

# Stream Restoration Project Hits 'Hole in One' at Delaware Golf Course

A deteriorating stream finds new life through the Ecological Restoration Program.

BY STEVE WILLIAMS

The 18-hole Three Little Bakers Golf Course is nestled in the Pike Creek stream valley of northern Delaware. It is located in an area that geologists refer to as the Piedmont Physiographic Province. For golfers who may be a little rusty on their geology, this term refers to an *uplifted area* in northern Delaware and

southeastern Pennsylvania where elevations reach as high as 400 feet above sea level. This elevated area of gently rolling hills not only offers some challenging fairway shots, but also provides the relief, or changes in elevation, that causes streams in the area to flow at accelerated rates, especially during storm events.

This relief, combined with the pressures from development and increased volumes of water entering the stream system with each rain event, has left a section of Pike Creek that flows through Three Little Bakers in need of some serious attention. For this reason the popular golf course caught the eye of the Ecological Restoration Team of

The lack of streamside vegetation to hold stream banks in place resulted in the undercutting of banks and the loss of fairway and trees. Holes seven, 15, and 16 were impacted on the Three Little Bakers site.



Delaware's Department of Natural Resources and Environmental Control.

Ecological restoration, a proactive environmental movement that's been sweeping the country over the past several years, is a term that more people are hearing about. Typically led by state and federal governmental agencies and non-profit environmental organizations, the goal is to improve the overall quality of our watersheds. With the increase in commercial and residential development over the past two decades, the impacts associated with urban sprawl are starting to take a serious toll on the habitat, water quality, and stream stability in many suburban areas.

Several stream valleys in the northern part of the state are showing some of the tell-tale signs of environmental degradation. Jim Chaconas, an environmental scientist with the Delaware Department of Natural Resources and

Environmental Control, has witnessed some dramatic changes over the past ten years. "I have actually seen some of the stream channels migrate laterally up to five feet in some locations," said Chaconas. "Streams are dynamic systems that are constantly shifting and relocating sediments. The problem is that we see these events occur far too frequently and the streams have no time to reach a state of equilibrium. They are under constant pressure."

Some of the causes can be traced back to the rapid increase in impervious, or hardened, surfaces that are a byproduct of the overdevelopment of watersheds. More rooftops, driveways, roads, and parking lots mean less permeable surfaces available for rainwater to soak into. This causes the volume of surface water runoff associated with each storm event to increase, which in turn results in more water entering waterways at a much faster rate.

The rate at which the runoff is reaching streams, rivers, and even small creeks is resulting in excessive erosion, the destruction of habitat, and water quality degradation. Stream banks are being undercut, channel bottoms are being incised deeper, and large volumes of sediment are being released into waterways and redeposited further downstream.

In an attempt to improve the health of some of Delaware's waters, the Department of Natural Resources' Ecological Restoration Team has been actively restoring degraded rivers and streams since 2001. The first step in the process requires the team to evaluate the condition of the streams. Equipped with tape measures, survey rods, global positioning system (GPS) units, cameras, and scientific instruments, team members have hiked and boated more than 300 miles of streams in northern Delaware. After collecting and studying





Once a grassy field routinely mowed by the golf course maintenance staff (above), a one-acre wetland as created to establish wildlife habitat and filter water from neighboring developments before entering Pike Creek.

the field data, they were able to identify some of the most degraded stream segments in terms of stressed habitat, severity of eroded banks, and lack of streamside vegetation. One of the most stressed stream segments was found along Pike Creek in the area where it flows through the Three Little Bakers Golf Course.

Representatives from the Ecological Restoration Team approached Steve Segui, course superintendent at Three Little Bakers, and discussed some of the environmental issues related to the stream and the concept of stream restoration. Although a little cautious, his initial reaction was optimistic. “We were watching our fairway in the areas of holes seven, 15, and 16 literally disappear before our eyes with each major storm event. The banks were eroding at an extremely rapid rate,” said Segui.

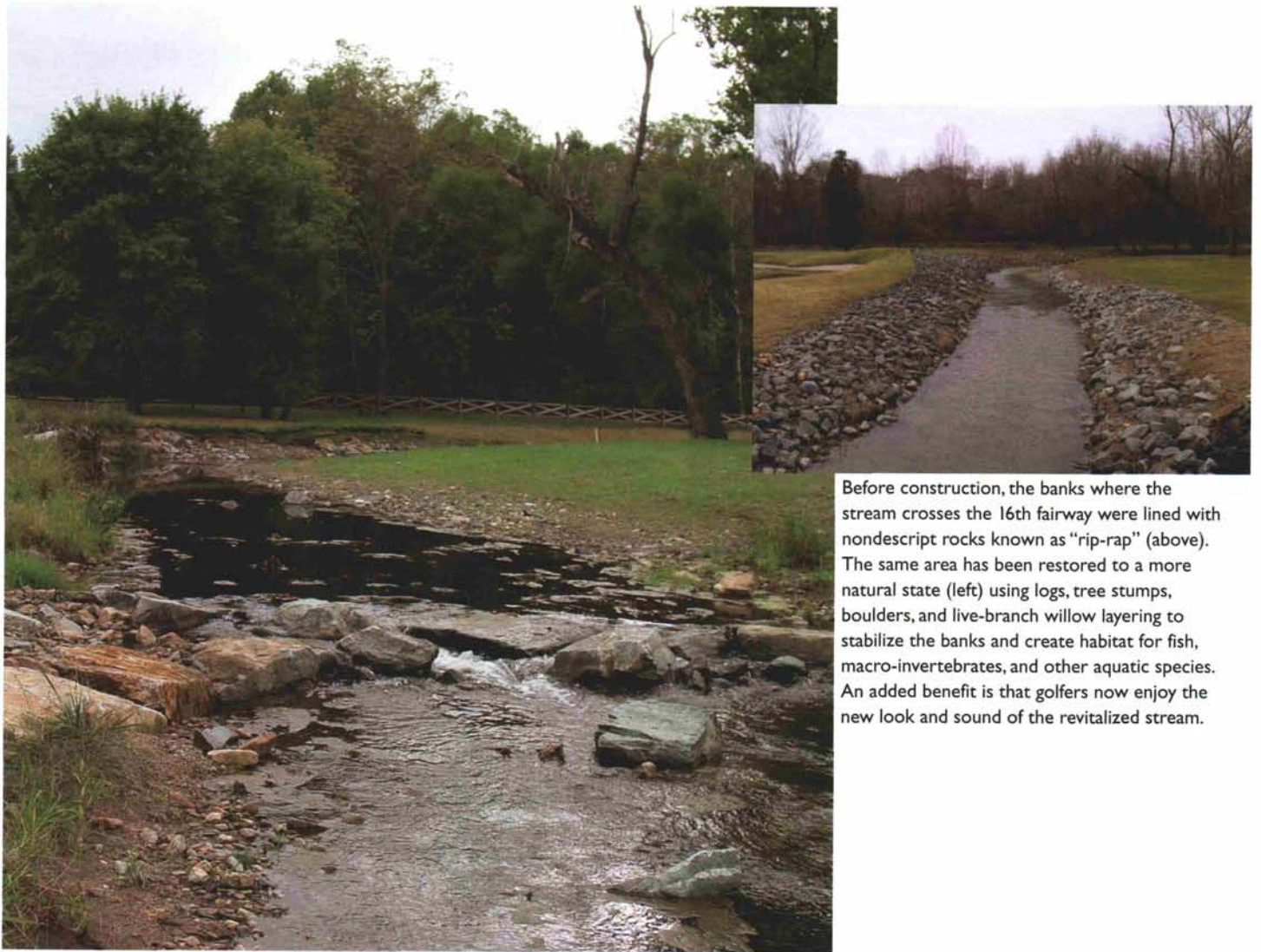
Three Little Bakers golf professional Dick Matthias was in total agreement. “Finding a solution to stabilize the stream banks and improve the environmental conditions of the stream would be nothing but a win-win solution for everyone,” stated Matthias. But the next step was to sell the general manager, Jim Rose, and owner, Hugo Immediato, about the idea of stream restoration.

One can only imagine the look on Mr. Immediato’s face back in 2003 when representatives from the Department of Natural Resources told him that they “would like to apply some state-of-the-art fluvial geomorphological techniques to stabilize the rapidly eroding stream that flows through the golf course.” And if that wasn’t bad enough, they went on to say, “In some areas we want to actually relocate the stream channel.”

“Well, needless to say, the blank expression on his face said it all,” recalls stream restoration expert Vince Sortman with Biohabitats, Inc.

It took several more meetings, presentations, and a lot of educating to help Three Little Bakers management and staff understand what stream restoration was all about. In the end, Mr. Immediato was so excited about the potential outcomes that he willingly assisted with some of the expenses and also applied for grant funding offered by the U.S. Department of Agriculture’s Natural Resources Conservation Service.

As time moved forward, the restoration team became increasingly excited about the possibility of implementing a restoration project in this area because this watershed possessed a number of unique environmental features. It was part of the White Clay Creek water-



Before construction, the banks where the stream crosses the 16th fairway were lined with nondescript rocks known as “rip-rap” (above). The same area has been restored to a more natural state (left) using logs, tree stumps, boulders, and live-branch willow layering to stabilize the banks and create habitat for fish, macro-invertebrates, and other aquatic species. An added benefit is that golfers now enjoy the new look and sound of the revitalized stream.

shed, a designated National Wild & Scenic River System. It was one of the few trout-stocked streams in the state. It provided a habitat corridor in an area of dense development and a potential migratory corridor for the endangered bog turtle. But most importantly, it served as a source of public drinking water.

The team established several goals for the project, including: stabilization of the stream banks to reduce erosion, creation of habitat by putting in sequences of riffles and pools in the stream channel and planting the banks with a large number of native trees and shrubs, improving the water quality,

reducing the number of out-of-bank flooding events, and restoring and maintaining the natural features of the stream.

Over the next two years, the Ecological Restoration Team worked on obtaining the additional funds that were needed to cover the planning and construction costs. The services of Biohabitats, Inc., located in Timonium, Maryland, were secured to assist with the restoration design plans and construction oversight. Departmental personnel busied themselves with obtaining the necessary permits from a host of different federal, state, and local agencies.

By the time 2005 rolled around, everything had come together as planned, and it was time to secure a qualified construction company with experience in stream restoration. After evaluating several companies, the Department awarded the contract to Meadville Land Services, Inc., a mobile restoration company from northwestern Pennsylvania.

In early March 2005, Delaware Governor Ruth Ann Minner kicked off the project at a rainy groundbreaking ceremony, Department of Natural Resources Secretary John Hughes turned the first excavator bucket of soil, and it was time for Meadville’s crew to



go into action. Over the next six months they installed a series of meander bends to reduce flow velocities and a host of restoration structures that not only stabilized the banks and channel bottom but also maintained a natural look to the stream.

By late September, Meadville had restored 5,000 linear feet of Pike Creek, the largest stream restoration project ever undertaken in Delaware. In addition to restoring the stream, three acres of floodplain wetlands were created in several areas adjacent to the stream channel. The largest wetland complex was once a grassy field routinely mowed by the grounds crew.

The final phase of the project involved the planting of more than 3,500

native trees and shrubs along both sides of the stream. These plantings not only help hold the stream banks in place, but they will also eventually create a canopy over the stream. This will create better habitat and improve water quality by shading and cooling the water, resulting in increased levels of oxygen in the water column for fish and other aquatic species. Post-restoration biological monitoring will continue at the site to evaluate fish and macro-invertebrate communities and will be compared to pre-restoration data. This analysis will help determine the effectiveness of the restoration effort and will be considered when planning future projects.

The project took a lot of work and involved a number of partners, including Three Little Bakers, Christina Basin

Clean Water Partnership, U. S. Environmental Protection Agency, Delaware Department of Transportation, Natural Resources Conservation Service, New Castle Conservation District, Partnership for the Delaware Estuary, and the Department of Natural Resources and Environmental Control.

Was the effort worth it? Linda Stapleford, river administrator for the White Clay Creek Wild and Scenic River Program, gives the project high marks. "It has made a significant improvement to the stream and will have positive impacts to the ecological health of the White Clay Creek watershed," she said.

Jim Rose agrees, along with a lot of golfers who were able to watch the entire project unfold as the construction



(Far left) The Three Little Bakers restoration project serves as an excellent outdoor classroom for students, the general public, and environmental professionals.

(Left) There is nothing like the scenic beauty and sound of a babbling stream that came into existence when this sequence of step pools was constructed near the 15th green. It was created to allow for upstream fish passage that was previously impossible because of a concrete structure that existed across the stream channel.

(Below) The six-month-long construction phase was sequenced so that no holes were ever closed to golfers. The ball was always in play!

work was sequenced so that no holes were ever closed. “We are extremely pleased with the positive contributions this project has made to enhance Delaware’s environment as well as what it has done to beautify our course, stabilize our stream banks, and create a more scenic and relaxing setting for the golfing community,” Jim said. “It was so well worth all the long-term planning. This project is truly a ‘hole in one!’”

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