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Galloway Creek

from **Engineering With Nature: An Atlas, Volume 2.**

by **US Army Engineer Research and Development Center**

Rochester Hills, Michigan, United States

Designing a new stream with natural features. The 1987 Great Lakes Water Quality Agreement established urban habitat restoration on the Clinton River as an international priority. A tributary of the Clinton River, Galloway Creek is one of only a few tributaries in the watershed to provide cold-water base flows, which are ideal for trout species. However, residential, industrial, and agricultural land use left Galloway, which runs through the Oakland University golf course, straightened, degraded, and cutoff from its watershed. Additionally, invasive species such as Phragmites had taken over the project site, and the golf course's off-line ponds were not functioning properly. So, with funding from the Environmental Protection Agency's Great Lakes Restoration Initiative, work began in 2015 to remediate and restore the stream habitat for fish and wildlife species by restoring floodplain connectivity, improving geomorphic stability, and providing in-stream habitat. The project team used wood and field stone to construct log and gravel riffles, restoring the stream's profile and reconnecting it with its associated floodplain; and they replaced two stream crossings with wider box culverts to better accommodate flood

events. The team anticipates that natural processes will take over in the stream, creating a self-sustaining watershed.

Article cover: Riffles created with rocks and logs. (Photo by Phil Mlinarich, USACE Detroit District)

Producing Efficiencies

This project provided a unique opportunity to leverage cold groundwater inputs in an urban system to maximize the benefits to cold-water fishes, such as brown and rainbow trout (*Salmo trutta* and *Oncorhynchus mykiss*). By using hydraulic modeling to determine the new stream channel's alignment and the stream crossings' optimal size, the team implemented a natural channel design to establish a stable channel and associated floodplain. The natural features require minimal operations and maintenance, saving time, labor, and resources both now and as natural processes take over.

Installing root wads and stones to mimic natural features.
(Photo by Phil Mlinarich, USACE Detroit District)

Using Natural Processes

Past land use had altered the natural flow of the river, channelizing the river and forcing it out of its natural alignment. The project realigned the channel, shaping it into a more natural design that allows for better sediment transport and will also prove more resilient in the future. Removal of invasive species will allow new herbaceous, shrub, and tree plantings to flourish. During construction, the placement of root wads and boulders created in-stream features that mimicked the natural processes previously restricted by past land use. Over time, the stream will return to its natural flow, providing cold-water habitat to trout and other important fish in the Clinton River system.

Using natural materials to realign Galloway Creek improves cold-water fish habitat for all life stages.
(Photo by USACE Detroit District)

Broadening Benefits

As the project is located on the Oakland University golf course, its visibility provides a great opportunity for educating the public on natural riverine processes. The university will use Galloway Creek for research opportunities and as a tool to teach students about the local ecosystem. The fish populations' recovery will increase the recreational fishing opportunities in the local community. Finally, by reducing flood risk and creating a new natural space for residents and visitors alike, the Galloway Creek project has increased tourism and local housing values.

Increasing the size of the stream crossing for better fish passage.
(Photo by Phil Mlinarich, USACE Detroit District)

Promoting Collaboration

In addition to the Environmental Protection Agency's guidance and funding, Oakland University; Clinton River Watershed Council; Clinton River Public Advisory Council; the U.S. Army Corps of Engineers (USACE)–Detroit District; and the Michigan Department of Energy, Great Lakes, and the Environment proved critical to the project's success. They provided data,

expertise, and personnel to ensure the design met the project and overall region's needs. Further, Oakland University created educational signs around the area and agreed to continue invasive species treatment after construction to allow the native vegetation to establish.

Restored wetlands after channel realignment.
(Photo by Phil Mlinarich, USACE Detroit District)

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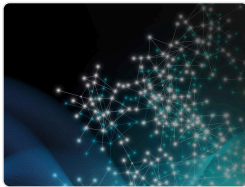

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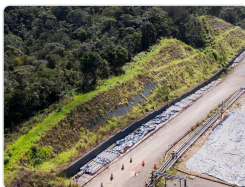**Natural Infrastructure Opportunities Tool**

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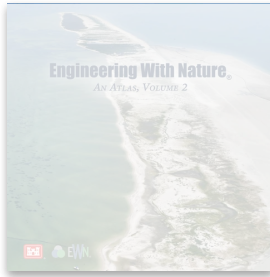
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