United States Department of the Interior

FISH AND WILDLIFE SERVICE
Florida Ecological Services Field Office

January 29, 2024

Ms. Katasha Cornwell
State Environmental Process Administrator
Office of Environmental Management
Florida Department of Transportation
605 Suwannee Street
Tallahassee, Florida 32399-0450

Subject: Concurrence of FDOT's 2024 revisions to the Freshwater Mussel Phase 1 Programmatic Approach for Transportation Work Activities

Dear Ms. Cornwell:

The U.S. Fish and Wildlife Service (Service) concurs with the Florida Department of Transportation's (FDOT) 2024 revisions to the Freshwater Mussel Phase 1 Programmatic Approach for Transportation Work Activities (PA). This PA addresses routine maintenance and modernization activities carried out by FDOT where there are either no effects or minor effects to specified federally protected mussel species and their critical habitat, protected under the Endangered Species Act of 1973, as amended (Act).

We agree that these updates to the PA will provide consistent expectations and outcomes for FDOT's review of its routine activities that are not expected to adversely affect federally threatened or endangered freshwater mussel species. As a result, this PA is anticipated to streamline consultation for those minor activities and allow for better allocation of staff resources towards complex projects thereby fulfilling both organizations' missions in a more effective manner.

As described in your January 18, 2024, letter, this PA has some important updates:

- Additional activities under the PA include: pile jacket installation using cathodic protection, spaulding repairs, and minor fender repairs.

- The PA was also updated to include the recently listed Suwannee Moccasinshell (*Medionidus walkeri*) and its critical habitat.

Thank you for development of this approach that will allow an efficient review of routine transportation activities. We appreciate your support and partnership in conserving endangered species and their habitat in Florida. If you have any questions, please contact Amber Rhodes, Service liaison to FDOT, at amber_rhodes@fws.gov or 772-268-7169.

Sincerely,

Robert L. Carey
Manager, Division of Environmental Review
Florida Ecological Services Office
Gainesville

cc: electronic only
FWC, Tallahassee, FL (Jason Hight, Laura DiGruttolo, Kristee Booth)
FHWA, Tallahassee, FL (Joseph Sullivan, Luis Lopez)
USFWS, Division Manager, Environmental Review and Consultations (Robert Carey)
USFWS, Panama City, FL (Mark Cantrell, Amber Rhodes, Sandra Pursifull)
USFWS North Florida Field Office, Jacksonville, FL (Zakia Williams)
FDOT District 2 (Robert Johns)
FDOT District 3 (Joy Swanson-Pleas, Amanda Marshall)

FRESHWATER MUSSEL
PHASE 1 PROGRAMMATIC APPROACH FOR TRANSPORTATION WORK ACTIVITIES

FLORIDA DEPARTMENT OF TRANSPORTATION

BIOLOGICAL ASSESSMENT

Prepared in partnership with

Florida Department of Transportation
U.S. Fish and Wildlife Service
Florida Fish and Wildlife Conservation Commission

January 2024 (Revision 2)

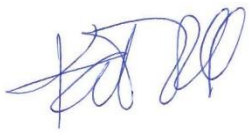
Document History
Revision 1 – May 2018
Original – March 2017

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by FHWA and FDOT.

Signature

The Florida Department of Transportation has reviewed the Biological Assessment and agrees with the recommended effect determinations.

Florida Department of Transportation:

	Katasha Cornwell	State Environmental Process Administrator	01.18.24
Signature	Printed Name	Title	Date

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ACRONYMNS

Act	Endangered Species Act
ACOE	Army Corps of Engineers
BA	Biological Assessment
BMPs	Best Management Practices
CH	Critical Habitat
CM	Conservation Measure
CR	County Road
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FWC	Florida Fish and Wildlife Conservation Commission
FWCA	Fish and Wildlife Coordination Act
MA	May Affect
NE	No Effect
NLAA	May Affect, Not Likely to Adversely Affect
PA	Programmatic Approach
PCE	Primary Constituent Element
ROW	Right-of-Way
Service	U.S. Fish and Wildlife Service
SR	State Road

Programmatic Working Group

The Programmatic Biological Assessment was developed and coordinated with the following core team members:

Florida Department of Transportation
Katasha Cornwell
Chloe Delhomme
Xavier Pagan
Joy Swanson Pleas
Amelia Plemons
Peter Southall

Florida Fish and Wildlife Conservation Commission
David Cook
Terry Gilbert
Jeanne-Marie Havrylkoff
Ted Hoehn
Jordan Holcolm
Matthew Rowe
Gary Warren

U.S. Fish and Wildlife Service
Sean Blomquist
Mary Mittiga
Lourdes Mena
Sandra Pursifull

Updates coordinated with:
Katasha Cornwell, FDOT
Denise Rach, FDOT
Joy Swanson Pleas, FDOT
Amanda Marshall, FDOT
Joseph Sullivan, FHWA
Luis Lopez, FHWA
Mark Cantrell, USFWS
Sandra Pursifull, USFWS
Amber Rhodes, USFWS

BIOLOGICAL ASSESSMENT

1.0 Introduction

In Florida – as throughout the United States – transportation planners are faced with numerous aging bridges in need of replacement, maintenance, or upgrades in the near future. Currently with fifteen federally protected and six petitioned freshwater mussels in the State, many of these bridge structures are likely to require consultation under the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531, et seq.), to evaluate effects on mussels and their critical habitat (CH). Other surface transportation projects in or near streams can also affect mussels.

State and federal agencies launched a concentrated team effort on August 18, 2015, to develop a streamlined programmatic approach (PA) for future transportation-related actions that may occur in habitat with protected mussels. These actions may include construction projects, maintenance activities, and other work activities within the rights-of-way (ROW). Participating agencies are the Florida Department of Transportation (FDOT), U.S. Fish and Wildlife Service (Service), and Florida Fish and Wildlife Conservation Commission (FWC). The PA is intended for transportation projects with a federal nexus including those funded by Federal Highway Administration's (FHWA) Federal Aid Highway Program, or that require an Army Corps of Engineers (ACOE) permit under the Clean Water Act 404 program. For non-federal actions when Section 7 is not applicable, the PA can be used to provide guidance for avoiding and minimizing adverse effects to protected resources. The PA's purpose is to provide a clear, consistent, and predictable approach for complying with the Section 7 requirements of the Act and reducing potential impacts to mussels and their stream habitat. By incorporating measures protective of freshwater mussels, the PA will also benefit other fish and wildlife species that share their aquatic ecosystem, as considered under the Fish and Wildlife Coordination Act (FWCA)(48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The PA will address regulatory compliance in two phases. This biological assessment (BA) was developed jointly and represents the Phase 1 PA, which focuses on FDOT actions that the participating agencies mutually agree will have either "no effect" (NE) on mussels or "may affect, but are not likely to adversely affect" (MA-NLAA) protected mussels with incorporation of conservation measures. If the conservation measures identified in the PA cannot be implemented, then additional coordination with the Service is needed.

A second phase PA is planned for a later date to address those actions that "may affect" (MA) mussels and need further assessment. A MA determination applies to actions where either it cannot yet be determined whether effects are MA-NLAA, or where effects are likely to adversely affect (MA-LAA) mussels and CH. At this time, any actions that MA mussels are not covered by the PA and require an individual consultation with the Service. Through further consultation, additional conservation measures may be needed to reduce impacts to a level that is insignificant and discountable. Formal consultation will be required for projects that are determined to be MA-LAA listed mussels and their CH.

1.1 Species Covered

This programmatic approach is a mechanism for consulting on listed freshwater mussels (see **Table 1**). The document can be amended to include additional species as needed. All federally listed mussels that occur in Florida are also included on Florida's List of Endangered and Threatened Wildlife administered by the FWC.

Table 1 Listed Mussels in Florida.

Common Name	Scientific Name	Federal Status	Florida Drainages
Chipola Slabshell	*Elliptio chipolaensis*	T[1] (CH[2])	Chipola River
Choctaw Bean	*Obovaria choctawensis*	E[3] (CH)	Escambia, Yellow, and Choctawhatchee Rivers
Fat Threeridge	*Amblema neislerii*	E (CH)	Chipola and Apalachicola Rivers
Fuzzy Pigtoe	*Pleurobema strodeanum*	T (CH)	Escambia, Yellow, and Choctawhatchee Rivers
Gulf Moccasinshell	*Medionidus penicillatus*	E (CH)	Econfina Creek and Chipola River
Narrow Pigtoe	*Fusconaia escambia*	T (CH)	Escambia and Yellow Rivers
Ochlockonee Moccasinshell	*Medionidus simpsonianus*	E (CH)	Ochlockonee River
Oval Pigtoe	*Pleurobema pyriforme*	E (CH)	Econfina Creek, Chipola, Ochlockonee, and Suwannee Rivers
Purple Bankclimber	*Elliptoideus sloatianus*	T (CH)	Chipola, Apalachicola, and Ochlockonee Rivers
Round Ebonyshell	*Reginaia rotulata*	E (CH)	Escambia River
Shinyrayed Pocketbook	*Hamiota subangulata*	E (CH)	Econfina Creek, Chipola, and Ochlockonee (upstream of Lake Talquin) Rivers
Southern Kidneyshell	*Ptychobranchus jonesi*	E (CH)	Escambia and Choctawhatchee Rivers
Southern Sandshell	*Hamiota australis*	T (CH)	Escambia, Yellow, and Choctawhatchee Rivers
Suwannee Moccasinshell	*Medionidus walkeri*	T (CH)	Suwannee (main stem) and Santa Fe (lower) Rivers
Tapered Pigtoe	*Fusconaia burkei*	T (CH)	Choctawhatchee River
Southern Elktoe	*Alasmidonta triangulata*	Proposed E (CH)	Chipola and Apalachicola Rivers

1 T = Threatened
2 CH = Critical Habitat
3 E = Endangered

1.2 Action Area

The Action Area is based on the Service guidance document for determining if a project may impact mussels (see http://www.fws.gov/panamacity/resources/DeterminingAproject.pdf). It is intended to cover the current range of the listed mussels named in **Table 1**, as well as one mile upstream of their range. At this time, the current range for all listed mussels occurring in Florida is the same as their designated and proposed CH (pCH). Throughout this PA, current range is synonymous with CH. The range for these species may need to be modified in the future should new information become available. The Action Area includes:

1. All stream channels identified as CH, pCH, or the species current distribution;
2. All stream channels that are upstream, up to one mile, of CH, pCH, or the species current distribution; and
3. All terrestrial areas within 300 feet of 1 and 2 above.

Maps of designated and proposed CH are provided in Appendix A and B.

2.0 Project Actions

The PA is intended to apply to transportation actions that occur within the Action Area. Potential action types are:

1. Construction projects such as bridge construction, bridge removal, bridge restoration/rehabilitation/preservation, bridge scour protection, culvert construction, culvert extension, emergency protective measures, road construction, road resurfacing, road improvements (add turn lanes, shoulder, bike paths, sidewalks) and constructing stormwater detention ponds.
2. Maintenance activities such as bridge painting, bridge rail repair, crack and joint sealing, ditch work, mowing and tree trimming, pavement marking, and debris removal.
3. Bridge maintenance projects with very minimal work in the water: pile jacket installation, spaulding repairs, and minor fender repairs.
4. Other minor actions such as utility work may be covered if they are comprised of the activities evaluated in this document.

Specific activities that are components of FDOT actions are described in Appendix C.

Activities covered by the PA either 1. will not affect mussels; or 2. have effects that are either a net benefit or can be reduced to a level considered insignificant and discountable. The appropriate effect determination for these categories of activities is NE or NLAA, respectively. Typically these activities may result in a risk of erosion, sedimentation, discharge of contaminants, physical materials in mussel habitat, and loss of stream connectivity - all of which negatively affect mussels and their habitat - but can be avoided or greatly reduced with suitable conservation measures.

The PA also identifies those activities with a higher level of adverse effect, including actions that would potentially modify or fill habitat, alter hydrologic flow regimes, cause physical injury to

individuals, and increase turbidity and sedimentation to greater levels. This category of activities may affect (MA) mussels and should be consulted upon individually with the Service to determine conservation measures to further reduce impacts. Formal consultation may be required for actions where effects cannot be reduced to a level that is insignificant and discountable.

3.0 Freshwater Mussel Species

The Service listed seven freshwater mussels (five endangered; two threatened) endemic to eastern Gulf Slope drainages of Alabama, Florida, and Georgia in 1998 (63 FR 12664). Their distribution includes portions of four river drainages in Alabama, Florida, and Georgia: the Econfina (Creek), Apalachicola-Chattahoochee-Flint (ACF), Ochlockonee, and Suwannee. Critical habitat was designated for these species in 2007 (72 FR 64286). In 2012, an additional eight freshwater mussels (four endangered; four threatened), of which seven occur in Florida, were listed and CH designated (77 FR 61664). These mussels are associated with three Coastal Plain river drainages in Florida and Alabama: the Escambia, Yellow, and Choctawhatchee. The Suwannee Moccasinshell was listed as threatened in 2016 (81 FR 69417). This species is endemic to the Suwannee River basin in Florida and Georgia. Critical habitat for the Suwannee moccasinshell is expected to be proposed in late 2016. Individual species accounts for the fifteen mussels are provided in Appendix D.

Most mussels have some shared biological traits. Freshwater mussels generally live embedded in the bottom of rivers, streams, and other bodies of water. They siphon water into their shells and across four gills that are specialized for respiration and food collection. Food items include detritus, algae, diatoms, and bacteria (Strayer *et al*. 2004). Adults generally orient themselves on or near the substrate surface to access food and oxygen from the water column. Juveniles typically burrow completely beneath the substrate surface and are pedal (foot) feeders (Yeager *et al.* 1994).

Sexes are usually separate. Males release sperm into the water column, which females take in through their siphons during feeding and respiration. Fertilization takes place inside the shell. The eggs are retained in the gills of the female until they develop into mature larvae called glochidia. Most freshwater mussel species have a parasitic stage, during which their glochidia must attach to the gills, fins, or skin of a fish host to transform into a juvenile mussel. Depending on the mussel species, females release glochidia either separately, in masses known as conglutinates, or in one large mass known as a superconglutinate. The duration of the parasitic stage varies by mussel species, water temperature, and perhaps host fish species. When the transformation is complete, the juvenile mussels drop from their fish host and sink to the stream bottom where, given suitable conditions, they grow and mature into adults. As mussels have very limited mobility, most dispersal occurs through the mobility of the host fish.

Within North America, the southeastern United States is the hot spot for mussel diversity. Seventy-five percent of southeastern mussel species are in varying degrees of rarity or are possibly extinct (Neves *et al.* 1997). Reasons for their decline include the modification and destruction of their habitat, especially from sedimentation, dams, and degraded water quality

(Neves *et al.* 1997). Their limited ability to move makes them particularly vulnerable to localized impacts to their habitat.

4.0 Critical Habitat

All listed mussels in Florida have designated CH. Within CH, special consideration is given to habitat features that are essential to the conservation of the species. These include, but are not limited to: (1) space for growth and normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing (or development) of offspring; and (5) habitats that are protected from disturbance or represent the historical, geographical, and ecological distributions of a species.

The 2007 CH designation for the Chipola Slabshell, Fat Threeridge, Gulf Moccasinshell, Ochlockonee Moccasinshell, Oval Pigtoe, Purple Bankclimber, and Shinyrayed Pocketbook identifies five primary constituent elements (PCEs) for CH that are essential for these mussels.

1. A geomorphically stable stream channel.
2. A predominantly sand, gravel, and/or cobble stream substrate with low to moderate amounts of silt and clay.
3. Permanently flowing water.
4. Water quality that meets or exceeds the current aquatic life criteria under the Clean Water Act.
5. Fish hosts that support the larval life stages of the seven mussels.

The PCEs of CH designated in 2012 for the Choctaw Bean, Fuzzy Pigtoe, Narrow Pigtoe, Round Ebonyshell, Southern Kidneyshell, Southern Sandshell, and Tapered Pigtoe identify similar features.

1. Geomorphically stable stream and river channels and banks.
2. Stable substrates of sand or mixtures of sand with clay or gravel with low to moderate amounts of fine sediments and attached filamentous algae.
3. A hydrologic flow regime necessary to maintain benthic habitats where the species are found, and to maintain connectivity of rivers with the floodplain, allow the exchange of nutrients and sediment for habitat maintenance, food availability, and spawning habitat for native fishes.
4. Water quality, including temperature, oxygen content, hardness, turbidity, and other chemical characteristics necessary for normal behavior, growth, and viability of all life stages.
5. The presence of fish hosts.

The PCEs of CH for the Suwannee moccasinshell were described in the 2021 designation:

(i) Geomorphically stable stream channels (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation).

(ii) Stable substrates of muddy sand or mixtures of sand and gravel, and with little to no

accumulation of unconsolidated sediments and low amounts of filamentous algae.
(iii) A natural hydrologic flow regime (magnitude, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species is found, and connectivity of stream channels with the floodplain, allowing the exchange of nutrients and sediment for habitat maintenance, food availability, and spawning habitat for native fishes.
(iv) Water quality conditions needed to sustain healthy Suwannee Moccasinshell populations, including low pollutant levels (not less than State criteria), a natural temperature regime, pH (between 6.0 to 8.5), adequate oxygen content (not less than State criteria), hardness, turbidity, and other chemical characteristics necessary for normal behavior, growth, and viability of all life stages.
(v) The presence of fish hosts necessary for recruitment of the Suwannee Moccasinshell. The presence of Blackbanded Darters (*Percina nigrofasciata*) and Brown Darters (*Etheostoma edwini*) will serve as an indication of fish host presence.

The PCEs for the Southern Elktoe (*Alasmidonta triangulata*) were described in the proposal to list as endangered and designate critical habitat in 2023; Unit 1 and Unit 2 of CH are in Florida:

(i) Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species is found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussel and fish host's habitat and food availability, maintenance of spawning habitat for native fishes that could serve as host fish, and the ability for newly transformed juveniles to settle and become established in their habitats.
(ii) Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (i.e., channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support the Southern Elktoe (e.g., slightly depositional habitats consisting of mixtures of silty mud, sand, and gravel).
(iii) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages. Water and sediment quality needs include appropriate thermal and dissolved oxygen regimes (temperature generally not above 90 °F (32 °C) and dissolved oxygen generally greater than 5.0 milligrams per liter (mg/L)) that are also low in ammonia (generally not above 1.5 mg N/L (milligrams Nitrogen per Liter)), heavy metals, pharmaceutical concentrations, salinity (generally not above 4 parts per million), total suspended solids, and other pollutants.
(iv) The presence and abundance of fish hosts necessary for recruitment of the Southern Elktoe, specifically species of the sucker family, Catostomidae, including the genera *Moxostoma* (Apalachicola Redhorse, Greater Jumprock, and Blacktail Redhorse) and *Erimyzon* (Creek Chubsucker and Lake Chubsucker).

The effects of FDOT activities on the listed mussels and their designated CH are evaluated in the following section.

5.0 Effects

We have considered the potential for FDOT actions and the activities that comprise an action (see **Appendix C**) to directly, indirectly, and cumulatively affect mussels and their habitat. These actions may include construction projects, maintenance work, and other activities. Activities that do not occur in, or cause impacts to, suitable habitat will have no effect on mussels. For the purposes of this PA, the federal action agencies and FDOT acknowledge mussels are present within designated or proposed mussel CH units which represent the species current range. As an alternative, site-specific presence/absence surveys can be conducted on a project-by-project basis.

Direct effects are impacts that result from the activity at the same time and place as the action. Indirect effects are those effects that are caused by the activity at a later time. Indirect effects may result from activities that cause discharges of sediment, chemicals, or other materials to be transported from the work site downstream into mussel habitat. Forman et al. (2002) indicated that roads, bridges, and culverts can affect the aquatic environment from distances of 10 to >1000 meters (33 to >3,281 feet). Potential indirect effects were evaluated for activities located up to one mile upstream of designated or proposed CH that may impact mussel habitat through the hydrologic connection.

Cumulative effects are defined under the Act as those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation. We are unaware of any specific future non-Federal activities planned that would affect the action area. The majority of the action area is comprised of waterways and wetlands; actions in these areas will likely require a permit from the ACOE or, less frequently, a permit from the U.S. Coast Guard. It is our understanding that the ACOE is undergoing a parallel programmatic process to address impacts to mussels from non-FDOT projects permitted through their regulatory program (Clif Payne, ACOE, pers. comm. 2015).

A. Erosion and Sedimentation

Erosion and sedimentation result from activities that disturb the ground surface, stream bottom, and stream banks. Rainfall can carry loose sediment into waterways in the absence of properly installed and maintained erosion control measures. Erosion events are generally expected to be intermittent and short-term, with most occurrences during seasonal periods of high rainfall in Florida. Unpaved roads and bridge approaches can contribute large volumes of sediment into streams over time. Mussels and CH can be adversely affected by diminished water quality and smothering (loss) of habitat. Increased suspended solids (turbidity) in the water column have the potential to impair the ability of freshwater mussels to breathe and feed. Turbidity may cause mussels to close their valves for long periods of time, affecting normal feeding, respiration, and reproductive activities. During large sediment discharges mussels may be deeply buried potentially causing their death. Good water quality and stable banks/channels are important for mussel recovery; thus, erosion and sedimentation is a major concern in mussel habitat.

B. Contaminant Discharge

For the purposes of this document, contaminant refers to parameters of concern that potentially affect water quality. A source of potential contamination is stormwater runoff, atmospheric deposition, pesticide[4] use, and contaminant spills/releases. Discharge of stormwater runoff from surrounding hydrologic basins can contribute a variety of contaminants to waterways that may originate directly from vehicles, impervious surfaces, chemical treatment of rights-of-way, and indirectly via aerial deposition from industrial and agricultural production. These pollutants may include nutrients, metals (arsenic, copper, chromium, lead, mercury, and nickel), PAHs, sediment, and pesticides (Buckler and Granato 1999; Colman et al. 2001; Kayhanian et al. 2003). The lime in cement and concrete is toxic to aquatic organisms and is most harmful and when concrete is wet and uncured. Nutrients and other oxygen demanding substances in stormwater lower oxygen levels in receiving waters and may lead to oxygen depletions. Additionally, the use of heavy construction equipment may result in small, accidental releases of fuel, lubricant, and hydraulic fluids. Paint spills can happen when painting bridges and marking roadways. The release of particulate construction material, though often minor, may occur as well (grinding slurry, concrete, and rubble).

C. Physical Materials In Stream, including Structures

Both construction and demolition activities can result in the placement of physical materials (structures, fill, rip rap, and debris) into streams. New physical materials on the stream bottom can crush or bury mussels, and destroy or damage habitat. The direct loss and injury of mussels and their CH from new in-stream structures is one of the most significant effects to mussels from transportation projects. The presence of existing structures, such as culverts, within the stream represents an ongoing loss of stream habitat for mussels. Culverts may result in altered hydraulic conditions and can be a barrier to host fish movement. Removing or improving existing culverts can provide a stream restoration opportunity.

Upgrading existing culverts to bridges that span the stream with no in-stream piles can reduce effects to mussels by eliminating in-stream structures, reducing the formation of impoundments, promoting host fish passage, and restoring the natural stream. Some temporary adverse effects to mussels and suitable habitat from sedimentation can occur during culvert removal. However, with enhanced erosion control practices, effects from sedimentation will be greatly reduced.

Large, heavy materials may fall into streams during demolition of bridge structures. These materials generally remain close to their point of origin and do not move very far downstream. Most debris will be mechanically removed to the extent practicable following bridge demolition. However it is generally not possible to remove all debris without causing disturbance to the stream substrate. The materials can cause some alterations in the patterns of water flow and sediment deposition, resulting in small shifts in mussel occurrence locations. Use of barges may scrape the river bottom, disturbing habitat and damaging/crushing mussels.

4 Pesticide refers to all insecticides, fungicides, herbicides, and any other chemical compound applied to reduce unwanted species.

D. Loss of Stream Connectivity

Mussels depend on fish hosts during their life cycle to support larvae development and to disperse juvenile mussels. Structures that disrupt stream connectivity, such as dams and culverts that are fish barriers, can limit fish passage, reduce the availability of mussel host fish, and restrict mussel dispersal. These factors can negatively impact mussel reproductive success and genetic diversity. Undersized structures can also affect mussels by altering stream stability. A lack of adequate relief drains to handle flood waters will result in an increase in blow-out events during storms, causing a release of sediment and debris that can alter habitat downstream.

When is a culvert a fish barrier? Culverts can prevent fish passage and fragment the stream system when they cause environmental conditions beyond the biological capabilities of fish. Features at culverts that may be fish passage barriers include high water velocities that exceed fish swimming speeds, excessive turbulence at contracted inlets, elevation drops at either the inlet or outlet, low flows without sufficient depth needed for fish to swim, lack of natural light, and physical obstructions such as weirs, debris, and sediment (Gardner 2006; FHWA 2007; FHWA 2010). Fish swimming speeds vary by species, age, and size. For example, adult shad can sustain swimming speeds of 8 ft/sec, whereas juvenile shad can only sustain swimming speeds of 1.75 ft/sec (FHWA 2010). The above attributes can degrade mussel habitat and limit mussel distribution since they rely on fish for portions of their life cycle. These adverse effects may extend for considerable distances in the watershed.

6.0 Conservation Measures

Conservation measures can be implemented to avoid and greatly minimize effects from many FDOT actions. Some measures can yield a net conservation benefit. FDOT requires many standard measures to provide the environmental protection necessary to prevent significant adverse effects to the aquatic environment. These FDOT requirements are provided in the following manuals:

- FDOT Standard Specifications for Road and Bridge Construction, Section 7, 104, and 110, January 2016 (Section 7, Section 104, Section 110);
- State of Florida Erosion and Sediment Control Manual, July 2013 (E&SC Manual); and
- FDOT Plans Preparation Manual, January 2016 (PPM).

Conservation measures will reference the above source manuals for FDOT requirements in brackets when applicable (e.g. [PPM]). In other instances, additional conservation measures are needed to achieve a higher level of protection as required for listed species and CH. The conservation measures are grouped to correlate with the effects they are targeted to offset (e.g. erosion, chemical discharge, etc.). All applicable conservation measures in each category should be used when a given action can lead to the indicated adverse effects.

1. Conservation Measures 1 (CM1) – Erosion and Sedimentation

These conservation measures are intended to prevent water pollution and stream habitat degradation from erosion and sedimentation that stem from activities that disturb the soil and stream bottom. For construction projects, the Contractor addresses sediment and erosion control through the Stormwater Pollution Prevention Plan (SWPPP) and/or Erosion Control Plan (ECP). These plans should be developed consistent with FDOT requirements.

A Florida Department of Environmental Protection's National Pollutant Discharge Elimination System (NPDES) Construction Generic Permit (CGP) is required for construction activities disturbing ≥1 acre. The SWPPP, including the ECP, is requisite for the CGP. For construction projects that do not require a SWPPP, an ECP should be developed to assure basic water quality protection from erosion and sedimentation. Any additional measures given below in exceedance of the SWPPP and/or ECP are deemed necessary by the Service for protection of listed mussels and their CH.

Design

1.1. For bridge construction projects on unpaved roads, additional measures emphasizing source control will be considered during design to reduce sediment deposition into the stream from the ongoing presence of the unpaved road. Such measures are intended to provide a conservation benefit and can offset impacts from the construction project itself. These measures can include paved approaches, paving to the top-of-the-hill, ditch blocks, sediment basins, and grassed swales. Reducing sedimentation provides a long-term improvement to mussel habitat.

Construction

1.2. For construction project activities that result in soil disturbance, the SWPPP and/or ECP will be strictly adhered to, including the installation, inspection, and maintenance of erosion control devices. These measures will be described in the SWPPP and/or ECP.

1.3. Complete the installation of sediment control devices prior to the commencement of any earthwork [Section 104-6.2].

1.4. Inspect all silt fences immediately after each rainfall and at least daily during prolonged rainfall. Immediately correct any deficiencies [Section 104-6.4.6.3].

1.5. Remove sediment deposits when the deposit reaches approximately 1/2 of the volume capacity of the silt fence [Section 104-6.4.6.3].

1.6. During Florida's primary rainy season (June through August) erosion control devices protecting streams will be inspected after every rain event.

1.7. a) To prevent potential destabilization or collapse of stream banks, no grubbing (i.e.

removing vegetation using methods that include ground disturbance) will occur within a horizontal distance of 25 feet from a stream's bankfull elevation[5] except where required for the placement of physical structures and clear zones.

b) Erosion control devices will be installed parallel to streams for their protection.

1.8. a) Disturbed lands that will not be brought to final grade within seven (7) days or are likely to be re-disturbed will be stabilized by employing appropriate temporary stabilization practices in accordance with the E&SC Manual when slopes are <1:4.

b) Sod or another equivalent performing stabilization measure will be used for temporary stabilization when slopes are ≥1:4.

c) The ECP will identify the extent of the disturbed lands and temporary stabilization measures.

1.9. For in-water substructure construction activities, weighted, floating turbidity barriers will be used around the work areas [Section 104-6.4.7].

1.10. When CMs 1.3 to 1.9 are required, they will be incorporated into the ECP. The ECP will be provided to the District Environmental Management Office for review.

1.11. Soil or dredge spoils will be stockpiled in uplands > 300 feet from streams. Additional erosion control measures (e.g. double silt fence) will be used for soils that due to site constraints must be stockpiled within 300 feet of streams.

1.12. Equipment staging and storage areas will be located in previously disturbed locations to prevent additional site disturbance. Acceptable staging/storage locations include previously cleared areas lacking native groundcover, and areas with compacted soils, gravel, or pavement. The contractor's proposed staging/storage locations will be provided to the District Environmental Management Office for review and approval.

1.13. a) Horizontal directional drilling pilot, entrance, and exit holes must be the minimum diameter necessary, and must be set back from the stream bank at least 50 feet.

b) During horizontal directional drilling, excavated materials and drilling muds must be stockpiled on non-wetland areas, where available. Fabric must be placed beneath all materials stockpiled in wetlands.

5 Bankfull elevation is the elevation at the top of the stream bank.

Maintenance:

1.14. Mowing and vegetation maintenance activities will avoid work with heavy equipment within riparian[6] wetlands. Tree trimming near bridges will be done from equipment located on the bridge or roadway whenever possible to avoid disturbing wetland soils.

2. Conservation Measures 2 (CM2) – Contaminant Discharges

These measures are intended to prevent contaminants from discharging into suitable habitat and adversely affecting water quality for mussels.

Design

2.1 Untreated stormwater collected from the bridge and associated roadways will not discharge directly into streams.

2.2 Stormwater ponds will not discharge overflow directly into streams.

Construction

2.3 All potential toxic substances such as fuels, paints, solvents, lubricants, etc. will be mixed and stored within a containment site that is buffered (berms, vegetation, distance, etc.) from streams.

2.4 All return water from groundwater dewatering will be discharged in accordance with the requirements for dewatering activities [E&SC Manual].

2.5 All equipment to be used in, on, or over streams will be checked on a daily basis for leaks or spills, and will be clean of any external petroleum products, hydraulic fluid, coolants, or other injurious materials.

2.6 Cleaning of equipment or materials within 300 feet of streams will include the following measures. All cleaning fluids will be collected and disposed of in accordance with manufacturer's directions. No paint or cleaning fluids will be allowed to contact the ground or enter streams. Any spilled paint or cleaning fluids will be contained, collected, and disposed of off-site.

2.7 Within 300 feet of streams, fertilizers will not be used.

Maintenance

2.8 Within 300 feet of streams, pesticides will not be broadcast sprayed. Application of pesticides may be spot-applied manually in accordance with manufacturer's directions [Section 7-1.7.1].

6 Riparian refers to wetlands adjacent to a stream or river.

3. Conservation Measures 3 (CM3) –Physical Materials In Stream

These measures are intended to prevent physical materials from entering known mussel streams that could result in the take of mussels or alteration of their habitat. No CMs are provided for new structures placed within the stream channels of mussel CH or proposed CH as such actions will likely require formal consultation and will be addressed in a future formal programmatic agreement.

Design

3.1. For new bridges and bridge replacement, design alternatives should be considered that avoid placement of hardened materials within the stream (support piles, rip rap). If structures cannot completely bridge the 100-year floodplain, floodplain drains should be considered to provide relief for stormwater and reduce the need to widen the stream's hydraulic opening by dredging or other means.

Construction

3.2. No equipment, concrete debris, paving materials, litter, demolition debris, or any other materials will be allowed to fall into or be placed into streams. Methods for removing accidental deposition into waterways will be coordinated with the District Environmental Management Office.

3.3. Construction waste/debris will be removed and disposed of in accordance with FDOT specifications [Section 110-9].

3.4. When using barges during construction/demolition activities, they will be held in place with spuds and/or anchors to prevent bottom scour in shallow waters.

4. Conservation Measure 4 (CM4) – Loss of Stream Connectivity

The following measures are intended to promote the design of stream crossing structures on perennial[7] streams that provide **conservation benefits** to host fish, mussels, and overall stream stability. They can provide additional societal benefits such as better handling flood events and reducing maintenance costs. These measures are based on stream crossing best practices identified in the Northwest Florida Unpaved Road-Stream Crossing Manual (SAIC 2005), a guidance document supported by the Service.

Design

4.1 Culverts should be sufficiently sized and placed at the appropriate elevation to allow for the water depth, flow and velocity that permit fish passage through the culverts.

7 A perennial stream has continuous flow in its stream bed year-round during years of normal rainfall.

4.2 Culvert diameter (or box culvert width) should encompass 1.2 times the stream bankfull width[8] to ensure the culvert is large enough to convey bankfull stream flow with minimal alteration of the stream's flow characteristics.

4.3 Normal water levels should rise no higher than half the diameter of the pipe that is available above the bottom substrate.

4.4 The culvert bottom should be counter sunk below the substrate to a minimum depth of six inches, regardless of the shape and size, to provide a sediment substrate conducive to fish passage.

4.5 Culvert slope should be designed to match the existing channel grade within the roadway crossing. However, when then channel velocity exceeds the expected fish swimming speed, the channel slope should be regarded to protect the CH within the available state-owned right of way.

4.6 Alternatives should be considered that that preserve the stream's natural bottom for fish passage. One potential option is to consider the use of bottomless box culverts. Another alternative is the use of single span bridges, including Geosynthetic Reinforced Soil (GRS) bridge systems.

4.7 Where possible, provide for bankfull flow with a single pipe or box culvert. Otherwise, install multiple pipe culverts or multi-cell box structures to minimize bankfull flow disruption. A bridge is preferable to multiple culverts.

4.8 In areas where the floodplain is low-lying and over twice as wide as the bridge opening, consideration should be given to include relief/equalizer culverts to maintain the floodplain elevations within this waterway crossing. Additionally, the design should be prepared to ensure the overflow areas maintain connectivity to the main channel and prevent the potential for blocking fish passage as the flood flows recede from the floodplain overflow banks back into the main channel.

Maintenance

4.9 Perched culverts that form a barrier to fish passage during low flows should be prioritized for replacement.

4.10 When the accumulation of sediment and debris in culverts exceed normal water levels and impede fish passage, these structures should be scheduled for maintenance activities as soon as possible. Culverts requiring frequent maintenance should be prioritized for either replacement or opening modifications to reduce the potential for clogging.

8 Bankfull width is the distance between the tops of the bank on either side of the stream.

7.0 Effect Determinations

7.1 Potential Effects

FDOT actions are evaluated by their collective component activities (See **Appendix C**) and potential effects upon mussels depending upon the activity location. For listed mussels, effects are determined for activities located both within designated CH (direct effects), and up to one mile upstream of designated CH (indirect effects). Since this PA was last updated, CH was designated for the Suwannee Moccasinshell in 2019 in three separate units across approximately 190 miles of stream channel in Alachua, Bradford, Columbia, Dixie, Gilchrist, Hamilton, Lafayette, Madison, Suwannee and Union Counties in Florida; and in Brooks and Lowndes Counties in Georgia.

Many activities covered under the PA are generally low in impact, short in duration, and temporary in their effects. The conservation measures developed for the PA include measures to provide a net conservation benefit, and to avoid and minimize potential direct, indirect, and cumulative effects from work activities. Effect determinations are made based on incorporating the appropriate conservation measures to avoid and minimize adverse impacts to a level that is insignificant and discountable. Potential effects from FDOT activities fall within five general categories given below: Ø, A, B, C, and D. These effects are more fully described in Section 5.

Ø Activities do not cause effects (either adverse or beneficial) on mussels and their habitat.
A. Activities can cause **erosion and sedimentation**, potentially suffocating mussels and degrading habitat quality.
B. Activities can cause **discharges of contaminants/pollutants** that alter water quality.
C. Activities can result in physical materials in the stream channel. May include placement of structures or medium to large **materials falling into the water**, potentially directly taking mussels or altering/contaminating habitat.
D. Activities can affect **stream connectivity**.

7.2 Effect Determinations for Actions Located Within Mussel Habitat

This section addresses FDOT actions located in stream channels within designated or proposed mussel CH, and all terrestrial areas within 300 feet of those stream channels. The effect determinations are grouped by action type and the component activities of those actions. **Tables 2-9** can be used to reach the effect determination for FDOT actions. **Table 2** provides a list of minor activities with no effect on mussels and their habitat. "No Effect" activities are not considered further. Each of **Tables 3-9** represents a typical FDOT action: bridge construction, bridge repairs, culvert construction, culvert extension/maintenance, road construction, resurfacing-restoration-rehabilitation (RRR) projects and maintenance activities, respectively. Column 1 lists potential activities for those FDOT actions with effect determinations given in Column 3. An individual project or action likely does not include all potential activities. Effect determinations include:

No Effect (NE). Activities do not occur in suitable mussel habitat and/or have no effect on mussels and their CH.

May Affect, Not Likely to Adversely Affect (NLAA). With implementation of the required conservation measures, impacts can be reduced so that the activity may affect, but is not likely to adversely affect mussels and CH.

May Affect (MA) – Activity may affect mussels and CH by destroying or modifying habitat, altering hydrologic flows, directly taking individuals, and increasing turbidity or sedimentation to significant levels. Further coordination is needed to identify conservation measures and determine if impacts can be reduced to a level that is insignificant and discountable (MA-NLAA); if impacts cannot be sufficiently reduced, formal consultation may be necessary (MA-LAA). Individual consultation is required.

Tables 3-9 are intended to be used as a tool to assess individual projects. The reviewer will choose the table that best represents their project type. Each component activity that is included in the overall project is checked "Yes" in the appropriate table. An effect determination is given for each activity in Column 3. To reach an effect determination of NLAA for the activity, the Conservation Measures given in Column 4 are required.

The effect determination for the overall project (sum of the checked activities) is shown in the Summary row at the bottom of each table. If any component activity has a MA determination, then the overall determination for the project type is MA. If all component activities have a NLAA determination, then with the incorporation of all relevant Conservation Measures, the overall determination for the action is NLAA. All required Conservation Measures should be shown in the Summary row.

7.3 Effect Determinations for Actions Located Upstream of Mussel Habitat

This section addresses FDOT actions located in stream channels up to one mile upstream of designated or proposed mussel CH, and including all terrestrial areas within 300 feet of those stream channels. For actions upstream of mussel habitat, the primary concern is erosion and sedimentation. Waters upstream of mussel habitat are also important for maintaining stream connectivity for mussel host fish.

- The following actions may cause significant erosion and sedimentation: bridge construction/replacement; bridge repair and rehabilitation; culvert installation (new and replacement); culvert extension or maintenance; road construction, and RRR projects (see potential effect of "**A**" for activities in **Tables 3-8)**. The FDOT will implement **Conservation Measures 1.1 to 1.12**. With implementation of CMs 1.1 to 1.12, impacts can be reduced so that activities may affect, but are not likely to adversely affect (NLAA) mussels and suitable habitat.

- When the action "Culvert – New or Replacement" occurs at stream crossings, **Conservation Measures 4.1 to 4.8** will be considered during Design to provide fish

passage. With implementation of CMs 4.1 to 4.8, impacts can be reduced so that activities may affect, but are not likely to adversely affect (NLAA) mussels and suitable habitat.

- When the action "Culvert – Extension or Maintenance" occurs at stream crossings, existing culverts that inhibit fish passage will be identified and prioritized for improvement (**Conservation Measures 4.9 to 4.10**). With implementation of CMs 4.9 to 4.10, impacts can be reduced so that activities may affect, but are not likely to adversely affect (NLAA) mussels and suitable habitat.

Table 2: FDOT Activities with No Effect.

"NO EFFECT" ACTIVITIES **For Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels. No in-stream impacts.**		
Activities (Column 1)	**Potential Effects** (Column 2)	**Effect Determination (CMs[9] Not Required)** (Column 3)
Asphalt Patching	Ø[10]	NE[11]
Concrete Pavement Repair	Ø	NE
Crack and Joint Sealing	Ø	NE
Curb and Flume (Without Direct Discharge into Stream)	Ø	NE
Curb and Gutter	Ø	NE
Fencing	Ø	NE
Geotechnical Investigation	Ø	NE
Guardrail Installation and Repair	Ø	NE
Landscaping	Ø	NE
Lighting, Traffic, and Pedestrian Signals	Ø	NE
Microsurfacing	Ø	NE
Nighttime Work with Lights	Ø	NE
Pavement Marking	Ø	NE
Pavement – Mill and Resurface, Existing Footprint	Ø	NE
Pavement Removal	Ø	NE
Resurfacing – Fog/Slurry Seal, Armor Coat/Chip Seal	Ø	NE
Signs with Soil Disturbance	Ø	NE
Signs without Soil Disturbance	Ø	NE
Survey and Staking	Ø	NE
Utility Investigations	Ø	NE
Utility Installation, Relocation, Adjustment – Above Ground, Without Grubbing	Ø	NE
Wetland Mitigation	Ø	NE

9 CM = Conservation Measure
10 Ø = Activities do not cause effects (either adverse or beneficial) on mussels and their habitat.
11 NE = No Effect

Table 3: Bridge Construction: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

BRIDGE, NEW AND REPLACEMENT **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels.**																													
Activities (Column 1)	**Yes (✓)**	**Potential Effects[12]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																									
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Armoring –In-Stream		A, C	**MA**																										
Armoring –Outside Stream		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓				
Bank Stabilization, In-Stream		A, C	**MA**																										
Barge Use and Staging		C	NLAA																						✓				
Bridge Demolition – Above Water		B, C	NLAA																✓					✓	✓	✓			
Bridge Demolition – Below Water		A, B, C	**MA**																										
Bridge Substructure – In-Stream		A, B, C	**MA**																										
Bridge Substructure – Outside Stream		A, C	NLAA	✓	✓	✓	✓	✓		✓		✓											✓	✓					
Bridge Superstructure – Over Stream		A, B, C	NLAA	✓								✓			✓				✓				✓	✓	✓	✓			
Causeway (fill)		A, C	**MA**																										
Clear, Grub, Dispose of Veg for Site Preparation		A	NLAA		✓	✓	✓	✓		✓																			
Cofferdams/De-watering		A, C	**MA**																										
Construction Haul Roads		A	NLAA		✓	✓	✓	✓		✓																			
Culvert Upgrade to Bridge. No In-Stream Piles or Hardening		A, B, C	NLAA	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			
Groundwater Discharge (outside of stream)		B	NLAA															✓											
Earthwork –Cut/Fill/Grade/Stockpile		A	NLAA		✓	✓	✓	✓		✓	✓																		
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓									
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓								
Paving – New (asphalt and cement)		A	NLAA		✓	✓	✓	✓		✓																			
Paving – New (of unpaved road)		A	NLAA	✓																									
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓				
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																			
Sidewalks and Bikeways		A	NLAA		✓	✓	✓	✓		✓																			
Soil Stockpile Sites		A	NLAA								✓																		
Staging/Storage Areas		A	NLAA									✓																	
Stormwater Treatment Pond		A, B	NLAA		✓	✓	✓	✓		✓						✓													
Stream Channel Impact		A, C	**MA**																										
Stream Restoration, Post Construction		A, B	**MA**																										
Temporary Stream Crossing, Work Bridge		A, B, C	**MA**																										
Utility Install. – Horiz. Directional Bore		A	NLAA										✓																
Utility Installation – In Stream Trenching		A	**MA**																										
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Bridge construction is NLAA mussels and CH with incorporation of these measures:**																													
Are any checked activities MA? If Yes, then bridge construction MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																													

12 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.

∗ FDOT Requirements

Table 4: Bridge Repair and Rehabilitation: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

BRIDGE, REPAIR AND REHABILITATE **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels.**																												
Activities (Column 1)	**Yes (✓)**	**Potential Effects[13]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																								
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Armoring –In-Stream		A, C	**MA**																									
Armoring –Outside Stream		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Bank Stabilization, In-Stream		A, C	**MA**																									
Barge Use and Staging		C	NLAA																						✓			
Bridge Demolition – Above Water		B, C	NLAA															✓					✓	✓	✓			
Bridge Demolition – Below Water		A, B, C	**MA**																									
Bridge Painting		B	NLAA														✓			✓								
Bridge Rail Repair/Replacement		B, C	NLAA																					✓	✓			
Bridge Substructure – In-Stream		A, B, C	**MA**																									
Bridge Substructure – Outside Stream		A, C	NLAA	✓	✓	✓	✓	✓		✓		✓											✓	✓				
Bridge Superstructure – Over Stream		A, B, C	NLAA	✓								✓			✓				✓				✓	✓	✓	✓		
Cofferdams/De-watering		A, C	**MA**																									
Groundwater Discharge (outside of stream)		B	NLAA															✓										
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓								
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓							
Minor Fender Repair (in-water)		A, B, C	NLAA	✓	✓	✓	✓	✓		✓		✓			✓		✓		✓	✓				✓	✓	✓		
Fender Repair (out-of-/above water using in-water equipment)		A, B, C	NLAA																									
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Pile Jacket Installation (standard and/or cathodic protection system)		A, B, C	NLAA	✓	✓	✓	✓	✓		✓		✓			✓		✓		✓	✓				✓	✓	✓		
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																		
Sidewalks and Bikeways		A	NLAA		✓	✓	✓	✓		✓																		
Soil Stockpile Sites		A	NLAA								✓																	
Spaulding Repairs		A, B, C	NLAA	✓	✓	✓	✓	✓		✓		✓			✓		✓		✓	✓				✓	✓	✓		
Staging/Storage Areas		A	NLAA									✓																
Stormwater Treatment Pond		A, B	NLAA		✓	✓	✓	✓		✓						✓												
Stream Channel Impact		A, C	**MA**																									
Stream Restoration, Post Construction		A, B	**MA**																									
Temporary Stream Crossing, Causeway, Work Bridge/Platform		A, B, C	**MA**																									
Utility Installation, Relocation, Adjustment –Horizontal Directional Bore		A	NLAA										✓															
Utility Installation, Relocation, Adjustment – In Stream Trenching		A	**MA**																									
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Bridge repair and rehabilitation is NLAA mussels and CH with incorporation of these measures:**																												
Are any checked activities MA? If Yes, then bridge repair and rehabilitation MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																												

13 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
∗ FDOT Requirements

Table 5: Culvert, New and Replacement: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

CULVERT, NEW AND REPLACEMENT **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels.**																												
Activities (Column 1)	**Yes (✓)**	**Potential Effects[14]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																								
				1.1	**1.2**	**1.3-1.5***	**1.6**	**1.7-1.8**	**1.9***	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4***	**2.5**	**2.6**	**2.7**	**2.8***	**3.1**	**3.2**	**3.3***	**3.4**	**4.9**	**4.10**
Armoring –In-Stream		A, C	**MA**																									
Armoring –Outside Stream		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Bank Stabilization, In-Stream		A, C	**MA**																									
Clearing, Grubbing, Disposing of Vegetation for Site Preparation		A	NLAA		✓	✓	✓	✓		✓																		
Cofferdams/De-watering		A, C	**MA**																									
Construction Haul Roads		A	NLAA		✓	✓	✓	✓		✓																		
Culvert Upgrade to Bridge. No In-Stream Piles or Hardening		A, B, C	NLAA	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
Groundwater Discharge (outside of stream)		B	NLAA															✓										
Earthwork – Terrestrial Cutting/Filling/Grading/Stockpiling		A	NLAA		✓	✓	✓	✓		✓	✓																	
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓								
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓							
Paving – New (of unpaved road)		A	NLAA	✓																								
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																		
Soil Stockpile Sites		A	NLAA								✓																	
Staging/Storage Areas		A	NLAA									✓																
Stream Channel Impact		A, C	**MA**																									
Stream Restoration, Post Construction		A, B	**MA**																									
Temporary Stream Crossing, Causeway, In-water Work Bridge/Platform		A, B, C	**MA**																									
Utility Installation, Relocation, Adjustment – Horizontal Directional Bore		A	NLAA										✓															
Utility Installation, Relocation, Adjustment – In Stream Trenching		A	**MA**																									
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Culvert construction is NLAA mussels and CH with incorporation of these measures:**																												
Are any checked activities MA? If Yes, then culvert construction MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																												

14 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
* FDOT Requirements

Table 6: Culvert Extension and Maintenance: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

CULVERT, EXTEND OR MAINTAIN **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels.**																												
Activities (Column 1)	**Yes (✓)**	**Potential Effects[15]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																								
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Armoring –Outside Stream		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Clearing, Grubbing, Disposing of Vegetation for Site Preparation		A	NLAA							✓																		
Construction Haul Roads		A	NLAA		✓	✓	✓	✓		✓																		
Culvert Upgrade to Bridge. No In-Stream Piles or Hardening		A, B, C	NLAA	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
Groundwater Discharge (outside of stream)		B	NLAA															✓										
Earthwork – Terrestrial Cutting/Filling/Grading/Stockpiling		A	NLAA		✓	✓	✓	✓		✓	✓																	
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓								
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓							
Paving – New (of unpaved road)		A	NLAA	✓																								
Remove Debris and Obstructions		D	NLAA																								✓	✓
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																		
Soil Stockpile Sites		A	NLAA								✓																	
Staging/Storage Areas		A	NLAA									✓																
Stream Channel Impact		A, C	**MA**																									
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Culvert extension and maintenance is NLAA mussels and CH with incorporation of these measures:**																												
Are any checked activities MA? If Yes, then culvert extension and maintenance MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																												

15 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
∗ FDOT Requirements

Table 7: Road Construction: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

ROAD CONSTRUCTION, NEW OR WIDEN **In Terrestrial Areas within 300 Feet of Stream Channels Designated or Proposed as Mussel Critical Habitat. Excludes Bridge Construction.**																												
Activities (Column 1)	**Yes (✓)**	**Potential Effects[16]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																								
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Armoring – Outside-Stream		A	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Clearing, Grubbing, Disposing of Vegetation for Site Preparation		A	NLAA		✓	✓	✓	✓		✓																		
Construction Haul Roads		A	NLAA		✓	✓	✓	✓		✓																		
Earthwork – Terrestrial Cutting/Filling/Grading/Stockpiling		A	NLAA		✓	✓	✓	✓		✓	✓																	
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓								
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓							
Paving – New (asphalt and cement)		A	NLAA		✓	✓	✓	✓		✓																		
Paving – New (of unpaved road)		A	NLAA	✓																								
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																		
Sidewalks and Bikeways		A	NLAA		✓	✓	✓	✓		✓																		
Soil Stockpile Sites		A	NLAA								✓																	
Staging/Storage Areas		A	NLAA									✓																
Stormwater Treatment Pond		A, B	NLAA		✓	✓	✓	✓		✓						✓												
Trenched Widening		A	NLAA		✓	✓	✓	✓		✓																		
Utility Installation, Relocation, Adjustment – Horizontal Directional Bore		A	NLAA										✓															
Utility Installation, Relocation, Adjustment – In Stream Trenching		A	**MA**																									
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Road construction is NLAA mussels and CH with incorporation of these measures:**																												
Are any checked activities MA? If Yes, then road construction MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																												

16 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
∗ FDOT Requirements

Table 8: Resurfacing, Restoration and Rehabilitation Projects. Check "Yes" for all activities included in the project.

Resurfacing, Restoration and Rehabilitation (RRR) Projects **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of Stream Channels.**																													
Activities (Column 1)	**Yes (✓)**	**Potential Effects[17]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																									
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Add Turn Lanes		A	NLAA		✓	✓	✓	✓		✓	✓	✓																
Armoring – In-Stream		A, C	**MA**																										
Armoring – Outside-Stream		A	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Barge Use and Staging		C	NLAA																							✓		
Clearing, Grubbing, Disposing of Vegetation for Site Preparation		A	NLAA		✓	✓	✓	✓		✓																		
Construction Haul Roads		A	NLAA		✓	✓	✓	✓		✓																		
Earthwork – Terrestrial Cutting/Filling/Grading/Stockpiling		A	NLAA		✓	✓	✓	✓		✓	✓																	
Equipment, Maintenance & Cleaning		B	NLAA														✓		✓	✓								
Erosion Control – Place and Remove		A, B	NLAA		✓	✓	✓	✓		✓	✓	✓									✓							
Pave Shoulder		A	NLAA		✓	✓	✓	✓		✓																		
Paving – New (asphalt and cement)		A	NLAA		✓	✓	✓	✓		✓	✓	✓																
Paving – New (of unpaved road)		A	NLAA	✓																								
Realign Intersection		A	NLAA		✓	✓	✓	✓		✓																		
Replace Insufficient Bridges – In-Stream Impacts		A, B, C	**MA**																										
Replace Insufficient Bridges – No In-Stream Impacts		A, B, C	NLAA	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
Retaining Walls (Terrestrial)		A, C	NLAA		✓	✓	✓	✓		✓		✓												✓	✓			
Sheet Pile Installation/Removal		A	NLAA		✓	✓	✓	✓		✓																		
Sidewalks and Bikeways		A	NLAA		✓	✓	✓	✓		✓																		
Soil Stockpile Sites		A	NLAA								✓																	
Staging/Storage Areas		A	NLAA									✓																
Stormwater Treatment Pond		A, B	NLAA		✓	✓	✓	✓		✓						✓												
Trenched Widening		A	NLAA		✓	✓	✓	✓		✓																		
Utility Installation, Relocation, Adjustment – Horizontal Directional Bore		A	NLAA										✓															
Utility Installation, Relocation, Adjustment – In Stream Trenching		A	**MA**																										
Widen Bridge Lanes – In-Stream Impacts		A, B, C	**MA**																										
Widen Bridge Lanes – No In-Stream Impacts		A, B, C	NLAA	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
Widen Roadway Lanes		A	NLAA		✓	✓	✓	✓		✓	✓																	
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **RRR project is NLAA mussels and CH with incorporation of these measures:**																													
Are any checked activities MA? If Yes, then RRR project MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																													

17 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
∗ FDOT Requirements

Table 9: Maintenance: Component Activities, Effects, and Conservation Measures. Check "Yes" for all activities included in the project.

MAINTENANCE ACTIVITIES **In Stream Channels within Designated or Proposed Mussel Critical Habitat, and Including All Terrestrial Areas within 300 Feet of the Stream Channels.**																													
Activities (Column 1)	**Yes (✓)**	**Potential Effects[18]** (Column 2)	**Effect Determination With CMs** (Column 3)	**Conservation Measures (CMs)** (Column 4)																									
				1.1	**1.2**	**1.3-1.5∗**	**1.6**	**1.7-1.8**	**1.9∗**	**1.10**	**1.11**	**1.12**	**1.13**	**1.14**	**2.1**	**2.2**	**2.3**	**2.4∗**	**2.5**	**2.6**	**2.7**	**2.8∗**	**3.1**	**3.2**	**3.3∗**	**3.4**	**4.9**	**4.10**
Ditches – Clean, Reshape, Regrade		A	NLAA			✓	✓	✓																				
Mowing and Tree/Shrub Trimming		A	NLAA											✓														
Pesticide/Fertilizer Use in ROW		B	NLAA																		✓	✓						
Remove Debris and Obstructions – Bridge and Culverts		D	NLAA																								✓	✓
SUMMARY **Are all checked activities NLAA? If Yes, then sum the conservation measures in this row.** **Maintenance activities are NLAA mussels and CH with incorporation of these measures:**																												
Are any checked activities MA? If Yes, then maintenance activities MA mussels and CH. Additional coordination is needed to determine if action MA-NLAA or MA-LAA mussels and CH.																												

18 A = erosion and sedimentation; B = discharge of contaminants and pollutants; C = materials in water; and D = loss of stream connectivity.
∗ FDOT Requirements

8.0 Key for Using the Mussel Programmatic Approach

A step-by-step key has been developed to assist FDOT staff in using the mussel programmatic approach to reach an effect determination for proposed work activities.

A. Determine if the project occurs within the Action Area of the mussel programmatic approach.

The mussel programmatic approach Action Area includes:

1. All stream channels identified as CH and pCH;
2. All stream channels that are upstream, up to one mile, of CH and pCH;
3. All terrestrial areas within 300 feet of #1 above; and
4. All terrestrial areas within 300 feet of #2 above.

Project is outside the Action Area.....”No Effect”

The project is within the Action Area.....Go to B

B. Determine if the project consists of activities evaluated in the mussel programmatic approach.

The project includes only activities given in **Appendix C** of the mussel programmatic approach biological assessment.....Go to C

The project includes additional activities not given in **Appendix C** of the mussel programmatic approach biological assessment.

Additional evaluation is needed by the District Environmental Management Office to determine if the project’s activities will require consultation with the Service.

C. Determine whether the project activities are located in or adjacent to CH and pCH (Action Areas #1 and 3 above) or are located upstream and hydrologically connected to CH and pCH (Action Areas #2 and 4 above).

The project activities are located in or adjacent to CH and pCH.....Go to D

The project activities are located within one mile upstream of CH and pCH.....Go to E

D. Determine if the project and its component activities may affect mussels. Go to the appropriate table/s for the project type. In Tables 3-9, check all activities that are components of the project.

Minor Activities	Table 2
Bridge, New and Replace	Table 3
Bridge, Repair and Rehabilitate	Table 4
Culvert, New and Replacement	Table 5
Culvert, Extend or Maintain	Table 6
Roads, New Construction	Table 7
Resurfacing, Restoration and Rehabilitation Projects	Table 8
Maintenance Activities	Table 9

All project activities are listed on **Table 2**. The project will have no effect on mussels and/or suitable habitat.....”No Effect”

All checked activities have an effect determination of NLAA in Column 3 indicating that Conservation Measures can be implemented to avoid and minimize adverse effects. The overall project may cause effects to mussels and/or suitable habitat. By implementing all appropriate Conservation Measures given in the Summary row, the project may affect, but is not likely to adversely affect mussels and/or suitable habitat.....”NLAA”

All checked activities have an effect determination of NLAA in Column 3 indicating that Conservation Measures can be implemented to avoid and minimize adverse effects. The overall project may cause effects to mussels and/or suitable habitat. While Conservation Measures are recommended to avoid and minimize adverse effects to a level NLAA, these measures cannot be implemented.
Further coordination with the Service is needed.....”May Affect”

One or more checked activities have an effect determination of MA in Column 3. The overall project MA mussels and/or suitable habitat.
Further coordination with the Service is needed.....”May Affect”

E. The project is located one mile upstream of CH and pCH. The primary concerns are erosion and sedimentation which can be transported downstream. Maintaining and improving stream connectivity for host fish passage is an important consideration for in-stream structures.

The project consists of either minor or maintenance activities (Tables 2 or 8) and will not cause significant erosion and sedimentation or affect stream connectivity. These activities will have no effect on mussels and/or suitable habitat.....”No Effect”

The project is one of the following types: bridge construction/replacement; bridge repair and rehabilitation; culvert installation (new and replacement); culvert extension or maintenance; and road construction. These actions may cause erosion and sedimentation. With implementation of **Conservation Measures 1.1 to 1.13** the actions may affect, but are not likely to adversely affect mussels and/or suitable habitat.....”NLAA”

The project is a culvert installation (new and replacement) at a stream crossing. The activities include in-stream structures that may affect stream connectivity. With implementation of **Conservation Measures 4.1 to 4.8** these actions may affect, but are not likely to adversely affect mussels and/or suitable habitat.....”NLAA”

The project is culvert work (extension or maintenance) at a stream crossing. Existing culverts that inhibit fish passage will be identified and prioritized for improvement. With implementation of **Conservation Measures 4.9 to 4.10** these actions may affect, but are not likely to adversely affect mussels and/or suitable habitat.....”NLAA”
While Conservation Measures are recommended in this section above to avoid and minimize

adverse effects to a level NLAA, these measures cannot be implemented.
Further coordination with the Service is needed....."May Affect"

9.0 Summary - Determination of Effects and Section 7 Concurrence

The following effect determinations apply only to freshwater mussels and their CH. Additional federally protected species may be present if suitable habitat occurs in the project area. Further evaluation may be needed to assess the effects of work activities on other protected species.

No Effect
For actions where the matrix and key indicate a "No Effect" determination, the proposed action is covered under the PA. These are minor activities have not required coordination with the Service in the past and therefore will not be tracked under the PA. The action needs no further Section 7 coordination with the Service for mussels.

May Affect, Not Likely to Adversely Affect
For actions where the matrix and key indicate a "May Affect, Not Likely to Adversely Affect"(NLAA) determination, the proposed action is covered under the PA. The action has programmatic Section 7 concurrence for mussels. The use of the PA for individual projects will be documented within the District Environmental Management Office's standard coordination letter provided to the Service at 60% design. A check list of Conservation Measures is provided in Appendix E; the appropriate Conservations Measures can be marked on the check list and included with the coordination letter. This letter will include a commitment to implement the appropriate conservation measures.

May Affect
For actions where the matrix and key indicate a "May Affect" determination, the proposed work is not covered under the PA. Separate coordination with the Service is needed to determine whether the action MA-NLAA or MA-LAA mussels and CH.

10.0 Consistency Verification

For each individual project covered by the PA, a record will be created by FDOT through their standard coordination letter to the Service. This letter will provide information on the project, work activities, location, effect determination, and conservation measure commitments, as applicable. When conservation measures require the consideration of design alternatives (CMs 1.1 and 3.1) an explanation should be given of designs alternatives considered and why the final design was chosen. The FDOT requests that the Service agree to respond in writing within 30 days of receipt of the coordination letter if the Service determines that the project is not consistent with the PA, or if the Service requires additional information/clarification to verify such consistency. The FDOT will presume that no Service response within 30 days indicates Service verification of project consistency with the BA.

Use of the PA will be tracked by FDOT and summarized annually for the Service. This annual report may be in a list format with: 1. project name; 2. action type; 3. location; 4. mussel

species/CH present; 5. construction start and end dates; and 6. conservation measures. The report will be available to stakeholder agencies upon request. An annual interagency coordination meeting will be held to discuss the effectiveness of the programmatic agreement and determine if updates and improvements are needed.

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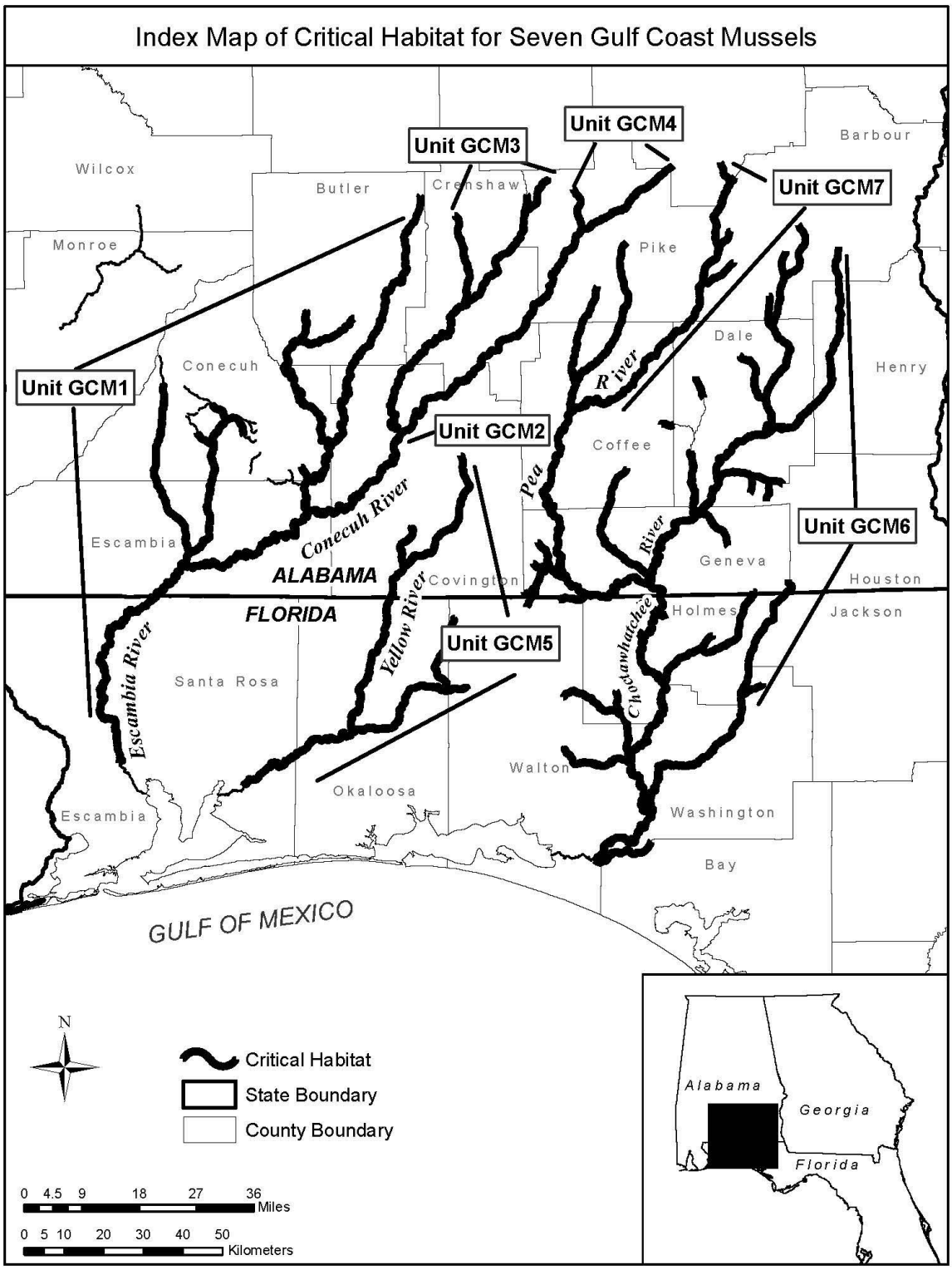
APPENDIX A

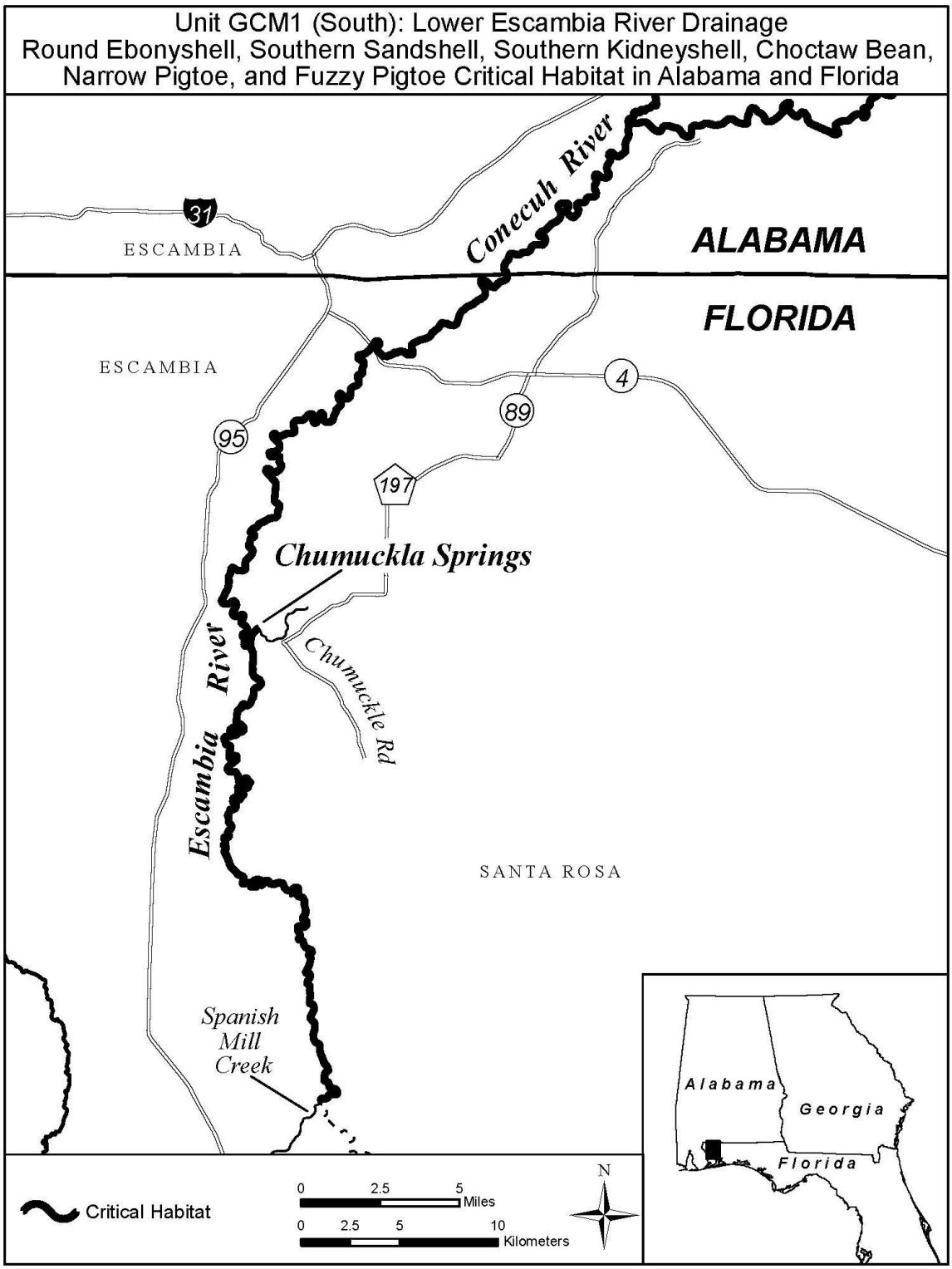
Critical Habitat Maps for Listed Freshwater Mussels

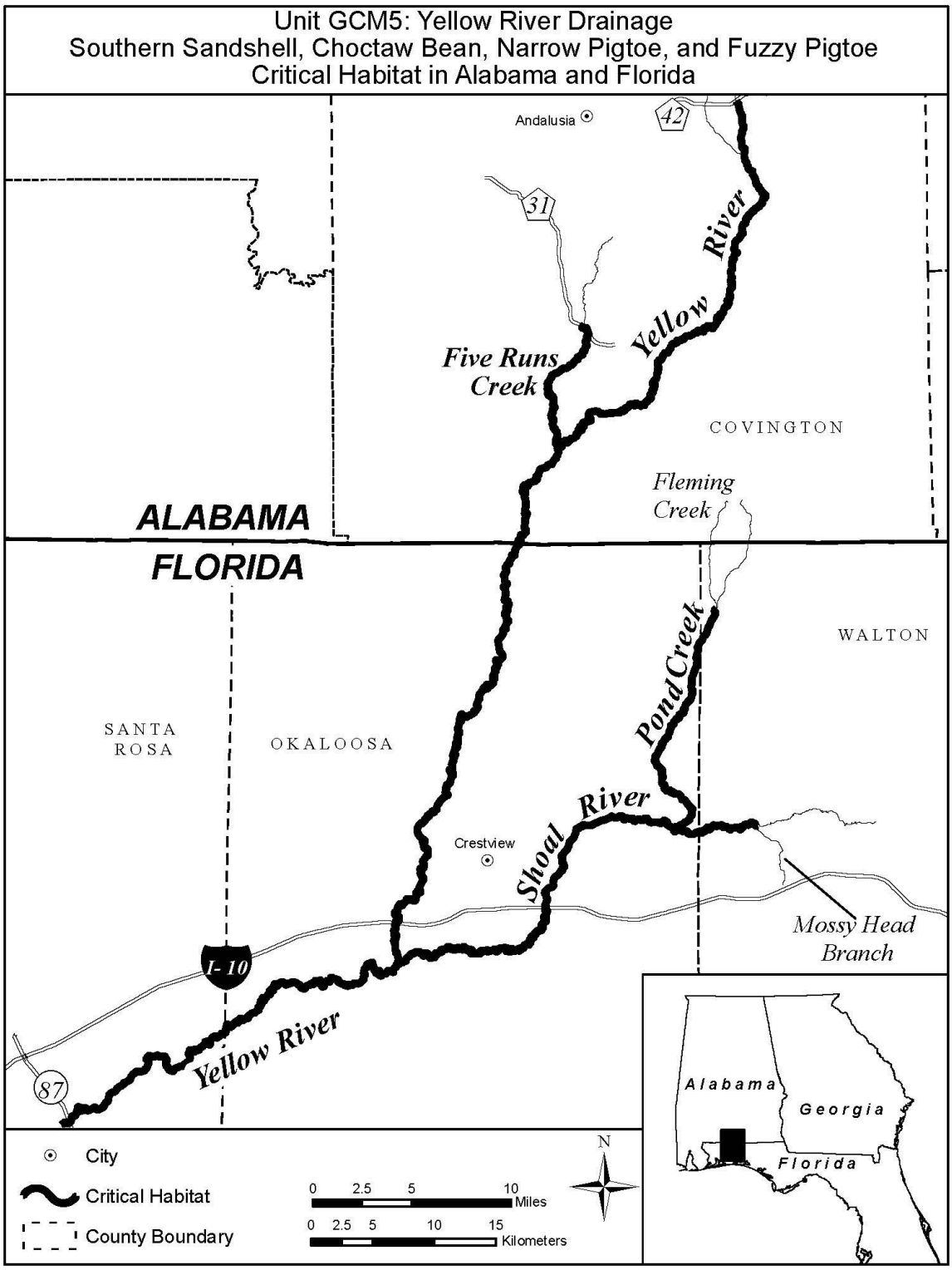
Florida Units

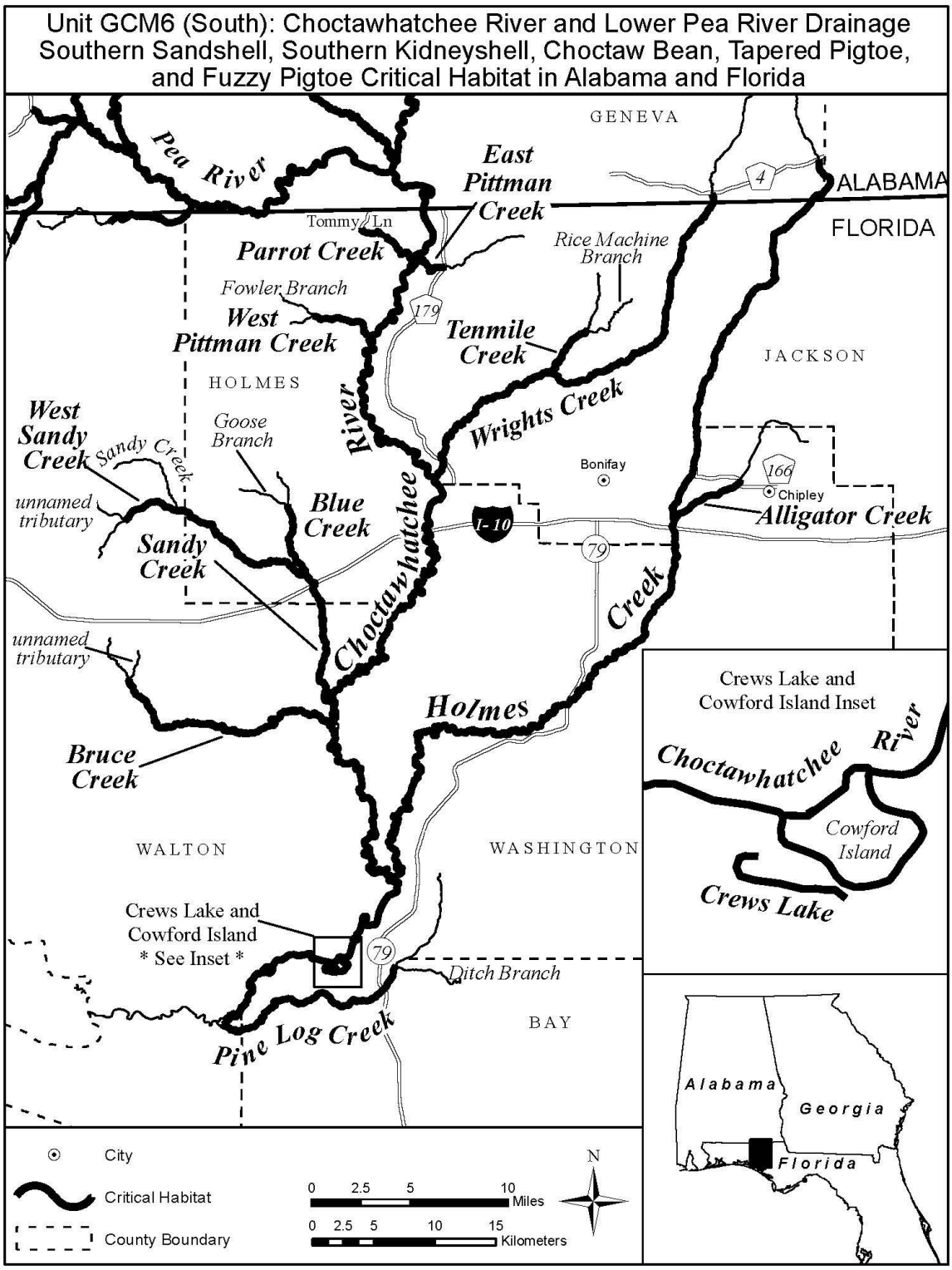
Critical habitat was designated in the Federal Register for seven species of freshwater mussels on November 15, 2007 (72 FR 64286) which included the following counties in Florida: Alachua, Bay, Bradford, Calhoun, Columbia, Franklin, Gadsden, Gulf, Jackson, Leon, Liberty, Union, Wakulla, and Washington. An additional eight mussel species – of which seven are Gulf Coast mussels - were listed and critical habitat designated on October 10, 2012 (77 FR 61664) which included Florida units in Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Washington, and Jackson counties. Critical Habitat was designated for the Suwannee Moccasinshell on July 1, 2021 including segments of the Withlacoochee, Sante Fe and Suwannee Rivers in Madison, Hamilton, Suwannee, Lafayette, Columbia, Gilchrist, Alachua, Bradford and Union Counties. The Southern Elktoe was proposed as endangered on June 21, 2023, with Critical Habitat in reaches of the Chipola River and Apalachicola River (Jackson, Calhoun, Gulf, Liberty, Gadsden, Liberty counties in Florida); updates may be updated whenever finalized.

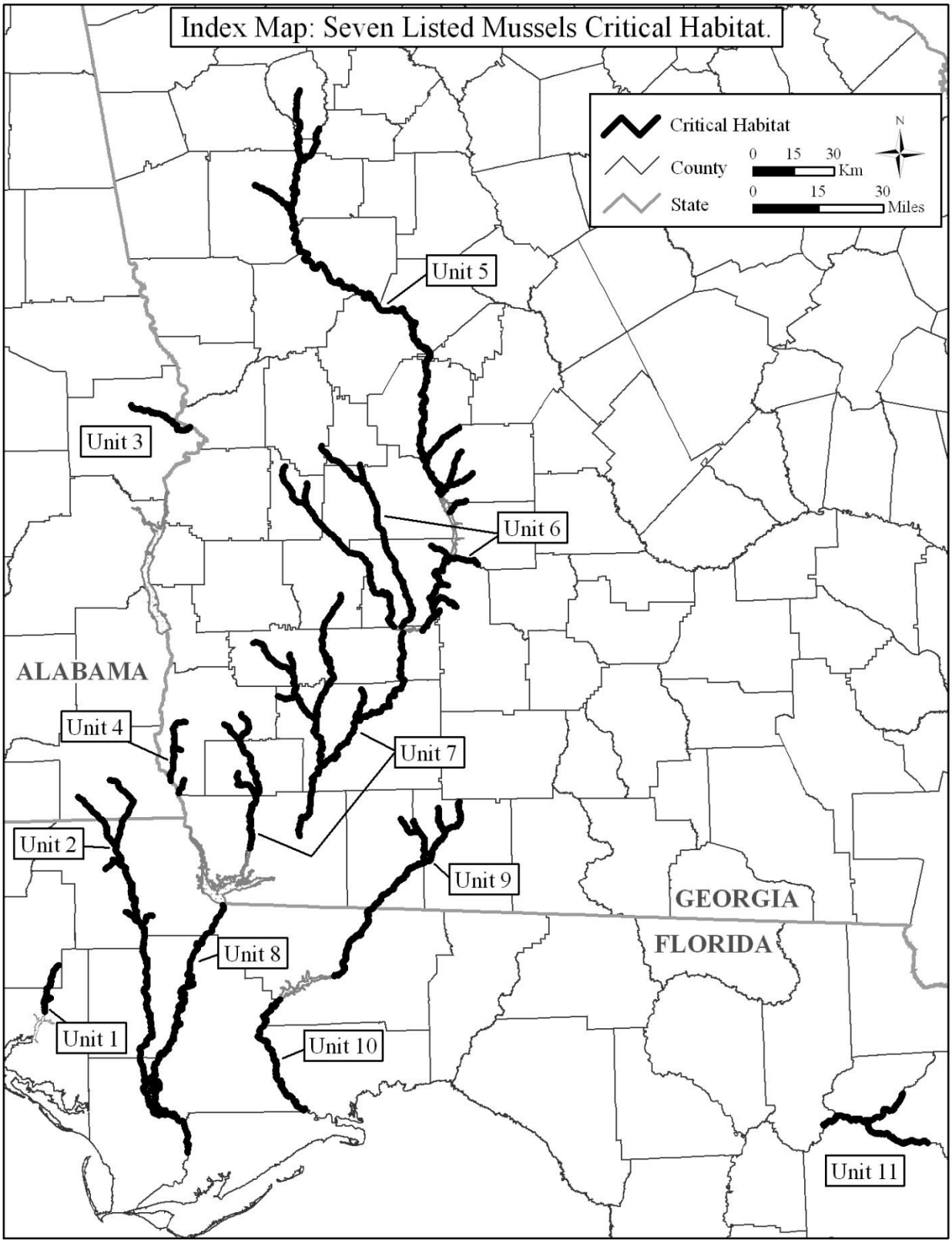
The following maps are provided as guidance in determining whether your project is located in or near mussel critical habitat. Maps are displayed beginning from Escambia County and moving eastward.

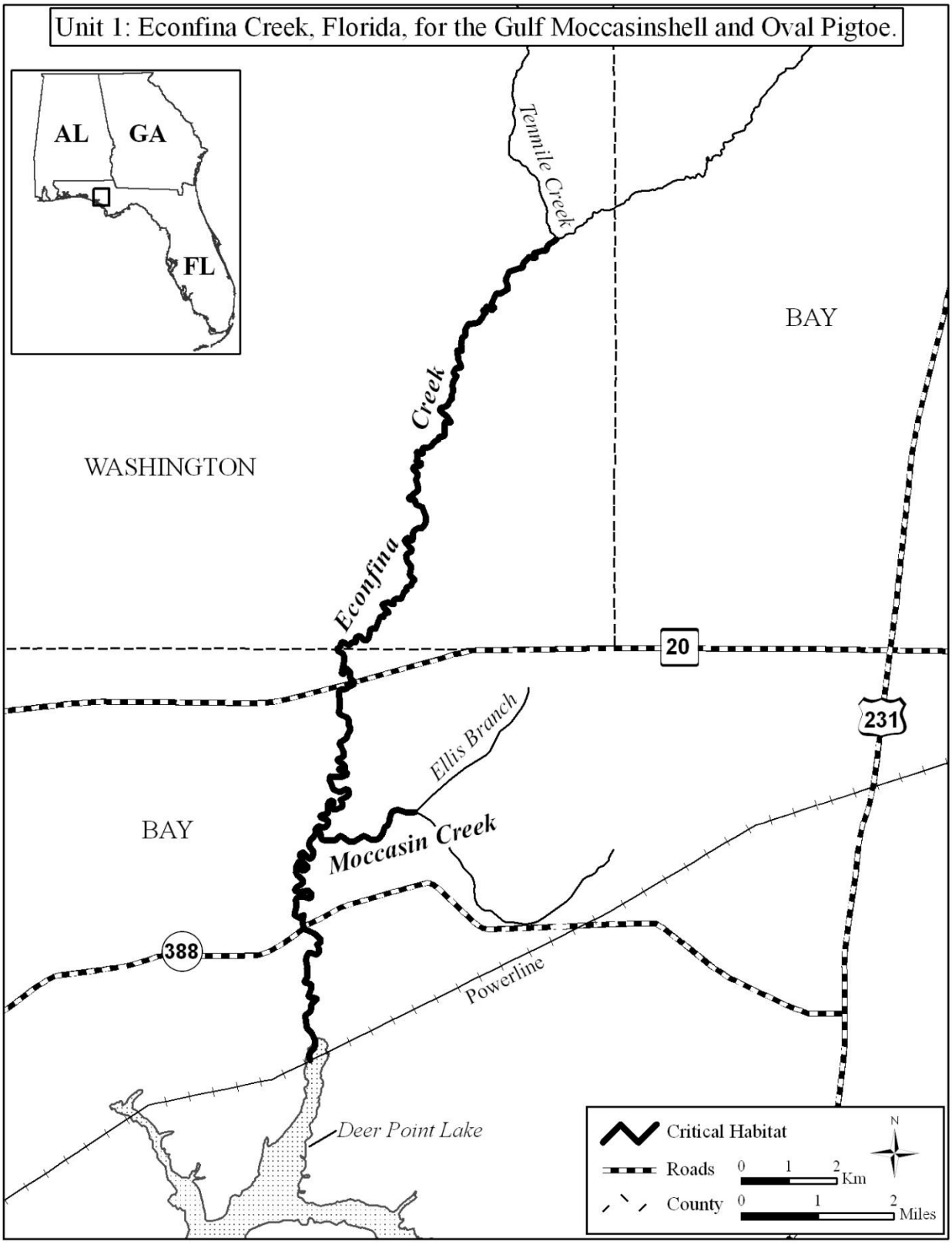

Index Map of Critical Habitat for Seven Gulf Coast Mussels
Unit GCM1
Unit GCM2
Unit GCM3
Unit GCM4
Unit GCM5
Unit GCM6
Unit GCM7
Wilcox
Butler
Crenshaw
Barbour
Monroe
Pike
Dale
Henry
Conecuh
Coffee
Escambia
Geneva
Houston
Covington
Holmes
Jackson
Santa Rosa
Walton
Okaloosa
Washington
Bay
Escambia
ALABAMA
FLORIDA
Conecuh River
Pea River
Yellow River
Escambia River
Choctawhatchee River
GULF OF MEXICO
N
Critical Habitat
State Boundary
County Boundary
0 4.5 9 18 27 36
Miles
0 5 10 20 30 40 50
Kilometers
Alabama
Georgia
Florida

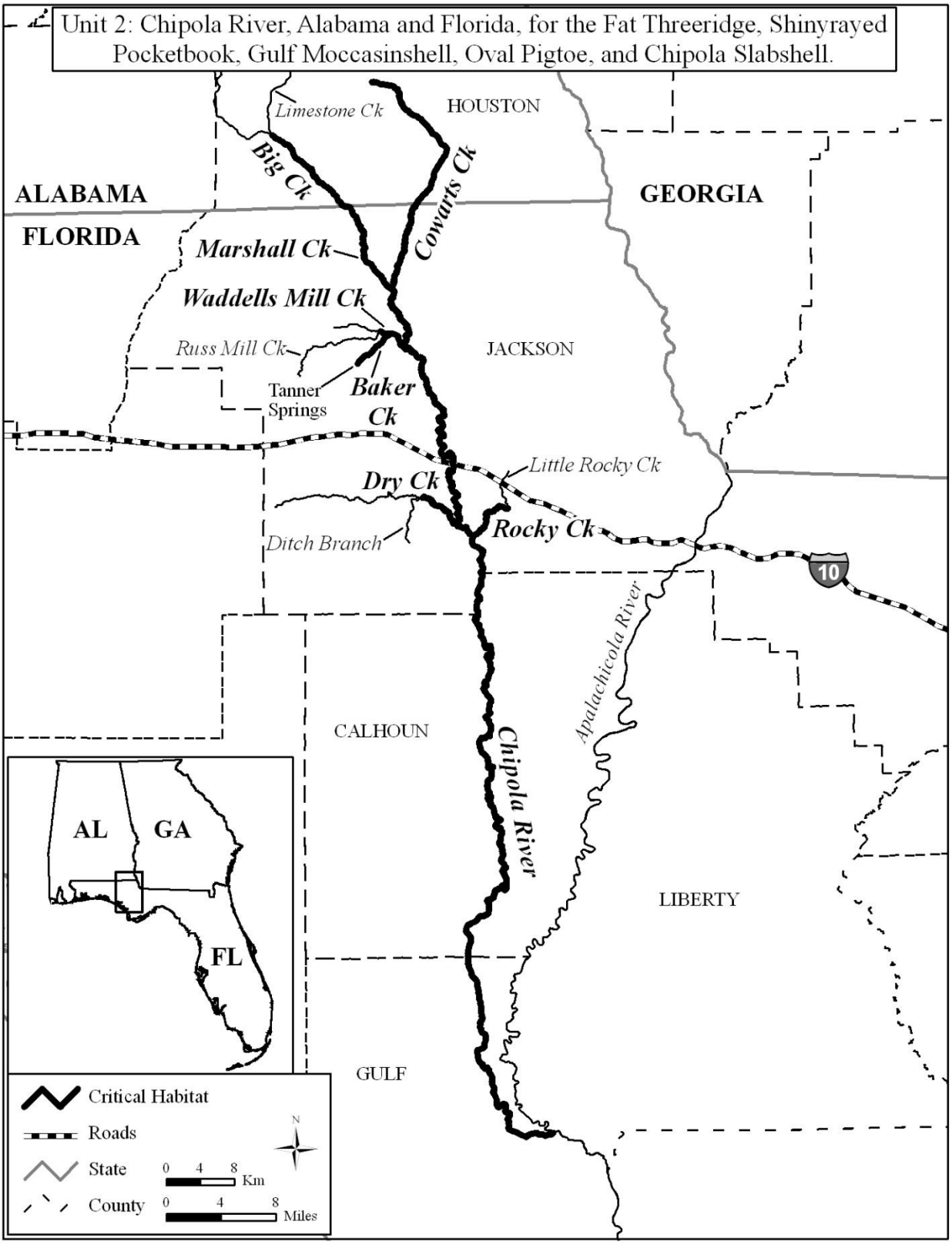

Unit GCM1 (South): Lower Escambia River Drainage
Round Ebonyshell, Southern Sandshell, Southern Kidneyshell, Choctaw Bean,
Narrow Pigtoe, and Fuzzy Pigtoe Critical Habitat in Alabama and Florida
Conecuh River
31
ESCAMBIA
ALABAMA
FLORIDA
ESCAMBIA
4
89
95
197
Chumuckla Springs
Chumuckle Rd
Escambia River
SANTA ROSA
Spanish Mill Creek
Critical Habitat
0 2.5 5 Miles
0 2.5 5 10 Kilometers
N
Alabama
Georgia
Florida

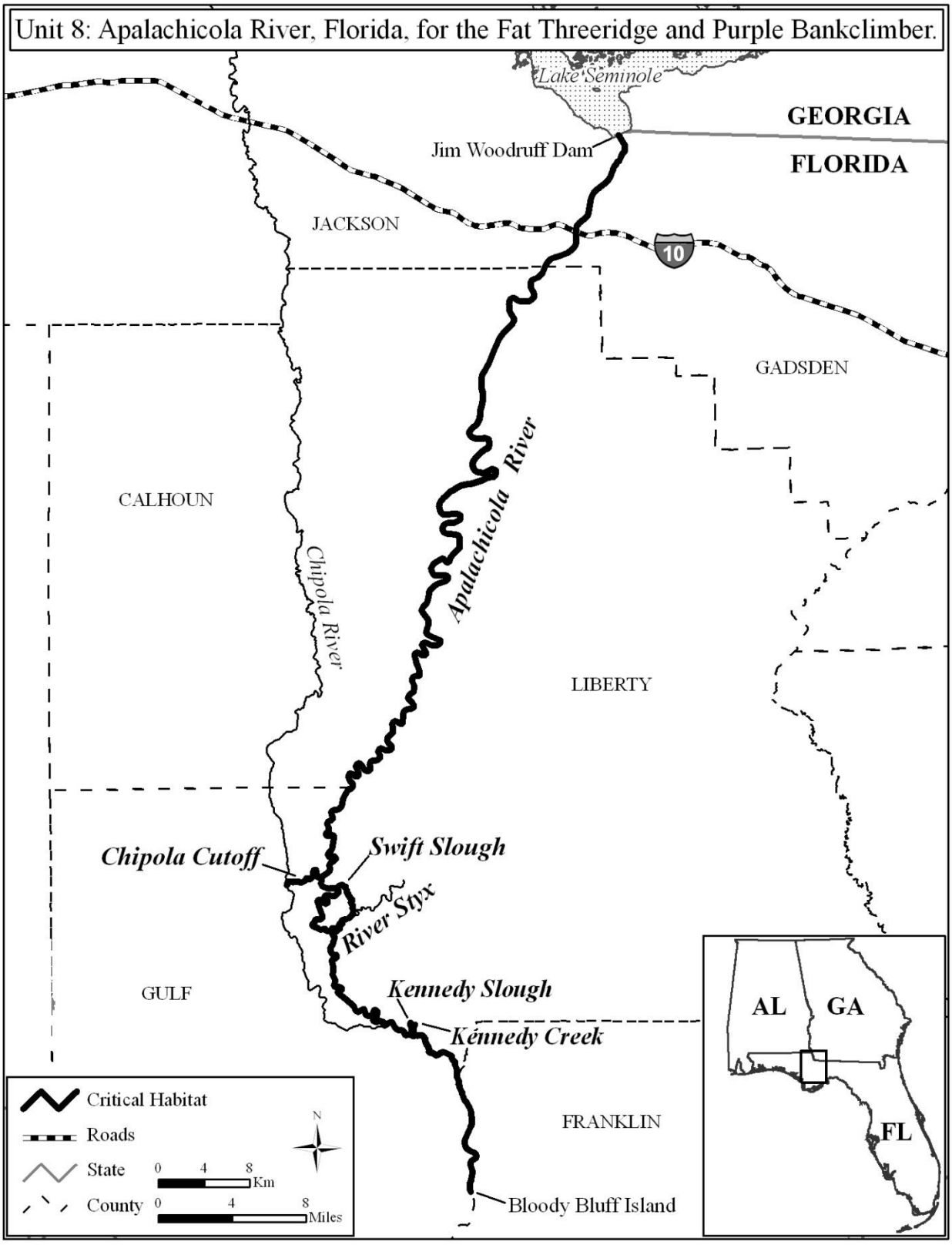

Unit GCM5: Yellow River Drainage
Southern Sandshell, Choctaw Bean, Narrow Pigtoe, and Fuzzy Pigtoe
Critical Habitat in Alabama and Florida
Andalusia
42
31
Yellow River
Five Runs Creek
COVINGTON
Fleming Creek
ALABAMA
FLORIDA
Pond Creek
WALTON
SANTA ROSA
OKALOOSA
Shoal River
Crestview
Mossy Head Branch
I-10
Yellow River
87
City
Critical Habitat
County Boundary
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
N
Alabama
Georgia
Florida

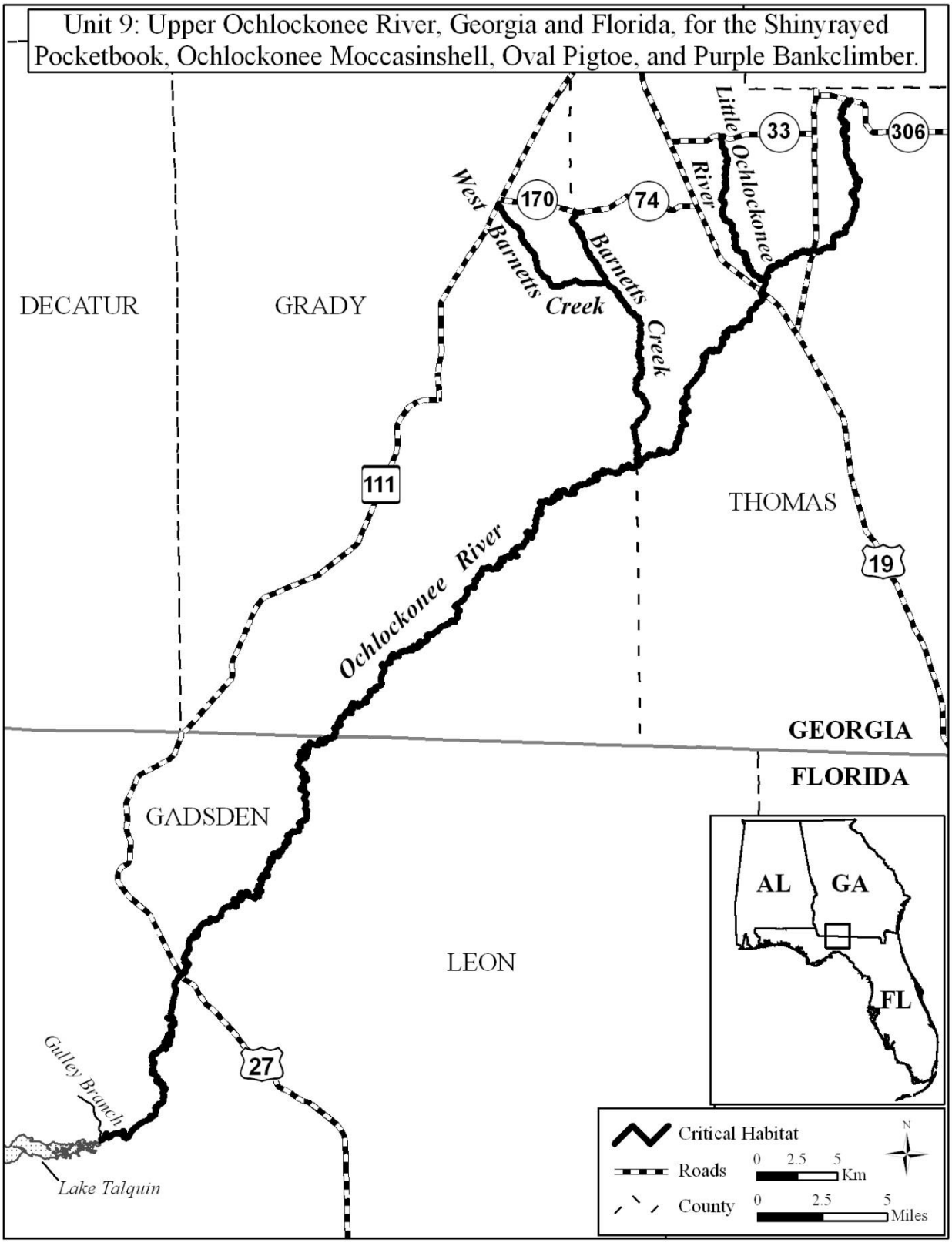

Unit GCM6 (South): Choctawhatchee River and Lower Pea River Drainage
Southern Sandshell, Southern Kidneyshell, Choctaw Bean, Tapered Pigtoe,
and Fuzzy Pigtoe Critical Habitat in Alabama and Florida
GENEVA
ALABAMA
FLORIDA
Pea River
East Pittman Creek
Tommy Ln
Parrot Creek
Rice Machine Branch
Fowler Branch
West Pittman Creek
179
Tenmile Creek
JACKSON
HOLMES
West Sandy Creek
Sandy Creek
Goose Branch
Choctawhatchee River
Wrights Creek
Bonifay
166
Chipley
Alligator Creek
unnamed tributary
Blue Creek
I-10
79
Sandy Creek
Holmes Creek
unnamed tributary
Crews Lake and Cowford Island Inset
Choctawhatchee River
Cowford Island
Crews Lake
Bruce Creek
WALTON
WASHINGTON
Crews Lake and Cowford Island
* See Inset *
Ditch Branch
BAY
Pine Log Creek
Alabama
Georgia
Florida
City
Critical Habitat
County Boundary
N
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers

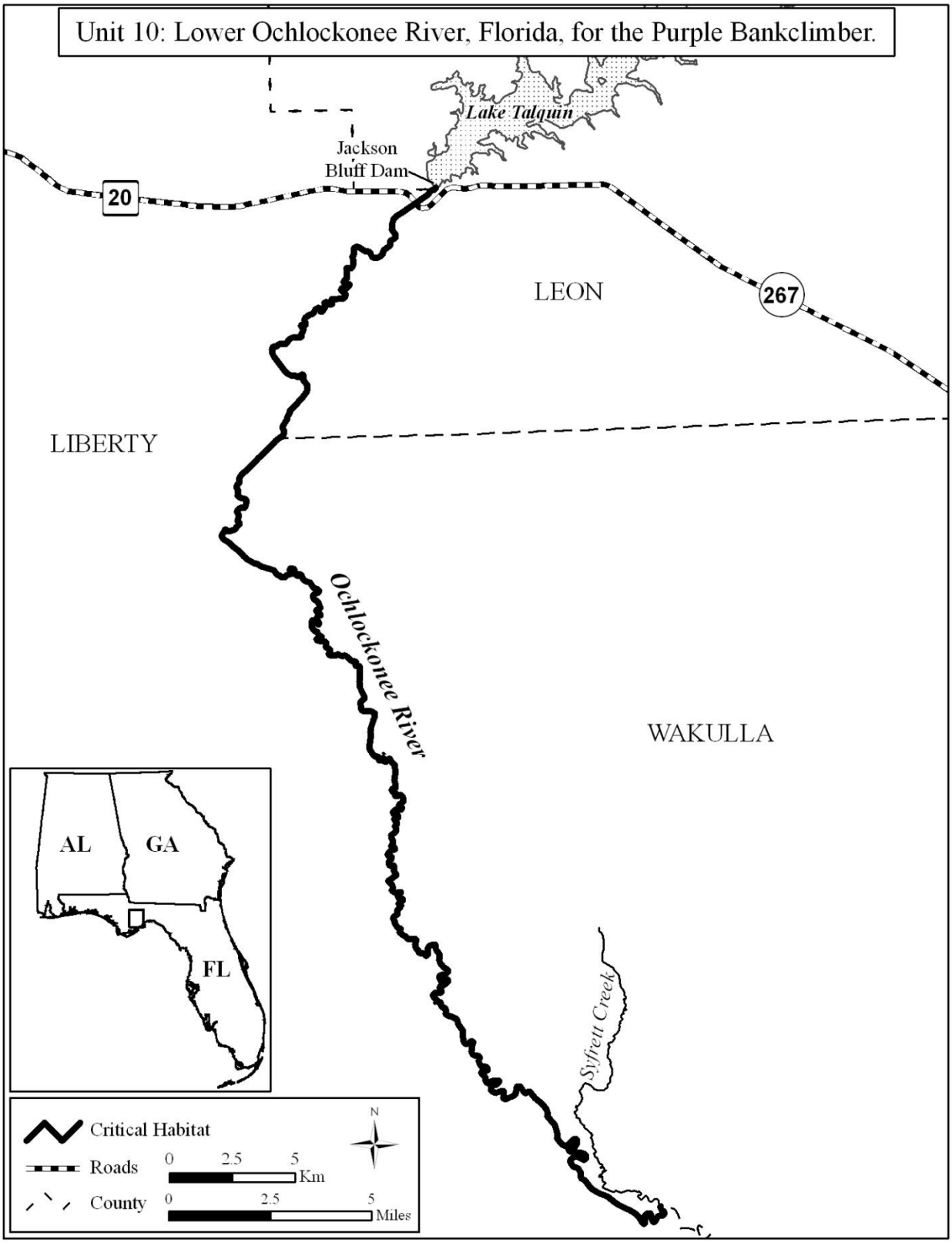

Index Map: Seven Listed Mussels Critical Habitat.
Critical Habitat
County
State
N
0 15 30
Km
0 15 30
Miles
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
Unit 6
Unit 7
Unit 8
Unit 9
Unit 10
Unit 11
ALABAMA
GEORGIA
FLORIDA

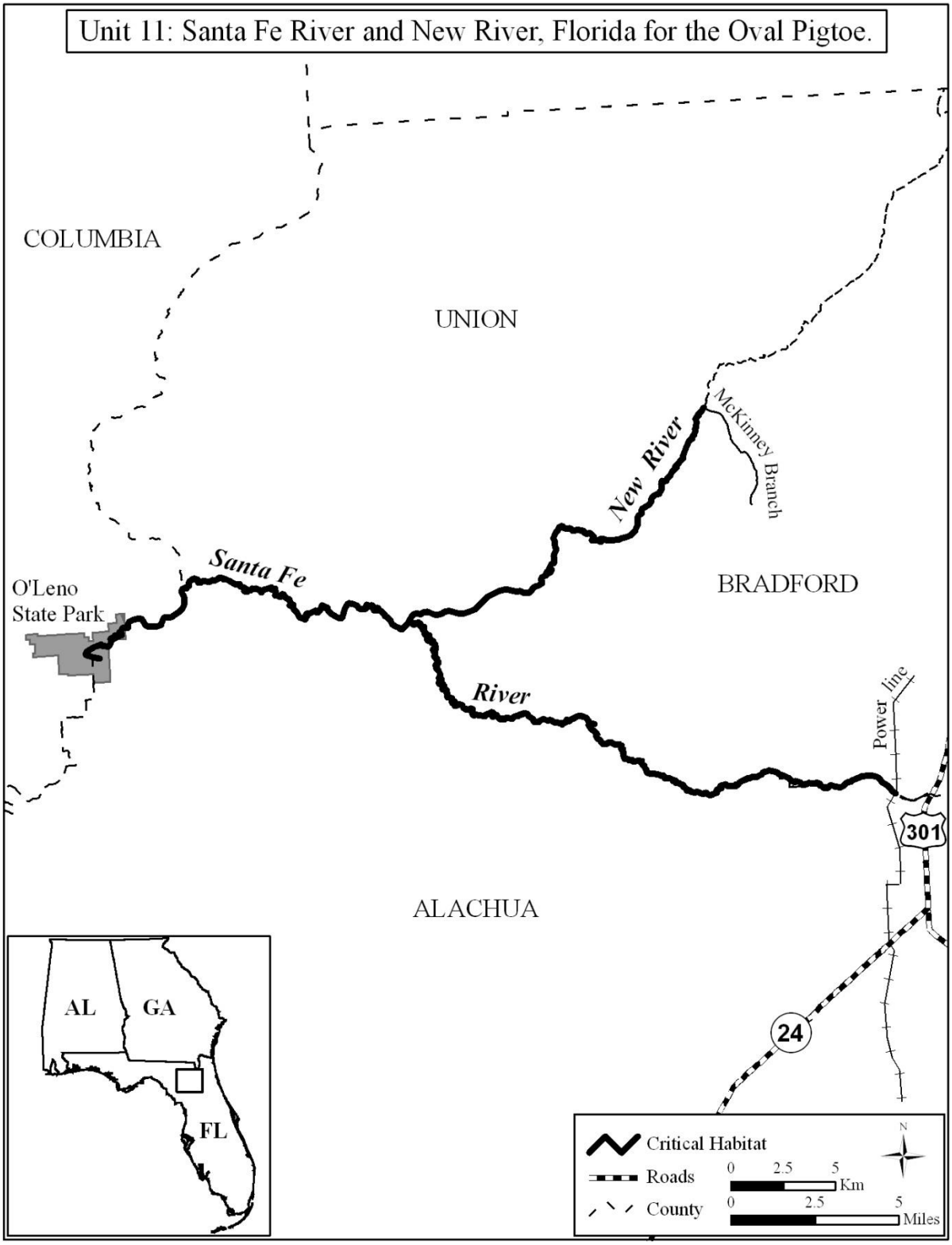

Unit 1: Econfina Creek, Florida, for the Gulf Moccasinshell and Oval Pigtoe.
AL
GA
FL
Tennile Creek
BAY
Econfina Creek
WASHINGTON
20
231
Ellis Branch
BAY
Moccasin Creek
388
Powerline
Deer Point Lake
Critical Habitat
Roads
County
0 1 2 Km
0 1 2 Miles
N

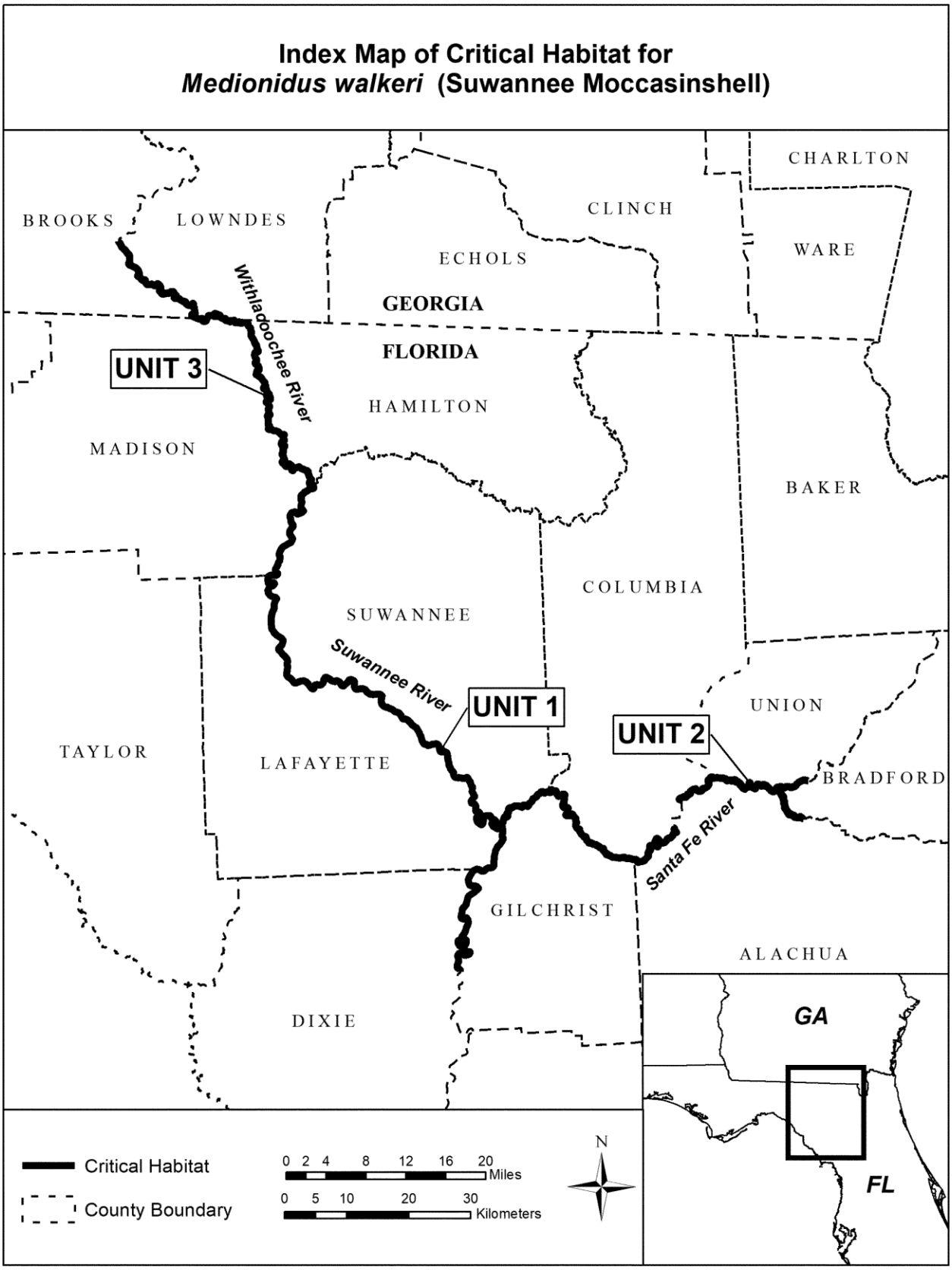

Unit 2: Chipola River, Alabama and Florida, for the Fat Threeridge, Shinyrayed Pocketbook, Gulf Moccasinshell, Oval Pigtoe, and Chipola Slabshell.
Limestone Ck
HOUSTON
Big Ck
Cowarts Ck
ALABAMA
GEORGIA
FLORIDA
Marshall Ck
Waddells Mill Ck
Russ Mill Ck
JACKSON
Tanner Springs
Baker Ck
Little Rocky Ck
Dry Ck
Rocky Ck
Ditch Branch
10
Apalachicola River
CALHOUN
Chipola River
LIBERTY
AL
GA
FL
GULF
Critical Habitat
Roads
State
County
N
0 4 8 Km
0 4 8 Miles

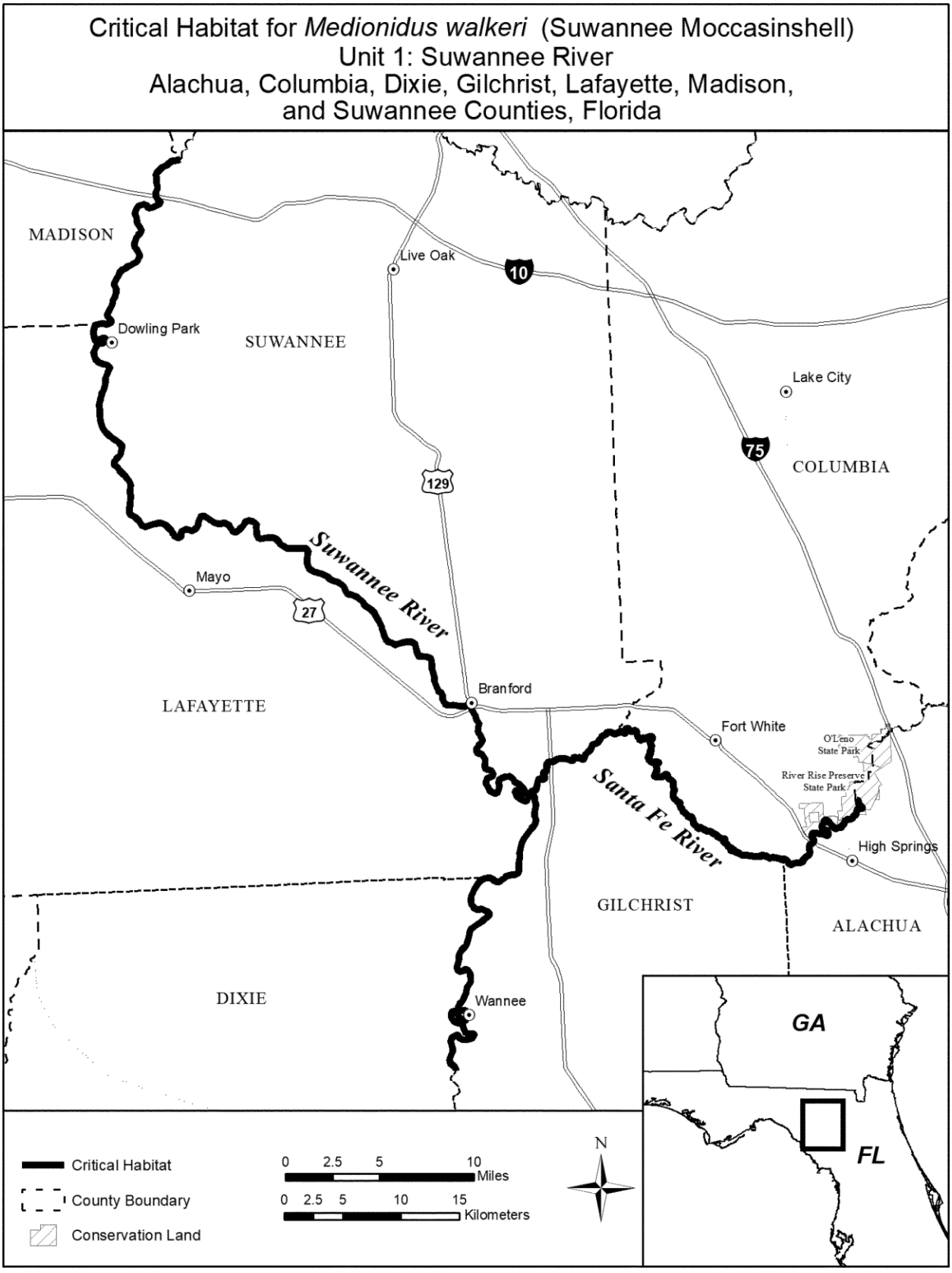

Unit 8: Apalachicola River, Florida, for the Fat Threeridge and Purple Bankclimber.
Lake Seminole
GEORGIA
FLORIDA
Jim Woodruff Dam
JACKSON
10
GADSDEN
CALHOUN
Apalachicola River
Chipola River
LIBERTY
Chipola Cutoff
Swift Slough
River Styx
Kennedy Slough
Kennedy Creek
GULF
FRANKLIN
Bloody Bluff Island
Critical Habitat
Roads
State
County
0 4 8 Km
0 4 8 Miles
N
AL
GA
FL

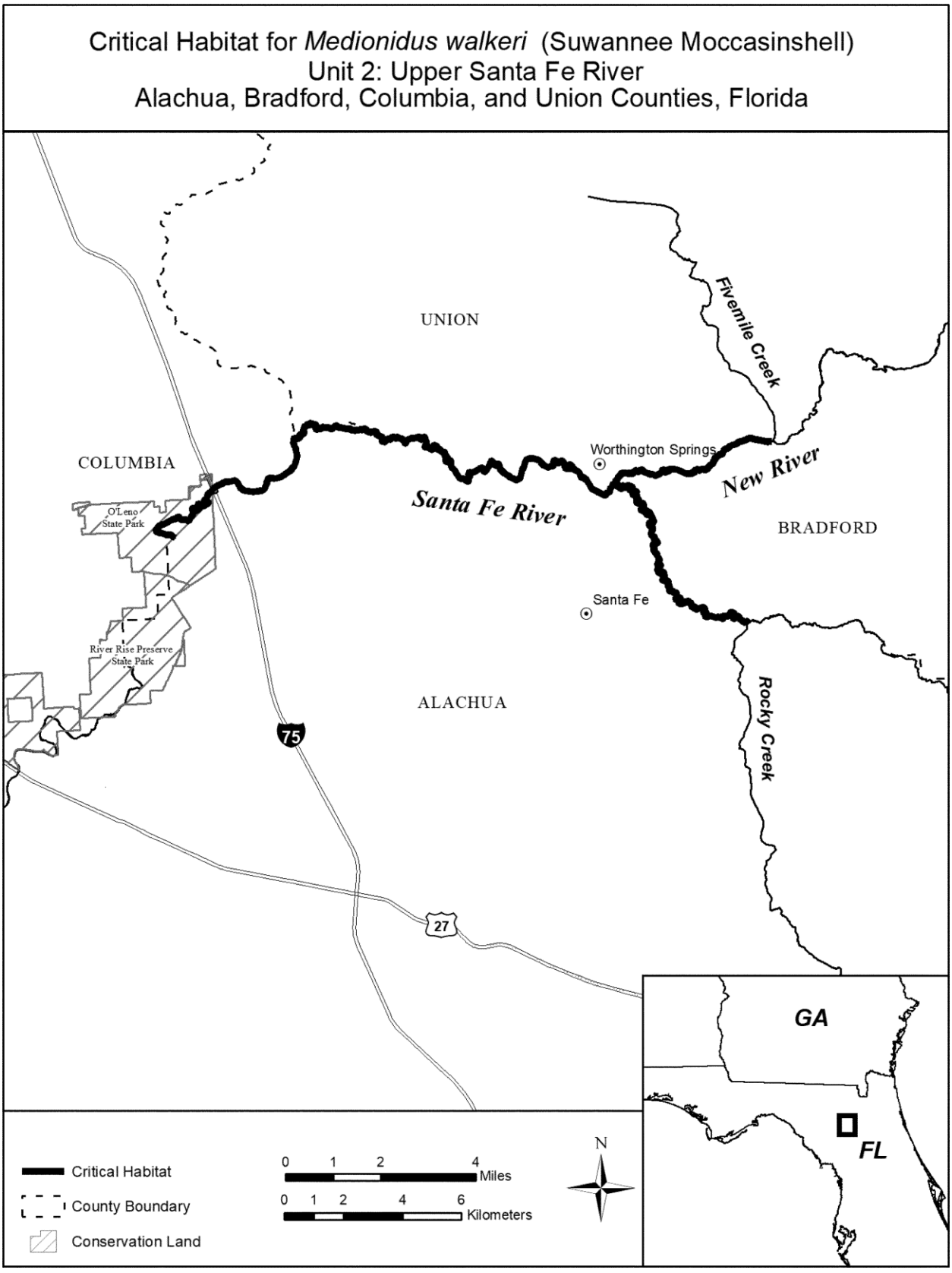

Unit 9: Upper Ochlockonee River, Georgia and Florida, for the Shinyrayed Pocketbook, Ochlockonee Moccasinshell, Oval Pigtoe, and Purple Bankclimber.
DECATUR
GRADY
THOMAS
GADSDEN
LEON
GEORGIA
FLORIDA
West Barnetts Creek
Barnetts Creek
Little Ochlockonee River
Ochlockonee River
Gulley Branch
Lake Talquin
170
74
33
306
111
19
27
AL
GA
FL
Critical Habitat
Roads
County
0 2.5 5 Km
0 2.5 5 Miles
N

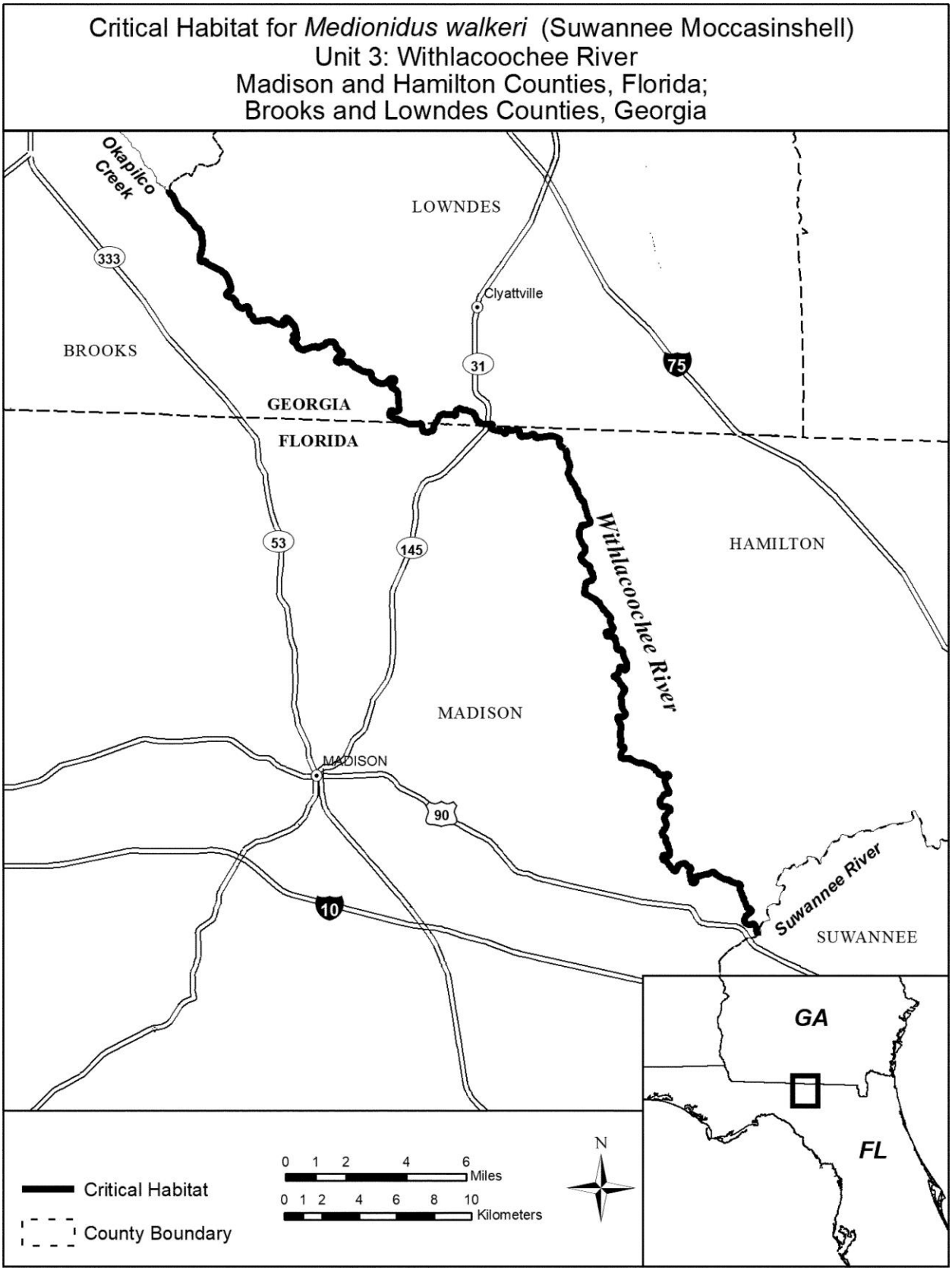

Unit 10: Lower Ochlockonee River, Florida, for the Purple Bankclimber.
Lake Talquin
Jackson Bluff Dam
20
LEON
267
LIBERTY
Ochlockonee River
WAKULLA
Sylvest Creek
AL
GA
FL
Critical Habitat
Roads
County
0 2.5 5 Km
0 2.5 5 Miles
N


Unit 11: Santa Fe River and New River, Florida for the Oval Pigtoe.
COLUMBIA
UNION
BRADFORD
ALACHUA
New River
McKinney Branch
Santa Fe
River
O'Leno
State Park
Power line
301
24
AL
GA
FL
Critical Habitat
Roads
County
0 2.5 5
Km
0 2.5 5
Miles
N


Index Map of Critical Habitat for
Medionidus walkeri (Suwannee Moccasinshell)
CHARLTON
BROOKS
LOWNDES
CLINCH
ECHOLS
WARE
Withlacoochee River
GEORGIA
FLORIDA
UNIT 3
HAMILTON
MADISON
BAKER
COLUMBIA
SUWANNEE
Suwannee River
UNIT 1
UNION
UNIT 2
TAYLOR
LAFAYETTE
BRADFORD
Santa Fe River
GILCHRIST
ALACHUA
DIXIE
GA
FL
Critical Habitat
County Boundary
0 2 4 8 12 16 20
Miles
0 5 10 20 30
Kilometers
N

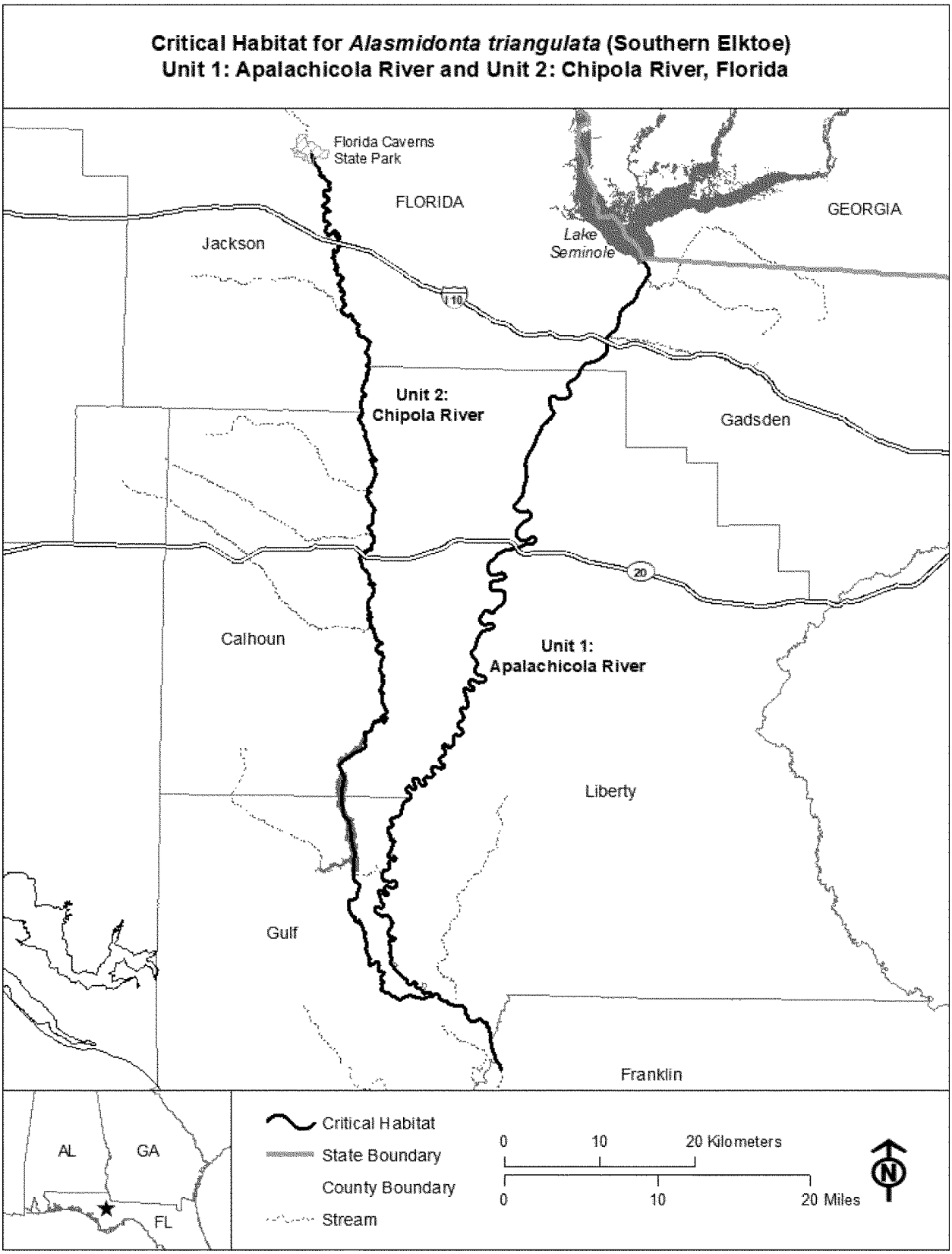

Critical Habitat for *Medionidus walkeri* (Suwannee Moccasinshell)
Unit 1: Suwannee River
Alachua, Columbia, Dixie, Gilchrist, Lafayette, Madison,
and Suwannee Counties, Florida
MADISON
Live Oak
10
Dowling Park
SUWANNEE
Lake City
75
COLUMBIA
129
Suwannee River
Mayo
27
LAFAYETTE
Branford
Fort White
O'Leno State Park
River Rise Preserve State Park
Santa Fe River
High Springs
GILCHRIST
ALACHUA
DIXIE
Wannee
GA
FL
Critical Habitat
County Boundary
Conservation Land
0 2.5 5 10 Miles
0 2.5 5 10 15 Kilometers
N

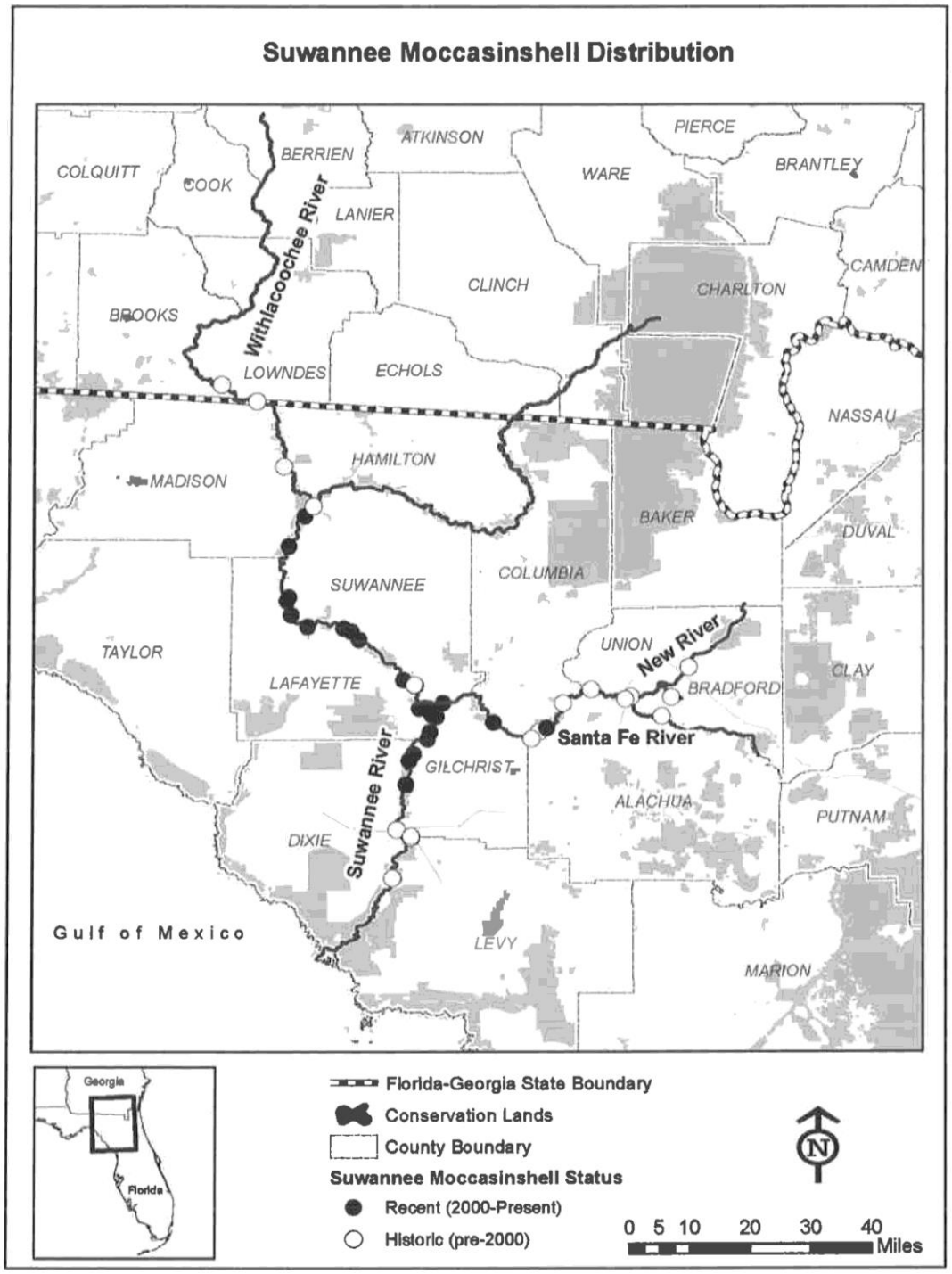

Critical Habitat for *Medionidus walkeri* (Suwannee Moccasinshell)
Unit 2: Upper Santa Fe River
Alachua, Bradford, Columbia, and Union Counties, Florida
UNION
COLUMBIA
BRADFORD
ALACHUA
Fivemile Creek
Worthington Springs
New River
Santa Fe River
O'Leno State Park
River Rise Preserve State Park
Santa Fe
Rocky Creek
75
27
GA
FL
Critical Habitat
County Boundary
Conservation Land
0 1 2 4 Miles
0 1 2 4 6 Kilometers
N


Critical Habitat for *Medionidus walkeri* (Suwannee Moccasinshell)
Unit 3: Withlacoochee River
Madison and Hamilton Counties, Florida;
Brooks and Lowndes Counties, Georgia
Okapilco Creek
LOWNDES
333
Clyattville
BROOKS
31
75
GEORGIA
FLORIDA
53
145
HAMILTON
Withlacoochee River
MADISON
MADISON
90
10
Suwannee River
SUWANNEE
GA
FL
Critical Habitat
County Boundary
0 1 2 4 6 Miles
0 1 2 4 6 8 10 Kilometers
N

APPENDIX B

Proposed Critical Habitat Map for Southern Elktoe


Critical Habitat for Alasmidonta triangulata (Southern Elktoe)
Unit 1: Apalachicola River and Unit 2: Chipola River, Florida
Florida Caverns State Park
FLORIDA
GEORGIA
Lake Seminole
Jackson
I 10
Unit 2: Chipola River
Gadsden
20
Calhoun
Unit 1: Apalachicola River
Liberty
Gulf
Franklin
AL
GA
FL
Critical Habitat
State Boundary
County Boundary
Stream
0 10 20 Kilometers
0 10 20 Miles
N


Suwannee Moccasinshell Distribution
COLQUITT
COOK
BERRIEN
ATKINSON
PIERCE
WARE
BRANTLEY
LANIER
Withlacoochee River
CLINCH
CHARLTON
CAMDEN
BROOKS
LOWNDES
ECHOLS
NASSAU
HAMILTON
MADISON
BAKER
DUVAL
SUWANNEE
COLUMBIA
UNION
New River
TAYLOR
LAFAYETTE
BRADFORD
CLAY
Santa Fe River
GILCHRIST
ALACHUA
PUTNAM
Suwannee River
DIXIE
Gulf of Mexico
LEVY
MARION
Georgia
Florida
Florida-Georgia State Boundary
Conservation Lands
County Boundary
Suwannee Moccasinshell Status
Recent (2000-Present)
Historic (pre-2000)
N
0 5 10 20 30 40
Miles

APPENDIX C

Description of Work Activities

Activity Descriptions

Add Turn Lanes: Adding new turn lanes require some disturbance and regrading of the shoulder and addition of base materials and asphalt. Work will require heavy equipment.

Armoring – In-Stream: Armoring is the use of materials such as rock rip rap, concrete mattresses, or other hard structures to prevent erosion and scouring around in-stream pilings or within the stream channel. Armoring may fill suitable habitat and modify the natural channel which may affect flows.

Armoring – Outside Stream: Armoring is the use of materials such as rip rap, concrete mattresses, sheet piling, or other hard structures to slow stormwater runoff, and prevent erosion and scouring around bridge supports. During construction, may expose sediment and cause accidental deposition of materials into the stream.

Asphalt Patching – Repairs to existing asphalt pavement with localized damage.

Bank Stabilization, In-Stream: Materials such as articulated concrete block, rip rap, gabions, or brush bundles are used to provide structural support to stream banks. May include work within the stream channel. It requires the use of heavy equipment and may cause soil disturbance and placement of physical materials into the stream.

Barge Use and Staging: The movement and anchoring of barges into the channel bottom, stream banks, other barges, and existing in-stream structures. It may include activities such as launching, docking, and loading.

Boat Ramp (removal, replacement, new): A boat ramp may need to be built, replaced, or improved to provide access to the river for bridge construction activities. This activity requires a hardened surface at the water's edge and will cause some soil disturbance during construction.

Bridge Demolition – Above Water: The removal of the deck and above-water portion of piers may be accomplished using mechanical methods (e.g. hydraulic impact hammer, cutting, high-powered waterjet systems, or similar systems). Debris will be collected to prevent materials from falling into the waterway using a barge or netting.

Bridge Demolition – Below Water: The removal of the under-water portion of piers may be accomplished using mechanical methods (e.g. hydraulic impact hammer, cutting, high-powered waterjets, pulling piles, or similar systems). It will require large equipment such as a barge and an excavator. River bottom disturbance is expected from debris and sedimentation.

Bridge Painting: The bridge will be sandblasted, cleaned, primed and painted to prevent deterioration. Any lead-based paints are stripped and collected for proper disposal.

Bridge Rail Repair/Replacement: Bridge railing will be fixed or updated, and may transition to new materials, such as concrete.

Bridge Substructure – In-Stream: Construction, replacement, rehabilitation, or repair of portions of a bridge below the superstructure including all or part of the following foundation elements: abutments, columns, crutch bents, fender, wall piers, footings, pile caps, precast or auger-cast concrete piles, drilled shafts, etc. over the stream. Work may involve the use of persons, heavy equipment and/or barges in the stream. (See "Pile/Pier Encasement" for the activity to add concrete jackets).

Bridge Substructure – Outside Stream: Construction, replacement, rehabilitation, or repair of portions of a bridge below the superstructure including all or part of the following foundation elements: abutments, columns, crutch bents, fender, wall piers, footings, pile caps, precast or auger-cast concrete piles, drilled shafts, etc. over the stream. This activity includes the addition of concrete jackets. Work may involve the use of persons and heavy equipment outside the stream. It may include bridge design that avoids placing piles and other physical structure in the stream channel.

Bridge Superstructure – Over Stream: Construction, replacement, rehabilitation, or repair of the structure above the substructure. The superstructure includes, but is not limited to, the deck and roadway for carrying traffic over any stream or river. This activity may include the use of heavy equipment and/or barges in the river.

Causeway (fill): A causeway uses fill and culverts to partially cross the waterway. Heavy equipment will be used in the river. Fill may be sediment and/or rock. The sides of the causeway may be armored.

Clearing, Grubbing, and Disposing of Vegetation for Site Preparation: Clearing is the removal and disposal of all unwanted material from the surface, such as: trees, vegetation, boulders, and trash. Grubbing is the removal and disposition of all unwanted material from underground, such as sod, boulders, stumps, roots, buried logs, or other debris. This is performed with heavy equipment and involves soil disturbance.

Cofferdams (work area isolation): A temporary, watertight enclosure that is pumped dry to expose the bottom of a stream or river so that construction of foundation elements such as piers may be undertaken. This activity is performed with heavy equipment and involves soil disturbance.

Concrete Pavement Repair: Repairs to existing concrete pavement with localized damage.

Construction Haul Roads: A temporary road to facilitate the movement of people, equipment, and materials during construction. This activity involves some disturbance of soils.

Crack and Joint Sealing: This measure consists of routing and sealing the joints and cracks in the pavement with a sealant or asphalt sealing product to prevent moisture from penetrating into

the base and subgrade material. It may consist of sealing joints between asphaltic concrete surfacing and Portland cement concrete pavement. Cracks and joints are commonly routed and cleaned with compressed air before being sealed. Work is performed using compressors and equipment operated on the roadway with no soil disturbance.

Culvert – New or Replacement at Stream Crossings: The construction or replacement of any structure, not classified as a bridge, which provides an opening under the roadway on a stream. Construction may be performed by heavy equipment and include soil disturbance.

Culvert – Extension or Maintenance at Stream Crossings: Extending an existing culvert or clearing a culvert of sediment and debris. Culvert refers to any structure, not classified as a bridge, which provides an opening under the roadway on a stream. Construction may be performed by heavy equipment and include soil disturbance. This refers only to work that occurs outside the stream.

Culvert – Upgrade to Bridge, No In-Stream Piles or Hardening: The removal of an existing in-stream culvert and replacement with a bridge spanning the stream's bankfull width and some portion of the floodplain to allow for natural stream formation. Construction would be performed with heavy equipment and include soil disturbance. Work would remove or reduce the potential for impoundments, accumulation of debris, and result in little or no physical structure within the stream. This action would result in a long-term improvement to stream habitat.

Curb and Flume: A curb is a raised edge of asphalt built along the road to direct water to a flume. A flume is an artificial water channel that carries water off the roadway and onto the shoulder. This activity is performed with heavy equipment and may include soil disturbance.

Curb and Gutter: Curb-and-gutter is typically constructed in urban areas to direct stormwater into storm drains. This activity uses heavy equipment and may include soil disturbance.

De-watering: Removing or draining water from an enclosure or a structure (such as a caisson or cofferdam) placed within a riverbed. It may also be a component of trenchless boring under a stream. Usually involves the use of dewatering pumps. Temporary diversions of streams or channels to bypass a bridge, culvert, or other work location are also considered de-watering.

Ditches – Clean, Reshape, and Regrade (maintenance to remove vegetation, sediment, debris): The removal of vegetation growth and material that has been deposited over time by erosion or transported by water. Equipment used may include front end loaders, excavators, and dump trucks.

Earthwork – Terrestrial, Cutting/Filling/Grading/Stockpiling: Procedure where earthen materials are hauled, added, compacted, bladed, and shaped to conform to the plan's typical cross sections and compaction requirements. This procedure may occur during the construction of new roadways or existing roadways where design standards require it. It is performed using heavy equipment and involves soil disturbance.

Equipment, Maintenance and Cleaning: The fueling and cleaning of heavy equipment. This work may involve the use of substances toxic to aquatic environment. Proper containment, handling, and storage of materials are needed to avoid impacts to stream water quality.

Erosion Control – Placement and Removal (silt fence, sheet pile, basins, vegetation, and synthetic hay bales): Erosion control structures are placed to slow down stormwater runoff and allow sediment to settle out. It is performed using heavy equipment and may include soil disturbance.

Fencing: This activity establishes a barrier or boundary to prevent or direct the movement of people and equipment from one area to another. It may include clearing vegetation from the fence-line and material removal for installation of fence posts. It may include some soil disturbance.

Minor Fender Repairs (in waterways): Localized patch repair; reinforcement, painting/coating, hardware replacement. Very minor to no turbidity issues.

Fender Repairs (out-of-/above water): Localized patch repair; reinforcement, painting/coating, hardware replacement. In-water equipment such as barges may be used. Very minor to no turbidity issues.

Geotechnical Investigations: This activity may consist of geotechnical borings or seismic refraction surveys. Drill methods vary depending on the type of soil and rock to be penetrated, groundwater conditions and type of sample required. Basic drill methods include hollow-stem augers, rotary drilling, percussive air drilling, and core drilling. Investigations are limited in scope and of short duration.

Guardrail Installation and Repair: This activity consists of installing, restoring, or replacing guardrail adjacent to the roadway to meet current design standards. It may include some reshaping of soil materials and post digging adjacent to the roadway.

Landscaping: This activity refers to the modification or enhancement the visible features of the project site by shaping the terrain and planting a variety of grasses, trees, or shrubs. It may require the use of heavy equipment and involves some short-term soil disturbance.

Lighting, Traffic, and Pedestrian Signals: The installation of roadway and bridge lighting, and traffic and pedestrian signals. It may involve trenching or boring for electrical lines and the construction of concrete foundations for light poles.

Microsurfacing: A mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed, and spread on a paved surface. It is performed using heavy equipment operated on the roadway without soil disturbance.

Mowing and Tree/Shrub Trimming: This activity involves mowing grass and cutting trees/shrubs to prevent limbs from growing over bridges. It may result in some ground disturbance and erosion if mowers and mechanical equipment are used within areas with wet soils.

Nighttime Work with Lights: This applies to any construction activity that takes place at night where temporary construction lighting is required. Some night work activities could include: bridge deck pours, joint cutting, and girder placement.

Noise Walls (Outside Stream): Noise walls are solid structures built between a roadway and an area where traffic noise is unwanted or needs to be reduced. The activity is performed using heavy equipment for preparing the subgrade and constructing the wall. Some soil disturbance may occur.

Pave Shoulder: Adding new pavement along an existing unpaved shoulder. May require soil disturbance and shoulder regrading.

Pavement Marking: This process places paint or other material on the roadway to provide guidance to motorists. It may involve the use of a truck or personnel using wheeled sprayers on the road surface.

Pavement – Mill and Resurface Asphalt– Existing Footprint: Existing asphalt surface material is removed to a certain depth and salvaged from the roadway. Milling is done with machinery that grinds the surface material. Millings are loaded onto trucks and removed from the project, unless in-place recycling reuses the materials for the new surfacing. This process may generate spoil and residue. Some soil disturbance can occur up to one foot from the edge of pavement to collect millings.

Pavement Removal: Removing the roadway surface (asphalt and concrete) using equipment such as jackhammers, back hoes, and excavators. Usually this activity is done when removing the full depth of roadway material, or patching individual panels in a roadway.

Paving – New (asphalt and cement): The placement of a new full depth roadway of asphalt, asphaltic concrete, or concrete on a new or existing alignment. It may include night work with lights.

Paving – New (of unpaved roads): Paving existing dirt roadways and bridge approaches can reduce sediment deposition into streams and rivers. This is a beneficial effect.

Pesticide/Fertilizer Use in ROW: Pesticide use refers to the use of insecticides, fungicides, herbicides, and any other chemical compound applied to reduce unwanted species. Fertilizer is used to help establish desired plant species within the ROW, including ground cover to stabilize disturbed areas.

Pile Jacket for Bridges: Application of a protective layer around a bridge pile. Used to prevent corrosion. Enhances durability and longevity. Soil disturbance is generally minimal unless the installation of the jacket is 2 feet below the mudline. In such cases, some disturbance will occur, primarily from use of shovels or coffer dams. Erosion control devices are staked turbidity barriers.

a) Standard pile jacket material – concrete, fiberglass, or specialized corrosion-resistant coating.
b) Cathodic Protection System – An electrical current is introduced to the pile and the surrounding electrolyte (water or soil) through anodes, which are sacrificial electrodes that corrode instead of the pile. This electric current counteracts the corrosion process, protecting the metal surface of the pile. This combination of physical protection (the jacket) and electrochemical protection (cathodic protection) helps extend the pile's lifespan and maintain its structural integrity in harsh environments.

Realign Intersection: An improvement to an intersection to meet safety needs or meet minimum design criteria. Work will require a modification of existing footprint, with regrading of soil and placement of new pavement. Realigning intersections may result in soil disturbance and use of heavy equipment.

Removal of Debris and Obstructions – Bridges and Culverts: This activity is the removal of deposited material such as dirt, trees, and other debris that are blocking or partially blocking structures and preventing their proper function. Work may be done manually, with hydraulic pressure, or mechanically with heavy equipment such as backhoes and excavators.

Replace Insufficient Bridges: Bridge replacement as a Resurfacing, Restoration and Rehabilitation (RRR) Project. Multiple activities may make up this work, including removing existing structure, adding fill, grading and paving approaches, placing bridge substructure and superstructure, and directing stormwater off of paved surfaces. There is potential for both in-stream and out of stream activities. Work is performed with heavy equipment and involves soil disturbance. In-stream structures will result in a loss of suitable mussel habitat.

Resurfacing – Fog/Slurry Seal, Armor Coat/Chip Seal: An additional layer of surfacing material is placed on top of the existing hard surfaced roadway. Fog/slurry seal includes the preservation of old asphalt surface, sealing small cracks and surface voids by spraying emulsions diluted with clear water. An armor coat/chip seal is a thin covering of gravel/crushed stone placed after the roadway has been sprayed with asphalt. Work is performed with heavy equipment operated on the roadway and should not involve soil disturbance.

Retaining Walls (Upland): A retaining wall is a structure built to hold back soil or rock and prevent downslope movement or erosion. It provides support for vertical or near-vertical grade changes. Construction is performed using heavy equipment and will involve soil disturbance to shape and back fill the area.

Sheet Pile Installation/Removal: Sheet pile may be installed as a temporary or permanent retaining wall during construction. It will require the use of heavy equipment and soil disturbance.

Sidewalks and Bikeways: These activities are the construction of sidewalks, bikeway, or multi-use non-motorized paths with ground disturbance.

Signs with Soil Disturbance: The placement or maintenance of signposts along with new signage that requires excavation of soil for their installation (e.g. digging of post holes). Soil disturbance should not reach a level where stream habitat is impacted.

Signs without Soil Disturbance: The placement or maintenance of signposts along with new signage that does not require soil disturbance. It may include replacing missing or damaged signs.

Soil Stockpile Site: A location for the temporary storage of soil. It may require the use of heavy equipment to transport soils. This activity may result in erosion and sedimentation transporting off-site if not properly contained.

Spall Repairs: Addresses various forms of deterioration and damage, usually in concrete bridge structures. Spalling refers to the chipping, flaking, or breaking away of concrete from the surface of a bridge due to factors like weathering, freeze-thaw cycles, corrosion of reinforcing steel, or heavy traffic loads. Different types of spall repairs are performed to restore the structural integrity and safety of the bridge. Types of repairs: deteriorated concrete is removed to create a smooth surface, sometimes fresh concrete is overlaid. Can be done underwater. Rebar in the concrete may also need repair/replacement. Bonded overlay and epoxy injection are other forms of spall repairs. Very minor or no turbidity issues. Floating turbidity barriers might be used depending on the type of spall repair used.

Staging/Storage Areas: The areas are identified for use to temporarily stage and store construction equipment, physical materials, chemicals/fluids needed for operating machinery and vehicles, and personal transportation. Use may result in ground compaction, soil disturbance, and potential contaminant spillage.

Stormwater Treatment Pond: An artificial pond created to collect stormwater and suspended sediments from impervious surfaces. The water is then slowly released to prevent downstream flooding. Work requires soil disturbance with heavy equipment to install pipes and contour the pond.

Stream Channel Impact: The design and/or construction activities that will change the area below the high-water mark on a stream. It will require disturbance of the stream bottom sediments.

Stream Restoration, Post Construction: This activity is the re-establishment of the general structure, function and self-sustaining behavior of the stream system that existed prior to

disturbance. It may involve stream impacts, ground disturbance and use of mechanical equipment.

Survey and Staking: The action of determining the boundaries, area, or elevations of surfaces and structures by means of measuring angles and distances. Staking refers to slope stakes and/or lath for delineation of right-of-way and limits of construction. Work would typically include vehicle use and foot traffic in the survey area.

Temporary Stream Crossing, Causeway, Work Bridge/Platform: A temporary crossing is a culvert or bridge for full crossing of the stream channel by workers, equipment, and for efficiency of phasing. Culverts are covered by earthen fill or rock. The sides of the crossing may be armored with rock rip-rap, sheet pile, or similar materials. A causeway uses fill and culverts or temporary bridges to partially cross the waterway. A work platform is a structure used to conduct activities in or adjacent to a stream channel and may include a temporary bridge, Acrow bridge, causeway, bank platform, and/or work pads. All these structures will be removed after construction is complete. Activity will cause stream bottom soil disturbance.

Trenched Widening of Roadway: Procedure used to widen existing roadways that do not meet current design standards. It involves removing soil adjacent to the roadway within the planned width. Asphalt or concrete pavement is placed within the trench to achieve road widening. Removed soils may be stockpiled and used to re-construct the earthen shoulder at the proper elevation. This work used heavy equipment and soil disturbance adjacent to the pavement edge.

Utility Investigations: FDOT's subsurface utility investigation (sometimes referred to as "potholing" or Subsurface Utility Engineering (SUE)) to locate underground utilities.

Utility Installation, Relocation, Adjustment – Above Ground, Without Grubbing: Work conducted by FDOT for the installation, relocation or adjustment of utility conduit elevated above ground. It requires the use of poles and heavy equipment. Some soil disturbance will occur during the placement of poles in the ground.

Utility Installation, Relocation, Adjustment – In Stream Trenching: Work conducted by FDOT for utility conduit installation, relocation, or adjustment by excavation, backfilling, and compacting soil, or by installation with horizontal boring equipment. Stream bottom soil disturbance will be required.

Utility Installation, Relocation, Adjustment – Below Stream Directional Bore: Work conducted by FDOT for utility conduit installation, relocation, or adjustment by installation with horizontal boring equipment. No stream bottom soil disturbance will occur.

Wetland Mitigation: The creation, restoration, enhancement, or preservation of wetlands, to compensate for wetlands lost due to regulated activities. This activity may include the use of heavy equipment and soil disturbance.

Widen Bridge Lanes: Work requires a modification to the existing bridge superstructure. It may require placing additional support structures within the stream channel. Barges may be used as a work platform in streams of adequate size. In-stream work may result in erosion and sedimentation, and loss of suitable mussel habitat. This activity involves the use of heavy equipment.

Widen Roadway Lanes: This activity is the modification of an existing roadway to meet safety and design criteria for lane size. It requires regrading of the road shoulder and placement of new pavement. Some soil disturbance is likely to occur.

APPENDIX D

MUSSEL SPECIES ACCOUNTS

To follow are fifteen Florida mussel species accounts. They are grouped by their geographic distribution and listing date, and include: seven mussels associated with the Escambia, Yellow, and Choctawhatchee River drainages listed in 2012 (77 F.R. 61664); seven mussels associated with the Apalachicola-Chattahoochee-Flint (ACF) River basin and Ochlockonee River system listed in 1998 (63 F.R. 12664); and one mussel endemic to the Suwannee River basin listed as threatened in 2016 (81 F.R. 69417)

Round Ebonyshell (*Reginaia rotulata*)

Status: Endangered
Critical Habitat Unit: GCM1 - Lower Escambia River AL, FL

Description
The Round Ebonyshell is a medium-sized freshwater mussel endemic to the Escambia River drainage in Alabama and Florida (Williams et al. 2008). The Round Ebonyshell is round to oval in shape and reaches about 70 mm (2.8 in.) in length. The shell is thick and the outside is smooth and dark brown to black in color. The shell interior is white to silvery and iridescent (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat
Very little is known about the habitat requirements or life history of the Round Ebonyshell. It occurs typically in stable substrates of sand, small gravel, or sandy mud in slow to moderate current. It is believed to be a short-term brooder, and gravid females have been observed in the spring and summer. The fish host(s) for the Round Ebonyshell is currently unknown (Williams et al. 2008).

Distribution
The Round Ebonyshell is known only from the main channel of the Escambia-Conecuh River and is the only mussel species endemic to the drainage (Williams et al. 2008). Its known range extends downstream on the Escambia River to Molino, Florida and upstream of the Conecuh River to just above the Covington County line in Alabama. The Round Ebonyshell has one of the most restricted distributions of any North American unionid (Williams and Butler 1994). Its current range is confined to approximately 120 km (75 mi) of river channel.

Status
The Round Ebonyshell is extremely rare (Williams et al. 2008). During a 2006 status survey approximately 950 mussels were collected for every 1 Round Ebonyshell. Its limited distribution and small population size makes Round Ebonyshell particularly vulnerable to catastrophic events such as droughts, flood scour, and contaminant spills. The USFWS (2012) determined it was in danger of extinction throughout all or a significant portion of its range, and designated it as endangered.

Management and Recovery
This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References
USFWS. 2012. Determination of endangered species status for the Alabama Pearlshell, Round Ebonyshell, Southern Kidneyshell, and Choctaw Bean, and threatened species status for the Tapered Pigtoe, Narrow Pigtoe, Southern Sandshell, and Fuzzy Pigtoe, and designation of critical habitat: final rule. Federal Register 77: 61664-61719.

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Southern Sandshell (*Hamiota australis*)

Status: Threatened

Critical Habitat Units: GCM1 Lower Escambia River, AL, FL; GMC3 Patsaliga Creek, AL; GMC4 Upper Escambia River, AL; GMC5 Yellow River, AL, FL; GCM6 Choctawhatchee River and Lower Pea River, AL, FL; GCM7 Upper Pea River, AL

Photo Credit: J. Dickey.

Description

The Southern Sandshell is a medium-sized freshwater mussel known from the Escambia River drainage in Alabama, and the Yellow and Choctawhatchee River drainages in Alabama and Florida (Williams et al. 2008). The Southern Sandshell is elliptical in shape and reaches about 83 mm (2.3 in.) in length. Its shell is smooth and shiny, and greenish in color in young specimens, becoming dark greenish brown to black with age, with many variable green rays. The shell interior is bluish white and iridescent. Sexual dimorphism is present as a slight inflation of the posterior-ventral shell margin of females (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat

The Southern Sandshell is typically found in small creeks and rivers in stable substrates of sand or mixtures of sand and fine gravel, with slow to moderate current. It is a long-term brooder, and females are gravid from late summer or autumn to the following spring (Williams et al. 2008). The Southern Sandshell is one of only four species that produce a super-conglutinate to attract a host. A super-conglutinate is a mass that mimics the shape, coloration, and movement of a fish and is produced by the female mussel to hold the glochidia (larval mussels) from one year's reproductive effort (Haag et al. 1995). The fish host for the Southern Sandshell has not been identified; it likely uses predatory sunfishes such as basses, like other *Hamiota* species (Haag et al. 1995).

Distribution

The Southern Sandshell is endemic to the Escambia River drainage in Alabama, and the Yellow and Choctawhatchee River drainages in Alabama and Florida (Blalock–Herod et al. 2002). The Southern Sandshell persists in its historical range; however, its range is fragmented and numbers appear to be declining (Williams et al. 2008).

Status

The number of locations in the Escambia drainage known to support the species has declined. It is known from a total of nine locations; however, only three are recent occurrences. Also, their numbers appear to be declining. Sedimentation could be one factor contributing to its decline. In order to reproduce, the Southern Sandshell must attract a site-feeding fish to its super-conglutinate lure. Waters clouded by silt and sediment would reduce the chance of this interaction occurring (Haag et al. 1995). The USFWS (2012) determined it was likely to become endangered within the foreseeable future throughout all its range, and designated it as threatened.

Management and Recovery

This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References

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Williams, J.D. and R.S. Butler. 1994. Class Bivalvia. In: Deyrup, M. and R. Franz (eds.). Rare and endangered biota of Florida, Vol. 4, Invertebrates. University Press of Florida, Gainesville.

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Southern Kidneyshell *(Ptychobranchus jonesi)*

Status: Endangered
Critical Habitat Units: GCM1 Lower Escambia River, AL, FL; GCM3 Patsaliga Creek, AL; GCM4 Upper Escambia River, AL; GCM6 Choctawhatchee River and Lower Pea River, AL, FL; GCM7 Upper Pea River, AL


Photo Credit: M. Gangloff.

Description
The Southern Kidneyshell is a medium-sized freshwater mussel known from the Escambia and Choctawhatchee River drainages in Alabama and Florida, and the Yellow River drainage in Alabama (Williams et al. 2008). The Southern Kidneyshell is elliptical and reaches about 72 mm (2.8 in.) in length. Its shell is smooth and shiny, and greenish yellow to dark brown or black in color, sometimes with weak rays. The shell interior is bluish white with some iridescence (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat
Very little is known about the habitat requirements or life history of the Southern Kidneyshell. It is typically found in medium creeks to medium rivers in firm sand substrates with slow to moderate current (Williams et al. 2008). A recent status survey in the Choctawhatchee basin in Alabama found its preferred habitat to be stable substrates near bedrock outcroppings (Gangloff and Hartfield 2009).

The Southern Kidneyshell is thought to be a long-term brooder, with females gravid from autumn to the following spring or summer. Preliminary studies found that females release their glochidia in small conglutinates that are bulbous at one end and tapered at the other. Host fish are currently unknown; however, darters serve as primary glochidial hosts to other members of the genus (Haag and Warren 1997).

Distribution
The Southern Kidneyshell is endemic to the Escambia, Choctawhatchee, and Yellow River drainages in Alabama and Florida (Williams et al. 2008), but is currently known only from the Choctawhatchee drainage. Since 1995, the Southern Kidneyshell has been detected at only 10 locations within the Choctawhatchee River drainage.

Status
Once common, it is now considered one of the most imperiled species in the United States (Blalock-Herod et al. 2005; Williams et al. 2008). In addition to a reduced range, its population numbers also appear very low. A 2006–2007 status survey in the Alabama portions of the Choctawhatchee basin found the Southern Kidneyshell was extremely rare. The USFWS (2012) determined it was in danger of extinction throughout all or a significant portion of its range, and designated it as endangered.

Management and Recovery
This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References

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Choctaw Bean (*Obovaria choctawensis*)

Status: Endangered
Critical Habitat Units: GCM1 Lower Escambia River, AL, FL; GMC3 Patsaliga Creek, AL; GMC4 Upper Escambia River, AL; GMC5 Yellow River, AL, FL; GCM6 Choctawhatchee River and Lower Pea River, AL, FL; GCM7 Upper Pea River, AL


Photo Credit: USFWS.

Description
The Choctaw Bean is a small freshwater mussel known from the Escambia, Yellow, and Choctawhatchee River drainages of Alabama and Florida. The oval shell of the Choctaw Bean reaches about 49 mm (2.0 in.) in length, and is shiny and greenish-brown in color, typically with thin green rays, though the rays are often obscured in darker individuals. The shell interior color varies from bluish white to smoky brown with some iridescence (Williams and Butler 1994; Williams et al. 2008). In 1964, Athearn described the sexes as dimorphic, with females truncate or a widely rounded posterior, and sometimes slightly more inflated.

Life History and Habitat
Very little is known about the habitat requirements or life history of the Choctaw Bean. It is found in large creeks and small rivers in stable substrates of silty sand to sandy clay with moderate current. It is believed to be a long-term brooder, with females gravid from late summer or autumn to the following summer. Its fish host is currently unknown (Williams et al. 2008).

Distribution
The Choctaw Bean is known from the Escambia, Yellow, and Choctawhatchee River drainages in Alabama and Florida (Williams et al. 2008). The Choctaw Bean persists in most of its historical range. However, its populations are fragmented and numbers are low, particularly in the Escambia and Yellow drainages.

Status
The number of locations in the Escambia River drainage known to support the species has declined from 13 to 6 current sites. Numbers within the drainage are very low with only 10 individuals collected since 1995. Locations in the Yellow River drainage have declined from 7 to 4 current sites. Since 1995, a total of 28 individuals have been collected within the Yellow drainage. In the Choctawhatchee River drainage, it continues to persist in most areas. It is known from a total of 40 locations throughout the drainage, of which 34 are recent occurrences. It was formerly abundant in the main channel of the Choctawhatchee River in Florida, but has become quite rare (Heard 1975). It is considered vulnerable to extinction due to its limited distribution and continued habitat degradation. The USFWS (2012) determined it was in danger of extinction throughout all or a significant portion of its range, and designated it as endangered.

Management and Recovery
This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

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Tapered Pigtoe *(Fusconaia burkei)*

Status: Threatened
Critical Habitat Units: GCM6 Choctawhatchee River and Lower Pea River, AL, FL; GCM7 Upper Pea River, AL

Description
The Tapered Pigtoe is a small to medium-sized mussel endemic to the Choctawhatchee River drainage in Alabama and Florida (Williams et al. 2008). The elliptical to sub-triangular shell of the Tapered Pigtoe reaches about 75 mm (3.0 in.) in length, and is sculptured with plications (parallel ridges) that radiate from the posterior ridge. In younger individuals, the shell exterior is greenish brown to yellowish brown in color, occasionally with faint dark-green rays, and with pronounced sculpture often covering the entire shell; in older individuals the shell becomes dark brown to black with age and sculpture is often subtle. The shell interior is bluish white (Williams et al. 2008).

Life History and Habitat
The Tapered Pigtoe is found in small to medium rivers in stable substrates of sand, small gravel, or sandy mud, with slow to moderate current (Williams et al. 2008). The reproductive biology of the Tapered Pigtoe was studied by White et al. (2008). A short-term brooder, females are gravid from mid-March to May. The blacktail shiner (*Cyprinella venusta*) was found to serve as a host for Tapered Pigtoe glochidia in a preliminary host trial (White et al. 2008).

Distribution
The Tapered Pigtoe is endemic to the Choctawhatchee River drainage in Alabama and Florida (Williams et al. 2008). Its historical and current distribution includes several oxbow lakes in Florida; some with a flowing connection to main channel.

Status
The Tapered Pigtoe appears to be absent from portions of its historical range and is found only in isolated locations (Blalock-Herod et al. 2005). The species is known from a total of 60 locations within the Choctawhatchee River drainage. It was not detected at 11 historical sites examined during recent status surveys (9 additional historic locations were not examined). Many of those historic occurrences are in the middle section of the drainage, and the species appears to be declining in that portion of its range. The Tapered Pigtoe continues to persist in isolated locations, mainly in the Choctawhatchee River main channel in Florida and in the headwaters in Alabama.

Due to its limited distribution, rarity, and habitat degradation, the Tapered Pigtoe is vulnerable to extinction. Several factors continue to impact Tapered Pigtoes, such as degraded water quality, dams which separate populations and alter flow regimes, and habitat loss. The USFWS (2012) determined it was likely to become endangered within the foreseeable future throughout all its range, and designated it as threatened.

Management and Recovery
This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References
Blalock-Herod, H.N., J.J. Herod, J.D. Williams, B.N. Wilson, and S.W. McGregor. 2005. A historical and current perspective of the freshwater mussel fauna (Bivalvia: Unionidae) from the Choctawhatchee River Drainage in Alabama and Florida. Bull. Alabama Mus. Nat. Hist. 24: 1-26.

USFWS. 2012. Determination of endangered species status for the Alabama Pearlshell, Round Ebonyshell, Southern Kidneyshell, and Choctaw Bean, and threatened species status for the Tapered Pigtoe, Narrow Pigtoe, Southern Sandshell, and Fuzzy Pigtoe, and designation of critical habitat: final rule. Federal Register 77: 61664-61719.

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Narrow Pigtoe *(Fusconaia escambia)*

Status: Threatened

Critical Habitat Units: GCM1: Lower Escambia River, AL, FL; GCM2 Point A Lake and Gantt Lake Reservoirs, AL; GCM3 Patsaliga Creek, AL; GCM4 Upper Escambia River, AL; GCM5 Yellow River, AL, FL

Description

The Narrow Pigtoe is a small to medium-sized mussel known from the Escambia River drainage in Alabama and Florida, and the Yellow River drainage in Florida. The sub-triangular to square shaped shell of the Narrow Pigtoe reaches about 75 mm (3.0 in.) in length. The shell is moderately thick and is usually reddish brown to black in color. The shell interior is white to salmon in color with iridescence near the posterior margin (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat

Little is known about the habitat requirements or life history of the Narrow Pigtoe. It is found in creeks and small to medium rivers in stable substrates of sand, sand and gravel, or silty sand, with slow to moderate current. It is believed to be a short-term brooder, with females gravid during spring and summer. The host fish for the Narrow Pigtoe is currently unknown (Williams et al. 2008). The species is somewhat unusual in that it does tolerate a small reservoir environment. Reproducing populations were found recently in some areas of Point A Lake and Gantt Lake reservoirs.

Distribution

The Narrow Pigtoe is endemic to the Escambia River drainage in Alabama and Florida, and to the Yellow River drainage in Florida (Williams et al. 2008). It still occurs in much of its historic range, but may be extirpated from localized areas.

Status

In the Escambia drainage, the number of locations that support the species has declined from 32 to 24 currently. It was not detected at two historical sites examined recently (four historical sites were not surveyed) in the drainage. In the Yellow River drainage, the number of sites supporting Narrow Pigtoe populations has declined from four to three at present. The species is rare in the Yellow River drainage; a total of only 23 individuals from 3 locations have been collected since 1995.

The Narrow Pigtoe is vulnerable to extinction because of its limited distribution, rarity, and susceptibility to habitat degradation. Williams et al. (1993) considered the Narrow Pigtoe threatened throughout its range. The USFWS (2012) determined the Narrow Pigtoe was likely to become endangered within the foreseeable future throughout all its range, and designated it as threatened.

Management and Recovery

This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References

USFWS. 2012. Determination of endangered species status for the Alabama Pearlshell, Round Ebonyshell, Southern Kidneyshell, and Choctaw Bean, and threatened species status for the Tapered Pigtoe, Narrow Pigtoe, Southern Sandshell, and Fuzzy Pigtoe, and designation of critical habitat: final rule. Federal Register 77: 61664-61719.

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Williams, J.D., A.E. Bogan, and J.T. Garner. 2008. Freshwater mussels of Alabama and the Mobile Basin in Georgia, Mississippi and Tennessee. University of Alabama Press, Tuscaloosa, Alabama.

Fuzzy Pigtoe *(Pleurobema strodeanum)*

Status: Threatened

Critical Habitat Units: GCM1 Lower Escambia River, AL, FL; GMC3 Patsaliga Creek, AL; GMC4 Upper Escambia River, AL; GMC5 Yellow River, AL, FL; GCM6 Choctawhatchee River and Lower Pea River, AL, FL; GCM7 Upper Pea River, AL

Photo Credit: USFWS.

Description

The Fuzzy Pigtoe is a small to medium-sized mussel known from the Escambia, Yellow, and Choctawhatchee River drainages in Alabama and Florida (Williams et al. 2008). It is oval to sub-triangular and reaches about 75 mm (3.0 in.) in length. Its shell surface is usually dark brown to black in color. The shell interior is bluish white, with slight iridescence near the margin (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat

The Fuzzy Pigtoe is found in medium creeks and rivers in stable substrates of sand and silty sand with slow to moderate current. The reproductive biology of the Fuzzy Pigtoe was studied by White et al. (2008). It is a short-term brooder, with females gravid from mid-March to May. The blacktail shiner (*Cyprinella venusta*) was found to serve as a host for Fuzzy Pigtoe glochidia in the preliminary study trial.

Distribution

The Fuzzy Pigtoe is endemic to the Escambia, Yellow, and Choctawhatchee River drainages in Alabama and Florida (Williams et al. 2008). Although the species still occurs in much of its historic range in the drainage, it may be extirpated from localized areas.

Status

Within the Escambia River drainage, the Fuzzy Pigtoe is historically known from a total of 38 locations. It is currently known from 20 of these locations, however, its status in the Escambia drainage is difficult to assess as 15 of the 18 remaining historical sites have not been surveyed since 1995.

The Fuzzy Pigtoe is exceedingly rare in the Yellow River drainage, where it is known from a total of only five localities. A single individual collected in 2010 in the Florida portion of the main channel is the only recent record of the species in the drainage. Its range in the Yellow drainage has declined, and the species may no longer occur in the Alabama portions of the drainage.

In the Choctawhatchee River drainage, the number of locations that support Fuzzy Pigtoe populations has declined from 61 to 54. At one site on Limestone Creek, a once abundant population may be gone. A total of 56 individuals were collected at the site in 1988; only 3 were collected in 1993 by the same collector; and none were collected during site visits at the same location in 1996 and 2011.

The Fuzzy Pigtoe is considered vulnerable to extinction because of its limited distribution and dwindling habitat. Williams et al. (1993) considered the Fuzzy Pigtoe a species of special concern throughout its range. The USFWS (2012) determined the Fuzzy Pigtoe was likely to become endangered within the foreseeable future throughout all its range, and designated it as threatened.

Management and Recovery

This species was listed and critical habitat designated on November 9, 2012 (77 FR 61664). A Recovery Plan is being developed for the eight mussels jointly listed in 2012.

References

USFWS. 2012. Determination of endangered species status for the Alabama Pearlshell, Round Ebonyshell, Southern Kidneyshell, and Choctaw Bean, and threatened species status for the Choctaw bean, Narrow Pigtoe, Southern Sandshell, and Fuzzy Pigtoe, and designation of critical habitat: final rule. 77 FR 61664-61719.

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Chipola Slabshell *(Elliptio chipolanensis)*

Status: Threatened
Critical Habitat Units: Unit 2 Chipola River, AL, FL


Photo Credit: USFWS.

Description

The Chipola slabshell is a medium-sized species reaching a length of about 85 mm (3.3 in). The shell is smooth and chestnut colored, ovate to subelliptical, somewhat inflated, with the posterior ridge starting out rounded but flattening to form a prominent biangulate margin. Dark brown coloration may appear in the umbo region and the remaining surface may exhibit alternating light and dark bands.

Life History and Habitat

The Chipola slabshell inhabits silty sand substrates of large creeks and the main channel of the Chipola River in slow to moderate current (Williams and Butler 1994). Specimens are generally found in sloping bank habitats. Nearly 70% of the specimens found during the status survey were associated with a sandy substrate (Brim Box and Williams 2000).

Chipola slabshell females were found to be gravid in June to early July (Brim Box and Williams 2000; Priester 2008). The species is presumably a short-term brooder (Williams et al. 2008). Researchers from Columbus State University (CSU) conducted laboratory studies on Chipola slabshell reproduction and found that glochidia were expelled in conglutinates approximately 13mm long and 3mm wide and resemble insect larva (Priester 2008). The study documented the successful transformation of glochidia on redbreast sunfish and bluegill. Sixty percent of the bluegill successfully transformed *E. chipolaensis* glochidia into juvenile mussels while 80% of the redbreast sunfish successfully transformed glochidia (Priester 2008).

Distribution

The Chipola slabshell is known only from the Chipola River system in Florida and Alabama, and from Howards Mill Creek, a tributary of the lower Chattahoochee River in southeastern Alabama (Williams et al. 2008). Its historical range is centered throughout much of the Chipola River main stem and several of its headwater tributaries. It is one of the most narrowly distributed species in the drainages of the northeast Gulf of Mexico. Currently, the Chipola slabshell occurs in nearly all of its historic range, with the exception of Howards Mill Creek. The species was re-discovered in the Alabama reaches of the Chipola drainage in 2007 where it had not been reported since 1916 (Garner et al. 2007).

Status

Relative abundance is thought to always have been low for the Chipola slabshell. An average of 3.7 individuals per site of occurrence (three sites) was found by the Service during status surveys in 1998 (Service 2003). The population of Chipola slabshells in the lower Chipola River below Dead Lake and the Chipola Cut has recently been estimated to be about 2,650 individuals (Gangloff 2011). However, the species was only detected at 2 of the 10 sites sampled, and additional sampling is needed to better estimate the size of the Chipola slabshell population in this portion of river. In addition, since our population estimates focused on moderately depositional bank habitat, we are likely underestimating the size of the population.

Based on the new status survey and data provided by C. Stringfellow (2006) and Garner et al. (2007) showing range expansions and higher abundance, we categorized the Chipola slabshell population as "improving" in 2007 annual reporting. The population has been reported as stable ever since.

Management and Recovery

The Chipola slabshell was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Fat Threeridge *(Amblema neisleri)*

Status: Endangered

Critical Habitat Units: Unit 2 Chipola River, AL, FL; Unit 7 Lower Flint River, GA; Unit 8 Apalachicola River, FL

Photo Credit: USFWS.

Description

The fat threeridge is a medium-sized, heavy-shelled mussel that reaches a length of about 100 mm (4.0 in). Large specimens are highly inflated. The dark brown to black shell is oval to quadrate and strongly sculptured with seven to nine prominent horizontal parallel plications (ridges). The umbo (the raised, rounded portion near the shell hinge) is in the anterior quarter of the shell. The inside surface of the shell (nacre) is white to bluish white. As is typical of the genus, no sexual dimorphism is displayed in shell characters (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat

The fat threeridge inhabits the main channel of small to large rivers in slow to moderate current, and can be found in a variety of substrates from gravel to cobble to a mixture of sand, mud, silt, and also clay (Williams and Butler 1994). The most abundant populations are found in moderately depositional areas along bank margins at depths of around 1 meter (3.3 ft.) (Miller and Payne 2005, 2006).

O'Brien and Williams (2002) determined the fat threeridge is likely a short-term summer brooder of its glochidia. Females appear to be gravid in Florida when water temperatures reached 75°F, in late May and June, suggesting that the species expels glochidia in the summer. Glochidia are released in a white, sticky, web-like mass, which expands and wraps around a fish to facilitate attachment. The glochidia are viable for two days after release.

The fat threeridge lacks morphological specializations that would serve to attract host fishes and appears to be a host-fish generalist. Five potential host fishes were identified: weed shiner, bluegill, redear sunfish, largemouth bass, and black-banded darter. Transformation of the glochidia on host fishes required 10 to 14 days at 73.4 ± 2.7°F (O'Brien and Williams 2002).

Fat threeridge age and growth data suggest females reach sexual maturity at three years of age (USFWS unpub. data 2011).

Distribution

The fat threeridge is reported from the main channels of the Apalachicola, Flint, and Chipola rivers, and a few tributaries and distributaries of the Apalachicola in Florida and southwest Georgia (Clench and Turner 1956; Williams and Butler 1994; Williams et al. 2008). Currently, the fat threeridge is known throughout much of its historical range; however, it is extirpated from localized portions of the Apalachicola and Chipola rivers. The fat threeridge no longer occurs in the portion of the Apalachicola and Flint rivers that is now submerged in the reservoir created by Jim Woodruff Lock and Dam.

Status

Although the species persists in the Flint River, it appears to be extremely rare. A 2011 survey by the Georgia Department Natural Resources examined 110 km of the Flint River. Thirty-nine stations were surveyed, however, fat threeridge

were collected only near the Highway 37 bridge site. Recent studies on the Apalachicola River and lower Chipola River, both upstream and downstream of Dead Lake, found that, in suitable habitat, the fat threeridge is common to abundant and recruitment is occurring. Considerable mortality occurred in the Apalachicola and Chipola rivers and Swift Slough in 2006-2007 and 2010-2011 when water levels dropped as a result of drought. Although the drought-induced mortality may have caused some localized population declines, the species' overall status is considered to be stable or improving.

Management and Recovery

The fat threeridge was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Gulf Moccasinshell *(Medionidus penicillatus)*

Status: Endangered

Critical Habitat Units: Unit 1 Econfina Creek, FL; Unit 2 Chipola River, AL, FL; Unit 4 Sawhatchee Creek and Kirkland Creek, GA; Unit 5 Upper Flint River, GA; Unit 6 Middle Flint River, GA; Unit 7 Lower Flint River, GA

Photo Credit: USFWS.

Description

The endangered Gulf moccasinshell is a small-sized mussel that reaches a length of about 55 mm (2.2 in.). It is elongate-elliptical or rhomboidal in shape, and fairly inflated. The shell is relatively thin. The shell is sculptured along the length of the posterior slope with a series of thin, radially oriented plications (parallel ridges). The rest of the shell surface is smooth and yellowish to greenish brown with fine, typically interrupted green rays (Williams and Butler 1994).

Life History and Habitat

The Gulf moccasinshell inhabits small creeks to large rivers, but apparently has been extirpated from large rivers. It may be found in a variety of substrates including combinations of sand and small gravel, rocky shoals, and occasionally sandy mud (Williams et al. 2008). It is a long-term brooder, becoming gravid in late summer or autumn and brooding until the following spring or summer (Williams et al. 2008). Native fish that have effectively transformed glochidia of the Gulf moccasinshell in laboratory trials include the brown darter and blackbanded darter (O'Brien and Williams 2002). No specific growth or longevity information is available for the Gulf moccasinshell.

Distribution

The historical range of the Gulf moccasinshell includes main stems and tributaries throughout the Apalachicola-Chattahoochee-Flint (ACF) basin in Alabama, Georgia, and Florida, and Econfina Creek in Florida (Service 2003). Brim Box and Williams (2000) reported 93 museum collections of this species from 52 sites in the ACF basin. The Gulf moccasinshell has lost a substantial number of subpopulations. It has been extirpated from all historical sites in the Chattahoochee River system above Walter F George Lake Reservoir (Brim Box and Williams 2000). It apparently is no longer found in several ACF basin tributary streams and has disappeared from most of the mainstem of the Flint and Chipola rivers (USFWS 2003). Populations in the Econfina Creek drainage appear to be stable.

The Gulf moccasinshell historically occurred in significant numbers in the Chipola River drainage. Large subpopulations were noted at sites in Cowarts Creek (67 specimens collected in 1916), and Spring Creek (63, 1915 to 1918); and from two sites in the main channel (46 and 21, 1954), and in Marshall Creek (23 and 26, 1954 and unknown date, respectively) (USFWS 2003). Recent surveys indicate Gulf moccasinshell numbers have declined dramatically in the Chipola River drainage.

Status

Current surveys (1995 to present) in the Chipola River drainage found live Gulf moccasinshell persisting in only 4 locations: Big Creek, Baker Creek, Dry Creek, and Sugar Mill Spring. Based on the amount of shell material, the Baker Creek population appears to be relatively large. The number of Chipola River locations that currently support Gulf moccasinshell have declined from a total of 23 historically to only 5 currently. The 5 recent collections are

represented by 3 or less live individuals or by shell material.

Management and Recovery

The Gulf moccasinshell was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Ochlockonee Moccasinshell *(Medionidus simpsonianus)*

Status: Endangered

Critical Habitat Units: Unit 9 Upper Ochlockonee River, FL, GA

Photo Credit: USFWS.

Description

The Ochlockonee moccasinshell is a small species, generally less than 55 mm (2.2 in) in length. It is slightly elongate-elliptical in outline, with the posterior end obtusely rounded at the shell's median line and the ventral margin broadly curved. Surface texture is smooth. The color is light brown to yellowish green, with dark green rays formed by a series of connected chevrons or undulating lines across the length of the shell.

Life History and Habitat

No information is currently available on the life history of the Ochlockonee moccasinshell (Williams et al. 2014). Surveys in 2014 found this species in stable sand near flow refuges associated with the backside of river bends and in moderately depositional habitats (downstream of features that deflect flow). Submerged logs parallel to flow may provide a significant flow refuge, stabilized sediment, and potential habitat for host-fish.

Distribution

The Ochlockonee moccasinshell is endemic to the Ochlockonee River system in Georgia and Florida. This species is known mostly from the upper Ochlockonee River basin within the Ochlockonee River mainstem and the Little River upstream of Lake Talquin. A population was discovered in the lower Ochlockonee River basin downstream of Jackson Bluff Dam in 2014, just the second known collection of this species in the lower Ochlockonee River (Holcomb et al. 2015). This finding extended the species known range by 100 rkm.

Status

Historically, the Ochlockonee moccasinshell was known from only 10 locations. Despite considerable survey effort at the historic locations and additional sites in the past 10years, no Ochlockonee moccasinshell were collected until a recent effort. The recent survey targeted 55 sites on an 18-rkm reach of the lower Ochlockonee River that had little to no previous sampling effort. These surveys detected 22 live Ochlockonee moccasinshell at 9 of the 55 sites (Holcomb et al. 2015). These were the first Ochlockonee moccasinshell records in 19 years. Five of the 9 sites had single occurrences; remaining sites had 2, 3, 4, and 7 specimens. The small population and reduced range make the Ochlockonee moccasinshell vulnerable to extinction.

Management and Recovery

The Ochlockonee moccasinshell was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Oval Pigtoe *(Pleurobema pyriforme)*

Status: Endangered
Critical Habitat Units: Unit 1 Econfina Creek, FL; Unit 2 Chipola River, AL, FL; Unit 4 Sawhatchee Creek and Kirkland Creek, GA; Unit 5 Upper Flint River, GA; Unit 6 Middle Flint River, GA; Unit 7 Lower Flint River, GA; Unit 9 Upper Ochlockonee River, FL, GA; Unit 11 Santa Fe and New Rivers, FL

Photo Credit: USFWS.

Description
The oval pigtoe is a small to medium-sized mussel that attains a length of about 60 mm (2.4 in.). The shell is oval in shape, and moderately inflated and moderately thin. The shell surface is shiny and smooth, yellowish or chestnut in color, and generally without rays (Williams and Butler 1994; Williams et al. 2008). However, faint, green rays may be present on the shells of some small individuals (Brim Box and Williams 2000).

Life History and Habitat
The species inhabits creeks and small to large rivers, where it generally occurs in slow to moderate current. It can be found in various combinations of clay, sand and gravel substrates (Williams et al. 2008). The oval pigtoe is a short-term brooder, gravid from March to July (O'Brien and Williams 2002). Glochidial hosts determined in laboratory trials include sailfin shiner and eastern mosquitofish. The nonindigenous guppy was reported to serve as a marginal host (O'Brien and Williams 2002). Specific growth or longevity information for the oval pigtoe are currently unavailable.

Distribution
The historical range of the oval pigtoe includes four river drainages in Alabama, Georgia, and Florida: Econfina, Apalachicola-Chattahoochee-Flint (ACF), Ochlockonee, and Suwannee (Brim Box and Williams 2000). Brim Box and Williams (2000) reported 96 historical records from 57 localities in the ACF basin.

The oval pigtoe has been extirpated from portions of its range. It apparently has been extirpated from numerous tributary and main channel locations within the ACF drainage, including all historical sites in the Chattahoochee River system above Walter F George Lake Reservoir and Flint River main channel. The species was recently found extant at only three sites within the Suwannee River drainage (two in the New River and one in the Santa Fe River), and is no longer known from the mainstem of the Suwannee. The species has not been detected in the Ochlockonee River drainage within the last 10 years despite numerous recent surveys in its historical range. Oval pigtoe populations in the Econfina Creek drainage appear to be stable.

Status
Nearly all known populations of oval pigtoe are presently comprised of relatively small numbers, and its numbers within the Chipola drainage are greatly reduced. A museum record of a single collection in 1916 from Cowarts Creek in Alabama yielded 109 specimens, and a 1916 collection from Rocky Creek in Florida is represented by 64 specimens (Brim Box and Williams 2000). In comparison, two recent collections in Cowarts Creek yielded a total of 5

individuals, and the species may be extirpated from Rocky Creek. One exception is a location in the lower Chipola River mainstem, where the species appears to be locally abundant in a flowing portion of Dead Lake.

Recent (1995 to present) surveys in the Chipola River drainage, have found the oval pigtoe persisting throughout the drainage, including all three tributary streams in which it was historically found – Rocky, Dry and Baker creeks. However, the number of sites that support the species appear to be declining, particularly in the middle portion of the main channel. The number of Chipola River locations that currently support oval pigtoe have declined from a total of 27 historically to 11 currently.

Management and Recovery

The oval pigtoe was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Purple Bankclimber *(Elliptoideus sloatianus)*

Status: Threatened

Critical Habitat Units: Unit 5 Upper Flint River, GA; Unit 6 Middle Flint River, GA; Unit 7 Lower Flint River, GA; Unit 8 Apalachicola River, FL; Unit 9 Upper Ochlockonee River, FL, GA; Unit 10 Lower Ochlockonee River, FL

Photo Credit: USFWS.

Description

The purple bankclimber is a large, heavy-shelled mussel that reaches a length of 205 mm (8.0 in). The shell is dark brown to black, quadrate to rhomboidal in shape, and sculptured by several irregular plications that vary greatly in development. A well-developed posterior ridge extends from the umbo to the posterior ventral margin of the shell. The umbos are low, extending just above the dorsal margin of the shell. No sexual dimorphism is displayed in its shell characters (Williams and Butler 1994; Williams et al. 2008).

Life History and Habitat

The purple bankclimber inhabits medium to large river channels in substrates of sand or sand mixed with mud or fine gravel, often near limestone outcrops (Brim Box and Williams 2000; Williams et al. 2008). Females with viable glochidia were found from late February to mid-April in the Ochlockonee River (O'Brien and Williams 2002); in mid-March in the Apalachicola River (Fritts 2011 pers. comm.); and from late-March to mid-June in the Flint River (Hartzog 2011). The species is presumably a short-term brooder. Females expel narrow lanceolate-shaped conglutinates (10-15 mm long) that are viable for three days after release (O'Brien and Williams 2002). Native fish that transformed glochidia in the laboratory include the eastern mosquitofish, holiday darter, lake sturgeon, shortnose sturgeon, Atlantic sturgeon, and Gulf sturgeon (O'Brien and Williams 2002; Fritts 2012 pers. comm.; Hartzog 2011).

Distribution

It is endemic to the Apalachicola Basin in Alabama, Georgia, and Florida, and the Ochlockonee River drainage in Georgia and Florida (Brim Box and Williams 2000; Williams et al. 2008). It is known historically from the main channels of the Apalachicola, Chattahoochee, Flint, Chipola, and Ochlockonee rivers, and also from two tributaries in the Flint River system.

Status

The purple bankclimber still occurs in much of it historical range; however, it is extirpated from localized areas, and it has likely been completely extirpated from the Chattahoochee River. Within the Flint and Ochlockonee river drainages, it is relatively common, but occurs at fewer sites than it did historically due in part to mainstem dams on both the Flint and Ochlockonee rivers. It is no longer found in the portion of the Apalachicola and Flint rivers submerged by Jim Woodruff Lock and Dam. Population numbers are reduced in the Apalachicola River compared to historical observations.

It has been collected recently from the Apalachicola, Flint, and Ochlockonee rivers. A survey of five sites in the main channel of the Flint River between Warwick Dam and Lake Worth found that the purple bankclimber was the most abundant among nine species collected, but very few small individuals were observed

(McCann 2005). A GDNR survey of the Flint River found purple bankclimbers at 19 of the 39 stations surveyed. Shell length data showed good size variation and included small individuals (Wisniewski 2011 pers. comm.). Apalachicola and lower Chipola River dive surveys of deeper habitat when water levels were very low found purple bankclimbers in depths ranging from 0.5 to 5 meters (1.6 to 16.4 ft.) (Gangloff 2011 unpub. data). These collections were mostly in the Apalachicola River in the vicinity of Race Shoals (RM 105.5), though several were located in a deep bed near Apalachicola RM 47. Very few juvenile bankclimbers were found, and of 113 individuals collected, only five were less than 100 mm in length. During surveys of the Ochlockonee River conducted from 2007 to 2011, the USFWS identified purple bankclimbers at 29 sites, many of which represented new locations for the species. At sites where the species was present, an average of 15 purple bankclimbers were collected. Few small and medium-sized individuals were found, although juveniles and small adults of other species were collected regularly (USFWS 2007-2011 unpub. data).

Management and Recovery

The purple bankclimber was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Shinyrayed Pocketbook *(Hamiota subangulata)*

Status: Endangered

Critical Habitat Units: Unit 2 Chipola River, AL, FL; Unit 3 Uchee Creek, AL; Unit 4 Sawhatchee Creek and Kirkland Creek, GA; Unit 5 Upper Flint River, GA; Unit 6 Middle Flint River, GA; Unit 7 Lower Flint River, GA; Unit 9 Upper Ochlockonee River, FL, GA

Photo Credit: USFWS.

Description

The Shinyrayed Pocketbook is a medium-sized mussel that reaches a length of about 85 mm (3.3 in). The shell is subelliptical, with broad, somewhat inflated umbos and a rounded posterior ridge. The shell is fairly thin but solid. The surface is smooth and shiny, light yellowish brown in color with fairly wide, bright emerald green rays over the entire length of the shell.

Life History and Habitat

It inhabits small to medium-sized creeks, to rivers in clean or silty sand substrates in slow to moderate current (Williams and Butler 1994). Specimens are often found in the interface of stream channel and sloping bank habitats, where sediment particle size and current strength are transitional. During a status survey on the Apalachicola-Chattahoochee-Flint (ACF) Basin, 45% of the specimens were found in a sand/rock substrate, while 38% were associated with a predominance of sand/clay or sandy substrates (Brim Box and Williams 2000).

O'Brien and Brim Box (1999) summarized the reproductive biology of the Shinyrayed Pocketbook. This species is known to produce a superconglutinate to attract potential fish hosts. Gravid females are found from December through August and superconglutinates are released from late May to early July at water temperatures of 71.6 to 74.3°F. Research suggests that nearly an entire year is needed by the incubating glochidia to reach full maturity. This indicates it is a parent-overwintering-summer-releasing species. Primary host fishes for the Shinyrayed Pocketbook based on laboratory infections appear to be Largemouth Bass and Spotted Bass, with 100% transformation rates on fish tested. Transformations also occurred in low percentages on Eastern Mosquitofish, bluegill, and the nonindigenous guppy. Glochidia metamorphosed in 11 to 16 days on the basses at a temperature of 72.5 ± 4.5°F.

Distribution

The Shinyrayed Pocketbook is endemic to eastern Gulf Slope streams draining the Apalachicola Region which are defined as streams from the Escambia to the Suwannee River systems, occurring in southeast Alabama, west-central and southwest Georgia, and north Florida. Presently, it is found in streams draining the eastern portion of the Apalachicola Region (from Econfina Creek east to the Suwannee River). Historically, it existed in the ACF basin and Ochlockonee River systems (USFWS 2003).

Status

The species is believed to have been extirpated from the main stem of the Chattahoochee River and several of its tributaries, including Mill, Little Uchee, Cowikee, and Kirkland Creeks (Service 2003). It is absent from numerous tributaries of the Flint River, including Patsiliga, Gum, Fowlton, and Dry creeks. In addition, it has not been found recently in Mosquito Creek, a tributary of the Apalachicola River. The species was located at four Chipola River main stem sites in 2000, but it apparently has been extirpated from Cowarts, Spring, and Rocky

creeks which are Chipola River tributaries. The species apparently has been extirpated from the Little River, part of the Ochlockonee River system, and the lower Ochlockonee River below the Talquin Dam (Service 2003).

One of two known occurrences for the species in Alabama is found in Uchee Creek. The other remaining subpopulation for the entire Chattahoochee River system is located in Sawhatchee Creek. In Georgia, Shinyrayed Pocketbooks exist in the uppermost main stem of the Flint River, as well as Line, Whitewater, Swift, Jones, Abrams, Mill, Muckalee, Lanahassee, Kinchafoonee, Ichawaynochaway, Chickasawhatchee, Aycocks, Coolewahee, and Spring creeks. Small subpopulations are still found from the upper half of the Chipola River main stem in Florida, and its tributaries Big, Waddells Mill, Baker, and Dry creeks. It exists in the upper half of the main stem of the Ochlockonee River, Little Ochlockonee River, Barnetts Creek, and West Branch Barnetts Creek. The Shinyrayed Pocketbook is believed to persist in seven watersheds. As of the 2007 status review, the range of the Shinyrayed Pocketbook has increased by 172 river miles (RM) for a total current extent of occurrence of 660 RM (USFWS 2007).

Relative subpopulation size for the Shinyrayed Pocketbook is generally low. An average of 2.9 live specimens was found at each of 23 sites during the status survey. Adult densities of the largest known subpopulation (Coolewahee Creek) were reported to be 0.02 specimens per square foot in a bed measuring 59 feet by 26 feet. Densities at four other sites where quantitative work was conducted in the Flint and Chipola Rivers showed no more than 0.01 specimens per square foot. At four sites within an approximate two-mile stretch of the Chipola River, 27 individuals were documented in 2000 (Service 2003).

Management and Recovery

The Shinyrayed Pocketbook was listed on March 16, 1998 (63 FR 12664-12687) and a Recovery Plan was issued on September 19, 2003. Critical habitat was designated on November 15, 2007 (72 FR 64286- 64330). A 5-Year Review completed in 2007 recommended no change to the listing classification or priority ranking as threats remain high and recovery potential is low.

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Suwannee Moccasinshell *(Medionidus walkeri)*

Status: Threatened

Current Range: Suwannee River main stem and lower Santa Fe River downstream of the river rise in Alachua County

Photo Credit: USFWS.

Description

The Suwannee Moccasinshell is a small mussel that rarely exceeds 50 mm (2.0 in) in length. Its shell is oval in shape and sculptured with corrugations extending along the posterior ridge, although corrugations are somewhat faint. The shell exterior is greenish yellow to brown with green rays of varying width and intensity in young individuals, and olive brown to brownish black with rays often obscured in mature individuals (Williams et al. 2014). The sexes can be distinguished, with female shells being smaller and longer than the males (Johnson 1977).

Life History and Habitat

The Suwannee Moccasinshell typically inhabits larger streams where it is found in substrates of muddy sand or sand with some gravel, and in areas with slow to moderate current (Williams and Butler 1994). Recent surveys by the Florida Fish and Wildlife Conservation Commission (FWC) found individuals at depths from 0.5 to 2.5 meters (1.6 to 8.2 ft). Suitable habitat appears to be clear stream reaches along bank margins with a moderate slope and stable sand substrates, where flow is moderate and slightly depositional conditions exist. It is associated with large woody material, and individuals are often found near embedded logs which may provide habitat for its host fish.

Preliminary information on its reproductive biology found gravid females with mature glochidia from December to February, and also in late May/early June (Johnson 2015 unpub. data). In laboratory trials, its glochidia transformed primarily on the blackbanded darter and to a lesser extent on the brown darter. It may be a host specialist and dependent on darters for reproduction. To attract host fish it uses a small mantel lure that flashes a vibrant blue patch while wiggling papillae on the mantel margin.

Distribution

The Suwannee Moccasinshell is endemic to the Suwannee River Basin in FL and GA. The historical range includes the lower and middle Suwannee River proper, Santa Fe River sub-basin, and the lower reach of the Withlacoochee River (Williams 2015). Its range has declined in recent years, and it is presently known only from the Suwannee River main channel and the lower Santa Fe River in Florida. Within the Suwannee River mainstem, the Moccasinshell occurs intermittently throughout a 75-mile reach of the lower and middle river from river mile (RM) 50 in Dixie/Gilchrist Counties, upstream to RM 125, near the Withlacoochee River mouth. Within the Santa Fe sub-basin, it is currently known from four localities in a 28-mile segment of the lower Santa Fe River downstream of the "rise"; the river runs underground for about 5 miles then "rises" back to the surface in Alachua County.

Status

Targeted surveys by FWC biologists in 2013 and 2014 indicate that numbers are low. Biologists surveyed 96 sites, covering most of its historical range, and collected a total of 67 live individuals at 21 sites, all from the Suwannee River main channel. Fourteen

individuals were collected at one site, but at most sites 3 or fewer individuals were found (FWC 2014 unpub. data). In 2015, surveys of 14 sites in the lower Santa Fe River detected only 1 Suwannee Moccasinshell out of 1,880 mussels collected (Holcomb 2015 in litt.). Abundance is low but the population is considered stable on the Suwannee River mainstem. There has been drastic decline and abundance is very low on the Santa Fe River. The Suwannee Moccasinshell may be extirpated from the New River, an unnamed tributary to the New River, and the Withlacoochee River.

Management and Recovery

The Suwannee Moccasinshell was listed on November 7, 2016 (81 FR 69417). Critical habitat of ~190 miles of stream channels was designated in 2021 and a recovery plan is being developed.

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Southern Elktoe *(Alasmidonta triangulata)*

Status: proposed Endangered
Current Range: Chipola River and Apalachicola River.

Description
The Southern Elktoe is a medium-sized (to 70 mm, ca. 2.75 inches; slightly smaller in Florida), freshwater unionid mussel with a moderately thin, inflated shell, often with distinct concentric sculpturing (ridges) originating at the umbo. The shell is typically dark olive brown to black, sometimes with faint dark rays; young are yellowish brown to olive and may bear green rays. The inner surface of the shell (nacre) is white to pinkish purple or purple. The left valve may have two compressed, poorly developed pseudocardinal teeth, and the lateral tooth is reduced or absent. The right valve has one compressed, high pseudocardinal tooth, with lateral teeth reduced or absent.

Life History and Habitat
The Southern Elktoe typically occupies large creeks to large rivers with soft substrates of silt, mud, sand, or gravel, often in slackwater and pools.

Distribution
The Southern Elktoe is restricted to the Apalachicola-Chipola river system (many sites representing a single large occurrence), and has suffered severe declines. Populations apparently are very small at all known sites.

Status
Proposed endangered. In Florida, from 2010-2020, small numbers have been found live at 18 sites (Chipola and Apalachicola rivers) (U.S. Fish and Wildlife Service 2020). In Alabama, it is still extant in Uchee and Little Uchee creeks in Russell and Lee counties (Mirarchi et al. 2004; Williams et al. 2008).

Management and Recovery
The Southern Elktoe has been proposed as endangered on July 1, 2023 (88 FR 40160-40189). Critical habitat has been proposed.

References
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APPENDIX E

Conservation Measure Check List

Freshwater Mussel Phase 1 Programmatic Approach – Conservation Measure Check List

Conservation Measures 1 (CM1) – Erosion and Sedimentation

☐ 1.1. For bridge construction projects on unpaved roads, additional measures will be considered during design to reduce sediment deposition into the stream from the ongoing presence of the unpaved road. These measures can include paved approaches, paving to the top-of-the-hill, ditch blocks, sediment basins, and grassed swales.

☐ 1.2. For construction project activities that result in soil disturbance, the SWPPP and/or ECP will be strictly adhered to, including the installation, inspection, and maintenance of erosion control devices. These measures will be described in the SWPPP and/or ECP.

☐ 1.3. Complete the installation of sediment control devices prior to the commencement of any earthwork [Section 104-6.2].

☐ 1.4. Inspect all silt fences immediately after each rainfall and at least daily during prolonged rainfall. Immediately correct any deficiencies [Section 104-6.4.6.3].

☐ 1.5. Remove sediment deposits when the deposit reaches approximately 1/2 of the volume capacity of the silt fence [Section 104-6.4.6.3].

☐ 1.6. During Florida's primary rainy season (June through August) erosion control devices protecting streams will be inspected daily.

☐ 1.7. a) To prevent potential destabilization or collapse of stream banks, no grubbing (i.e. removing vegetation using methods that include ground disturbance) will occur within a horizontal distance of 25 feet from a stream's bank full elevation except where required for the placement of physical structures and clear zones.
b) Erosion control devices will be installed parallel to streams for their protection.

☐ 1.8. a) Disturbed lands that will not be brought to final grade within seven (7) days or are likely to be re-disturbed will be stabilized by employing appropriate temporary stabilization practices in accordance with the E&SC Manual when slopes are <1:4.
b) Sod will be used for temporary stabilization when slopes are ≥1:4.
c) The ECP will identify the extent of the disturbed lands and temporary stabilization measures.

☐ 1.9. For in-water substructure construction activities, weighted, floating turbidity barriers will be used around the work areas [Section 104-6.4.7].

☐ 1.10. When CMs 1.3 to 1.9 are required, they will be incorporated into the ECP. The ECP will be provided to the District Environmental Management Office for review and approval.

☐ 1.11. Soil or dredge spoils will be stockpiled in uplands > 300 feet from streams. Additional erosion control measures (e.g. double silt fence) will be used for soils that due to site constraints must be stockpiled within 300 feet of streams.

☐ 1.12. Equipment staging and storage areas will be located in previously disturbed locations to prevent additional site disturbance. Acceptable staging/storage locations include previously cleared areas lacking native groundcover, and areas with compacted soils, gravel, or pavement. The staging/storage locations will be provided to the District Environmental Management Office for review and approval.

☐ 1.13. a) Horizontal directional drilling pilot, entrance, and exit holes must be the minimum diameter necessary, and must be set back from the stream bank at least 50 feet.
b) During horizontal directional drilling, excavated materials and drilling muds must be stockpiled on non-wetland areas, where available. Fabric must be placed beneath all materials stockpiled in wetlands.

☐ 1.14. Mowing and vegetation maintenance activities will avoid work with heavy equipment within riparian wetlands. Tree trimming near bridges will be done from equipment located on the bridge or roadway whenever possible to avoid disturbing wetland soils.

Conservation Measures 2 (CM2) – Contaminant Discharges

☐ 2.1 Untreated stormwater collected from the bridge will not discharge directly into streams.

☐ 2.2 Stormwater ponds will not discharge overflow directly into streams.

☐ 2.3 All potential toxic substances such as fuels, paints, solvents, lubricants, etc. will be mixed and stored within a containment site that is buffered (berms, vegetation, distance, etc.) from streams.

☐ 2.4 All return water from groundwater dewatering will be discharged in accordance with the requirements for dewatering activities [E&SC Manual].

☐ 2.5 All equipment to be used in, on, or over streams will be checked on a daily basis for leaks or spills, and will be clean of any external petroleum products, hydraulic fluid, coolants, or other injurious materials.

☐ 2.6 Cleaning of equipment or materials within 300 feet of streams will include the following measures. All cleaning fluids will be collected and disposed of in accordance with manufacturer's directions. No paint or cleaning fluids will be allowed to contact the ground or enter streams. Any spilled paint or cleaning fluids will be contained, collected, and disposed of off-site.

☐ 2.7 Within 300 feet of streams, fertilizers will not be used.

☐ 2.8 Within 300 feet of streams, pesticides will not be broadcast sprayed. Application of pesticides may be spot-applied manually in accordance with manufacturer's directions [Section 7-1.7.1].

Conservation Measures 3 (CM3) –Physical Materials In Stream

☐ 3.1. For new bridges and bridge replacement, design alternatives should be considered that avoid placement of hardened materials within the stream (support piles, rip rap). Floodplain drains should be considered to provide relief for stormwater and reduce the need to widen the hydraulic opening.

☐ 3.2. No equipment, concrete debris, paving materials, litter, demolition debris, or any other materials will be allowed to fall into or be placed into streams. Methods for removing accidental deposition into waterways will be coordinated with the District Environmental Management Office.

☐ 3.3. Construction waste/debris will be removed and disposed of in an off-site location only after clearance by the Project Engineer, Office of Construction [Section 7-1.4].

☐ 3.4. When using barges during construction/demolition activities, they will be held in place with spuds and/or anchors to prevent bottom scour in shallow waters.

Conservation Measure 4 (CM4) – Loss of Stream Connectivity

☐ 4.1 Culverts should be sufficiently sized and placed at the appropriate elevation to allow for the water depth, flow and velocity that permit fish passage through the culverts.

☐ 4.2 Culvert diameter (or box culvert width) should encompass 1.2 times the stream bankfull width to ensure the culvert is large enough to convey bankfull stream flow with minimal alteration of the stream's flow characteristics.

☐ 4.3 Normal water levels should rise no higher than half the diameter of the pipe.

☐ 4.4 The culvert should be counter sunk below the substrate to a depth of 20% of the culvert diameter (round) or rise (elliptical, box) to provide a sediment substrate conducive to fish passage.

☐ 4.5 Culvert slope should match the channel grade, but not exceed 4%.

☐ 4.6 Alternatives should be considered that provide the stream's natural bottom for fish passage. Potential options include bridging the crossing or using bottomless box culverts.

- ☐ 4.7 Where possible, provide for bankfull flow with a single pipe or box culvert. Otherwise, install multiple pipe culverts or multi-cell box structures to minimize bankfull flow disruption. A bridge is preferable to multiple culverts.
- ☐ 4.8 Where adjacent floodplain is present, consideration should be given to accommodating flows exceeding bankfull elevation by installing floodplain drains ("equalizer culverts") at the floodplain elevation to prevent blow-outs during storm events.
- ☐ 4.9 Perched culverts form a barrier to fish passage and should be a priority for replacement.
- ☐ 4.10 When the accumulation of sediment and debris in culverts exceed normal water levels and impede fish passage, these structures should be scheduled for maintenance activities as soon as possible. Culverts requiring frequent maintenance should be prioritized for upgrading.

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