

welcome to NANFA

North American Native Fishes Association
est. 1972 • John Bondhus, founder

Welcome! You are now a member of the oldest and most respected organization of its kind. Whether we're aquarists, biologists, fisheries professionals, anglers, or just curious (and concerned) naturalists, we all have one thing in common: We think North America's fishes are among the most fascinating creatures on earth.

Yellowfin Shiner, *Notropis lutipinnis*,
from NC, SC and GA.
Photograph © William Roston.



As a NANFA member, you will receive our quarterly publication *American Currents*, which contains feature articles and shorter items on all aspects of North American fishes: biology, conservation, distribution, collection, and aquarium care—and news about

NANFA programs and regional events. Members are encouraged to contribute articles and news items.

If you haven't already, please visit www.nanfa.org. There you will find additional information about NANFA and native fishes, reprinted articles from *American Currents*, and a searchable table of contents to over 30 years of *American Currents*. Instructions on how to order back issues are included on the site.

Our annual national meetings are fun, educational, and full of fish and "finship." Past meetings have been in LA, OR, TN, IL, MS, OH, MI, AL, SC, AR, MO and NC. The 2008 meeting will be in Athens (just east of Dallas), TX, 25-28 September.

NANFA's activities are governed by a seven-member Board of Directors elected by the membership. They follow procedures as dictated by NANFA's Constitution, a copy of which is available on our Web site or by contacting any NANFA officer.

NANFA's Mission

The North American Native Fishes Association, Inc. (NANFA) is a not-for-profit, tax-exempt corporation dedicated to the appreciation, study and conservation of the continent's native fishes.

Objectives

- to increase and disseminate knowledge about North America's native fishes and their habitats among aquarium hobbyists, biologists, fish and wildlife officials, anglers, educators, students, and others, through publications, electronic media, regional and national meetings, and other means;
- to promote the conservation of native fishes and the protection/restoration of natural habitats;
- to advance the captive husbandry of North America's native fishes for its educational, scientific, and conservation benefits:

Education. Captive husbandry acquaints people with organisms they might otherwise never see alive or know existed, and affords people an opportunity to witness and appreciate their behaviors (feeding, breeding, parental care, etc.). Such acquaintance is a vital step in fostering environmental awareness and promoting a conservation ethic.

Scientific Knowledge. Studying and documenting the captive husbandry of North American fishes can provide information about a species' life history that is lacking in the scientific record, or difficult to study under natural conditions.

Conservation. The captive propagation of native fishes can play a key role in conservation efforts in several ways: a) by providing crucial life history information about a species before it

becomes imperiled; b) by providing aquarium-reared specimens for restocking efforts; c) by serving as a “last-ditch” safeguard against extinction in the wild; and d) by maintaining species already extinct in the wild.

- to promote the legal and environmentally responsible collection of native fishes for private aquaria as a valid use of a natural resource.
- to provide a forum for fellowship and learning among its members.

North American Fish Families

North America has the most temperate freshwater fish fauna in the world, with 1,084 described species and many others awaiting description. NANFA maintains a complete and up-to-date list of species and subspecies on its Web site at:

www.nanfa.org/checklist.shtml

If you're new to native fishes, the following descriptions will introduce you to just *some* of the families you might encounter.

Petromyzontidae (lampreys) Lampreys are eel-shaped, fish-like vertebrates that lack jaws but possess a sucking disc that's lined with teeth-like horny plates. Many species of lamprey, such as the Sea Lamprey of the Atlantic Coast and Great Lakes, are parasitic, attaching themselves to living fishes and rasping away at their flesh. Other lamprey species do not feed as adults. Lampreys and their nonparasitic larvae (called ammocoetes) are occasionally caught in traps.



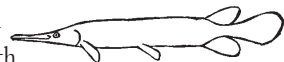
Acipenseridae (sturgeons) Sturgeons are primitive fishes that have been fished to near-extinction. They are the most common source of caviar and, as such, are in high demand. Sturgeons are recognizable by their rows of bony scutes in place of scales, and a subterminal (underslung) mouth preceded by a single row of barbels. Some sturgeons grow quite large, reputedly over a ton. If you catch or collect one, please release it unharmed.



Polyodontidae (paddlefishes) Only one species of paddlefish is found in North America. It is native to the Mississippi River system, where the loss of its spawning habitat is driving it towards extinction. It is a large (up to 7') filter feeder, and is easily recognized by its long, flat snout (or rostrum).



Lepisosteidae (gars) These predators have elongated bodies and long, alligator-like snouts. One is even called the Alligator Gar. This behemoth attains a length of 10' and can even eat alligators! If you find any gars, be careful not to cut your hands on their sharp scales. Five species occur in North America. The most common is the Longnose Gar, which is widely distributed in the eastern U.S.



Amiidae (bowfins) There is one living representative of this ancient family. It has a cavernous maw, a long and sinuous dorsal fin (hence its name), and a spot at the base of the tail. They can grow to over two feet long. Bowfins can breathe atmospheric oxygen and are often found in habitats with poorly oxygenated water.



Anguillidae (eels) The American Eel, North America's only true eel, is easily recognized by its serpentine form, terminal (mid-placed) mouth, and continuous fins. It is commonly caught on hook and line in estuaries. Eels are catadromous—living as adults in fresh water and spawning in salt water (the Atlantic Ocean's Sargasso Sea in this case). Males remain in streams or estuarine waters near the Atlantic and Gulf coasts, while females often migrate far upstream and remain there for up to 15 years.



Clupeidae (herrings and shads) Gizzard Shad and Threadfin Shad are two of the most commonly encountered clupeids. Clupeids have a sharp “keel” on their underside. Shad are a significant forage fish in large lakes and rivers, where they are most common.



Cyprinidae (minnows) Many people think that “minnow” is a generic term for any small fish. This is not true! Only cyprinids are properly called minnows. This is a very large family with over 2,200 species worldwide. North American minnows have a single dorsal fin and 12 or fewer dorsal rays (rarely spines). Most have terminal mouths. This family includes some very large fish, such as the Colorado Pikeminnow (which can reach 6' in length), and the Common Carp. Dace, shiners and chubs are among the fishes that belong to this family. Some, like the Fathead Minnow, are adaptable to a variety of habitat conditions and have extremely widespread distributions. Other species have extremely limited distributions. Nearly every state and some provinces are home to cyprinids that are endangered or threatened from habitat destruction, pollution, and/or exotic species introductions.



Catostomidae (suckers) Like minnows, suckers are widely distributed throughout the U.S., Canada and northern México. Suckers may be distinguished from minnows by examining the relative position of the dorsal and anal fins; the first ray of the anal fin is opposite a portion of the dorsal fin in minnows, and behind the dorsal fin in suckers (closer to the tail). Commonly encountered suckers include the White Sucker, Longnose Sucker, Northern Hog Sucker, and Redhorse Sucker. Considered by the uninformed to be a “trash fish,” most suckers are intolerant of pollution and sensitive to habitat destruction. For example, the Harelip Sucker, once one of the most common fishes of the central U.S., went extinct by the early 1900s due to the clearing of land for agriculture and pollution from untreated industrial and municipal waste.



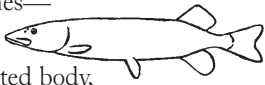
Ictaluridae (North American Catfishes)

Easily identified by the presence of barbels (or “whiskers”), catfishes range in size from the 5’ Flathead Catfish of the Mississippi River drainage, to the mid-sized bullheads, to the diminutive madtoms. Madtoms, such as the Stonecat and Tadpole Madtom, are native to streams in the eastern U.S. west to the Dakotas and Texas. Several, like the Smoky Madtom of the Little Tennessee River drainage, are endangered.



Esocidae (pikes)

These voracious fishes—pickerels, Muskellunge and Northern Pike—can be identified by their elongated body, fierce mouth full of teeth, and forked tail (gars have rounded tails). The smaller, foot-long Redfin Pickerel and Grass Pickerel are frequently encountered in clear, vegetated pools, lakes, and swamps throughout much of the eastern U.S.



Umbridae (mudminnows)

Mudminnows look like killifishes except that they lack the super-terminal (up-turned) mouth of the latter and do not possess a lateral line. They are purported to take their name from the habit of burying themselves in mud in their swampy, backwater habitat. Mudminnows are commonly sold as bait in many parts of the country. Like the Bowfin, they can breathe atmospheric air. The Central Mudminnow (Great Lakes and northern Mississippi River drainage) and Eastern Mudminnow (south Atlantic Coast) are common, but the Olympic Mudminnow in Washington is threatened by habitat destruction within its limited native range.



Salmonidae (trouts, salmon, chars and whitefishes)

Much-loved by anglers, these fishes have been introduced all over the continent for fishing. All have a single, soft dorsal fin and an adipose fin. They live in clear, well-oxygenated waters. Several species of Pacific salmon were recently declared endangered or threatened, representing the first time in which Endangered Species Act legislation has affected heavily urbanized areas (Seattle to San Francisco). On the other side of the continent, the once mighty Atlantic Salmon is virtually extinct in the wild.



Atherinopsidae (New World silversides)

You’ll sometimes encounter these, especially the widespread Brook Silverside of the eastern U.S. Silversides have two soft dorsal fins, elongated 4-5” bodies, and a pointed, beak-like terminal mouth. They travel in large schools near the surface and leave the water while fleeing predators.



Cyprinodontidae (pupfishes) and Fundulidae (topminnows)

Collectively known as killifishes or killies, they are widely kept in the aquarium hobby (and some, like the Florida Flagfish, are often found in fish stores). These families differ in appearance from minnows in that their dorsal fins are located well towards the tail, and by having



have a super-terminal mouth. These families are generally not found in Canada, except at the edges of some distributions (e.g., Banded Killifish and Mummichog). Some pupfishes are found in North America’s harshest habitats, such as salt marshes and the deserts of the Southwest. The famous Devils Hole Pupfish of Nevada has the smallest known natural range of any vertebrate on Earth—a hole just 20 meters square!

Poeciliidae (livebearers)

Another minnow-like fish that may easily be confused with killies, poeciliids are found almost everywhere, often at the water’s edge of a pond or lake, where they may be easily dipnetted. An easy way to identify a livebearer is to look at the anal fin of a male. It will be pointy, not fan-shaped as with females. Females will usually have a gravid (dark) spot just above the anal fin. This family includes the popular (though incorrectly named) Least Killifish, the mollies, and the mosquitofishes.



Gasterosteidae (sticklebacks)

Sticklebacks are often found in bait shops mixed in with minnows. They differ from other families by possessing free dorsal spines in front of the dorsal fin. Sticklebacks have interesting nest-building breeding habits. Some have been well-studied, particularly the Brook Stickleback, which is widely distributed throughout Canada and the northern U.S.



Elassomatidae (pygmy sunfishes)

Previously classified in the Centrarchidae, the evolutionary relationships of this family are hotly debated. Its six species are not as deep bodied as centrarchids. Also, they are much smaller (less than 2”) and have a rounded tail. All are native to the southeast U.S. Some are common, such as the Banded Pygmy Sunfish, which is found from North Carolina to Texas. The Spring Pygmy Sunfish, on the other hand, has been extirpated from several areas, and is now found at only two locations in Alabama.



Moronidae (temperate basses)

Some of North America’s most popular gamefishes belong to this family. Striped Bass may be found in either salt or fresh water, and can grow up to six feet long and weigh over 100 pounds. White Bass and hybrids of Striped Bass and White Bass (known as wipers) are commonly stocked in impoundments across the country. Moronids can be distinguished from the centrarchids by their two separate (or nearly so) dorsal fins. They differ from percids by possessing angular-shaped fins.



Centrarchidae (sunfishes)

If your interest in natives is an outgrowth of your passion for fishing, then you are probably well-familiar with this family. All centrarchids have multiple dorsal and anal fin spines. The Largemouth Bass, Smallmouth Bass, Bluegill and Pumpkinseed are members of this family. The only native centrarchid west of the Rockies is the Sacramento Perch, but many others have been introduced as gamefish. As a result, competition



with these non-native centrarchids has eliminated the Sacramento Perch from many of its native waters.

Percidae (perches and darters) Like the centrarchids, percids come both big and small.



Most anglers are familiar with some of the larger percids like Walleye or Yellow Perch. But it is the small guys, known as darters, that receive much well-deserved attention. Most darters are very colorful—arguably among the most beautiful fishes in the world. Many live in disturbed habitats and are threatened or endangered. The most famous darter is the Snail Darter of Tennessee, which went up against a dam in court. (It won, but the dam was built anyway.) All percids have two separate dorsal fins.

Cottidae (sculpins) These curious-looking fellows have wide mouths, eyes on the top of



their head, and prickly skin. Like the widespread Mottled Sculpin and Slimy Sculpin, most are bottom-dwellers associated with rocky areas of streams and lakes.

There are *many* other North American freshwater fish families not covered here. Plus, there are many fascinating fish families from coastal marine waters that we didn't even begin to discuss!

Conservation

Many of North America's 1,100+ fish species are either extinct or fighting for survival. Currently, 40 species and subspecies of North American fishes are extinct. About 34 percent of the remaining native fish species are either endangered or threatened with extinction, or at risk of becoming endangered or threatened by minor disturbances to their habitat. Even abundant species are in peril because North America's fresh waters are among the most degraded habitats on earth. In fact, North America's freshwater fishes and other freshwater animals are dying out at a rate five times faster than animals that live on land.

For these reasons, NANFA and its members are involved in several conservation and education initiatives:

The NANFA Conservation Research Grants Program

In 2001, NANFA established a grant fund that awards a minimum \$1000 per year for research that aids the conservation of North America's native fishes, particularly those that are imperiled. Researchers, conservation groups and aquarists are all eligible for the award.

So far, NANFA has awarded \$11,350 in Conservation Grants, funding projects as diverse as North America's fish fauna. One grant helped fund an underground expedition to determine the population status of a rare blind cave catfish in México. Another grant was used to determine whether the spawning ability of brightly colored darters was affected by the clarity of the water in which they live. Yet another grant is helping researchers collect the data they need to establish conservation strategies for a rare killifish found in the Great Plains of Nebraska and Missouri.

For details on how to apply for the Grant, visit NANFA's Web site at:

www.nanfa.org/research.shtml

Or contact Dr. Bruce Stallsmith, Department of Biological Sciences, University of Alabama in Huntsville, Huntsville, AL 35899. Dr. Stallsmith may also be contacted by telephone at 256-824-6992 or by e-mail at stallsb@uah.edu.

Many NANFA members regularly participate in activities designed to preserve or improve the habitat of our native fishes. Here are just three examples:

- Members from South Carolina, while collecting fishes for their ponds and aquaria, help state nongame fish biologists monitor fish populations and distribution patterns. Their efforts have resulted in the rediscovery of a population of the rare Bluebarred Pygmy Sunfish (*Elassoma okatie*) that was thought to have been extirpated. A Heritage Trust Preserve is now being established at this site to help protect the population. Members from South Carolina also provide the Riverbanks Zoo (Columbia, SC) with broodstock for their pygmy sunfish captive reproduction program.

- NANFA's Utah regional representative Peter Unmack makes regular pilgrimages to southern Nevada to conduct conservation work, such as removing exotic species, and estimating population sizes of threatened pupfishes and springfishes. Everyone is welcome to join in. For the next trip itinerary, visit:

www.pupfish.net/dsac

Or write to Peter at peter.nanfa@unmack.net.

- Conservation Fisheries, Inc. (CFI) of Knoxville, Tennessee, breeds several dozen species of rare southeastern U.S. fishes (e.g., darters, minnows, madtoms) for reintroduction back into the wild. For updates on their important work, visit their website:

www.conservationfisheries.org

Captive propagation efforts like CFI's may be the only hope for species that are facing extinction due to habitat loss.

NANFA's Gerald C. Corcoran Education Grant Public education is an important part of NANFA's conservation plan. Whether it's distributing informational materials to community groups, speaking at schools and aquarium clubs, setting up public native fish aquariums, improving access to streams in public parks, or sharing field observation and fish collection information, NANFA members all over the continent are helping spread the word about native fishes and habitat protection.

NANFA's Gerald C. Corcoran Education Grant program was formed to help fund such education efforts. Named after a past NANFA President (now deceased) and renowned environmental educator, the Grant provides NANFA members with at least \$1000 annually for environmental education projects including,

but not limited to, producing and distributing educational materials, stream surveys with education as a primary goal, nature center displays, lecturing expenses, and teacher training workshops.

Past Corcoran Grants have included: \$700 to a Tucson high school for an underwater video camera that lets students monitor the behavior of desert fishes in a 16,000-gallon artificial refugium; \$1000 to help finance a photographic exhibition, "Freshwater Fishes of the Northeastern United States," at an environmental education center within the Great Swamp wetlands of Somerset County, NJ; \$1000 to help fund "The Traveling Native Fish Showcase," a portable series of display boards featuring color photographs of Ohio's fishes that can be used at schools, nature centers, county fairs, aquarium club meetings, and more; and \$938.65 for the creation of a Web site devoted to North America's little-known (and highly imperiled) cave fishes.

For details on how to apply for the Grant, visit:

www.nanfa.org/education/corcoran.shtml

Or contact Sajjad Lateef, 600 Park View Drive, Apt. 211, Santa Clara, CA 95054, 541-206-8541, sajjadlateef@yahoo.com.

To find out what's going on in your area and how you can participate, contact your regional representative or anyone listed on the inside front cover of *American Currents*. Also be sure to visit the regional page at our website:

www.nanfa.org/regional.shtml

Please suggest ideas—we're always looking for project ideas from NANFA members. If your region does not have a NANFA representative or regional contact, then maybe *you* can fill that position! If so, please contact NANFA's Regional Outreach Coordinator: Charles Nunziata, 6530 Burning Tree Dr., Largo, FL 33777, 727-393-3757, epiplaty@tampabay.rr.com.

Collecting Native Fishes

Many NANFA members live in states that allow them to collect fishes for home aquaria. If you are fortunate enough to be such a member, this section is for you. But do your homework first. Some states will not permit hobbyists to do any collecting at all, while others are very liberal and require only a sport fishing license. There are also restrictions on the type of equipment you may use, and which fishes you may collect.

To ensure that its members collect fishes in a legal and environmentally responsible manner, NANFA has prepared a collecting "Code of Ethics" (see next page). Before you attempt to remove fishes from the wild, please read and abide by our "Code."

Here is some of the equipment used by fish collectors:

Dipnet The lowly dipnet can actually be an amazingly effective and versatile tool. It consists of a small-mesh net on a hoop attached to a long handle. Dipnets are great for catching small fishes near the shore or creek bank, or underneath boat docks.

They can also be used to scoop up crayfish or bottom-dwelling fishes such as darters from shallow streams. Many fishes move into shallow water at night, so go out after dark with a flashlight and net fishes that are stunned temporarily by the bright beam. Chances are, if you can see the fish, you can catch it with a dipnet.

Minnow Seine A minnow seine is a great way to sample lakes, ponds, and large streams when you have a helper or two. It is essentially a long net stretched between two poles. A mesh size of 1/4" is best for most purposes. Lengths of 4' to 50' or longer are available, but most states have restrictions on length and mesh size, so check local regulations before purchasing one. Many users find it easier to use a seine that is mounted to two poles (called brails). These need to be sturdy, such as five- or six-foot shovel handles that can be purchased at any hardware store.

The most effective use of a seine requires that you always keep your bottom line on the bottom (if it raises up you can miss darters, madtoms, or other bottom dwellers) and forward of the top line. Work one end near the shore so you can probe under the bank with one pole, chasing out any fishes that seek refuge there. Try dragging the seine both up- and downstream. In fast water, seining downstream is often best. It helps if you have a "chaser"—someone upstream who can splash the water and kick at submerged rocks, making a ruckus, and chasing the fishes downstream into your waiting net. Sometimes you can get good results with a dipnet or seine by simply waiting at the base of a riffle or rapid as the chaser works towards you.

Traps These are available in all shapes and sizes at many discount stores, bait shops, and mail order houses. Their use is fairly self-explanatory and it usually helps if you bait the trap. Good results can be had from chicken liver, stinkbait, cottonseed meal cakes, etc. Again, many states have restrictions on the size and type of trap you may use, so check before buying.

Other Methods Professionals use other techniques that are not normally available to the hobbyist, such as poisoning or electroshocking. These methods always require a collecting permit and are in most cases not suitable for the hobbyist collector.

Keeping Native Fishes in Aquaria

If you're a beginning fishkeeper, then read on! As mentioned in the NANFA Code of Ethics, providing captive fishes with the best care possible is important, so here's some basic information to help you get started.

Water Quality It's an aquarium adage, but it's true: *You're not really keeping fish; you're keeping water.* You can't expect to plop a fish into a tank full of water and expect it to live (much less thrive). Here are some things to keep in mind:

Temperature Most of our natives are temperate species. That means they generally do not tolerate temperatures—72°F (22°C) and higher—that most tropical fishes do. You must consider the

NANFA Code of Ethics

NANFA members who collect native fishes from the wild and maintain them in private aquaria are encouraged to comply with the following Code of Ethics:

- § It is the responsibility of NANFA members to acquaint themselves with, and abide by, the collecting, fishing and fish transfer regulations of each Country, State or Province in which they collect or transfer fishes.
- § Collecting must be done in an environmentally sound and responsible manner, which includes, but is not limited to: a) not removing numbers of fishes beyond that which one requires or is capable of sustaining; b) taking all reasonable actions to prevent negative impacts on the habitat in which one collects; c) respecting private property rights; and d) complying with any law-enforcement, natural-resource, or other conservation officer or agent encountered in the field.
- § NANFA members who enjoy collecting and maintaining fishes do so of their own accord. Except for specific programs funded and/or sponsored by the Association, NANFA does not sanction any specific collection and/or captive maintenance of fishes.
- § Not all native fishes are suitable for aquaria, and some species may test the skills of even the most experienced

aquarist. Therefore, members are encouraged to research the biology and captive requirements of each species before an attempt is made to remove them from the wild.

- § Fishes or other aquatic organisms must not be relocated or introduced into any outdoor bodies of water, *even to places where they were originally collected* (except catch and immediate release), including specimens raised in private aquaria, without permission from the appropriate governing agency. Members must realize that there are complicated and often unknown ecological processes at work in aquatic systems that may make fish introductions detrimental to the system. Potential problems from such introductions include displacement of native species, spread of disease, and the loss of genetic diversity via hybridization.
- § All reasonable attempts should be made to maintain fishes with the utmost regard for their safety and health, which includes, but is not limited to: maintaining sufficient water quality; providing water chemistry, temperature, oxygen levels, and foods appropriate for each particular species; fish compatibility; and the safe and humane transport of fishes from the wild to the aquarium. Sick or infirm specimens should be euthanized in a humane manner and disposed of properly.

temperature of the water from where the fish was collected. If you have a “room temperature” aquarium, you will not be able to keep species that require cold water, such as Brook Trout or Northern Pike. You either need to bring the water temperature down or select fishes from waters that get rather warm in the summer.

Current and Oxygen Content These two are related since where you find one in abundance you will usually find the other. Also, cold water can hold more oxygen than warm water. Typically, a fish from a fast-flowing part of your local stream will not do well in a stagnant aquarium with a small box filter bubbling lazily away in a corner of the tank. There are ways to provide both strong water movement and good aeration (discussed in the “equipment” section below). But for now, if you don’t want to make a large investment (or even a moderate one) in aquarium gadgets, then you should stick to pond fishes, or those that can be collected from the still parts of streams.

pH pH is measured as a number from 0 to 14. A pH lower than 7.0 means the water is acidic. A pH higher than 7.0 means the water is basic. A pH of 7.0 is considered neutral. Tap water and most naturally occurring waters have a pH that falls between 5.5 and 7.8. For all practical purposes you will not have to pay too much attention to pH, but if you are interested in breeding your captives then you will need to be a little more careful. Test kits can be purchased from any aquarium store.

General Hardness You probably won’t need to worry about hardness unless you are trying to breed fishes, or if you want to document the type of water you’ve collected them from. Water hardness terminology (e.g., total hardness, alkalinity, carbonate hardness) can be confusing, but for the purposes of this discussion they refer to dissolved solids, primarily calcium and magnesium salts. Inexpensive hardness test kits are available at most aquarium stores. In most cases you can leave your hardness alone.

Water Movement Many stream fishes live in strong current in the wild. Watching fish swim in the current in aquaria can be very entertaining. It’s also interesting to see how some species prefer the current and how others hunker down behind rocks and other structure. Airstones and powerheads keep the water moving, but be aware that powerheads may increase the temperature outside of your fish’s “comfort range,” especially during the summer.

Water Changes You should get into the habit of changing part of your aquarium’s water about once a week. Use this opportunity to suck all the debris out of your gravel so it doesn’t rot and foul the tank. A Python® is most suitable for this purpose, although you may also use a siphon and bucket and simply siphon part of the gravel off, wash it, and return it to the tank. You should change 15-25% of your water weekly. This prevents the accumulation of nitrate, which can build to toxic levels. Take time to adjust the temperature of the replacement water to that of your tank. And be sure to use dechlorinator if you use treated tap water.

Lighting This is probably the most overlooked environmental parameter. Most fishes do not hover in direct sunlight, preferring instead the relative security of shade. High levels of light can stress aquarium fishes. Too much light will also result in your tank turning into a slimy mass of algae. If you are not keeping live aquatic plants, then use only one full-length fluorescent bulb, or maybe two for a deep tank. Make sure your fishes have a shady place to hide, such as under the limb of a piece of driftwood.

Structure Your fishes need shelter, and a place to hide if the need arises. A bare tank gives them neither. Most of the time you will find rocks in the stream bed where you do your collecting, or you can get some from pet shops or simply forays into your backyard. Rocks can be arranged to form caves and landmarks that fishes can use to define their territory. Driftwood serves the same purpose and helps your tank look more natural.

Filtration Filters accomplish three things: They remove particulate matter (mechanical filtration), dissolved organic matter (chemical filtration), and toxic fish by-products (biological filtration). Some filters are specialized to perform only one of these tasks, others will do all three. Biological filtration is the most important. Fishes excrete ammonia as a natural product of their metabolism. In nature this is absorbed and utilized by other organisms. In the aquarium it can rapidly build up to fatal levels. Biological filtration is a means of culturing bacteria that utilize ammonia and convert it into less toxic substances. An old standby is the undergravel filter. But nowadays, other media, such as rotating contact wheels (“biowheels”), are more popular.

Breeding Getting fishes to breed in captivity is the zenith of the fishkeeping hobby. Unfortunately, save for some subtropical species that hail from México and the Gulf Coast, many North American fishes are difficult to spawn in captivity. The trick is to recreate the natural cycles of temperature and light that exist in temperate climes. It’s this gradual transformation of winter into spring—cold water and short daylengths giving over to warmer water and longer daylengths—that gets many North American fishes into spawning condition. What’s more, many small North American minnows are *nest associates* that spawn over the nests of larger fishes, such as chubs and sunfishes (termed *nest hosts*). In fact, it’s the sexual pheromones released by spawning nest hosts that get nest associates “in the mood.” It’s not impossible to simulate these conditions in aquaria, but they do require advanced skills and major commitments in time. Should you succeed in breeding a North American fish, please submit a Breeder’s Award Program report (see below) and an article to *American Currents*!

Feeding Many (but not all) North American fishes will acclimate to prepared foods. You should keep in mind two things when choosing a commercial food: the size of the fish’s mouth and its preferred feeding zone. The first is self-explanatory, but the latter is often overlooked. Fishes that spend most of their time on the

Aquarium Club Speakers and Sponsorships

If your local aquarium club or society has an annual fish show, NANFA is willing to sponsor the native fish class. NANFA can also supply brochures, copies of and/or sample articles from *American Currents*, and other display materials. In addition, several NANFA members are available for giving slide or PowerPoint presentations on a variety of native fish subjects. NANFA can even help defray the speaker’s transportation and lodging costs, if necessary. And just in case a live speaker is not practicable, NANFA has a VHS copy of an excellent 30-minute documentary, *Swimming in Troubled Waters: America’s Nongame Fishes*, available as a free loaner. For details, contact Tom Watson, 2408 S. 359th St., Federal Way, WA 98003, 253-838-6745, onefish2fish@comcast.net.

tank bottom (such as darters) do not like to dash to the surface to grab floating flakes. Likewise, killies with their upturned mouths have a hard time eating from the bottom. So look at where your fishes spend their time, and supply foods that sink or float as appropriate. You may need both.

Some native fishes will not take prepared foods at first. You must get them used to eating live food and gradually wean them to frozen, and then perhaps dried food. Feeding wild-caught live foods can be dangerous, as you risk introducing parasites, especially during the warmer months. Cultivated live food should be safe.

If you wish to breed North American fishes, then live foods—and lots of them—are a must. In the wild, most native fishes spawn in the spring and early summer when the water is teeming with insect larvae and other yummy, nutritious critters. The captive environment should replicate wild conditions.

If you’re fortunate to get your fish to spawn, then you will need to find food that’s small enough for the fry to eat. Most live-bearing fry are big enough to eat brine shrimp nauplii and microworms. But most fry that hatch from eggs will need infusoria, rotifers and “green water” as their starter food.

The NANFA Breeder’s Award Program

The objectives of this program are to recognize outstanding achievement in the breeding and rearing of North American fishes by NANFA members, and to provide the opportunity for aquarists to contribute to a library of information on native fishes. For more information, visit:

www.nanfa.org/bap.shtml

Or contact Bob Muller, 625 S. Altadena, Royal Oak, MI 48067, 248-398-0195, michiganfish@wideopenwest.com.

Fishwatching

You don’t need to keep fish in fish tanks to appreciate them. Many native fish enthusiasts don masks and snorkels and see sights that rival the beauty of tropical coral reefs! Swimming skills

are generally not required since some of the best freshwater snorkeling can be done in (clear) water that's knee- to waist-deep. Just stick your head underwater, remain still, and let the fish come to you. Fish are surprisingly brave and curious when you're in the water with them. Stir the bottom sand or gravel with your fingers and watch them feed on the tiny food particles you've released.

If snorkeling's not your thing or the water's too cold, then you can make an underwater viewing bucket by cutting out the bottom of a 5-gallon plastic bucket and affixing a piece of Plexiglas in its place. It really works!

Recommended Reading

Most regions, states, and provinces have books on area fishes, too many to list here. For a long list of titles, visit:

www.nanfa.org/books.shtml

Some of our favorite regional fish books are the ones for AL (Boschung & Mayden), CA (Moyle), TN (Etnier & Starnes), and VA (Jenkins & Burkhead). Other recommendations include:

Field Guide to Freshwater Fishes of North America North of Mexico by Lawrence M. Page and Brooks M. Burr. The best field guide. Part of the Peterson Field Guide series. Available at most bookstores.

National Audubon Society Field Guide to Fishes by Carter R. Gilbert and James D. Williams. Revised (2002) guide with color photos of over 700 freshwater and marine fish species. Readily available.

North American Native Fishes for the Home Aquarium by David M. Schleser. A handy, compact guide. Out of print.

Our Native Fishes: The Aquarium Hobbyist's Guide to Observing, Collecting and Keeping Them by John R. Quinn. Out of print, but available at many public libraries.

Fish Watching: An Outdoor Guide to Freshwater Fishes by C. Lavett Smith. Birdwatchers have lots of books. Why not fishwatchers?

American Aquarium Fishes by Robert J. Goldstein with Rodney W. Harper and Richard Edwards. Provides natural history and captive husbandry notes for hundreds of species, with chapters on native plants and collecting methods/regulations.

Vanishing Fishes of North America by R. Dana Ono, James D. Williams and Anne Wagner. Out of print but worth finding. The authors document the plights of 59 extinct and endangered fishes.

Battle Against Extinction: Native Fish Management in the American West by W. L. Minckley and James E. Deacon. The full story of western fishes—their discovery, early struggles to protect them, and precarious future.

Handbook of Darters by Lawrence M. Page and *The American Darters* by Robert A. Kuehne and Roger W. Barbour. Invaluable references for anyone wishing to study or collect darters. Out of print. Both collector's items if you can find them!

Trout and Salmon of North America by Robert J. Behnke. Game fish are natives, too! A fine natural history, with remarkable color illustrations by the incomparable Joseph R. Tomelleri.

Salmon Without Rivers: A History of the Pacific Salmon Crisis by Jim Lichatowich. Why these awesome fish are disappearing, and why hatchery-based conservation measures don't work.

Fish Conservation: A Guide to Understanding and Restoring Global Aquatic Biodiversity and Fishery Resources by Gene S. Helfman. This comprehensive and readable treatise covers all areas of fish conservation, including topics close to the heart of every aquarium hobbyist. NANFA and the ethics of native fishkeeping are discussed on pp. 403-405. Expensive, but worth every penny.

Also look for the July 2003 issue of *Tropical Fish Hobbyist* magazine (your local library should have it). Written by NANFA members, the entire issue is devoted to North American natives.

NANFA Forum (<http://forum.nanfa.org>)

Sections of this bulletin board-style Forum include parallel discussions of various native fish groups (e.g., minnows and suckers, catfishes, sunfishes); a photo gallery where you can show off your fish tanks and fish collections; a dedicated forum for fish identification assistance; a "Fish Market" where you can buy and sell fish-related products; a "Local Edition" where you can post notices of local collecting/sampling trips and find collecting/sampling partners; a forum where you can share your favorite collecting sites of non-protected species; and dedicated forums on each of the following topics: conservation, collecting and snorkeling, state laws and regulations, native plants for the aquarium, and exotics. Anyone can view messages on the forum, but you must register to post to them.

NANFA Photo Gallery (<http://gallery.nanfa.org>)

Share your photographs in this photo gallery. Anyone can view photos, but registration is required to post them.

NANFA E-mail List

It doesn't get much traffic since the advent of the NANFA Forum, but the NANFA E-mail List still provides a place for native fish enthusiasts to ask questions, learn more and meet new friends. Instructions on how to subscribe are given at <http://www.nanfa.org/email.shtml>.

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