

Ruffe

A new threat to our fisheries

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The Great Lakes Sea Grant Network is a cooperative program of the Illinois-Indiana, Michigan, Minnesota, New York, Ohio, and Wisconsin Sea Grant programs. Sea Grant is a university-based program designed to support greater knowledge and wise use of the Great Lakes and ocean resources.

Through its network of advisory agents, researchers, educators and communicators, the Great Lakes Sea Grant Network supplies the region with usable solutions to pressing problems and provides basic information needed to better manage the Great Lakes for both present and future generations.

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Troutperch drawing: ©1975, Dr. W.B. Scott, used with permission.

Yellowperch drawing © 1957, Samuel Eddy, Wm. C. Brown Publishers, used with permission.

Graphs created from information found in *Trophic Relations of Ruffe* (*Gymnocephalus cernuus*) in the St. Louis River Harbor, Lake Superior by Derek Ogle, June 1992.

Ruffe *Gymnocephalus cernuus*

The ruffe (pronounced ruff), is a small but aggressive fish species native to Eurasia. It was introduced into Lake Superior in the mid-1980s in the ballast water of an ocean-going vessel.

Because the ruffe matures quickly, has a high reproductive capacity, and adapts to a wide variety of environments, it is considered a serious threat to commercial and sport fishing. It also has the potential to seriously disrupt the delicate predator/prey balance vital to sustaining a healthy fishery.

Effects of the ruffe on other species

Explosive growth of the ruffe population means less food and space in the ecosystem for other fish with similar diets and feeding habits. Because of this, walleye, perch, and a number of small forage fish species are seriously threatened by continued expansion of the ruffe's range.

While it is too early to tell exactly how the ruffe will affect other fish in the St. Louis River, its numbers have increased dramatically while other species, especially emerald shiner, yellow perch, and trout perch, have declined. It would be easy to blame all of these changes on the ruffe, but some could be the result of natural fluctuations, fishing pressure, or fisheries management practices.

How fast is the ruffe spreading?

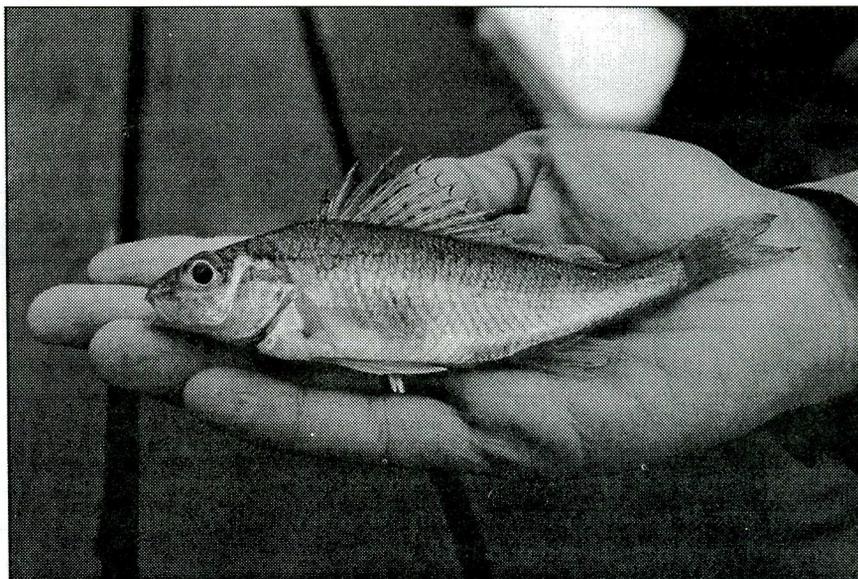
Ruffe were first collected in the Duluth/Superior harbor area of Lake Superior in 1986 during a routine analysis of the local fishery. Although officially identified in 1987, ruffe were probably introduced about 1985. In the short time since its introduction, the ruffe has become the most numerous fish in the St. Louis River. As of 1993, the ruffe has spread east along Lake Superior's coast to the Sand River in northern

Wisconsin, and north to Thunder Bay, Ontario. Ruffe probably moved across the lake to Thunder Bay via intralake ballast exchange. So far, Lake Superior is the only place ruffe were found in the Western Hemisphere. The ruffe's ability to move from lake to lake in ships' ballast, however, will make it difficult to prevent the fish from expanding its range to the lower Great Lakes.

Control strategies in the St. Louis River

Fisheries managers first tried to control ruffe by increasing their number of predators, especially walleye and northern pike. They did this by limiting sport catches of these species, and stocking walleye and northern pike. Early results of the predator stocking program have been disappointing, but it is too early to judge the effectiveness of this approach since fish often take several years to switch to a new food source.

Researchers analyzed stomach samples of the predators and found very few ruffe in walleye and northern pike stomachs. Bullheads appear to be the only species that consistently eat ruffe. Research suggests that predators stocked to control ruffe may not eat them because they prefer soft-rayed shiners and small hard-rayed fish like darters and young perch. This could explain the increase in ruffe and reduction in these forage species.



The average adult ruffe is 4 to 6 inches long.

The battle to keep the ruffe from spreading is being fought on several fronts. For instance, poison will be used to eradicate ruffe when the fish is found in small numbers at a new location. Poisoning was considered for areas where the ruffe is firmly entrenched, but was ruled out. As one researcher said, "The cost would have been staggering, and it probably would have failed. All it takes is one pair of ruffe to survive and the problem starts all over again."

Chemical controls that kill ruffe but leave other species unharmed are being sought. For instance, researchers are exploring the possibility that the ruffe is susceptible to low doses of the lampricide TFM, a chemical that in low doses kills lamprey but not other fish. Recent field tests have shown that treating streams with TFM for lamprey control kills a high percentage of the ruffe. TFM, however, is registered for use on lamprey only. Fisheries managers have also considered a program to net and destroy as many ruffe as possible in the St. Louis River, on the theory that the ruffe's range would not expand as rapidly if populations were controlled.

Fisheries managers will plan eradication and control measures for Lake Superior rivers and streams on a case-by-case basis. The overall goal, however, is to contain ruffe to the western part of Lake Superior. To keep ruffe from spreading to the other Great Lakes, the Lake Carriers Association developed voluntary guidelines for handling ballast water in Great Lakes ships. Under these new guidelines, ships going to other Great Lakes are required to exchange ballast in deep (at least 240 feet) water west of a demarcation line between Ontonagon, Michigan and Grand Portage, Minnesota and at least five miles from the south shore of Lake Superior.

What do we really know about ruffe?

Because ruffe are so new to North America, fisheries managers rely on European studies that describe their life cycle and habits. Even with these data, it is difficult to predict how an exotic species will act in a new environment.

In Europe, the ruffe generally matures in two or three years, but it may mature in one year in warmer waters. It spawns between mid-April and July, depending on location, water temperature, and preferred habitat. A female ruffe lives an average of seven years, but may live up to 11 years. Males live up to seven years but average three to five years.

The ruffe's range includes northeastern France, England, the rivers entering the Baltic and White Seas, most of Siberia, and the Baltic Sea. Before coming to North America, the ruffe's most recent expansion was to Loch Lomond, Scotland where it may have been responsible for dramatic declines in the local perch population.

A hearty species

The ruffe can thrive in a wide range of temperatures and habitat. It has a faster first-year growth rate than most of its competitors. It starts reproducing at age two or three, but can

reproduce after the first year in warmer waters. An average female can produce 13,000 to 200,000 eggs per season. Due in part to its hearty reproductive rate, ruffe populations can explode quickly.

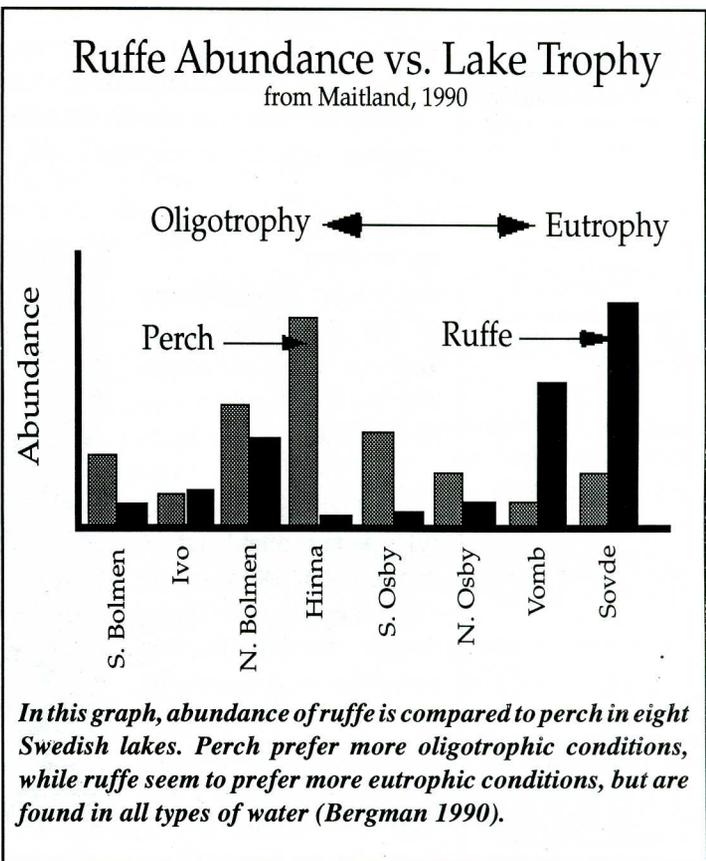
In Europe, the ruffe is found in fresh and brackish (salinity less than 3-5 ppm) waters and in all types of lakes—from deep, cold, and clear to shallow, warm, and full of nutrients. In rivers, the ruffe prefers slower-moving water; in lakes, it prefers turbid areas and soft bottoms, usually without vegetation.

Unlike other perch species, the ruffe is more tolerant of murky, nutrient-rich (eutrophic), conditions (see graph below). Like walleye, the ruffe spends its days in deeper water and moves to the shallows to feed at night.

To avoid predators, the ruffe prefers darkness. Although it has poor eyesight, the ruffe's head has a well developed system of bone canals that contain sensory organs called "neuromasts." Such organs are common among perch species in early life stages, but they tend to atrophy as the fish reach adulthood. In adult ruffe, however, these sensory organs continue to detect water vibrations given off by both predators and prey.

Do ruffe eat other fish's eggs?

In Europe, the ruffe is known to eat other fish's eggs, but its main diet consists of small water insects and larvae found primarily in the bottom (benthic) layer of the water column. In the St. Louis River, an important hatchery area for many Lake Superior fish, ruffe stomach samples reveal few fish



eggs. But the ruffe is an opportunistic feeder and will eat almost anything. So far, the ruffe seems to have the same basic diet of insects and larvae it has in its native Eurasian environment. While fish eggs do not seem to be part of the ruffe's regular diet in the St. Louis River, that's no guarantee fish that eggs won't be part of the ruffe's diet in other North American habitats.

The "bottleneck effect"

Whether ruffe feed on fish eggs may be less important than whether ruffe eat the food preferred by other fish. Because of its sheer numbers and the variety of food it eats, the ruffe will reduce food sources for many fish species. If the ruffe, in turn, is not eaten by native predators—or if young predator fish starve before they get big enough to eat ruffe, the result will be an explosion of ruffe and population bottlenecks in other species.

For example, recently hatched yellow perch must consume large amounts of plankton in a fairly short time in order to

grow to the next stage. At stage two, yellow perch must eat larger food items—small crustaceans and insects—abundant near the bottom of the water column. Only after passing these two hurdles do yellow perch get big enough to eat other fish. If the ruffe interrupts either growth stage by reducing the food supply just as the yellow perch need it (an ecological bottleneck), the yellow perch population will crash.

What you can do

Because ruffe could easily spread to inland waters, the Minnesota and Wisconsin departments of natural resources enforce regulations that make it illegal to transport ruffe, dead or alive. As with any exotic species, boaters and anglers must take precautions so that they don't accidentally transport ruffe.

The ruffe cannot be used as bait by anglers, and bait dealers who trap in areas infested with ruffe should take special precautions to insure they are not contributing to the spread of this exotic species.

What does a ruffe look like?

The ruffe is a small fish that resembles a yellow perch with walleye markings. In fact, it is a member of the perch family. An adult ruffe is about five to six inches long; it rarely exceeds 10 inches. At first glance, ruffe can resemble young walleye, yellow perch, johnny darter, or troutperch, but there are ways to tell the difference.

The most obvious differences are the ruffe's large, continuous dorsal fin and its slightly downturned mouth.

The average ruffe is small, only 4-6 inches long (see ruffe illustration).

The ruffe is a member of the perch family so

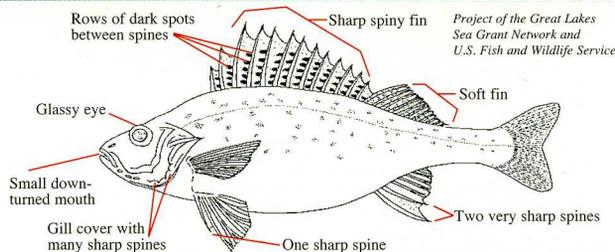
- it has spiny dorsal and anal fins and
- it has two fins on top. The front fin has hard and sharp spines (also called rays) and the back fin has soft rays.

The ruffe is different from other perch (see yellow perch illustration) because

- it has a very large dorsal fin, joined together, front and back, with 11-16 spines in front,
- it has a slightly downturned mouth, and
- it has no scales on its head.

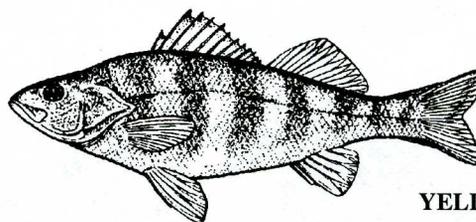
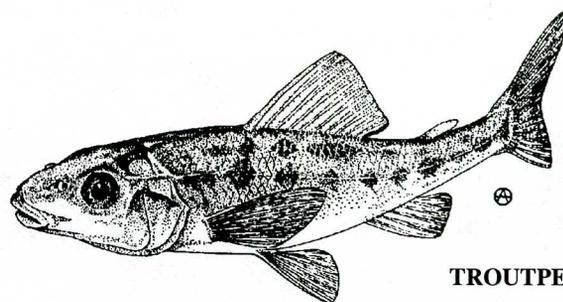
Don't mistake ruffe for troutperch (see illustration). Troutperch are a soft-rayed fish with a single top fin, and are smaller than ruffe.

How to Identify Eurasian Ruffe (adult shown)



General Characteristics

- Very slimy when handled
- Usually less than 6 inches (15.5 cm) long
- Perch-like body shape



The Ruffe

The Eurasian ruffe (rhymes with tough) may pose a serious ecological threat to water environments and to sport and commercial fishing. This invader may compete with native fish for food and habitat. First reported in western Lake Superior in 1986, the ruffe population has rapidly increased in the St. Louis area and is spreading to other rivers and bays along the western shore of Lake Superior.

There is great concern over the spread of ruffe in North American waters. Efforts are being made to help slow or restrict the spread of ruffe and to prevent the spread of ruffe.

What you can do

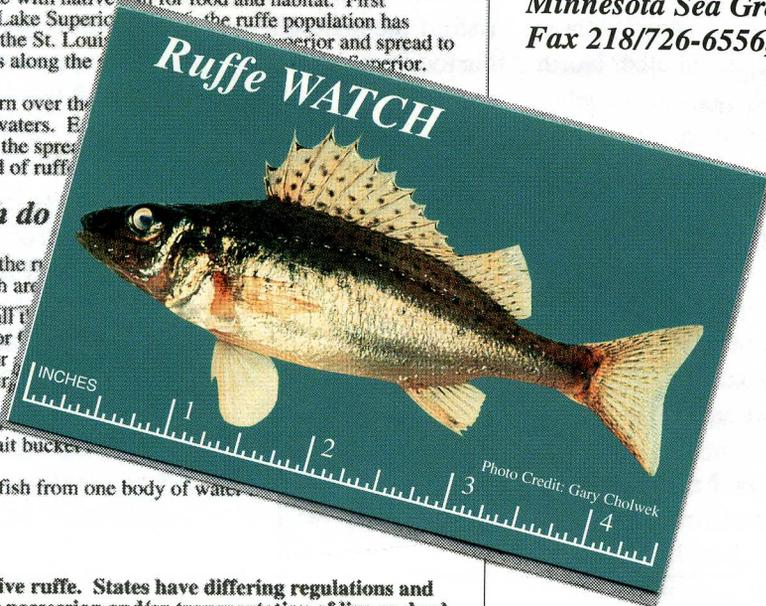
- Learn to identify the ruffe outside the Duluth area.
- If you catch a ruffe, freeze it, and call (614) 292-8949, or (419) 625-8062, or (612) 625-8062.
- Always drain your bucket, leaving the water to evaporate.
- Never empty your bucket into another body of water.
- Never dip your bait bucket into another body of water.
- Never dump live fish from one body of water into another.
- Never dump live fish from one body of water into another.

WARNING!

Never transport a live ruffe. States have differing regulations and penalties regarding possession and/or transportation of live or dead ruffe. Know your State statutes.

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A ruffe identification card is now available from Minnesota Sea Grant Extension Office (218/726-8712, Fax 218/726-6556, email: djensen@mes.umn.edu).



For other publications, newsletters, conference and workshop announcements, or for advice from local experts, contact the Sea Grant program or state natural resources management office nearest you. Phone numbers for the Great Lakes Sea Grant programs follow.

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Minnesota Sea Grant

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New York Sea Grant

800/285-2285

Ohio Sea Grant

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Wisconsin

608/263-3259

For more information about the ruffe, contact the U.S. Fish and Wildlife Service, Great Lakes-Big Rivers Region, Federal Building, 1 Federal Drive, Fort Snelling, MN 55111, or MN DNR Exotic Species Program Office, 500 Lafayette Road, St. Paul, MN 55155.

Thanks to the continued generosity of Brunswick Marine in donating the printing of publications to Ohio Sea Grant, we can provide others with the following two- and four-page fact sheets for the cost of postage.

• *Zebra mussels in North America: The invasion and its implication* (4 pages, OHSU-FS-045)

• *A Great Lakes Sea Grant resource list on zebra mussels and other nonindigenous species* (4 pages, OHSU-FS-052) NOTE: This list also includes journal articles written as a result of research conducted.

• *Zebra mussel migration to inland lakes and reservoirs: A guide for lake managers* (4 pages, OHSU-FS-058)

• *Safe use of zebra mussels in classrooms and laboratories* (2 pages, OHSU-FS-059—published in cooperation with Michigan Sea Grant)

• *Slow the spread of zebra mussels and protect your boat and motor, too* (2 pages, OHSU-FS-054)

• *The spiny water flea, Bythotrephes cederstroemi: Another unwelcome newcomer to the Great Lakes* (2 pages, OHSU-FS-049)

Ohio Sea Grant encourages other agencies and associations to distribute these publications to individuals. Postage charged is based on quantity requested, speed and location of delivery. To date, more than 100 agencies in nearly every state have distributed approximately one-and-half million publications! For more information or to place an order, contact Ohio Sea Grant.

Other fact sheets in progress cover the goby, the loss of our nation's native unionids, and a general overview of introduced species.