

# Westsylvania's Aquatic Gems

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Photos by the author.

**T**hey're exquisite! One is underlain with polished turquoise and emblazoned with rubies. Another is encrusted with rich gold throughout. A special piece shimmers in translucent crystal, studded with a row of black onyx ovals and highlighted with a thin golden ribbon. The most gorgeous presents a stunning display of emerald, sapphire, and topaz, with even more rubies than the first.

They have graced their kingdom for centuries. Their value is inestimable, and they are truly irreplaceable. They are passed from generation to generation, but no person owns them—they are the common property of all. This fortune has been appreciated by but a few, and has been unwittingly plundered by the masses.

These are the magnificent crown jewels of Westsylvania. They are not stored away in the guarded tower of an ancient castle, but are distributed throughout the hinterlands, and are readily accessible to the wealthy and commoner alike. Nor are they priceless ornaments fashioned of fine gemstones and precious metals. They are fish, aquatic jewels whose realm is the region's rivers and streams! Darters, to be precise—the Bluebreast, Tippecanoe, Eastern Sand and the incomparable Candy (Fig. 1), respectively—diminutive representatives of North America's second largest finny tribe, and its most colorful.

Many folks (mostly middle-aged and up!) are aware of the existence this group because of a single species—the Snail Darter (*Percina tanasi*). During the 1970s this small, rare fish, confined to the Tennessee River drainage, delayed construction of the massive Tellico Dam while politicians and conservation-

ists battled over provisions of the Endangered Species Act. Snail Darters were transplanted, the dam was eventually built, and the little fish that caused the big stir still survives.

By any measure, darters are unique. No other group of native fishes can boast so many brilliantly hued members, specialized requirements, or unique habits. The most basic habit, "darting," accounts for their name. Their swim bladder (the organ that allows a fish to control its buoyancy and drift effortlessly about) is absent or greatly reduced, so that darters must expend energy to "hover" in the water column. It's much easier for them to stay on the bottom, moving about in short bursts. Their pectoral fins (the pair immediately behind the gills) are enlarged to provide support for the resting fish, much like a kid watching TV on the floor with his head propped up with his hands.

The old adage "good things come in small packages" certainly applies to darters. Several species, including the Tippecanoe (*Etheostoma tippecanoe*, Fig. 2) and Channel Darter (*Percina copelandi*), are often less than two inches long as adults, and claim the distinction of being Westsylvania's smallest fishes. On rare occasions, the "whoppers" of the tribe—Greenside Darter (*Etheostoma blennioides*, Fig. 5) and Logperch (*Percina caprodes*)—may stretch the tape at a bit over six inches.

The darters are an All-American family, with representatives distributed from northern México to northern Canada, but nowhere else. They reach their greatest diversity in the southeastern United States, where 90 or more species occur in Tennessee alone, and nearly 80 call Alabama home. The total number of darters presently known is somewhere around 190 and growing, with new species still being described yearly.

The waterways of Westsylvania (here defined roughly as West Virginia, the Maryland panhandle, and the western half of Pennsylvania) can't compete with the South in darter

diversity, but still boast 28 species. The lion's share of these live in waters that flow into the Ohio River and eventually the Mississippi. Fish speciation and dispersal was greatest in tributaries to the "Big Muddy" (as witnessed by the numbers in Alabama and Tennessee), and the Appalachian Mountains served as an effective barrier that prevented many of the "inlanders" from reaching the watersheds that flow into the Atlantic. This is supported by the fact that, in Pennsylvania, 17 darters have been reported for the Ohio River drainage, but only five have been captured in the Susquehanna basin.

Darters occupy a wide variety of habitats and situations, including small creeks, large, swift riffles, swamps, and lakes, but very few are "generalists." The Logperch may be the most "tolerant," and is comfortable in both the fast runs of rocky streams and the quiet waters of glacial lakes, where it hunts for food by flipping over rocks and debris with its upturned nose.

The most finicky habitat specialist are the sand darters (*Ammocrypta*, Fig. 3), which, true to their name, are almost completely restricted to waterways with bottoms of clean sand. While other darters hide in the crevices among rocks, tangles of roots, or dense vegetation, sand darters become one with their surroundings, diving headfirst into their favorite medium, and either remaining completely buried for as long as an entire day, or poking just their heads above the sand to keep an eye on things. Its cryptic translucent body allows the color of the bottom sand to show through, further camouflaging these elusive species. Several theories have been advanced to explain their behavior, including energy conservation, prey ambush opportunities, and protection from predators.

Even where a large number of darter species occur in the same river, studies have shown that they "partition" their habitat and resources. Variegate Darter (*Etheostoma variatum*, cover photo, bottom) Bluebreast Darter (*E. camurum*, cover photo, top) and Spotted Darter (*E. maculatum*) generally prefer faster riffles than Greenside Darter, Banded Darter (*E. zonale*) and Rainbow Darter (*E. caeruleum*). Within the faster waters, some need gravel bottoms while some others prefer rubble and rocks. Longhead Darter (*P. macrocephala*, back cover photo) and Logperch often prefer the transition areas between riffles and pools, and Blackside Darter (*Percina maculata*) and Johnny Darter (*Etheostoma nigrum*, Fig. 6) favor sluggish current. Some darters appear on riffles only long enough to breed, then drift back into deeper waters for the remainder of the year.

Although some male darters maintain bright colors throughout the year, all are most brilliant during the spawning

season, which is generally during April, May and June in Westsylvania. The gaudy hues attract mates and may also warn other males that a territory is already occupied. The adult male Fantail Darter (*Etheostoma flabellare*) develops fleshy knobs on its dorsal fin that mimic fish eggs. It is these "experienced" fish that females tend to select as mates. Female coloration, on the other hand, generally remains nondescript and subdued.

Exacting habitat and water quality requirements have resulted in some darters becoming rare and localized while others remain common or abundant. Greenside, Banded and Rainbow Darters are ubiquitous in many drainages of the region, while Bluebreast, Gilt (*Percina evides*), Longhead, Spotted and Tippecanoe Darters, along with a few others, are confined to the Allegheny River and a few tributaries in Pennsylvania, and one or two drainages in West Virginia.

This wasn't always the case. It is likely that most of these darters were widely distributed at one time. Although Westsylvania was poorly surveyed by ichthyologists during the period before the Europeans' environmental impacts became significant, we may draw some inferences from isolated collections and reports.

In 1869, the venerable Edward Drinker Cope described the Longhead Darter from three specimens he collected, along with some Eastern Sand Darters, in the Youghiogheny River, in southwestern Pennsylvania. In 1885, Charles Bollman captured four Sharpnose Darter (*Percina oxyrhynchus*, Fig. 4) from the Monongahela, and noted that sand darters were "Common everywhere in suitable places." None of these darters were ever reported from southern Pennsylvania again.

J. P. Kirtland, a noted scientist of the early and middle nineteenth century, collected Spotted Darter in 1838 "at Loveland's Ripple, in the Mahoning River, near the village of Youngstown" in Ohio, just across the border from New Castle, Pennsylvania. In 1853, Spencer F. Baird, a colleague of Kirtland's, collected Spotted and Bluebreast Darters nearby in Yellow Creek. In the 1930s, Edward C. Raney of Cornell University found both species on the Keystone State side of the border, in the Shenango River. Neither has been seen there since.

Dr. A. E. Ortmann, a malacologist (a biologist who studies mollusks) from Carnegie Museum, painted a grim picture of the condition of the region's waterways in his 1909 report *The Destruction of the Fresh-Water Fauna in Western Pennsylvania*. He wrote: "We may say that of the Monongahela drainage by far the greatest part is utterly polluted, chiefly by mine water." The Beaver River, formed at the confluence



▲ Fig. 1.  
Candy Darter, *Etheostoma osburni*.

▼ Fig. 2.  
Tippecanoe Darter, *Etheostoma tippecanoe*.







▲ Fig. 3.  
Eastern Sand Darter, *Ammocrypta pellucida*.

▼ Fig. 4.  
Sharpnose Darter, *Percina oxyrhynchus*.





Fig. 5.  
Greenside Darter, *Etheostoma blennioides*.

of Kirtland's Mahoning and Raney's Shenango, was "utterly polluted its whole length."

Summarizing the condition of the largest rivers, Ortmann stated that "both the Allegheny and Monongahela are as badly polluted as they can possibly be, and, consequently, it is not astonishing that the Ohio immediately below Pittsburgh is also in a deplorable condition."

Ortmann's assessment of other area rivers read like the script of a horror movie. The Kiskiminitas, which drains the coal regions of Cambria, Indiana, Somerset, and Westmoreland counties, was in "a fearful condition." He noted "in almost all of the drainage basin of the Kiskiminitas fresh-water life is extinct." The Clarion was "possibly one of the worst streams in the state" with waters that ran "black like ink." On July 23, 1908, he "witnessed the actual destruction of the fauna, and the number of dead and dying fishes seen in Yellow Creek at Homer City (Indiana County) was perfectly appalling."

The situation was little better in West Virginia. E. L. Goldsborough and H. W. Clark concluded, in their 1908 report *Fishes of West Virginia*, that "aquatic life in general, and fishes in particular, had been and are now in many streams being greatly injured and in others practically destroyed by the unwise and destructive operations of the lumberman and the miner."

Today, many of these waterways that were in such deplorable condition at the turn of the last century once again support significant numbers of the more resilient darters. Unfortunately, many miles of prime habitat for darters, and

other river fish, was permanently lost when the Allegheny, Monongahela, and Ohio were transformed into a series of deep, sluggish pools through construction of navigation dams. Zadok Cramer, who authored a navigation guide to the Ohio River and its tributaries in 1818, described the condition of these then pristine, free-flowing waterways, with many references to sandbars, rock and gravel bars, bedrock and rock ledges, ripples and rapids. This variation in habitats and depth allowed an incredible array of fish species to exist in almost unbelievable numbers.

A few rivers amazingly escaped the rampant destruction wrought by the Industrial Age. One of the "luckiest" was French Creek, which begins in New York and enters the Allegheny at Franklin, Venango County. Ortmann observed that "French Creek and its tributaries are generally clear and possess a wonderfully rich fauna."

According to Dr. Jay Stauffer, Jr., a professor of ichthyology at Penn State University, who has studied Pennsylvania waterways (and darters) for nearly 30 years, the French Creek drainage supports 16 darters and more than 80 species of fish, and is considered Pennsylvania's most diverse aquatic ecosystem. Eight of those darters are classified as endangered or threatened by the Pennsylvania Fish and Boat Commission (PFBC). French Creek's treasures also include 26 species of mussels, including two that are federally endangered.

If French Creek is Pennsylvania's best, the Elk River system in West Virginia is better, according to Dan Cincotta,





Fig. 6.  
Johnny Darter, *Etheostoma nigrum*.

fisheries biologist with that state's Natural Heritage Program (NHP). The Elk boasts 18 darters, including all but one of those that survive in French Creek, along with nearly 100 total fish species.

Mussel populations are good in the Elk River drainage as well. Janet Clayton, also a biologist with West Virginia's NHP, has identified three federally-listed species there, including the Clubshell (*Pleurobema clava*) and Northern Riffleshell (*Epioblasma torulosa rangiana*), both of which are also found in French Creek.

When mussels reproduce, the larval form, called glochidia, are harmless parasites on the gills of fish. Some are extremely restricted as to which fish species they may successfully colonize, and Clayton believes that the diversity of darters and occupation of French Creek and the Elk River by rare mussels is probably not a coincidence.

Because darters are all at least somewhat sensitive to environmental conditions, and exhibit varying degrees of tolerance to changes and degraded situations, their presence, absence, and composition within a stream or watershed allow scientists to draw accurate conclusions about the health of that system. Clearly, the Elk River and French Creek are two of the healthiest drainages in Westsylvania. Conversely, a similar-sized stream with only a few darters, or non at all, is likely degraded.

It is precisely this quality that gives darters their appeal for John Arway, who leads PFBC's Fishery Environmental

Services Division, the unit that investigates permit applications, pollution events and related problems. He feels they are probably the most diverse and understudied group of North American fishes, and are very good indicators of environmental stresses.

Keeping streams and rivers healthy enough for darters, and improving those that are not, is a conservation priority of both governmental conservation agencies and private environmental groups. Watershed conservation has been one of the key missions of the Western Pennsylvania Conservancy since 1932. Charles Bier, the organization's senior scientist, touts WPC's recently organized Watershed Assistance Center, whose staff is involved in the planning and protection of many of western Pennsylvania's waterways. The staff provides on-the-ground support with a crew that erects streambank fencing for interested volunteer landowners, and technical advise and assistance to local and regional conservation groups that are developing watershed conservation plans.

The center's cooperation with the Buffalo Creek Watershed Association in Washington County is an excellent example of this cooperation works. Bier notes that the WPC collected data and information for the local group, including a mussel inventory and survey of streamside vegetation of stream, and providing input into more challenging aspects of the project. The end result of efforts such as this will be better water quality and more darters (and, of course, other aquatic life, too). ◀▶



Top: Bluebreast Darter, *Etheostoma caeruleum*, male.  
Bottom: Variegate Darter, *E. variegatum*, male.  
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## Longhead Darter

*Percina macrocephala* (Cope 1867)

Family: Percidae

Edward Drinker Cope described the Longhead Darter from three specimens he collected in the Youghiogheny River in southwestern Pennsylvania. The species was never reported from southern Pennsylvania again. See "Westsylvania's Aquatic Gems," pp. 15-20. Photograph © Rob Criswell.

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