

## Krispin Drain Habitat Restoration, Michigan

Habitat loss was identified as a primary factor limiting the natural resources within the St. Clair River Area of Concern (AOC). Under a U.S. Environmental Protection Agency (EPA) Work Order, EA performed habitat restoration evaluation, design, and construction oversight for five habitat projects within the AOC, including Krispin Drain on Harsen Island. Krispin Drain is approximately 4 miles in length and traverses the middle of Harsens Island. The project area included a 200-foot wide easement along the centerline of Krispin Drain. Restoration goals for Krispin Drain called a return to conditions similar to the 1960s and required significant stakeholder involvement.

Characterization activities included a delineation of wetlands and Waters of the United States; vegetation survey of rare, threatened, and endangered species, invasive species, and dominant habitat types; stream habitat assessment; and mussel, herpetofauna, and macroinvertebrate surveys. These surveys provided a baseline characteristic of habitat conditions to be compared to post-restoration monitoring results in an effort to document ecological uplift throughout the site.

### Habitat Restoration Designs (HRDs)

EA completed an engineering assessment utilizing HEC-RAS software to develop a computer model to characterize hydraulic conditions and determine water levels and stream velocities. Model results were compared to U.S. Fish and Wildlife Service guidelines to evaluate effectiveness of each alternative for fish passage and to a FEMA Flood Insurance Study to document that the alternatives would not increase flooding hazards to ensure the correct fish passage was designed. In addition, HRDs were produced taking into consideration all field survey results as well as public and stakeholder requests. Implementation of HRDs afforded native species the best available habitats to flourish. Designs included specialized woody debris habitat structures, debris placements, and grading to accommodate a variety of reptiles and amphibians through varying the detention time of wetlands, providing woody substrates, and enhancing the connectivity of restored wetlands with the riparian systems.

### Meeting Restoration Goals

It was determined that many of the restoration goals were met using data collected from the post-habitat-restoration monitoring. In general, when compared to pre-restoration monitoring, the ecological assessment demonstrated a decrease in invasive species, an increase in native plant diversity, a decrease in open water coverage, and a higher quality of wetland. There was an increase in herpetological species diversity and a reduction in dense monotypic stands, improving herpetile habitat. Post-restoration surveys identified two state species of concern, including the Blanding's Turtle and the Eastern Fox Snake.

Bioassessment surveys exhibited clear improvements. Post-restoration instream habitat varied little among the reaches; however, removal of soft sediment resulted in increased depth, flow, and lower turbidity—elements that were once limiting. These factors resulted in the restoration of a diverse, aquatic macrophyte community that now supports quality benthic macroinvertebrate and fish assemblages. Diversity among the benthic community increased pre- to post-restoration generally but also among environmentally sensitive taxa while the abundance of fish species such as the state endangered Pugnose Shiner and Blackchin Shiner that prefer clear, calm, waters with an abundance of macrophytes illustrates achievement of the restoration goals.

