

## Carolina Heelsplitter Recovery Action Plan



Photo by: J. Alderman, Alderman Environmental Services, Inc.  
Carolina heelsplitter (*Lasmigona decorata*)

U.S. Fish and Wildlife Service, Southeast Region – Asheville, North Carolina Ecological Services Field Office, August 3, 2009

### ▣Target: Prevent Extinction of the Carolina heelsplitter

#### **Carolina heelsplitter:**

Status: Endangered

Recovery Priority Number: 5C (high degree of threat/low recovery potential)

Recovery Plan: Recovery Plan for the Carolina Heelsplitter (*Lasmigona decorata*) Lea; January 17, 1997

5-year Review: initiated July 2006, document under review process

Other: Listed as endangered on June 30, 1993 (58 FR 34926); critical habitat designated July 2, 2002 (67 FR 44502)

#### **Threats:**

Habitat loss and fragmentation: Habitat of all surviving populations of the Carolina heelsplitter continue to be threatened by many of the same factors identified at the time of listing as leading to the loss and decline of the species throughout significant portions of its historic range. Threats include: 1) poorly controlled runoff of silt and other pollutants from agricultural, forestry, and residential and commercial development activities, golf courses, and roads and highways; 2) stream bank and channel scour from poorly controlled stormwater runoff from impervious surfaces; 3) changes in stream hydrology (lowering of base-flows) resulting from runoff from impervious surfaces (lack of infiltration and groundwater recharge), persistent and reoccurring drought conditions, removal of surface flows and groundwater for irrigation, and conversion hardwood and mixed forest stands to pine monoculture; 4) discharge of municipal and industrial pollutants; and, 5) habitat alterations and fragmentation associated with impoundments, channelization, dredging, and sand mining operations.

Although forestry, agriculture, mining, dams, etc. continue to pose significant threats to the continued existence of the Carolina heelsplitter, the most significant threat to the majority of the extant populations is currently associated with residential and commercial development activities. Many of the counties in North Carolina and South Carolina where surviving populations of the Carolina heelsplitter occur are among the fastest growing counties in the nation.

The same factors associated with development activities (e.g., runoff and discharge of silt, sediments, and organic and chemical pollutants; loss of forested buffers; increased stormwater runoff affecting bank and channel stability and lowering base flows; etc.) that have in the past eliminated several other populations of the Carolina heelsplitter in Mecklenburg and surrounding counties are contributing to a significant decline in the health and range of the Goose Creek/Duck Creek population; appear to be adversely affecting the Sixmile Creek and Fishing Creek/South Fork Fishing Creek populations of the species; and pose significant threats to the Waxhaw Creek, Gills Creek/Cane Creek, and Flat Creek/Lynches River populations of the Carolina heelsplitter. In addition, the proximity of the Turkey Creek system and Cuffytown Creek populations to the cities of Aiken and North Augusta, South Carolina, threaten these two populations with development activities associated with the expansion of these cities. Much of the development that is occurring within the watersheds of the streams supporting occurrences of the Carolina heelsplitter is not subject to review and comment by the U.S. Fish and Wildlife Service or other federal agencies and is subject only to state and local regulations/ordinances.

Overutilization: We have no information to indicate that overutilization poses a significant threat to the Carolina heelsplitter

Disease/Predation: At the time of listing, disease and predation were not considered significant threats to the Carolina heelsplitter. However, based on available information, all the surviving populations are small in number; several are extremely small with only 1-17 live heelsplitters documented during the most recent surveys. Several small mammal species are known to feed on mussels including muskrat, otter, raccoon, mink, etc. While predation is not thought to be a significant threat to a healthy mussel population, it could limit the recovery of endangered mussel species or contribute to the local extirpation of mussel populations already depleted by other factors. Also, while we do not have any new information indicating that disease has been a contributing factor in the decline of the Carolina heelsplitter, extensive mussel kills or die-offs have been reported at various times in streams throughout the U.S. The cause(s) of many of these die-offs is unknown, but disease has been suggested as a possible factor.

Inadequacy of existing regulatory mechanisms: Neither of the states of North Carolina or South Carolina, nor the local governments with jurisdictions within the watersheds of streams supporting populations of the Carolina heelsplitter, currently have regulations/ordinances that are adequate to protect the species from many of the adverse effects of agriculture, private forestry, and residential and commercial development activities (e.g., loss of riparian buffers; impacts to the streams' hydrographs; stormwater runoff of sediments and other non-point source pollutants; wastewater discharges, etc.). The majority of the land use activities in watersheds of streams supporting the Carolina heelsplitter are occurring without any federal nexus or in cases where a federal nexus has existed, many of the measures necessary for the protection of the heelsplitter and its habitat are not within the permitting or funding federal agencies' authority to implement. Also, recent studies indicate that current federal and state water quality standards for many pollutants commonly found in wastewater discharges and stormwater runoff are likely not protective of freshwater mussels and current regulations controlling the discharge or runoff of these pollutants are not protective. Because of the inadequacy of existing federal, state, and local regulations designed to regulate the discharge and runoff of pollutants into surface waters, all of the extant occurrences of the species are under significant threat of extirpation. Portions, and some cases the entire reaches, of the most of streams currently supporting populations of the Carolina heelsplitter have been listed by North Carolina and/or South Carolina as having impaired water quality including Goose Creek, Duck Creek, Waxhaw Creek, Sixmile

Creek, Flat Creek, Lynches River, Cane Creek, Gills Creek, Beaverdam Creek (Rocky Creek system), Fishing Creek, and South Fork Fishing Creek. Of the streams monitored for water quality by the states, only Beaverdam Creek in the Turkey Creek system and Cuffytown Creek currently meet the state's water quality standards at all monitoring sites. Mountain Creek, Sleepy Creek, and Little Stevens Creek are not currently being monitored by the state.

Other natural or human factors: The genetic viability of the surviving populations remains a significant concern. All of the remaining populations of the Carolina heelsplitter appear to be effectively isolated from one another by impoundments and long reaches of highly degraded habitat; and, the numbers of all of the surviving populations appear to be well below the level necessary to maintain a reproductively viable population. In addition, all streams supporting populations of the Carolina heelsplitter have been significantly affected by severe - exceptional drought conditions which persisted from the fall of 2006 through the spring of 2009 – flow in several of the streams supporting the species completely dried up and significant mussel mortality was documented in several streams surveyed. Even prior to the drought conditions all surviving populations of this highly imperiled species existed only at extremely low numbers and it is highly probable that some of these populations are now extirpated.

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<p><b>Current Status:</b> The Carolina heelsplitter is endemic only to the slate-belt portion of the piedmont of the Carolinas. There are currently only 10 known surviving populations. Densities of all known populations are extremely low and highly vulnerable to extirpation from stochastic and chronic events affecting the quality of their habitat. During the most recent surveys, only 1-17 individuals were documented for 8 of the surviving populations, only 26 individuals were recorded in one population, and only 42 individuals in what appears to be the best surviving population. The results of the most recent surveys indicate majority of the surviving populations are in significant decline. All surviving populations are highly fragmented, isolated from one another, and restricted to short stream reaches. Habitat in the streams where the species exists appears to be generally marginal at best, as evidence of the low numbers of individuals found at each site (generally only 1-3) and patchily distributed, being separated by long reaches of degraded, unsuitable habitat. The species' entire range is within the areas most severely affected by the 2006-2009 drought and all of the surviving populations are restricted to small tributary streams, most vulnerable to the drought. Several of the species' populations may now be extirpated. Given past and recent trends in populations of this species, extinction of the Carolina heelsplitter in the wild is increasingly probable. At a meeting in October 2007, federal, state, university, and private biologists from North Carolina and South Carolina identified the need for rescue, holding, and controlled propagation of the species in order to maintain unique genetic stock and provide offspring for population augmentation and reintroduction to prevent the extinction of this species in the wild.</p>
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<p><b>Target:</b> Given the current status of the Carolina heelsplitter and its habitat, and the multitude of threats facing the species, preventing the species' extinction over the next 5-year period is the primary target of this action plan.</p>
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<p><b>Measure:</b> Persistence of the Carolina heelsplitter; finalization of the Conservation Bank for Lancaster County, SC; establishment of a facility in SC and/or increased capacity and efficiency of existing facilities in NC for holding and controlled propagation; and consideration</p>
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of development of experimental population designation for reintroduction of the species into the Pee Dee River, Catawba River, Barnes Creek, and/or other stream or streams within the species' historic range identified as most likely to serve as a refuge for the species.

**Actions:**

RA=Recovery Action/Task; 1 <sup>st</sup> # = priority; 2 <sup>nd</sup> # = task no.	FY 09	FY 10	FY 11	FY 12	FY 13	Estimated Costs	Responsible Parties and Notes
1. Assess the status of surviving populations.  RA: 1-1.; RA: 2-6.	X	X	X			\$75-90K (On-going - \$50K was obligated in FY08 for surveys in FY08-FY09; additional funding will be needed to complete population assessments)	USFWS, USFS, NCWRC, SCDNR, and/or contractor
2. Continue and expand captive propagation efforts for maintenance of unique genetic material; population augmentation and reintroduction; and, life history/habitat requirement studies.  RA: 1-1.4; RA: 1-2.1,2.2; RA: 2.4; RA: 2 (1)*-4	X	X	X	X	X	On-going; \$150-170K/Year for operation of the two NC facilities (most of the cost of operation and maintenance of the facilities has been and currently is provided by our partners [NCWRC, NCSU, and NCDOT]).  \$50-60K is needed to establish a mussel propagation facility at the Orangeburg NFH in SC and \$25-40K/year will be needed to operate the facility. In addition there may be periodic equipment replacement, upgrades or other needs at any of the three facilities.	USFWS, USFS, NCWRC, NCSU, SCDNR, and/or contractor
3. Determine intra- and inter-population	X	X	X	X	X	\$40K/Year	USFWS,

<p>genetics and develop and implement a captive species propagation and genetics management plan to provide guidance for potential augmentation and reintroduction efforts, monitor the success of these efforts, and inform other potential management actions.</p> <p>RA: 1-2.; RA: 2-2.5</p>						<p>The Service provided funding in FY06 to the NC Museum of Natural History to conduct a genetic comparison of surviving populations which should be completed in FY09. Additional funding will be needed to develop a genetics management plan and monitor success of augmentation/reintroduction efforts</p>	<p>NCMNH, NCWRC, SCDNR</p>
<p>4. Work with federal and state agencies, knowledgeable biologists, and land stewards, to compile and map data concerning water quality (including identification of point and non-point pollution) and quantity, fish and mussel assemblages, current and likely future watershed conditions and landownership, and current and prospective protective mechanisms to identify streams/stream reaches within the species' current and historic range most likely to support and serve as genetic refugia for the species.</p> <p>RA: 1-1.4; RA:1-2.1,2.2; RA: 1.2.4</p>	X	X	X	X	X	<p>\$40-80K (\$40K will be obligated in FY09 to begin compiling data on the suitability of at least two of the following sites as potential refugia: the Pee Dee River below Blewitt Falls Dam, NC, Barnes Creek in Montgomery and Randolph Counties, NC, and the Catawba River below Lake Wylie Dam, SC. Additional funding will be needed to assess/identify additional sites)</p>	<p>USFWS, NCWRC, SCDNR, and/or contractor</p>
<p>5. Based on the results of actions 1.-4. above, implement population augmentation in priority streams/stream reaches</p> <p>RA: 2 (1)*- 4.</p>		X	X	X	X	<p>\$10-20K/yr. depending on the number of augmentations</p>	<p>USFWS, USFS, NCWRC, SCDNR</p>

6. Based on the results of actions 1.-4. above, consider working with States on possible experimental population designation for reintroduction into priority streams/stream reaches and publish a proposed rule for the initial agreed upon introduction site.  RA: 2 (1)*- 4.			X	X	X	\$20-50K to help in relation to coordination and planning related to possible proposed experimental population designations	USFWS, USFS, NCWRC, SCDNR
7. Develop and implement a detailed population and habitat monitoring plan.  RA: 2-6.	X	X	X	X	X	\$10-20K/year	USFWS, USFS, NCWRC, SCDNR
8. Inventory nonpoint source pollution concerns and assess toxicity of wastewater treatment plant effluents discharged to the mussels' habitat	X	X	X	X		\$300K	USFWS, NCWRC, SCDNR, USGS, NCDWQ
<b>Ongoing and Future Conservation Actions</b>	<b>Responsible Party</b>					<b>Estimated Cost</b>	
Continue establishment of conservation easements and restoration of forest lands, forested buffers and instream habitat. Initially these efforts should be focused primarily on the best of the remaining populations of the Carolina heelsplitter and areas targeted for reintroduction of the species.	USFWS, USFS, NCWRC, SCDNR, and other federal, state, and private partners					\$100K-10 million	
Continue efforts to protect and implement conservation measures to the degree possible through Section 7 consultations	USFWS and other federal agencies					\$5-40K depending on number, types, and complexity of federal actions within watersheds of streams supporting the species	

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\* Although currently identified as priority 2 tasks in the species' recovery plan, because of the significant increase in the species' vulnerability to population extirpations and extinction in the wild, controlled propagation and population augmentation and reintroduction are now considered priority 1 tasks. In fact, given the

species' current status and extreme vulnerability to extinction, most all recovery actions/tasks are now needed to prevent the extinction of the species and there are therefore are priority 1 tasks.

**Role of other Agencies:**

The USFS, Longcane District, SC has in the past and should continue to monitor and implement conservation actions to improve the status of Carolina heelsplitter populations in the Stevens Creek watershed. Recently, a meeting was held in SC to initiate a major effort to conserve and restore lands within the Stevens Creek watershed through partnerships with other state and federal agencies (USFWS, USFS, SCDNR, SC Forest Service, SC Division of Water Quality, etc.) private organizations (e.g., Quail Unlimited, Wild Turkey Federation, The Nature Conservancy, and others), and landowners within the watershed and hopefully the USFS will continue to contribute to this effort.

The NCWRC and NCSU are vital partners in all of the above activities and have done an outstanding job of initiating holding, propagation, and life history efforts for the Carolina heelsplitter and other imperiled mussel species. The NCDOT has also provided significant funding to holding and propagation of this and other imperiled species and will hopefully continue to be a valuable partner in these efforts.

The SCDNR has contributed to efforts to acquire and protect lands within the Flat Creek watershed (see below) and should continue with and expand their efforts to implement conservation actions to improve the status of the species.

Federal and state regulatory and action agencies need to make a greater effort at utilizing their authorities to further the conservation of the species through better regulations, enforcement of regulations, and implementation of conservation actions.

**Role of Other ESA Programs:**

Recovery: Preventing the extinction of the Carolina heelsplitter in the wild will likely require reintroductions of the species into streams within the species' historic range that are less degraded and less threatened by reoccurring drought conditions and existing and future land use activities than most of the streams currently occupied by the species. However, these reintroductions will likely require non-essential experimental population rules in order to obtain approval for the reintroductions from the local governments and landowners. Accordingly, it is difficult to predict when actual reintroduction efforts could likely commence.

Section 7 Consultation: Although many projects impacting the Carolina heelsplitter and its habitat do not have a federal nexus, some projects, especially large road and water supply infrastructure projects, receive federal funding or permits. Significant conservation measures need to be incorporated into every consultation for the Carolina heelsplitter to prevent the extirpation of several populations within the rapidly expanding Charlotte and adjacent metro areas. Consultations with the USFS on the Sumter NF, Longcane District must continue efforts to improve on forestry management activities and lessen their effects on the hydrology and water/habitat quality of streams in Stevens Creek watershed.

Section 6-Recovery Land Acquisition: In 2006, SCDNR was granted \$1 million for the purchase of land adjacent to Forty-Acre Rock, Flat Creek Watershed, Lancaster County, South Carolina. Due to the threats from land development activities, protection of this land and other important tracks within recovery priority watersheds is essential to the long-term survival of the Carolina Heelsplitter.

Conservation Banking: A conservation bank is being established in Lancaster County, South Carolina to offset development impacts to the Carolina Heelsplitter in the Sixmile Creek watershed. Finalizing and implementation of this bank and expanding the use of conservation banking through county and state agreements is a priority.

**Role of Other FWS Programs:**

Fisheries: Orangeburg National Fish Hatchery currently is initiating efforts to hold adult freshwater mussels. With additional funding, the hatchery can develop facilities to propagate and grow out juvenile freshwater mussels and further mussel propagation knowledge and technology for the Carolina heelsplitter and other rare species. Individuals propagated at Orangeburg can be released to augment existing wild populations of Carolina heelsplitter or establish new, experimental populations within the species' historic range.

Contaminants and Partners for Fish and Wildlife: The Service's contaminants program is working to assess the protectiveness of various federal and state water quality standards to freshwater mussels and the Partners for Fish and Wildlife is working to protect and restore aquatic habitats for this and other imperiled aquatic species.

**Revised Action Plan Due:** August 2014