



PENNSYLVANIA



Stream and Wetland Restoration

Introduction and General Description

The loss and degradation of quality fish and wildlife habitat in the United States have generated concerns at the national and state levels over the long term fate of many wildlife species. To combat this destruction and decline, the U.S. Fish and Wildlife Service (Service) implements habitat restoration projects through its Partners for Fish and Wildlife Program (Partners). This voluntary program is designed to restore habitat on private lands through partnerships with other federal, state, and conservation programs. The Partners program provides financial and technical assistance to private landowners through voluntary cooperative agreements. Through these various partnerships, the Service is able to leverage significant financial and in-kind contributions to accomplish more habitat projects with fewer Federal funds.

In Pennsylvania, the Partners program began addressing habitat loss in the late 1980s. Partners projects are focused in watersheds where conservation efforts will provide the greatest benefit for federal trust species, which include: migratory birds,

anadromous (migratory) fish, and threatened and endangered species. The Partners program in Pennsylvania was one of the leading programs in the Nation in designing and implementing streambank fencing and wetland restoration projects, and has more recently become a leader in the field of in-stream assessment and aquatic restoration.

Pennsylvania Activities

- Wetland restoration
- Native grassland establishment and management
- Invasive plant control
- Riparian enhancements via streambank fencing and cattle exclusion
- Restoration, enhancement, protection of habitat for threatened, endangered, and rare species
- In-stream habitat enhancement
- Streambank stabilization and restoration
- Restoration of floodplains
- Restoration of fish habitat
- Dam removal
- Fish passage
- Outdoor classrooms

Habitats of Special Concern

In Pennsylvania, the Service has also worked with its partners to install gates on caves to minimize disturbance to hibernating bats, since wintertime disturbance causes these mammals to expend energy reserves needed to get them through their winter hibernation.

Other projects have included the restoration of timber rattlesnake hibernacula, and enhancement of habitat for the eastern masassauga rattlesnake, a candidate for federal listing as threatened or endangered.

Our habitat restoration projects for the threatened bog turtle have included the mechanical and chemical control of invasive woody vegetation. Treated sites have then been fenced so grazing animals can be used to curtail succession and maintain the open emergent wetlands that this species needs for successful reproduction.

The Partners program in

Pennsylvania has also completed projects to increase breeding habitat for American bitterns, green herons, black ducks, American woodcock, golden-winged warblers, and grasshopper sparrows, all of which are migratory bird species of special concern.

Threats

Since European settlement began in the 1600s, Pennsylvania's vast forests, wetlands, streams, and grasslands have fueled the Commonwealth's growth and development. Natural resources were exhausted or degraded as the landscape was changed to make room for agricultural and urban development. More than half of Pennsylvania's wetlands were drained or filled, 99 percent of its native grasslands were converted to other uses, more than 5,000 dams were constructed that blocked fish movement, and miles of stream were channelized. In addition, its extensive hemlock-white pine and hardwood forests were cut and cleared.



Fishing on Restored Pennsylvania Trout Stream

As these habitats changed, so did the fish and wildlife populations that relied on them, leading to declines in waterfowl, grassland nesting birds, anadromous fish, and many forest dependent species.

Today, rapidly increasing urbanization, energy development, and industrialization are moving into remaining native habitats and farmed areas, thereby reducing opportunities for both conservation and restoration of fish and wildlife.

Conservation Strategies

Wetlands

The Partners program in Pennsylvania focuses on restoration of wetlands because of their importance to many federal trust species such as migratory birds. Restoration methods focus on returning hydrology to formerly drained wetlands by removing or disabling field drainage tiles, plugging drainage ditches, and



Bog Turtle Habitat Restoration

constructing low berms to further inhibit drainage. Restoration projects are carefully crafted to blend into the surrounding landscape, and involve a variety of techniques, including creating micro-topography; incorporating small, seasonal wetland complexes; and restoring larger, permanent wetlands.

Wetland restoration projects have been a top priority in our Northwest (Lake Erie coastal plain and the glaciated areas of northwestern Pennsylvania) and Lower Susquehanna River (intensive agricultural areas of southcentral Pennsylvania) focus areas. These areas include more extensive hydric soils and the dense breeding populations of waterfowl in the Commonwealth.

The cost of an individual wetland restoration project varies according to the techniques employed, but averages about \$1,000 per acre.

Grasslands

Grasslands are an essential component of nesting habitat for many species of migratory birds. The decline of grassland bird species such as the bobolink and eastern meadowlark, is directly linked to the decline of grasslands in the Northeast. The Service has

cooperated with numerous partners to promote the use of native grasses in agricultural programs, including rotational grazing systems. Other grassland management techniques include mowing, burning, planting both warm-season and cool-season grasses, and removing invasive plant species.

The focus area for grassland habitat restoration is in our Upper and Lower Susquehanna River focus areas. This watershed supports some of the largest populations of migratory birds dependent upon grassland and early succession scrub/shrub habitats for nesting cover.

Grassland restorations typically cost \$250 to \$500 per acre.

Streams and Riparian Areas

Pennsylvania's streams and riparian (streamside) areas support fish, mussels, and amphibians, and serve as corridors connecting fish and wildlife communities.

However, many Pennsylvania streams have been dredged and straightened, and then "armored" with stone or other man-made materials. Because these areas are also flood-prone and usually inhabited, flood damage costs are often high, and the response has been additional dredging and straightening – an endless cycle of stream degradation.

In agricultural areas, hundreds of miles of streams and their riparian areas have also been degraded by over a hundred years of intensive livestock grazing.

We have found streambank fencing to be a cost-effective technique for halting stream degradation that is popular with landowners. We provide the equipment and labor to control livestock access to streams and Stream-side habitat, at a typical installation cost of \$1.25 per linear foot. Fencing out livestock restores excellent habitat for fish and wildlife, while reducing concentrations of sediments and nutrients in streams that are tributary to the Susquehanna River and Chesapeake Bay. Our Partners program also provides tree seedlings to landowners to establish woody riparian buffers, at a cost of \$1.50 per linear foot to plant.



Riparian Fencing and Crossing

Our in-stream restoration work also applies the concept of "natural channel design," a cost-effective approach that improves fish and wildlife habitat, and stabilizes the stream channel. Although this state-of-the-art approach requires special expertise, it has paid off in many Pennsylvania streams, where we have collaborated with other agencies and organizations to construct a number of large-scale demonstration projects. These techniques are more costly than other aquatic habitat restoration projects (typically \$50 to 100 per linear foot), but

they are much more cost-effective and less environmentally damaging than traditional stream channelization projects.

Invasive Species

Our Partners program works to eliminate, control and manage a host of invasive plant species on its projects. Examples of problem species include multiflora rose, autumn olive, Japanese barberry and tree-of-heaven on upland sites, and purple loosestrife and reed canarygrass in restored wetlands. Effective control methods include mechanical (mowing and cutting), chemical (herbicide spray, stump painting, and tree injection), and biological (encouraging rose-rose disease and releasing plant-specific insects). Typical cost for the initial removal of invasive vegetation is approximately \$400 per acre.

Farming for Wildlife and Profit

The Service recognizes the value of agricultural lands to wildlife, and works with landowners to ensure their farms are both economically and biologically productive. Our Partners program also improves the effectiveness of U.S. Department of Agriculture (USDA) Farm Bill conservation programs by providing the technical expertise needed to select projects, recommend restoration methods, and assist in cost-effective, on-the-ground project delivery. The expertise of Partners program staff is valued by the USDA, and we have added high-quality fish and wildlife habitat to

thousands of acres of farmland in Pennsylvania.

Outdoor Classrooms

Our Partners program staff works with schools, nature centers, partner agencies and organizations, and private



BEFORE: 10-Acre Corn Field



AFTER: 12-Acre Emergent Wetland

landowners to restore and enhance fish and wildlife habitat as part of local educational and recreational programs. Connecting with today's youth through the use of these outdoor classrooms is a valuable tool to promote a conservation ethic and educate future leaders in this field. We also leverage project funds through these connections, with an average contribution of \$4,000 per project.

Partners

Natural Resources

Conservation Service
Farm Service Agency
National Fish and Wildlife Foundation
National Park Service
Pennsylvania Fish and Boat Commission
Pennsylvania Game Commission
Pennsylvania Department of Transportation
County Conservation Districts
Pennsylvania Department of Environmental Protection
Pennsylvania Department of Conservation and Natural Resources
California University of Pennsylvania
Pennsylvania State University
Allegheny College
Elizabethtown College
Edinboro University
University of Pittsburgh
Lycoming College
Chester County Parks and Recreation
Ducks Unlimited
The Nature Conservancy
Audubon Society
Trout Unlimited
American Rivers
Pheasants Forever
Ruffed Grouse Society
Chesapeake Bay Foundation
Wildlife for Everyone Foundation
Clearwater Conservancy
Penns Valley Conservation Association
Kettle Creek Watershed Association
Tri-County Conewago Creek Association
Fishing Creek Watershed Association
Northwest Pennsylvania Duck Hunters Association
Susquehanna Waterfowlers Association
Milton High School
Keystone Central School District

State College Area School District
Private industry
Private landowners
Various municipalities

Accomplishments

- Since 1988, wildlife habitat has been restored, enhanced, or protected on 1,563 privately-owned sites, including:
- over 6,300 acres of wetlands
- 7,630 acres of upland habitat, with the majority in native warm season grasses
- nearly 300 miles of riparian buffers, primarily through streambank fencing
- planting over 400,000 tree and shrub seedlings
- over 35 miles of in-stream habitat
- nearly 560 acres of invasive plant control
- approximately 30 acres of bog turtle habitat at six sites
- six educational restoration projects, and 2 recreational facilities at project sites

Future Needs

- Restore, enhance and protect 5,000 miles of riparian habitat.
- Restore, enhance, and stabilize 2,000 miles of in-stream habitat.
- Restore 30,000 acres of wetlands in Pennsylvania, with a focus on the Chesapeake Bay watershed.
- Control and manage invasive vegetation on

250,000 acres of private land.

- Restore, protect, and/or enhance bog turtle habitat on private lands in southeast Pennsylvania.
- Reach out to non-traditional partners (coal mining, timber, and recreational industries) to

develop partnerships to restore, enhance, and protect habitat for a variety of federal trust species.

- Work with 300,000 private landowners across Pennsylvania to improve fish and wildlife habitat.

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