

KENTUCKY'S THREATENED AND ENDANGERED FISHES

BLACKSIDE DACE (*CHROSOMUS CUMBERLANDENSIS*)



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Kentucky supports an impressive fish fauna (264 species), and nine species occur nowhere else in the world! Unfortunately, habitat disturbance and pollution over the past 200 years have degraded many of our waterways, negatively impacting the fauna and contributing to the loss of nine species. Another 60 species (25% of Kentucky's fauna) are now considered rare, and some are declining. Six Kentucky species are so imperiled that the US Fish and Wildlife Service (USFWS) has placed them on the Federal List of Threatened and Endangered Wildlife (Table 1). Once on the list, these species are afforded special protections under the Endangered Species Act (ESA) and are made the focus of conservation programs that seek to remove threats and improve each species' status.

Kentucky's most widely distributed threatened or endangered species is the Blackside Dace (*Chrosomus cumberlandensis*), a headwater minnow endemic to the upper Cumberland River drainage in southeastern Kentucky and northeastern Tennessee (Figure 1). It was not formally recognized as a distinct species until 1978 but was immediately

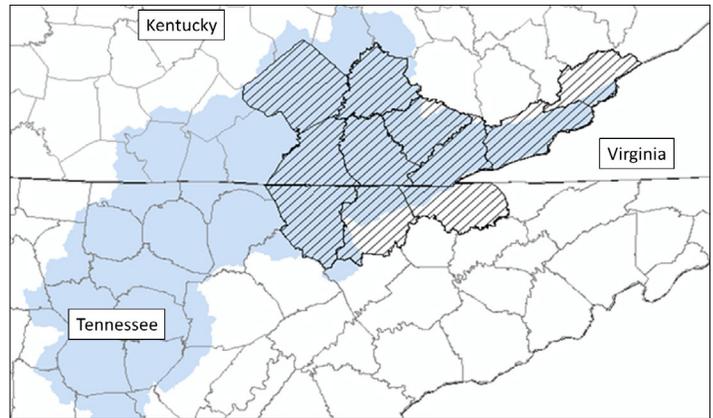


Figure 1. Range of Blackside Dace. Historically, the species was known only from blue areas in the 11 counties marked with diagonal lines, but populations have since been found that extend the species' range.

recognized by its descriptor, Dr. Wayne Starnes (then a graduate student at the University of Tennessee), as a species in trouble. Based upon subsequent status surveys and threat assessments by Dr. Starnes and others, the species was federally listed as threatened in 1987.

Table 1. Kentucky's Federally Threatened and Endangered Fishes

COMMON NAME	SPECIES	LISTING DATE
Blackside Dace	<i>Chrosomus cumberlandensis</i>	1987
Relict Darter	<i>Etheostoma chienense</i>	1994
Duskytail Darter	<i>Etheostoma percnum</i>	1993
Cumberland Darter	<i>Etheostoma susanae</i>	2011
Palezone Shiner	<i>Notropis albizonatus</i>	1993
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	1990



Figure 2. Blackside Dace (*Chrosomus cumberlandensis*). (Photo courtesy Matt Thomas, Kentucky Department of Fish and Wildlife Resources [KDFWR])

Modified version of the article originally published in *Naturally Kentucky*, Summer/Fall 2014, Number 72.



Figure 3. Blackside Dace inhabit pools with little silt and good water quality. (Photo courtesy USFWS)

The Blackside Dace is a small member of the minnow family, reaching a maximum length of about three inches. It is distinguished from other fishes by its pointed snout, a wide, black lateral stripe on its side (sometimes two stripes that converge at the tail), an olive-colored to gold-colored back, and some scarlet and yellow coloration on the head and belly (Figure 2). During the breeding season, males will exhibit an intensely black stripe; bright scarlet coloration on the belly, head, and mouth; and bright yellow fins with metallic spots. The Southern Redbelly Dace (*Chrosomus erythrogaster*) can sometimes occur in the same habitats, but it can be differentiated by its two, parallel lateral stripes.

Blackside Dace typically inhabit pools of small, cool, upland streams with moderate flows, minimal silt, and good water quality (Figure 3). Their habitats generally have good canopy cover, and a variety of instream cover such as submerged roots wads, undercut banks, woody debris piles, and large rocks. Spawning occurs between April and June over clean gravel in nests typically constructed by other species such as Creek Chub (*Semotilus atromaculatus*) and Central Stoneroller (*Campostoma anomalum*) (Figure 4). For most of the year, dace eat algae that are attached to submerged surfaces (wood, rocks) but they supplement their diet with aquatic insects during the winter.

Members of the minnow family tend to be good swimmers, and Blackside Dace are no exception. Recent research on the Daniel Boone National Forest has shown that dace can travel up to 2.5 miles within a given year! They can even leave their headwater reaches and travel downstream through deep, unsuitable habitats (e.g., larger streams, lakes) to reach other tributaries. The species often forms schools, and some of these groups can contain as many as 100 individuals.

When the species was described in 1978, it was known from only 12 streams. We now have current records of the species from 119 streams in three states: Kentucky, Tennes-

see, and Virginia. The majority of these streams are located within the upper Cumberland River drainage (the species' historical range); however, several new populations have been discovered over the last 20 years in the Big South Fork Cumberland River drainage, the upper Kentucky River drainage, and the Clinch and Powell River drainages in Virginia (Figure 1). So far, it appears that most of these new populations are the result of accidental bait-bucket introductions; however, preliminary genetic analyses suggest that at least some of the Big South Fork populations could be natural.

When the Blackside Dace was listed in 1987, habitat loss or modification was listed as the species' primary threat. Unfortunately, these threats continue, and aquatic habitats in eastern Kentucky and Tennessee continue to be degraded chemically and physically by a variety of human activities: surface coal mining, logging, oil/gas exploration, land development, road construction, residential land use, and agriculture. Surface coal mining is often cited as the species' most significant source of threats because it is widespread within the upper Cumberland River drainage; it creates large, physically altered landscapes; and it has the potential to contribute high concentrations of dissolved metals and other solids that elevate stream conductivity, increase sulfate and hardness levels, and cause wide fluctuations in stream pH. Oil and gas exploration and drilling activities represent another significant source of harmful pollutants. A variety of chemicals (e.g., hydrochloric acid, surfactants, potassium chloride) are used during the drilling process, and these chemicals can be harmful to aquatic organisms if they leave the drill site and enter nearby waterways. Recent research has shown that Blackside Dace are less likely to be present when conductivity levels exceed 240 $\mu\text{S}/\text{cm}$, so the water quality threats associated with these activities are clear.



Figure 4. Blackside Dace spawning over Creek Chub nest. (Photo by Dr. Tyler Black, TN Tech)

Blackside Dace are also vulnerable to the effects of physical habitat alteration (e.g., excessive sedimentation, stream canopy removal, and channelization). Sediment continues to be ranked by the Kentucky Division of Water as the most common stressor of aquatic communities in eastern Kentucky, and numerous streams within the Blackside Dace's current range have been identified as impaired due to siltation from mining, logging, agricultural activities, and land development (see www.water.ky.gov/waterquality). All of these activities can result in canopy removal, channel disturbance, and increased siltation, thereby degrading habitats used by fishes for both feeding and reproduction. The reduction or loss of riparian vegetation results in the elevation of stream temperatures, destabilization of stream banks, and removal of submerged root systems that provide habitat for fishes and macroinvertebrates.

A third factor in the decline of Blackside Dace populations is their small size and fragmented distribution. Even though Blackside Dace currently occupy over 100 streams, recent research has demonstrated that most dace populations are small (only a few individuals observed during field surveys) and, presumably, remnant in nature, making them less secure and more vulnerable to local extirpations. When extirpations do occur, populations are so isolated that recolonization simply cannot occur. Small populations run the risk of reduced fitness due to inbreeding and loss of genetic variation.

To protect and promote recovery of the species, the USFWS and its many partners (e.g., Kentucky State Nature Preserves Commission [KSNPC] and KDFWR) work together to implement recovery actions outlined in the 1988 Blackside Dace recovery plan. Some of these actions include (1) utilization of existing legislation and regulations to protect the species and its habitats (e.g., ESA, Clean Water Act, and state laws/regulations); (2) completion of monitoring surveys and searches for new populations; (3) acquisition of important dace habitats to provide long-term protection for the species (e.g., Blanton Forest

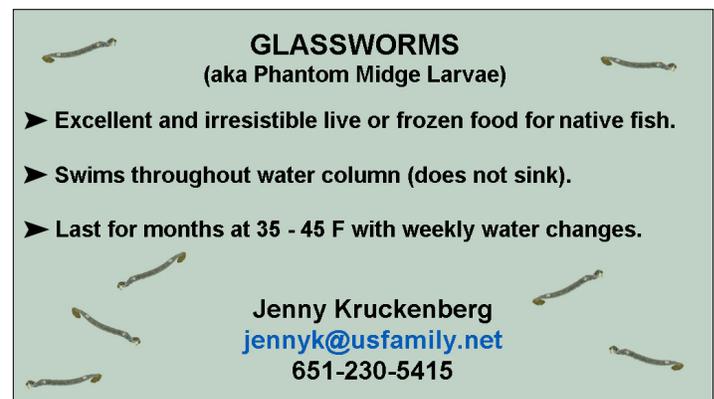
State Nature Preserve, Harlan County); (4) completion of research on the species' distribution, ecology, threats, and conservation; (5) restoration of dace habitats; and (6) development of educational materials that describe the species' biology and inform the public about proper land use practices.

One notable recovery effort is the Mill Branch stream restoration project completed in 2008. The project involved a 2,300-ft reconfiguration of Mill Branch in Knox County, Kentucky and was accomplished through the cooperative efforts of the USFWS; University of Louisville Stream Institute; Bluegrass Streams, LLC; Knox County Fiscal Court; KDFWR; KSNPC; Eastern Kentucky University, Cumberland Valley RC&D; and the Kentucky Division of Conservation. Prior to the restoration, a small dace population had persisted within Mill Branch, but the population was limited due to channel dredging and straightening, removal of riparian vegetation, over-grazing of adjacent pastures, and placement of culverts within the stream channel. The project was designed to alleviate these problems by reconfiguring instream and riparian habitats for the species and removing a perched culvert that inhibited fish dispersal. Post-restoration monitoring has demonstrated that physical habitat conditions have improved, flows are perennial, the culvert no longer restricts dace movement, and overall fish diversity and abundance have increased.

The USFWS is currently in the process of completing a five-year status review for the Blackside Dace. The five-year review is a document required by the ESA and is intended to summarize the species' status using the best scientific and commercial data available at the time of the review. The purpose of the review is to determine if the species' current listing status (threatened) is accurate, and it will determine what future conservation actions are needed. Once complete, a copy of the five-year review will be available on the USFWS endangered species website, www.fws.gov/endangered.



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