

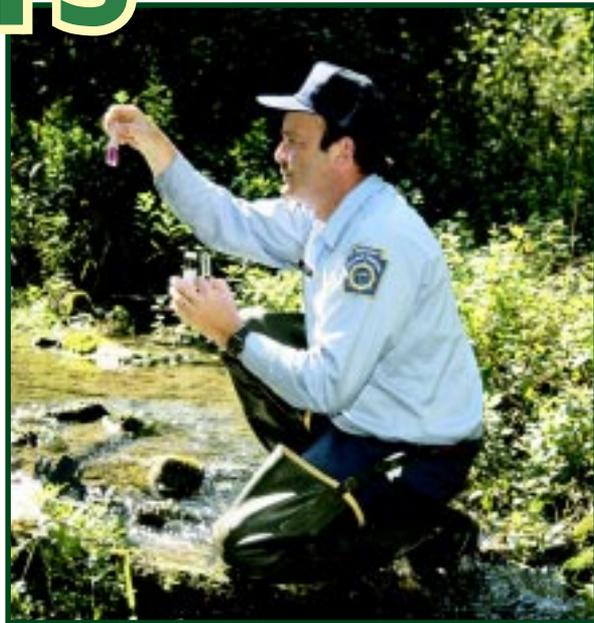
Area Fisheries Managers and Habitat

by Bob Moase, Area 4 Fisheries Manager

Fisheries management as we know it today is a young profession. Even though our fisheries resources have been manipulated since our nation was

founded, the application of science to address fisheries problems did not begin in

earnest until after World War II. Many of the returning GIs took advantage of the GI Bill of Rights that gave them the opportunity to further their education. Some of these veterans looked to the natural resources field, and it wasn't long before there was a supply of fisheries workers. A second important event occurred in 1950, when the Federal Aid in Sport Fish Restoration Act was passed by Congress. This act, also known as the Dingell-Johnson Act, created a 10 percent excise tax on fishing equipment that provided dedicated funds to states to create and improve their recreational fisheries. An educated work force and the availability of funds were fertile ground for fisheries programs.



Fisheries biologist Steve Kepler measures the pH in Lick Run, Centre County.

photo-Art Michaels



This article is the first in a year-long series of articles on the theme of "habitat." This theme is one of the original major topics of concern in the Conserve 2000 program. "Habitat" was chosen so that we could examine the topic more closely in 2001. In this article, Commission Area 4 Fisheries Manager Bob Moase explains the role of Commission area fisheries managers and some of their habitat change success stories.

Area fisheries managers contribute to sound management decisions by gaining knowledge about various habitats. Background photo: Delaware River, Delaware Water Gap National Recreation Area south of Stroudsburg. Lower left inset photo: Fisheries technician Bob Weber and summer intern Susan Avau record information on fish gathered through electrofishing at Cedar Run, Tioga County. Lower right inset photo: Area 6 Fisheries Manager Mike Kaufmann (left) and fisheries technician Bryan Chikotas weigh and measure yellow perch from trapnetting at Marsh Creek Lake, Marsh Creek State Park.



Area Fisheries Managers and Habitat

Just exactly what is fisheries management and what does a fisheries manager do? One generic explanation is this: The application of scientific knowledge to produce fisheries products. If fisheries management is the application of scientific knowledge that results in the production of fisheries products, it follows that a fisheries manager applies scientific knowledge to a

fisheries with a reasonable expectation of producing benefits or fisheries products. What might some of these products be? Fisheries products may be fish in a creel, an increase in the average size of a panfish population, a reduction in the rate of hooking mortality, lesser aquatic vegetation in a lake, or perhaps more vegetation, opportunities for the public to view fish at a fishway, or even the reintroduction of an extirpated species.

One of the ways that fisheries managers produce fisheries products is by manipulating habitats, both aquatic and terrestrial. Changing habitats and their environments produces benefits. Before considering the changes to habitats and environments, it's important to understand the difference between the two. Habitat is simply that place where a particular plant or animal normally lives. The environment can be thought of as something functional, a stimuli that can evoke a response. The environment in a habitat dictates the quality of the habitat.

The habitat-environment relationship can be confusing because these terms are often used incorrectly. The following example, a make-believe trout stream, may help. This particular stream is trout habitat from top to bottom. That is, trout would normally be found in this stream. When we look at the entire length of stream, we find that the environment throughout differs widely. The headwaters are a tumbling mountain stream with high velocities and cold, infertile water. The middle section is lower-gradient with increased volume and fertility. Nearer the stream mouth, the pools are much longer. They are separated by short riffles, with summer temperatures that often approach the mid-70s. This example is one trout stream, one habitat, but it has many stimuli, or environmental factors, throughout. In many cases, the most difficult aspect of planning a habitat improvement project is



Colyer Lake, Centre County. The lake's infertility kept fish small. An aggressive program included draining the lake and applying some 300 tons of limestone to the lake's bed. The result: Improvement in the growth and abundance of largemouth bass and bluegills.

correctly identifying the environmental factor(s) that when altered will achieve the greatest benefit.

An important ecological concept to keep in mind when discussing habitats, their manipulation and improvement is this: Any manipulation that does not result in a change to the environment of the habitat will have no effect on the target species. In addition, if the environmental change does not result in a response by the target species, there will be no gain in fisheries products or benefits to the resource user. It is possible to cause an environmental change to a habitat only to discover that it caused a

negative response, or perhaps, no response.

Recognition of habitats, knowledge of the environments in these habitats and approaches to alter environments in a positive way allow fisheries managers to make sound management decisions that result in fisheries benefits. Consider some of the problems that face aquatic habitats and see how fisheries managers address these problems, thereby increasing the quantity, quality and diversity of fisheries products.

Because many challenges of managing aquatic resources begin outside of the water, we'll first look beyond the water's edge. Every waterway, regardless of its size, has a landmass associated with it. This landmass is referred to as a "watershed," or "drainage basin." The Susquehanna River, for example, has a watershed of 26,988 square miles; Letort Spring Run in Cumberland County has a watershed of only 21.7 square miles. Land use practices in a watershed or drainage basin have an effect on the receiving water.

Sediment resulting from erosion is the number one pollutant by volume to the surface waters of Pennsylvania. It is regarded as the greatest source of water pollution in the United States. Soil disturbances routinely result from agriculture, silviculture, mineral extraction, highway construction and maintenance, and the urbanization of rural areas.

Excess sediments degrade aquatic habitats in several ways. Turbidity resulting from sediments can decrease the amount of solar radiation, vital for primary productivity. The abrasive action of sediment can scour stream bottoms of algae and decrease the feeding efficiency of fish. Sediment can also smother spawning sites. In extreme cases, it causes fish kills.

Rates of sediment transport from land uses vary. An undisturbed forest yields 24-tons/square mile/year. A

construction site can yield up to 48,000-tons/square mile/year. That's 2,000 times the amount from the undisturbed forest!

A second area of concern relates to the watershed's ability to produce water and the cycle of release. Watersheds with high percentages of forest and wetlands tend to have stable flows throughout the year. Disturbed watersheds experience big changes in their flows. Runoff from a parking lot can be nearly 16 times that produced by an equivalent amount of undeveloped meadow.

As we approach the water's edge, the condition of the riparian (shoreline) zone can also have a great effect on the environment of the nearby aquatic habitat. Riparian vegetation can stabilize banks and stream morphology. It can also filter out sediments and provide bank cover. Shoreline plants also maintain cooler water temperature in the summer and warmer temperature in the winter.

Another area that needs to be considered is outside of watershed influences. If we were to look at a figure of the hydrologic cycle, we see that much of the water that a watershed received arrives from outside of the watershed. In recent decades, we have become increasingly aware of how outside-of-basin influences can have an effect on water quality. We are all too familiar with the airborne pollutants that have lowered the pH of precipitation and its negative effect on poorly buffered aquatic systems.

An interesting illustration of just how far material can be transported was recently revealed by a sequence of satellite photographs. The photographs show a cloud of dust from a desert dust storm in China. The dust was transported all the way to the west coast of North America.

Another across-watershed activity that has become an issue is the diversion of water from one watershed to another. The transfer of water from one watershed into another presents a host of environmental changes to both the receiving and donor watersheds.

To address many of these problems that arise away from the waters, a fisheries manager's most effective tool is communication. The process can involve a meeting with a private landowner, county agent, district forester, or township supervisor. It can also include providing expert testimony. Of course, sharing information takes many forms. It can have a significant effect on the ultimate fate of our aquatic habitats. Many habitat changes that have resulted in positive benefits have involved the sharing of information, development of partnerships and maintaining effective communication among the partners.

Consider some specific habitat changes statewide:

Northwest

One example of habitat manipulation deals with the effect that dredging has had on sections of the Allegheny River. In 1999, the U.S. Army Corp of Engineers completed some major repair work on lock 7 structure. The concrete rubble from this repair work may have ended up in a landfill. But at the urging of the fisheries manager, the rubble was used to construct an artificial reef in Pool 7. The com-

pleted structure is about six feet high and 175 feet long. It is located well within the reach of shore anglers. This physical structure will not only benefit the pool's fish community, but it will also improve angling opportunities.

Southeast

Most of the streams in southeast Pennsylvania are warmwater and can be used only on a seasonal basis as a trout fishery. Tulpehocken Creek in Berks County was no exception with its warmwater sunfish community. In the late 1970s, impounding Tulpehocken Creek created Blue Marsh Lake. Arrangements were made with the U.S. Army Corps of Engineers for a cold-water bottom release. A catchable trout program was initiated in the tailrace in 1980. Later, changes were made to the release regime, and the trout program shifted from a catchable program to a Delayed-Harvest, Artificial-Lures-Only program that is sustained with fingerling trout. This once warmwater fishery is now one of the most popular trout waters in Pennsylvania.

Northeast

Throughout the state, the over-abundance of aquatic vegetation has had a great effect on fish communities and resource users. Harris Pond in Luzerne County was just such a lake. Throughout the mid-1990s, aquatic vegetation was congesting more than 65 percent of the lake's surface by mid-summer. This created problems for anglers, boaters and the lake's fish community. An evaluation of the problem determined that the introduction of triploid grass carp was feasible. Sterile grass carp were introduced in 1997. This plan has since resulted in a decrease in vegetation that in turn has resulted in improvements in the lake's largemouth bass population.

Southwest

Shawnee Lake in Bedford County and Lake Somerset in Somerset County also had aquatic vegetation problems that were affecting their fish communities. The approach taken at these two lakes involved lowering the lake level during the winter. By lowering the lake level, aquatic vegetation was exposed to winter freezing and drying. This action has not only decreased the abundance of aquatic vegetation, but it has also increased the abundance of large panfish.

Central

The problem with Colyer Lake in Centre County was infertility. Just as a vegetable garden will not produce a good crop without the necessary nutrients, the fish in Colyer Lake were small. An aggressive program was initiated in 1986 that involved draining the lake and application of 300 tons of limestone to the lake's bed. This action has resulted in an increase in the lake's aquatic vegetation as well as a great improvement in the growth and abundance of largemouth bass and bluegills.

These examples are just a few of the many habitat manipulations that have resulted in the production of fisheries benefits. As our knowledge of the habitat-environmental relationship increases, so too will the effectiveness of our habitat manipulations. □