Who are these front-line health care providers for Illinois' streams?

Stream Detectives

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Teams of biologists venture afield each year to survey the rivers and streams of Illinois.

They face challenges—angry water snakes, blistering July and August heat, summer thunderstorms and blood-sucking mosquitos and ticks.

They haul equipment ranging from waders and shocking boats to backpack electrofishing units and minnow seines. Their goal is simple: to capture all fish species in proportion to their relative abundances at that site.

By comparing the data collected with data from the last survey—surveys on the 33 major Illinois basins are repeated every 5 years and the third round of surveys was completed in 2005—biologists ascertain changes in fish abundance and habitat conditions within the watershed.

Give one of these stream detectives a list of fish found in a stretch of water and they can characterize the habitat.

Shorthead redhorse and orangethroat darters present? The stream contains shallow water with turbulent flow (riffles) and gravel that these fish attach their eggs to. Collectively, these fish are called mineral substrate spawners.

Largemouth bass more prominent than smallmouth bass? The stream has slow flow rates and a mud or clay bottom. Smallmouth bass prefer swift-flowing streams with coarse, rock substrates

Electric seines are used to sample wadeable streams and require five or six operators. These seines are powered by a portable generator connected to a 30-foot electric supply cord with numerous small electrodes dangling from it.

Netters walking behind the seine capture stunned fish and transfer them to an oxygenated tank for processing.

where their prey, invertebrates and small fish, reside.

Survey reveals populations of rainbow darters, slender madtoms, northern hogsuckers and bigeye shiners? Such fish are intolerant of stream habitat degradation and pollution. For example, the bigeye shiner cannot survive in turbid water because it relies on vision for feeding and reproduction.

If red shiners, white suckers and green sunfish are the predominant species, fisheries biologists know that the stream has suffered serious habitat degradation and/or pollution. These species are tolerant of a variety of stream conditions.

"A little bit of art goes into the science of fish sampling to determine if what you're seeing is an accurate representation of the fish community," said Mike Conlin, chief of the Department of Natural Resources' Office of Resource Conservation.

Illinois has a detailed record of river and stream fish populations which reflects the effects of pollution and Illinois landscape changes over the past 100 years.

Stephen A. Forbes and Robert Earl Richardson's landmark "Fishes of Illinois," published in 1908, was the first-ever documentation of fish species distributions using range maps where the occurrence of each species is represented by a dot on the map. The Illinois Natural History Survey fish collection houses Illinois stream fish specimens from the 1800s to the present.

The DNR Division of Fisheries began organized efforts to sample stream systems in the 1960s. Those samples allowed comparison of fish species distributions over a 40-year time period and were included in Philip Smith's 1979 book "The Fishes of Illinois."

Today's cooperative basin surveys—Illinois Environmental Protection Agency staff assesses in-stream habitat, water and sediment chemistry and macroinvertebrate populations while DNR is responsible for fish community assessment—started in 1981. The initial statewide coverage was completed in 1995.

Simply stated, the river and stream teams are health-care providers for our streams, and basin surveys are the regular check-up that allows biologists to monitor conditions within the watershed.

Larger fish are individually measured and weighed and released back to the stream. Smaller fish require closer examination for species identification, often with a dissecting microscope.

DNR is responsible for sampling fish populations, while the Illinois Environmental Protection Agency samples insects and other aquatic macroinvertebrates.

"Streams are accumulation points of everything going on in the drainage system and collection of data in a scientifically sound manner allows us to know when to sound the alarm, and when not to," Conlin explained. "Having a long-term data set within each watershed lets us recognize when things are going bad, and also when changes are normal, cyclic changes that occur within the population of any given species."

Surveys identify both outstanding and impaired stream resources, and biologists can then apply specific management, protection or restoration efforts toward those systems.

Fish distribution records also allow a continuous record of species occurrences that can be used to document expanding ranges of exotic species, such as the Asian carps, and changes in populations of sport fishes and rare species.

During the 2007 survey of the West Fork of Richland Creek (Kaskaskia River basin, St. Clair County), the first-ever interior Illinois stream record of the northern studfish (*Fundulus catenatus*) was collected. Fish experts think this topminnow probably represents a legitimate expansion of the species from its Missouri, Kentucky and Tennessee range. If so, the 3-inch fish may have swam more than 40 miles to reach the sampling site.

Basin survey results also are used to determine sport fishing opportunities. It also is used as background data when evaluating proposals to alter the landscape, such as U.S Army Corps of Engineers Section 404 Permits for construction activities in wetlands.

Basin survey data is a means of evaluating the health of Illinois stream systems, and examining trends within those systems. Stream conditions reflect the physical and biological characteristics of the watershed—and indicate the state of the environment.

Basin surveys are funded through U.S. Fish and Wildlife Service Federal Aid monies. Results of basin surveys can be found at www.ifishillinois.org.

What trends are occurring?

A notable improvement in water quality has occurred since implementation of the Federal Clean Water Act in the 1970s.

In rural Illinois, this is primarily the result of improved municipal sewage treatment facilities. Non-point source pollution has been a more recent target of both state and federal water quality and conservation programs and as a result, some improvement in biotic integrity of the Illinois River and other central Illinois streams has been documented between surveys conducted in the 1980s and the 1990s.

The effects of agricultural set-aside programs hold promise for streams in the Illinois River Basin because they target restoration of floodplain and riparian land critical to physical and biological stream functions. Landowners in Illinois have improved their land stewardship by implementing more efficient soil conservation practices which has resulted in less soil erosion on the land and less sedimentation reaching Illinois' rivers.

Negative trends noted by basin survey data have been attributed to urbanization. The percentage of urban land in a watershed has been negatively correlated with the biotic integrity of that stream. Although most notable in northeastern Illinois, urban sprawl is a statewide problem. When more impervious surface replaces native soils and vegetation, precipitation runoff increases and infiltration into groundwater decreases. The result is more destructive flooding, greater stream channel erosion and lower groundwater levels that exacerbate drought stress on stream organisms.