Tiny Fish Under Big Skies
Why Minnows Matter

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Walleye anglers and trout devotees sometimes argue over whose fish deserves the most respect in Montana. On their side, trout anglers have 100-plus years of fly-fishing history, Norman Maclean, and some of the nation's most renowned coldwater fisheries. To their credit, warmwater anglers can point to the vastness of Walleye waters here (roughly 300,000 acres) and the fact that their fish tastes like heaven when sautéed in butter. The thing is, neither side is right. In Montana, as in so many states, it's minnows that rule.

Of the state's 54 native fish species, more than 30 percent (18 species) are members of the minnow family, or Cyprinidae, including the Lake Chub, Redside Shiner, and Longnose Dace. The percentage is even higher in the state's middle and eastern regions. From 1999–2007, crews from Montana Fish, Wildlife & Parks and Montana State University (MSU) swept seining nets through prairie streams across the state's eastern two-thirds and found more minnows than any other species.

Konrad Schmidt

Longnose Dace

The continent's great bastion of minnow diversity is in Appalachia and other parts of the South. Some of those minnow species have been able to move up along the Mississippi and then the Missouri and Yellowstone rivers into eastern Montana over the past 10,000 years," explains Bob Bramblett, an MSU research professor and coordinator of the university's share of the stream surveys. Western Montana, cut off from the continent's minnow strongholds, contains far fewer species.

Anglers have been baiting hooks with minnows at least since the mid-17th century, when Izaak Walton wrote, "A large Trout will come as fiercely at a Minnow as the highest mettle Hawk doth seize on a Partridge." Minnows are natural prey for all game fish, from Cutthroat Trout and Walleyes to crappies and Yellow Perch. Still, most anglers pay scant attention to what turns out to be the most abundant and diverse group of fish swimming in Montana.

Pinning down a commonly accepted minnow definition is as difficult as grabbing a squirmy shiner from a bait bucket. Biologically, minnows are members of the world's largest freshwater fish family, which contains more than 2,000 species. Most cyprinids, as they are known to biologists, have a scaleless head and spineless fins. (The Common Carp, a minnow species, has dorsal rays that harden into what feel like spines but aren't). Minnows have one to three rows of pharyngeal "teeth," hard structures in the throat the fish use to grind food against a rough-textured pad.

As Webster's second definition of the word confirms, people often refer to any small fish as a minnow, though technically that's not correct. Bait shops also have their own nomenclature. What some call sucker minnows, for example, aren't real minnows but small White Suckers. On the other hand, crappie minnows aren't tiny crappies; they're small Fathead Minnows used to catch crappies. Dace, chubs, and shiners are all minnows. But Montana's Iowa Darter, another small native fish, is not. Nor, oddly enough, are Central Mudminnows, members of a completely different fish family that were introduced to a few small streams and ponds west of the Continental Divide.

All minnows have what's called a Weberian apparatus. This series of small bones connects the swim bladder to the inner ear and allows the fish to "hear" vibrations in the water. During mating season, most male minnows develop tubercles, also known as pearl organs. They use these bony bumps and spikes that grow on the head, body, or fins to fight rivals and attach themselves to females while mating. Males of some minnow species also develop brilliant breeding colors, turning various combinations of red, green, and gold in spring.

Almost all minnows in Montana are small—3 inches or less—but two species can grow much bigger. The largest is the Common Carp, the state angling record for which is 40.27 pounds. Another oversized cyprinid is the Northern Pikeminnow, known as the Squawfish until 1998, when the American Fisheries Society changed the name. The Montana record for this species, which lives in the state's northwestern region in lakes and slow rivers, is 7.88 pounds. The closely related Colorado Pikeminnow, North America's largest minnow, can reach over 6 feet long and top 100 pounds—the size of a tall, skinny middle-schooler.

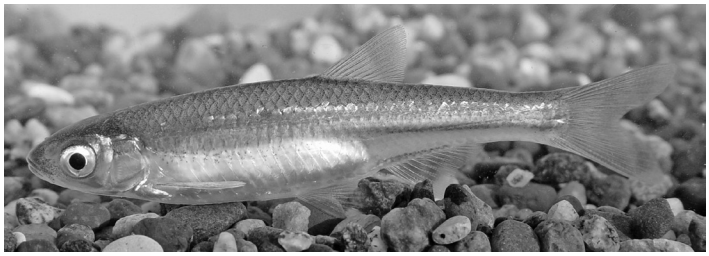
Bramblett says the primary ecological value of most minnows is as food for other species. "Pelicans, cormorants, kingfishers, garter snakes, herons, and other wildlife all rely on minnows, especially in eastern Montana," he says. Minnows are especially important for larger fish, including popular sport fish such as Walleyes, Sauger, and big trout. "If you didn't have minnows, you wouldn't

have game fish," says Bramblett. "They are like what grass and forbs are to elk and deer."

Minnows so effectively attract other, larger fish, that inventors have been trying to replicate them since the mid-19th century. After dropping a silver teaspoon overboard and seeing a fish attack the reflecting metal, Julio T. Buel took out the first U.S. fishing lure patent for a spoon lure in 1852. Mepps and other brands of spinners mimic shiners or other bright minnows. Fly anglers tie Blacknose Dace, Zonkers, Matukas, and other minnow lookalikes to fool trout and other game fish.

The most realistic minnow mimics are plugs, or crankbaits, like the one invented by Finnish angler Lauri Rapala in 1936. These fish-shaped lures dip and wobble like wounded minnows. Constantly being improved and modified, some crankbaits are now impregnated with fish scent or coated in holographic paint. A recent invention, the Vibra-Strike, has a built-in electronic vibrator.

Despite these improvements, few manmade lures can beat a live minnow for catching fish. In bait shops, anglers select minnows proven to catch specific game species in certain waters. Small fatheads are the top choice for catching crappies on Tongue River Reservoir. Emerald Shiners and Flathead Chubs are popular for Walleyes on Fort Peck Lake and Burbot on the Yellowstone River. Another factor in minnow selection is hardiness. Many minnows, such as fatheads and some shiners, tolerate the low oxygen and crowded conditions in bait buckets. Other small fish, such as darters, are delectable to game fish but make poor bait because they turn belly up when crowded or handled.



Konrad Schmidt

Emerald Shiner

Because bait buckets can transport the deadly VHS virus and other fish diseases and aquatic invasive species, Montana restricts minnow movement. It's illegal to 1) bring minnows and other live bait into Montana from another state, 2) use or possess live minnows in northwestern Montana and in some lakes and rivers elsewhere in the state, or 3) release live bait into any waters. According to Fish, Widlife and Parks (FWP) south-central region fisheries manager Ken Frazer, minnow movement in eastern Montana is a growing concern. He says anglers from as far away as Glasgow and Havre drive to the Yellowstone River and adjacent irrigation canals to collect minnows for use at Fort Peck Lake, Frenso Reservoir, and other waters. "When you move minnows around like that, you're certainly moving other things too," he says. In addition to possibly spreading disease and invasive species, overaggressive seiners may deplete some prairie streams of forage fish needed for other fish and wildlife, Frazer adds.

Because Zebra Mussels have reached western states and Silver Carp are now in South Dakota, Montana may need to further tighten intrastate minnow movement. "Most surrounding states and provinces are tightening their restrictions on minnows, and Montana is feeling pressure to do the same," says Steve Dalbey, FWP northeastern region fisheries manager. Dalbey says the use of live bait has been banned in Idaho, Alaska, Saskatchewan, Alberta, and parts of Ontario. In Wyoming, minnows may be used only in the drainage from which they were seined.

Further restrictions on minnow collection and use would be tough on Montana bait dealers such as Ron Herman, who with his son Michael owns Pryor Creek Bait in Laurel. "If you ask me, we've got plenty of bait restrictions as it is," he says. But most bait shops would likely survive. Jerry Reller, owner of Bent Willow Bait and Tackle in Townsend, says he does a brisk business in plastic and salt-preserved minnows used by anglers on nearby Canyon Ferry, where live bait is banned.

For now, Montana has no plans to tighten regulations on minnow collection, use, or transportation. But if the state wants to reduce the risk of aquatic invaders and fish diseases harming its multimillion-dollar fishing industry—not to mention lake and stream ecosystems and native minnows and other fish species—it may have few other options.

Six Montana Minnows

Konrad Schmidt

Male Fathead Minnow (*Pimephales promelas)*

Pimephales: Greek for "fat head."
promelas: From the Greek words for "before" and "black," possibly referring to the darkened head of the original specimen.

Found throughout Montana east of the Rocky Mountain Front, the Fathead Minnow lives in shallow lakes, ponds, and murky prairie streams. Like Creek Chubs, Fathead Minnows can survive in water with almost no oxygen. According to Bob Bramblett, a research professor at Montana State University, nearly 80 percent of the waters sampled in eastern Montana prairie stream surveys during the 2000s held fatheads, more than any other fish species.

The chunky Fathead Minnow grows to 3 inches long. Its back is dark olive or brown and its sides are dusky above and pale below. The fathead's head is round and flat on top, the eyes are large, and the terminal (front-facing) mouth angles up slightly.

During spring breeding, the male fathead darkens. His head turns almost black and swells. Three rows of small, bony bumps, called tubercles, develop on the snout, making the fish look like a pimply faced teenager. The tubercles serve no apparent purpose other than as a weapon for head-butting males.

The female Fathead Minnow deposits her eggs beneath logs, stones, or other debris in slow-moving or still water. Before mating, the male cleans the underside surface with his mouth, head tu-

bercles, and dorsal fin. He defends the site as ferociously as an NHL goalie, whapping any intruder with his tail fin. When a ripe female enters the nest, she turns upside down, and the male uses his pectoral (front) fins to press her body up tight against the underside of the rock or other item. She then deposits eggs, which stick to the surface, and the male vibrates to release milt.

The female then swims off, but the male holds down the fort. He swims back and forth beneath the eggs, stroking them with his back to remove sediment and circulate oxygenated water. He also eats any eggs that become covered in fungus to protect the others from infection. He rests only when the eggs hatch and the tiny fry—his genetic future—swim off.

Konrad Schmidt

Common Carp (*Cyprinus carpio*)

Cyprinus: Greek for "carp" and derived from the island of Cyprus, from which it was once thought the first specimens came to Europe.
carpio: Latin for "carp."

Anglers usually do a double-take when first hearing that the Common Carp is a minnow. After all, the big, whiskered fish looks nothing like the pinkie-sized species that swim in bait buckets. But they are closely related.

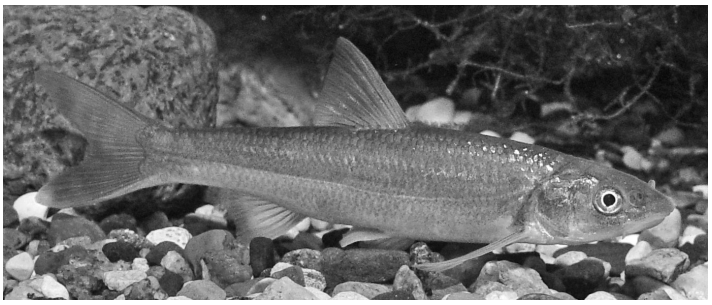
The Common Carp is Montana's largest minnow (elsewhere in the United States, only the Colorado Pikeminnow grows larger). Though disdained by many American anglers as a "trash" species, carp are the most widely eaten freshwater fish in the world and are considered a top game species in Great Britain and Europe. And increasingly, in the United States.

In 1995, the venerable *In-Fisherman* magazine predicted that the Common Carp would be the "world's greatest sportfish" in the 21st century. It's already happening in Fort Smith, where each summer Bighorn River fishing guides vie for top honors by trying to catch the largest carp on a fly on Bighorn Lake above Yellowtail Dam.

Common Carp were first imported to this country by the U.S. Fish Commission in 1871 to shore up flagging native fish stocks. No one knows when the carp and closely related Goldfish came to Montana. Carp are found in many lakes, reservoirs, and large rivers east of the Continental Divide.

The fish are bronze with large scales and a long, sloping forehead. They are occasionally mistaken for native Smallmouth Buffalo, which also have a lipped, subterminal (below the head) mouth. The best way to tell the two species apart is to look for the two barbels on each side of the carp's upper jaw. Buffalo and other sucker species have no barbels.

Contrary to myth, nothing is inherently "dirty" about carp. It's true they tolerate warm, polluted water and can be found downstream from wastewater treatment plants. But they also swim in the Missouri River below Holter Dam, one of Montana's premier blue-ribbon trout waters, and in the clear waters of Fort Peck Lake.



Konrad Schmidt

Flathead Chub (*Platygobio gracilis*)

Platygobio: Latin for "broad goby" (a goby is a European fish found in marine shallows).
gracilis: Latin for "slender."

Chubs are another group of fish in the minnow family. The Flathead Chub is a fish found mostly in the Great Plains, from Texas north through eastern Montana into Alberta and the Northwest Territories. It lives in the main channels of large rivers, sometimes moving to smaller tributaries to spawn.

The Flathead Chub's seemingly contradictory scientific name (both "broad" and "slender") actually makes sense. The fish has a broad, flat, wedge-shaped head, while its body is long and trout-shaped. The minnow is brownish above, silvery on the sides, and light below. In both corners of the large mouth, which is overhung by a long snout, is a distinctive barbel the fish uses to smell food.

Flathead Chubs eat mostly aquatic insects as well as terrestrial bugs that blow into the river. The fish average about 5 inches long but can reach nearly a foot. The larger specimens eat small fish, and biologists have even found small rodents in Flathead Chub stomachs.

Flathead Chubs will occasionally grab a baited hook or a fly angler's nymph and offer some sport, though the species is not considered edible. Anglers in some Midwestern states use these large, hardy minnows as catfish bait.

Konrad Schmidt

Pearl Dace (*Margariscus margarita*)

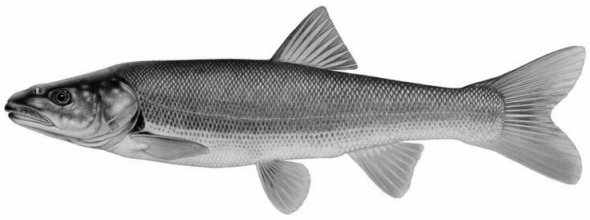
Margariscus: Latin for "pearl," perhaps referring to the sharp tubercles, also known as pearl organs, that develop on the pectoral fins of males during mating season.
margarita: Greek for "pearl."

According to Bramblett, the Pearl Dace is likely a "glacial relic" minnow pushed south from Canada 15,000 years ago with the last ice age, then left behind as the glaciers retreated. "It's a fish tolerant of cool streams, rivers, and lakes, and we find it only in a few disjunct locations in north-central and northeastern Montana," he says. The species is found swimming with trout in cool streams throughout Canada, from British Columbia to Nova Scotia.

Because of its limited distribution in Montana, the Pearl Dace is classified as a state species "of concern." Given their preference for cool temperatures, Pearl Dace may be vulnerable to the warming of water from global climate change.

The Pearl Dace has a small, flaplike barbel in a groove of the upper lip above each corner of the mouth. The cylindrical body is almost round in cross section, similar to that of the Creek Chub, which it closely resembles. It averages about 3 inches long.

Unlike most minnows, a male Pearl Dace establishes and defends his territory during spawning season. Rather than make a nest, he selects an area over a gravel or sand bottom and drives away intruders. When a ripe female enters the male's territory, he moves parallel to her, slides his pectoral fin under her body, and puts his tail fin over hers in a piscatorial embrace. He then presses her lower body down into the substrate as she arches her back slightly and angles her head up. The pair then vibrates, waving their tails frantically while releasing eggs and milt into the gravel or sand.



OR Fish & Wildlife Dept

Northern Pikeminnow (*Ptychocheilus oregonensis*)

Ptychocheilus: Latin for "folded lip," referring to the flesh border of its mouth.
oregonensis: Latin for "of Oregon," where the first specimen was identified.

Some anglers in northwestern Montana who think they caught a trout actually reeled in a Northern Pikeminnow, one of the largest minnow species in North America. Northern Pikeminnows average a foot long in Montana, though some specimens reach 27 inches. Even larger Northern Pikeminnows swim in Alberta, where trophy fish topping 30 inches have been recorded.

The Northern Pikeminnow can be distinguished from a trout by its long head, toothless mouth (trout have teeth), lack of an adipose fin, and deeply forked tail.

This native species is found in lakes and slow river and stream stretches within the Clark Fork drainage.

Young Northern Pikeminnows eat mainly aquatic insects, but the adults are piscivores (fish eaters). Other large minnows such as the Creek Chub occasionally consume fish, but not as much as adult pikeminnows do. That's largely because of the Northern Pikeminnow's large size. Though anglers consider them too bony to eat, adult pikeminnows provide good sport. They take worms, spinners, or crankbaits, as well as streamers or other minnow-imitating flies.

Jay DeLong

Redside Shiner (*Richardsonius balteatus*)

Richardsonius: For Sir John Richardson, who first described the shiner in the Columbia River.
balteatus: Latin for "girdled," perhaps referring to a belt of color around the body of the first identified specimen.

The Redside Shiner is a distinctly western Montana minnow. The name "shiner" refers to the glare that comes off the scales when struck by sunlight, causing the body to sparkle. The redside is darker than most shiners, with a dark olive back and a dark midside band and parallel light stripe above the band from snout to tail fin. Like many minnows, the male lights up like a Las Vegas showgirl during spring spawning season, turning brilliant crimson and bright yellow on the sides and belly.

The Redside Shiner is a flat-sided minnow, with a body shape more like a Goldeye's than a trout's. It averages about 4 inches long but can reach 6 inches.

The redside is found throughout the Clark Fork drainage in lakes, ponds, and rivers.