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**Case Study 13**

**Owl Creek Farms, North Branch of the  
Kokosing River, Knox County, Ohio**

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**Cover photo:** Treated section of Owl Creek on Owl Creek Farms, Ohio

### **Advisory Note**

Techniques and approaches contained in this handbook are not all-inclusive, nor universally applicable. Designing stream restorations requires appropriate training and experience, especially to identify conditions where various approaches, tools, and techniques are most applicable, as well as their limitations for design. Note also that product names are included only to show type and availability and do not constitute endorsement for their specific use.

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## Case Study 13

# Owl Creek Farms, North Branch of the Kokosing River, Knox County, Ohio

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*By David Moore, Burgess & Niple, Inc.*

*Owl Creek Farms was fined in 2000 by the Ohio Environmental Protection Agency for unpermitted stream straightening activities that were constructed in 1997. They were then required to submit a stream mitigation plan, implement the plan, and monitor the site for 5 years. This case study is a short account of these mitigation activities.*

## Project overview

The Owl Creek Farms project site is on a working farm on the North Branch of the Kokosing River (approximately RM 15.0), in the northwest corner of Knox County, Ohio (near Fredericktown). The watershed is rural, actively agricultural, and in a temperate climatic zone. Mitigation features included buried riprap revetment used on outside meander bends, two instream vortex rock weirs installed in the realigned reach for grade control, and live willow stakings planted along streambanks and on top of point bars. Management support activities include cessation of mowing and pasturing adjacent to stream. Tree seedlings were planted in the riparian area.

The North Branch of the Kokosing River generally supports a high quality aquatic community due largely to ground water supplemented flows and the availability of coarse substrate material. Agricultural runoff and bank erosion are the main sources of sedimentation. The flow is perennial and uncontrolled (no dams or weirs) in this part of the watershed.

## Design

The drainage area above the site is about 10 square miles, and the substrate is predominantly gravel. The stream slope is relatively low (0.4%). The original bank condition was fair to poor, with erosion concentrated on the outside meander bends. Little vegetation was present along the banks (<10-ft corridor width). The bankfull channel width at riffles was 20 to 25 feet, and the mean bankfull depth at riffles was about 2 feet.

Mitigation features were selected and designed primarily to meet aquatic community index (Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) values), physical habitat potential evaluation (Qualitative Habitat Evaluation Index (QHEI)) scores, rather than hydraulic criteria. The data collected include fish and macroinvertebrate surveys, cross sections, profiles, pebble count data, and riparian vegetation surveys.

No channel reconstruction was undertaken for mitigation. Existing postchannelization alignment was stabilized in place, and vortex rock weirs and plantings were added. No in-depth hydraulic analyses were conducted. Weir locations were determined in the field.

## Results

The mitigation plan was implemented in the spring of 2001 by Owl Creek Farms, with costs not quantified. The stream had been channelized and is now stabilized in the current alignment. The overall goals were to mitigate the stream straightening done in 1997 to protect a barn and county road from meander migration. Goals of this mitigation were expressed in terms of IBI and ICI values, QHEI scores, and percent survival and areal coverage values for vegetation. Project goals were optimistic, relative to the preconstruction conditions, but as of the third year of postconstruction monitoring, the goals of this mitigation are being met.

In the third year of monitoring, the project is meeting or exceeding stated goals for fish and macroinvertebrate community quality, habitat quality, and vegetation survival. The vortex rock weirs, bank stabilization measures, live willow plantings, and mowing and grazing restrictions all have performed better than expected. The least successful feature of this project was the survival of riparian tree seedlings. The tree seedlings should have been better protected from competition, or not planted at all, to allow natural succession to occur.

## Lessons learned

The vortex rock weirs performed better than anticipated in creating scour pools and attracting fish and macroinvertebrates. Of key importance was the skillful installation of anchor rocks that were well keyed into the bank. The property owner was a skilled equipment operator. The live willow stakings were very successful in stabilizing banks, improving cover, and even providing some shading benefits in the first growing season. Simply ceasing mowing and precluding grazing next to the stream are effective aquatic habi-

tat improvement strategies. Concerns about noxious weeds did not materialize, probably because the area was not actually disturbed, and the existing diverse seedbank successfully outcompeted weeds. Noxious weeds would be more of a concern if the ground were disturbed by construction or other activities. The inherent qualities of the stream, good substrate supply, ground water-supported flow, and a relatively low gradient make it resilient for recovering from impacts. This project has caused a reexamination of the value of tree plantings versus simply allowing natural succession to occur. Figures CS13-1 and CS13-2 show before and after photos of Owl Creek.

**Figure CS13-1** Owl Creek—before



**Figure CS13-2** Owl Creek—after

