

Carolina heelsplitter *(Lasmigona decorata)*

Listed as endangered: June 30,
1993



The Recovery Plan, authored by John Fridell (USFWS, Asheville), was approved in January 1997. The immediate goal as listed in the recovery plan is to protect and maintain the known surviving populations of Carolina heelsplitter. Recovery objectives state: “Lack of proper protection and management of these populations, particularly the populations in South Carolina, will preclude recovery of the Carolina heelsplitter and will ultimately lead to the species’ extinction.”

Life History

General information concerning the habitat requirements of the Carolina Heelsplitter is becoming better known through survey and monitoring efforts for the species. However, we still know very little about the species’ life history, biology, and specific habitat preferences and tolerances of the various life stages.

Limited studies have been conducted, using surrogate species, to determine potential toxicities of some common pollutants to mussels, but there are a countless number of other pollutants present in discharges and stormwater runoff into streams occupied by the species, the acute and chronic effects of which we know nothing about.

Personnel with the North Carolina State University, in cooperation with the North Carolina Wildlife Resources Commission (NCWRC) and the Service, have initiated experiments in captive propagation and culture of the Carolina Heelsplitter. Several species of fish have been used in the lab to successfully transform Carolina Heelsplitter glochidia to juveniles, and offspring produced from these efforts presently range in age from 5-6 months (C. Eads pers. comm.. 2007). Fish species that successfully transformed glochidia to juveniles in the lab include:

Bluehead Chub (*Nocomis leptocephalus*)
Creek Chubsucker (*Erimyzon oblongus*)
Bluegill (*Lepomis macrochirus*)
Golden Shiner (*Notemigonus crysoleucas*)
Rosyside Dace (*Clinostomus funduloides*)
Satinfin Shiner (*Cyprinella analostana*)

Highfin Shiner (*Notropis altipinnis*)
Spottail Shiner (*Notropis hudsonius*)
Sandbar Shiner (*Notropis szepticus*)
Whitefin Shiner (*Cyprinella nivea*)
Warmouth (*Chaenobryttus gulosus*)

Distribution

The species has a fragmented, relict distribution, currently known from six streams and one small river in the Carolinas. On July 2, 2002 critical habitat for Carolina heelsplitter was designated. Critical habitat included 6 units encompassing a total of 148.4 stream kilometers in North and South Carolina. Designated stream segments include all areas where Carolina heelsplitter had been observed at the time of designation and are considered currently occupied. Several newly discovered populations do not have critical habitat designation.

There are currently 10 known surviving populations of the Carolina Heelsplitter:

Pee Dee River System

- Goose Creek/Duck Creek population, Union County, North Carolina
- Flat Creek /Lynches River (Flat Creek/Lynches River population), Lancaster, Kershaw, and Chesterfield Counties, South Carolina

Catawba River System

- Waxhaw Creek population, Union County, North Carolina
- Sixmile Creek population, Union and Mecklenburg Counties, North Carolina and Lancaster County, South Carolina
- Gills Creek/Cane Creek population, Lancaster County, South Carolina
- Fishing Creek/South Fork Fishing Creek population, Chester County, South Carolina
- Bull Run Creek/unnamed tributary to Bull Run Creek/Beaverdam Creek (Rocky Creek population), Chester County, South Carolina (note: Bull Run Creek and Beaverdam Creeks are tributaries to Rocky Creek)

Saluda River System

- Red Bank Creek population, Saluda County, South Carolina

Savannah River System

- Turkey Creek/Mountain Creek/Beaverdam Creek/Sleepy Creek/Little Stevens Creek (Turkey Creek population), Edgefield and McCormick Counties, South Carolina
- Cuffytown Creek population, Greenwood and McCormick Counties, SC

All of these populations appear to be small in numbers and their genetic viability is questionable. All of the surviving populations remain highly susceptible to stochastic and chronic events (e.g., drought, chemical spills, stormwater runoff, etc.). While 6 of the 10 extant populations – the Goose Creek/Duck Creek population, Flat Creek/Lynches River population, Fishing Creek/South Fork Fishing Creek population, Gills Creek/Cane Creek population, Rocky Creek population, and Turkey Creek population – currently inhabit more than one stream, these populations are extremely small and/or the majority of individuals within each population occur primarily in one stream, and in most cases

one short stream reach, where a single event could reduce population numbers to a point where extirpation over a short time period would be likely.

Although there have been discoveries of additional occurrences of the Carolina Heelsplitter since the species was listed as endangered in 1993, the species continues to have a very fragmented, relict distribution. There are currently 10 known extant populations. Based on available survey data, all extant populations are small in numbers; only 2 populations appear to be relatively stable; 2 populations appear to be in significant decline; and, current trend information is not presently available for 6 of these populations, because of either their recent discovery or lack of recent monitoring surveys (see Table 1 below). Although trend information is not available for all known extant populations, given their low population levels; limited amount of suitable habitat available within the streams supporting these populations; the fact that most streams (with the exception of Red Bank Creek which is not being monitored by the state) have been added to the states' list of impaired waters (303d lists); and, degree of recent, on-going, and/or proposed development within the watersheds of several of these populations, several, if not all, of these populations are likely in decline and/or are expected to decline in the future without adequate protection.

Table 1. Number of Carolina heelsplitter observed in each known population.

Population	Date of last survey(s)	Total number live recorded*	Trend
Goose Creek/Duck Creek (Pee Dee River system), NC	2009	2 (Duck Creek)	Declining
Flat Creek/Lynches River (Pee Dee River system), SC	2010 (Flat Creek); 2011 and 2007 (Lynches Riv.)	57 (50 in Flat Creek and 7 in Lynches River)	Stable (but habitat in the Lynches River is patchy and appears to be declining in quality)
Waxhaw Creek (Catawba River system), NC and SC	2008-2011	0 (not surveyed in SC and 0 in NC)	Declining
Sixmile Creek (Catawba River system), NC and SC	2008-2011	2	Declining
Gills Creek/Cane Creek (Catawba River system), SC	2011 (Gills Creek); 2007 (Cane Creek)	3 (1 in Gills Creek; 2 in Cane Creek)	Unknown
Fishing Creek/South Fork Fishing Creek (Catawba River system), SC	2008-2011	13 (12 in South Fork Fishing Creek; 1 in Fishing Creek)	Declining
Rocky Creek	2008-2011	16 (11 in Bull Run	Declining

(Catawba River system), SC		Creek; and 5 in Beaverdam Creek)	
Red Bank Creek (Saluda River system), SC	2006	1	Unknown
Turkey Creek (Savannah River system), SC	2008-2011	30 (1 in Turkey Creek; 9 in Mountain Creek; 18 in Sleepy Creek; 1 in Beaverdam Creek; and 1 in Little Stevens Creek)	Declining
Cuffytown Creek (Savannah River system), SC	2010	2	Unknown

* In several cases the surveys conducted were only partial surveys of the occupied streams. However, the surveys included a significant portion of the streams and most often the reaches of the streams that appear to provide the best habitat for the species. Accordingly, while the total number of individuals recorded would be expected to be slightly higher if more extensive surveys of these streams were conducted, these figures should give a relatively good indication of the population levels within these streams.

Threats

The decline of the Carolina heelsplitter throughout its range is attributed to siltation from poor agriculture and silvicultural practices, conversion of forest land to impervious surface, road construction and maintenance, discharge of pollutants, habitat alterations, and other natural and human-related factors. Persistent drought throughout the slate belt eco-region, combined with the expansion of pine monoculture land use in heelsplitter watersheds is dramatically lowering base flows in occupied streams, altering temperature regimes and creating slack-water and lentic conditions that are unsuitable to the habitat needs of the Carolina heelsplitter. Existing (known) populations are at such low density; the current recovery priority is protection and habitat improvement (physical and chemical) within occupied watersheds.

Information contained in Table 2, below, was generated from South Carolina's Integrated Report for 2006 Part I: Listing of Impaired Waters as submitted by SCDHEC and approved on October 27, 2006 and the USEPA STORET database. This table is a list of water quality monitoring stations within the portions of the watersheds of streams in South Carolina currently occupied by Carolina Heelsplitter. Based on the 2006 water quality monitoring data, 18 out of 29 (62.1 percent) monitoring stations within Carolina Heelsplitter watersheds where monitoring is occurring do not meet Clean Water Act standards. Seventeen of these monitored sites are impaired for aquatic life use and 1, Turkey Creek, is impaired for recreational use.

Table 2. Water quality data from monitoring stations in heelsplitter watersheds. Based on the SCDHEC 2006 303d list.

<u>STATION</u>	<u>WATERBODY</u>	<u>PARAMETER NOT MEETING STANDARDS</u>	<u>HEELSPLITTER POPULATION</u>
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CW-017	Cane Creek	Dissolved Oxygen	Cane/Gills Creek
CW-047	Gills Creek	Dissolved Oxygen	Cane/Gills Creek
CW-131	Bear Creek	Dissolved Oxygen	Cane/Gills Creek
CW-185	Cane Creek	Dissolved Oxygen	Cane/Gills Creek
CW-210	Cane Creek	Macroinvertebrates	Cane/Gills Creek
RS-05403	Hannah's Creek	meets standards	Cane/Gills Creek
RS-03342	Doctors Branch	Macroinvertebrates	Cuffytown Creek
SV-351	Cuffytown Creek	meets standards	Cuffytown Creek
CL-021	Conrad Creek	Chlorophyll-a	Fishing Creek
CW-007	SF Fishing Creek	Macroinvertebrates	Fishing Creek
CW-008	Fishing Creek McFadden	meets standards	Fishing Creek
RS-01007	Branch	meets standards	Fishing Creek
PD-001	Lynches River	meets standards	Flat Creek /Lynches River
PD-066	Lynches River	meets standards	Flat Creek /Lynches River
PD-068	Fork Creek	Macroinvertebrates	Flat Creek /Lynches River
PD-182	Flat Creek	Macroinvertebrates	Flat Creek /Lynches River
PD-342	Flat Creek	Copper	Flat Creek /Lynches River
CW-002	Rocky Creek Grassy Run	Copper	Rocky Creek
CW-088	Branch	Dissolved Oxygen	Rocky Creek
CW-691	Beaverdam Creek	Macroinvertebrates	Rocky Creek
CW-176	Sixmile Creek	Turbidity	Sixmile Creek
SV-068	Beaverdam Creek	meets standards	Turkey Creek
SV-352	Turkey Creek	Fecal Coliform	Turkey Creek
SV-353	Beaverdam Creek	meets standards	Turkey Creek
SV-727	Rocky Creek	meets standards	Turkey Creek
SV-728	Log Creek	meets standards	Turkey Creek
SV-729	Turkey Creek	Macroinvertebrates	Turkey Creek
RS-06171	Beaverdam Creek	meets standards	Turkey Creek
CW-145	Waxhaw Creek	Copper	Waxhaw Creek