

Recovery Outline for the Suwannee Moccasinshell (*Medionidus walkeri*)
November 2016



Introduction

This document outlines a preliminary course of action for the recovery of the Suwannee moccasinshell (*Medionidus walkeri*) until a recovery plan for this species is approved. It organizes near-term recovery actions, provides a rangewide conservation context for Service recovery efforts, and sets the stage for recovery planning and stakeholder involvement. For a more detailed description of Suwannee moccasinshell biology, status, distribution, and threats affecting the species, please see the proposed (80 FR 60335) and final (81 FR 69417) listing rules. A proposed rule to designate critical habitat is scheduled to be published in early FY 2017.

Common Name: Suwannee moccasinshell

Scientific Name: *Medionidus walkeri*

Listing Classification: Threatened range wide

Effective Listing Date: November 7, 2016

Recovery Priority Number: 11

Lead Agency, Region: U.S. Fish and Wildlife Service, Southeast Region

Lead Field Office: Panama City Ecological Services Office, Panama City, FL

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I. RECOVERY STATUS ASSESSMENT

A. Species Description and Life History

The Suwannee moccasinshell is a small freshwater mussel of the family Unionidae. The Suwannee moccasinshell is endemic to the Suwannee River Basin in Florida and Georgia where it typically is associated with stable substrates composed of muddy sand or sand with some gravel, and in areas with slow to moderate current (Williams *et al.* 2014). The larvae of most freshwater mussels are parasitic, requiring a period of encystment on a fish host before they can develop into juvenile mussels. Suwannee moccasinshell larvae are obligate parasites on darters, primarily on blackbanded darters (*Percina nigrofasciata*) and to a lesser extent, on brown darters (*Etheostoma edwini*) (Johnson *et al.* 2016). Darters are small, bottom-dwelling fish that do not move long distances; therefore, the exclusive use of darters

as a host may limit the Suwannee moccasinshell's ability to disperse and recolonize some areas from which it has become extirpated.

B. Population Status and Distribution

The Suwannee moccasinshell's historical range includes the lower and middle Suwannee River mainstem, and two large tributary rivers—the Santa Fe River subbasin and the lower Withlacoochee River mainstem (Williams 2015). An evaluation of historical and recent collection data show that its range has declined in recent decades, and the species is presently known only from middle portions of the Suwannee River and the lower Santa Fe River in Florida (Table 1, Figure 1) (see Johnson *et al.* 2016 Table S1 Supplement for sources of collection data). In the Suwannee River mainstem, the species occurs intermittently throughout a 75 mile (121 kilometer) reach of the middle river, and sporadically in a 28 mile (45 kilometer) segment of the lower Santa Fe River. The species was not detected in recent surveys of historical locations in the Withlacoochee River mainstem or the upper Santa Fe River subbasin.

Table 1. Summary of Suwannee moccasinshell populations by waterbody.

Water Body	State and County	Occurrence*	Distribution and Abundance
Suwannee River mainstem	FL: Madison Suwannee, Lafayette, Gilchrist, Dixie, Levy,	Recent	Occurs in a 75 mile reach of middle river; abundance low but population stable. May be extirpated from the lower river.
Lower Santa Fe River	FL: Suwannee, Gilchrist, Columbia, Alachua, Union, Bradford	Recent	Occurs in 28 mile reach in lower river; drastic decline and abundance very low.
Upper Santa Fe and New Rivers	FL: Union, Alachua, Bradford	Historical	May be extirpated; last collected in system in 1996.
Withlacoochee River	GA: Brooks, Lowndes; FL: Madison, Hamilton	Historical	May be extirpated; last collected in system in 1969.

* Recent occurrence is based on collections made from 2000 to 2015; historical occurrence is based on collections made prior to 2000.

Table 2. Summary of 2013–2015 Suwannee moccasinshell surveys by waterbody.

Water Body	Survey Year	Number of Sites	Total Mussels	Live Suwannee moccasinshells
Suwannee River mainstem	2013–2015	103	15,195	73
Lower Santa Fe River	2015	15	7,044	1
Upper Santa Fe and New Rivers	2015	19	1,969	0

Withlacoochee River	2014–2015	17	4,377	0
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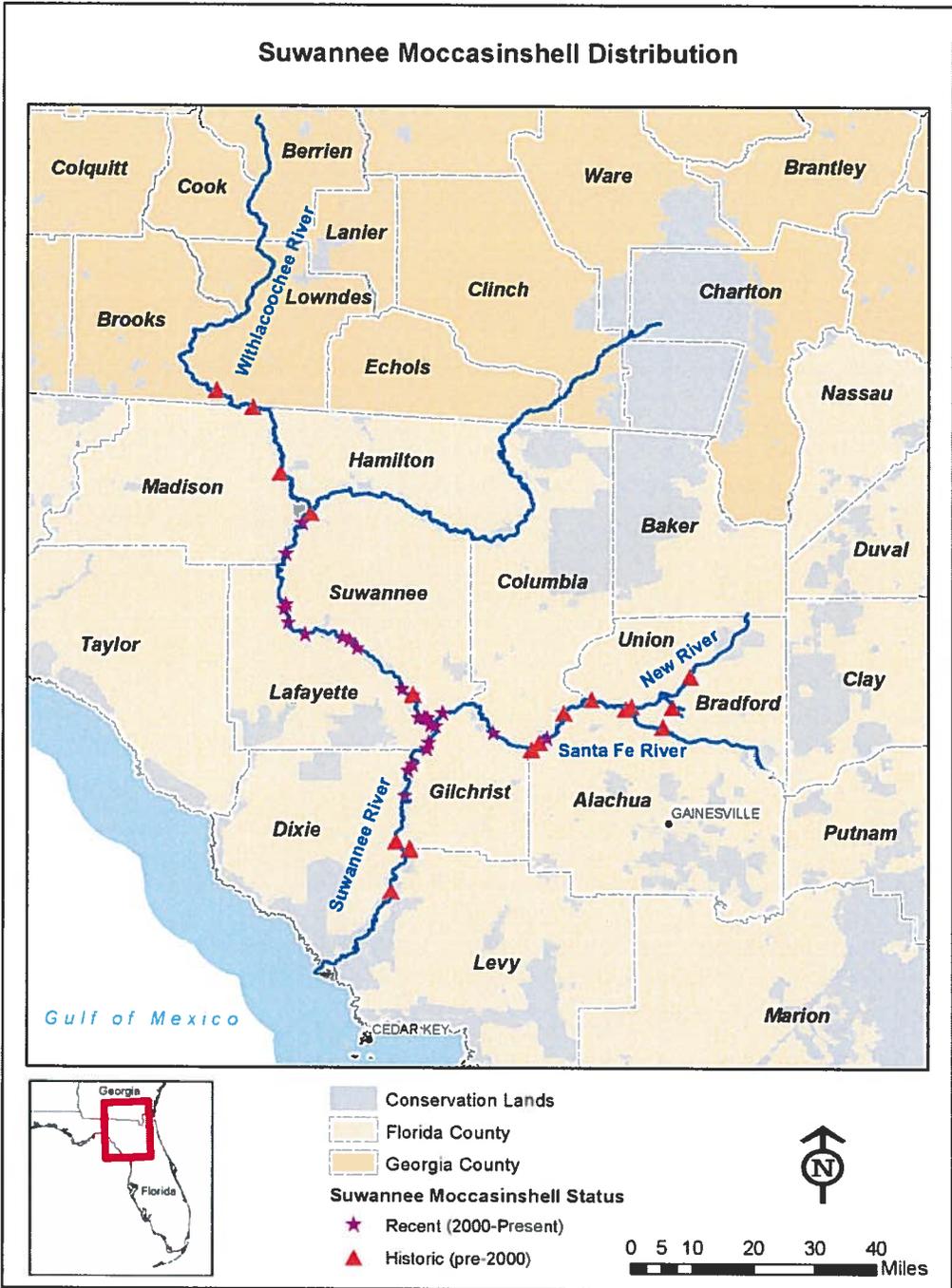


Figure 1. Suwannee moccasinshell historical and current distribution.

In addition to a reduction of range, recent surveys targeting the Suwannee moccasinshell show that its numbers are very low. Florida Fish and Wildlife Conservation Commission (FWC) and Georgia Department of Natural Resources (GDNR) biologists surveyed 144 sites during 2013–2015 within the Suwannee River Basin, covering nearly all of its historical range (FFWCC 2015 unpub. data; USFWS 2015 unpub. data) (Table 2). Suwannee moccasinshell densities were found to be exceedingly low in comparison to other mussel species, particularly in the Santa Fe River. Despite low abundance, populations in the Suwannee River mainstem presently appear to be stable. We attribute the species' persistence in the mainstem to the stability of habitat and the attenuation of certain threats by larger volumes of flow.

C. Threats

The Suwannee moccasinshell has disappeared from portions of its range due to the combined influences of numerous stressors that have caused the degradation of its riverine habitat. Within the Suwannee River Basin, a rapidly growing human population and changing land use have had profound adverse effects on the aquatic ecosystem, primarily through pollution and water withdrawal. Sources of degradation include pollutants discharged from industries, mines, and sewage treatment facilities, polluted runoff from agricultural lands, reduced flows as a result of groundwater extraction, and in portions of its range, stream channels have become destabilized by scouring floods and other perturbations. The species is also threatened by catastrophic weather events like droughts and floods, the introduced Asian clam, accidental contaminant releases, and saltwater intrusion as sea levels rise. In addition its small population size and range makes it more vulnerable to extinction from these threats.

Its disappearance from the fringes of its range (Figure 1) is likely due to different stressors. In the Withlacoochee River, point source pollution is considered the primary threat. In the Santa Fe subbasin, reduced flows, excessive nutrients, and channel instability are the primary problems. It is unclear why the species has disappeared from the lower Suwannee mainstem, however, saltwater intrusion is a possible factor. Research is needed to better understand all potential threats to the species.

D. Conservation Actions

During the past two decades, conservation partners in state and federal agencies have dedicated resources to locate extant Suwannee moccasinshell populations, identify its habitat, and conduct life history research.

Population monitoring – Biologists with the FWC, GDNR, U.S. Geological Survey (USGS), and Service have conducted periodic surveys within the Suwannee River Basin. Comprehensive surveys were initiated by the FWC in 2012 and, along with limited surveys by the GDNR, helped identify the current range of Suwannee moccasinshell (FFWCC 2015 unpub. data; USFWS 2015 unpub. data).

Status assessment – In 2009, the Service funded a conservation status assessment of the Suwannee moccasinshell (Williams 2015), and the information was used to help inform our listing decision.

Research – The USGS Wetland and Aquatic Research Center conducted a study of Suwannee moccasinshell life history (Johnson *et al.* 2016). The Service funded the effort and the research provided a better understanding of the species' reproductive biology and dispersal ability. The FWC is examining factors that affect Suwannee moccasinshell occupancy and also detection during surveys (Holcomb *et al.*, In prep.).

II. PRELIMINARY RECOVERY STRATEGY

A. Recovery Priority Number with Rationale

The Suwannee moccasinshell is assigned a recovery priority of 11, which indicates it faces a moderate degree of threat and a low recovery potential. Recovery potential is considered low for the species because of the extent of its decline, its apparent sensitivity to common pollutants, and due to historical and continued impacts upon its habitat (see Section I.C). The problems affecting these streams are difficult to remove or mitigate as threats are numerous, complex, and encompass many landowners. Issues such as groundwater withdrawal, nonpoint source pollution, and urban and industrial waste management are complex and require considerable time and effort to resolve.

B. Recovery Strategy

Promoting aquatic ecosystem management is the best route to protect surviving populations of threatened and endangered mussels and their stream and river habitats, as well as to minimize possible future listings of other species occurring in these river basins. Therefore, it is essential to characterize and monitor aquatic habitats on a watershed scale, and respond to changing conditions rapidly, through negotiation and partnerships to alleviate threats or implementation of recovery actions. This approach will require monitoring extant populations and characterizing current habitat conditions in each watershed, as well as routine periodic monitoring of populations and habitat conditions. Recovery efforts will progress based on available resources and staff availability for all partners involved.

Initial recovery efforts should focus on protecting Suwannee moccasinshell sites, while investigating potential causes of declines. Long-term recovery efforts should focus on restoring natural flow levels, reducing contaminant input, establishing wide riparian corridors, and addressing any other threats found to contribute to declines. Once conditions have improved, captive propagation will be considered to reintroduce populations into previously occupied habitats.

C. Initial Action Plan

Anticipated Recovery Actions in relation to our recovery strategy described above:

1. Restore and protect riverine habitat that **currently support or could support Suwannee moccasinshell** populations.

- a. Identify for protection and restoration, river reaches that support high native aquatic biodiversity and mussel species using the Service's landscape scale approach to conservation, with a particular focus on reaches within the Suwannee moccasinshell's range to support this mussel's recovery.
 - b. Minimize adverse effects to Suwannee moccasinshell populations and its habitat resulting from activities conducted or permitted by regulatory authorities (e.g., water supply, navigation, and mining).
 - c. Develop coordinated plans to address wastewater effluents within affected watersheds to reduce ammonia, chlorine, pharmaceuticals, and other pollutants that might be impacting this mussel.
 - d. Promote voluntary stewardship as a practical and economical means of reducing nonpoint source pollution from private land use.
 - e. Work with municipal communities and industry to ensure compliance with effluent discharge limits.
 - f. Encourage the establishment of minimum flow levels in reaches that currently support or could support Suwannee moccasinshell populations.
 - g. Encourage the development and implementation of adequate Streamside Management Zones (SMZs) along all streams and rivers in the Suwannee moccasinshell's range.
2. Survey and monitor the status of the species and other native mussel species in the Suwannee River Basin.
 3. Conduct physical and molecular genetic analysis to better understand the taxonomic status of the Suwannee moccasinshell.
 4. Conduct life history research to better understand food habits, age and growth, and mortality factors.
 5. Determine contaminant sensitivity and work with States and the EPA to ensure water quality standards and classifications provide for native species' conservation. If current numerical criteria of certain pollutants are not protective of Suwannee moccasinshell and other mussels, these standards should be adjusted to better conserve mussel resources.
 6. Education and outreach.
 - a. Work with local offices of State and Federal agencies, tribes, and private organizations to promote land and water stewardship awareness (e.g., Soil and Water

Conservation Districts, Natural Resource Conservation Service (NRCS), State Forestry Commissions, private industry groups, environmental groups, etc.).

- b. Develop programs and materials to inform the public on the need and benefits of aquatic ecosystem management.
7. Develop and implement a propagation and reintroduction plan for Suwannee River Basin mussels in cooperation with State partners.
8. Periodically review management strategies for Suwannee moccasinshell.

III. PREPLANNING PROCESS

We will prepare a Species Status Assessment (SSA) for the Suwannee moccasinshell that will inform a recovery plan. The SSA will assess the species' biological condition and will provide a summary of the species needs, the current species' condition, and the future species' condition. The recovery plan will include objective and measurable criteria which, when met, will address threats to the species and ensure the conservation of this mussel. The plan will also estimate the time and the cost to achieve recovery. The SSA and recovery planning effort will be led by the Panama City Ecological Services Office in coordination with our partners. The Service anticipates either writing the recovery plan or appointing a recovery team to help us effectively draft a recovery plan for the Suwannee moccasinshell. If a recovery team is formed, individuals on the recovery team would advise the Service and would include experts on the mussel and other relevant areas.

During the recovery planning process, input, comments and review will be sought from multiple stakeholders within the states of Florida and Georgia. These will include State, Federal, and local agencies, universities, conservation organizations, and others. Many of these stakeholders are currently cooperating in on-going conservation efforts in the Suwannee River Basin. Primary authorship of the Recovery Plan will be the responsibility of Service staff, though State partners will be heavily involved in all phases of the planning and implementation processes.

The draft recovery plan should be finalized and sent to the Regional Office for review by February of 2018. The final recovery plan should be sent to the Regional Office for review by February of 2019. These timelines may be affected by available resources and regional priorities.

Approve:  _____
Assistant Regional Director, Region 4

Date: 12.16.16

REFERENCES CITED

- FFWCC (Florida Fish and Wildlife Conservation Commission). 2015. Unpublished data. Field data collected by FWRI biologists in 2013–2015. Spreadsheet provided to USFWS Panama City Field Office June 2016.
- Johnson, N.A., J.M. McLeod, J. Holcomb, M. Rowe, and J.D. Williams. 2016. Early life history and spatiotemporal changes in distribution of the rediscovered Suwannee Moccasinshell, *Medionidus walkeri* (Bivalvia: Unionidae). *Endangered Species Research*, 31:163-175.
- USFWS (US Fish and Wildlife Service). 2015. Unpublished data. Field data collected by USFWS biologist in Sept 2015; data housed at USFWS Field Office, Panama City, Florida.
- Williams, J.D. 2015. *Medionidus walkeri* report to USFWS. Unpublished report, 11 pp.
- Williams, J.D., Butler, R.S., Warren, G.L., and Johnson, N.A. 2014. *Freshwater Mussels of Florida*. University of Alabama Press, 498 pp.