inc. (Marty Melchior and Andy Selle), who addressed geomorphic design details and fishery habitat issues; Ecological Services of Milwaukee (Rose Chmielewski) and Oneida Total Integrated Enterprises (Scott Horzen), who addressed environmental permitting issues and developed the invasive species management plan and the native vegetation restoration designs; and Great Lakes Ecological Services (Gary Casper) and NES Ecological Services (James Havel), who addressed wildlife assessments and developed related reptile and aviary habitat features. Also acknowledged is the oversight and direction provided by the Sheboygan River Fish and Wildlife Technical Advisory Committee, who guided the Sheboygan River AOC Habitat Restoration Projects from initial planning through the development of final design documents.

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