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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2015–0142]

[4500030113]

RIN 1018–BB09

Endangered and Threatened Wildlife and Plants; Proposed Threatened Species Status for the Suwannee Moccasinshell

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; 12-month finding and status review.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the Suwannee moccasinshell (*Medionidus walkeri*), a freshwater mussel species from the Suwannee River Basin in Florida and Georgia, as a threatened species under the Endangered Species Act of 1973, as amended (Act). If we finalize this rule as proposed, it would extend the Act's protections to this species. The effect of this regulation will be to add this species to the List of Endangered and Threatened Wildlife.

DATES: We will accept comments received or postmarked on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** below) must be received by 11:59 p.m. Eastern Time on the closing date.

We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically*: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. In the Search box, enter FWS–R4–ES–2015–0142, which is the docket number for this rulemaking. Then, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on "Comment Now!"

(2) *By hard copy*: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R4–ES–2015–0142; U.S. Fish and Wildlife Service Headquarters, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments **only** by the methods described above. We will post all comments on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us (see *Public Comments* below for more information).

FOR FURTHER INFORMATION CONTACT: Catherine T. Phillips, Project Leader, U.S. Fish and Wildlife Service, Panama City Ecological Services Field Office, 1601 Balboa Avenue, Panama City, FL 32405; by telephone 850–769–0552; or by facsimile at 850–763–2177. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if we determine that a species is an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the **Federal Register** and make a determination on our proposal within 1 year. Critical habitat shall be designated, to the maximum extent prudent and determinable, for any species determined to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designations of critical habitat can only be completed by issuing a rule.

This rule proposes the listing of the Suwannee moccasinshell (*Medionidus walkeri*) as a threatened species. The Suwannee moccasinshell is a candidate species for which we have on file sufficient information on biological vulnerability and threats to support preparation of a listing proposal, but for which development of a listing regulation has been precluded by other higher priority listing activities. This rule reassesses all available information regarding status of and threats to the Suwannee moccasinshell.

This rule does not propose critical habitat for the Suwannee moccasinshell. We have determined that designation of critical habitat is prudent, but not determinable at this time because:

- While we have significant information on the habitat of the species, we need more information on biological needs of the species (i.e., specific habitat features on the landscape) in order to identify specific areas appropriate for critical habitat designation.
- In addition, as we have not determined the areas that may qualify for designation,

the information sufficient to perform a required analysis of the impacts of the designation is lacking.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that this species is threatened by degradation of its habitat due to polluted runoff from agricultural lands, discharges from industrial and municipal wastewater sources and mining operations, sedimentation, decreased flows due to groundwater extraction and drought (Factor A); State and Federal water quality standards that are inadequate to protect sensitive aquatic organisms like mussels (Factor D); contaminant spills as a result of transportation accidents or from industrial, agricultural, and municipal facilities (Factor E); increased drought frequency as a result of changing climatic conditions (Factor E); greater vulnerability to certain threats because of small population size and range (Factor E); and competition and disturbance from the introduced Asian clam (Factor E).

We will seek peer review. We will seek comments from independent specialists to ensure that our designation is based on scientifically sound data, assumptions, and analyses. We will invite these peer reviewers to comment on our listing proposal.

Because we will consider all comments and information received during the

comment period, our final determinations may differ from this proposal.

Information Requested

Public Comments

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from the public, other concerned governmental agencies, Native American tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning:

(1) The Suwannee moccasinshell's biology, range, and population trends, including:

(a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for the species, its habitat, or both.

(2) Factors that may affect the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors.

(3) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to this species and existing regulations that may be addressing those threats. In particular, we seek information concerning the potential threats to the Suwannee moccasinshell, including:

(a) The effects of pesticides and their ingredients and metabolites on the species;

(b) The impact of diseases on the species;

(c) The impact of flood scour on the species and its habitat; and

(d) The impact of introduced flathead catfish on fishes needed by the species to reproduce.

(4) Additional information concerning the historical and current status, range, distribution, and population size of this species, including the locations of any additional populations of this species.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is a threatened or endangered species must be made "solely on the basis of the best scientific and commercial data available."

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments **only** by the methods described in **ADDRESSES**.

If you submit information via *http://www.regulations.gov*, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Panama City Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Public Hearing

Section 4(b)(5) of the Act provides for one or more public hearings on this proposal, if requested. Requests must be received within 45 days after the date of publication of this proposed rule in the **Federal Register**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** and local newspapers at least 15 days before the hearing.

Peer Review

In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), we are seeking the expert opinions of three appropriate and independent specialists regarding this proposed rule. The purpose of peer review is to ensure that our listing determination is based on scientifically sound data, assumptions, and analyses. The peer reviewers have expertise in Suwannee moccasinshell biology, habitat, physical or biological factors, etc., and are currently reviewing the species status report, which will inform our determination. We invite comment from the peer reviewers during this public comment period.

Previous Federal Actions

We identified the Suwannee moccasinshell (*Medionidus walkeri*) as a Category 2 species in the Candidate Notice of Review (CNOR) published in the **Federal Register** of November 15, 1994 (59 FR 58982). Category 2 candidates were defined as species for which we had information that proposed listing was possibly appropriate, but for which conclusive data on biological vulnerability and threats were not available to support a proposed rule at the time. In the February 28, 1996, CNOR (61 FR 7596), we discontinued the designation of Category 2 species as candidates; therefore, the Suwannee moccasinshell was no longer a candidate species.

In 2010, the Center for Biological Diversity (CBD) petitioned the Service to list 404 aquatic, riparian, and wetland species from the southeastern United States under the Act. On September 27, 2011, the Service published a substantial 90-day finding for 374

of the 404 species, including the Suwannee moccasinshell, soliciting information about, and initiating status reviews for, those species (76 FR 59836). In 2013, CBD filed a complaint against the Service for failure to complete a 12-month finding for the Suwannee moccasinshell within the statutory timeframe. In 2014, the Service entered into a settlement agreement with CBD to address the complaint; the court-approved settlement agreement specified that a 12-month finding for the Suwannee moccasinshell would be delivered to the **Federal Register** by September 30, 2015.

Background

Taxonomy and Species Description

The Suwannee moccasinshell (*Medionidus walkeri*) is a freshwater mussel of the family Unionidae. The species was originally described by B.H. Wright in 1897; it was briefly considered a synonym of *Medionidus penicillatus* (Clench and Turner 1956), but subsequently was recognized as a valid species by Johnson (1977, p. 176). Its distinctiveness as a separate species is recognized by recent authors (Williams and Butler 1994, p. 85; Williams *et al.* 2014, p. 278). Its sharp posterior ridge and generally dark, rayless shell distinguishes it from other species of *Medionidus* in Gulf drainages (Johnson 1977, p. 177; Williams and Butler 1994, p. 86).

The Suwannee moccasinshell is a small mussel that rarely exceeds 50 millimeters (2.0 inches) in length. Its shell is oval in shape and sculptured with corrugations extending along the posterior ridge, although the corrugations are sometimes faint. The

shell exterior (periostracum) 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, p. 278). The sexes can be distinguished, with female shells being smaller and longer than the males (Johnson 1977, p. 177). The Suwannee moccasinshell is easily distinguished from all other mussels in the Suwannee River Basin by having an oval outline and sculpture on the posterior slope (Williams *et al.* 2014, p. 279).

Evaluation of Listable Entity

Under the Act, the term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature (16 U.S.C. 1532(16)). Based on our review of the best available scientific and commercial information (see *Taxonomy and Species Description* above) the taxonomic entity that is known as Suwannee moccasinshell (*Medionidus walkeri*) is a distinct species. Therefore, we conclude that the Suwannee moccasinshell does meet the definition of a species under section 3(16) of the Act, and that the petitioned entity does constitute a listable entity and can be listed under the Act.

Habitat and Biology

Unionid mussels live in the bottom substrates of streams and lakes where they generally burrow completely into the substrate and orient themselves near the substrate

surface to take in food and oxygen. 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, p. 86; Williams 2015, p. 2). Recent surveys by the Florida Fish and Wildlife Conservation Commission (FFWCC) for the species in the Suwannee River main channel found individuals at depths ranging from around 0.5 to 2.5 meters (1.6 to 8.2 ft) (FFWCC 2014 unpub. data). Based on stream conditions in areas that still support the species, suitable Suwannee moccasinshell 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. These are ideal habitat conditions for most mussels in the main channel, and several species occur in areas where the Suwannee moccasinshell is found. In addition, the Suwannee moccasinshell is associated with large woody material, and individuals are often found near embedded logs. These attributes also likely indicate the habitat preferences of its host fishes.

Adult mussels obtain food items both from the water column and from the sediments. They filter feed by taking water in through the incurrent siphon and across four gills that are specialized for respiration and food collection. They can also move sediment material into the shell by using cilia (hair-like structures) on the foot or through currents created by cilia. Juvenile mussels typically burrow completely beneath the substrate surface for the first several months of their life. During this time, they feed primarily with their ciliated foot, which they sweep through the sediment to extract material, until the structures for filter feeding are more fully developed. Mussels feed on a variety of microscopic food particles that include algae, diatoms, bacteria, and fine

detritus (disintegrated organic debris) (McMahon and Bogan 2001, p. 331; Strayer *et al*. 2004, pp. 430–431, Vaughn *et al*. 2008, p. 410).

Spawning in freshwater mussels general occurs from spring to late summer (Haag 2012, p. 38). Water temperature appears to be the primary cue for spawning (McMahon and Bogan 2001, p. 343; Galbraith and Vaughn 2009, p. 42). During spawning, males release sperm into the water column, which females take in through their inhalant aperture during feeding. Fertilization takes place inside the gills, and females brood the fertilized eggs in modified portions of one or both pairs of gills until they develop into mature larvae called glochidia. The timing and duration of the brooding period varies by species, but can be classified as either short term or long term. In short-term brooders, glochidia are released as soon as they are mature, generally 2-6 weeks after fertilization. In long-term brooders, the mature glochidia are brooded over the winter and released the following spring or summer.

Reproduction in unionid mussels is remarkable in that the glochidia of most species must attach to a fish host in order to transform into a juvenile mussel. Many mussel species use only one or a few specific fish species as hosts, and have evolved lures to attract a particular fish species or group of related fish species (Haag 2012, p. 42). Females of some mussel species release their glochidia, either individually (sometimes in mucus strands for suspension), in packets termed conglutinates, which resemble fish food items, or in one large mass known as a superconglutinate, which resembles a small fish (Barnhart *et al*. 2008, pp. 374–379). In other species, female mussels transmit glochidia directly to the host fish by using mantel flap lures to entice an attack (Barnhart *et al*. 2008, p. 380) and expel glochidia into the host's mouth.

The number of glochidia released by a female in one reproductive cycle can range from several thousand to several million and is extremely variable among species (Haag 2012, p. 196). The variation is related to body size with larger females producing more eggs than smaller individuals (Haag 2012, pp. 200–206). If the glochidia encounter a fish, they attempt to clamp onto the gills, fins, or skin. Glochidia that attach to a suitable host encyst in the tissues and undergo a metamorphosis. The duration of the encystment varies by mussel species, usually lasting from 2–4 weeks, but can last for several months (Haag 2012, p. 42). When the metamorphosis is complete, the juveniles drop from the host and sink to the bottom to begin life as a free-living mussel.

Parasitism primarily serves as a means of upstream dispersal for this relatively sedentary group of organisms (Haag 2012, p. 145). The intimate relationship between freshwater mussels and their host fish plays a major role in mussel distributions on both a landscape and community scale. Haag and Warren (1998, p. 304) determined that mussel community composition was more a function of fish community pattern variability than of microhabitat variability, and that the type of strategy used by mussels for infecting host fishes was the determining factor.

An ongoing study has provided preliminary information about the reproductive biology of the Suwannee moccasinshell. Females were found gravid with mature glochidia from December to February, and also in late May/early June (Johnson 2015 unpub. data). In laboratory trials, Suwannee moccasinshell glochidia transformed primarily on the blackbanded darter (*Percina nigrofasciata*) and to a lesser extent on the brown darter (*Etheostoma edwini*) (Johnson 2015 unpub. data). Six other fish species from 5 families were also tested but none transformed moccasinshell larvae. This

indicates that the Suwannee moccasinshell is a host specialist and dependent on darters for reproduction, and is consistent with other members of the genus *Medionidus,* which also use only darters (Percidae) as hosts (Haag and Warren 2003, p. 82; Fritts and Bringolf 2014, p. 54). To attract its darter host, the moccasinshell uses a small mantel lure consisting of a vibrant blue patch on the mantel interior that it flashes while wiggling papillae on the mantel margin (Johnson 2015 unpub. data). Darters are small, bottom-dwelling fish that generally do not move considerable distances (Freeman 1995, pp. 363–365; Holt 2013, p. 657). Thus, the exclusive use of darters as a host may limit the Suwannee moccasinshell's ability to disperse, and to recolonize some areas from which it has become extirpated.

Distribution and Abundance

The Suwannee moccasinshell is endemic to the Suwannee River Basin in Florida and Georgia. The Suwannee River Basin is a unique river system, characterized by blackwater streams in its headwaters and numerous springs (over 300) in its middle and lower reaches. The river originates in the Okefenokee Swamp and meanders more than 400 kilometers through south-central Georgia and north-central Florida before emptying into the Gulf of Mexico. There are three large tributaries to the Suwannee River—the Alapaha, Withlacoochee, and Santa Fe Rivers. The Suwannee moccasinshell's historical range includes the lower and middle Suwannee River proper, the Santa Fe River sub-basin, and the lower reach of the Withlacoochee River (Williams 2015, p. 7). There are no freshwater mussels in the upper Suwannee River Basin (upstream of the mouth of

Swift Creek) due to naturally low pH and nutrient levels (Williams *et al.* 2014, p. 62). Within the Suwannee River mainstem, the species is historically known from the mouth of Manatee Springs run, upstream to the vicinity of the junction of the Withlacoochee River. Within the Santa Fe sub-basin, the species is known from several locations in the Santa Fe River, one location in the New River (a headwater tributary), and one location in a small unnamed tributary to the New River. In the Withlacoochee River, it is known from three historical locations in the lower reach of the river.

There is a single record of the species from the Hillsborough River Basin, a small river basin in Florida that empties into Tampa Bay, collected by van Hyning in 1932 (Williams *et al.* 2014, p. 280). However, recent information obtained while examining specimens in the collection of the University of Michigan's Museum of Zoology calls the record into question. There is a possibility that the specimen, along with at least two other species, were actually collected from the Suwannee River and mislabeled (Williams 2015a in litt.). Incorrect locality data seems plausible considering that none of the three species have been found in the basin before or since the van Hyning collection (Williams 2015, p. 3; Williams 2015a in litt.). Therefore, the Hillsborough River is not considered part of the Suwannee moccasinshell's range at this time, and further research is under way that may clarify this situation.

The Suwannee moccasinshell's range has declined in recent decades, and it is presently known only from the Suwannee River main channel and the lower Santa Fe River in Florida. Recent occurrence is based on collections made from 2000 to 2015. Within the Suwannee mainstem, the moccasinshell occurs intermittently throughout a 75-mile (121-kilometer) 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. A shell fragment was collected in 2015 approximately 7 miles downstream of the mouth of Manatee Springs run (Williams 2015b in litt.). The fragment was estimated to be several years old, and additional survey work is needed; however, if the species is found to occur in this area, its distribution would be extended downstream by several miles. Within the Santa Fe sub-basin, the species is currently known from four localities (two are shell material only) in a 28-mile segment of the lower Santa Fe River downstream of the rise. The Santa Fe River runs underground for about 5 miles and "rises" back to the surface in Alachua County. The species was not detected in recent surveys in the Withlacoochee River or in the upper Santa Fe sub-basin (upstream of the rise), which includes its tributary, the New River. The species has not been collected in the past 50 years in the Withlacoochee River; however, the lower reach of the river continues to support good mussel diversity (Williams 2015, p. 3), and additional survey work is needed to verify if it is extirpated in this sub-basin.

Targeted surveys by FFWCC biologists in 2013 and 2014 show that Suwannee moccasinshell numbers are low. Experienced mussel 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 location, but at most sites 3 or fewer individuals were found (FFWCC 2014 unpub. data). At locations where the species was detected, it comprised only 1 percent of the mussel sample. In April of 2015, FFWCC biologists surveyed 14 sites in the lower Santa Fe River, and encountered only 1 Suwannee moccasinshell out of 1,880 mussels collected during the survey (Holcomb 2015 in litt.). A summary of occurrence, distribution, and

abundance of Suwannee moccasinshell populations by waterbody are shown in Table 1 below.

Table 1. Summary of Suwannee moccasinshell populations by waterbody.

Water Body	**State and County**	**Occurrence***	**Distribution and Abundance**
Suwannee River mainstem	FL: Madison Suwannee, Lafayette, Gilchrist, Dixie, Levy,	Recent	Occurs in a 75-mile reach; 67 individuals at 21 sites; abundance low but population is stable.
Santa Fe River	FL: Suwannee, Gilchrist, Columbia, Alachua, Union, Bradford	Recent	Occurs in 28-mile reach in lower river; 2 individuals at 2 sites; drastic decline and abundance very low.
New River, and unnamed trib. to New River	FL: Union, Alachua, Bradford	Historical	May be extirpated; last collected in system in 1996.
Withlacoochee River	GA: Brooks, Lowndes; FL: Madison, Hamilton	Historical	May be extirpated; last collected in system in 1969.

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

Historical mussel collection data are often limited, making it difficult to compare trends in abundance over time. Available historical collection data seem to indicate that the species was more abundant at one time as several museum lots contain 20 or more individuals. However, it is difficult to compare historical collections to recent collections, as survey efforts for these collections (and for most early mussel collections) are unknown, and sometimes museum lots are split or combined. It does seem clear from museum collections that Suwannee moccasinshell numbers in the Santa Fe River sub-basin have declined dramatically in recent decades. Three lots in the Florida Museum of Natural History (4,133; 4,159; 4,160) collected from the Santa Fe River in 1934 contain a

total of 70 individuals. In comparison, only two live moccasinshells have been collected in the entire Santa Fe River sub-basin since 2000 (one in 2012 and another in 2015) despite considerable survey effort in areas where the species historically occurred.

In summary, an evaluation of historical and recent collection data show the Suwannee moccasinshell has undergone a reduction in range, and may no longer persist at several locations where it historically occurred. The species may be extirpated from the Withlacoochee River, and its range and abundance have clearly declined in the Santa Fe River system, where it is now found only in the lower portion of the Santa Fe River mainstem in exceedingly low abundance. In addition, the species may not be able to reestablish populations in some areas due to its limited ability to disperse. The Suwannee moccasinshell continues to occur throughout most of its known range in the Suwannee River mainstem; however, its numbers are likely lower now than a few decades ago. Despite its low abundance, populations in the Suwannee River mainstem presently appear to be stable. We attribute its persistence in this reach to the stability of the streambed and habitat due to the prevalence of geomorphically stable limestone in the channel, and to the absence of excessive sedimentation. Also, certain threats such as contaminants and reduced flows are likely attenuated in the mainstem due to the larger volume of water (threats are discussed in detail in the following section).

Summary of Information Pertaining to the Five Factors

Section 4 of the Endangered Species Act (16 U.S.C. 1533) (ESA, Act) and its implementing regulations (50 CFR 424) set forth procedures for adding species to the

Federal List of Endangered and Threatened Wildlife . Under section 4(a)(1) of the Act, we may determine that a species is endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In making this finding, information pertaining to the Suwannee moccasinshell in relation to the five factors provided in section 4(a)(1) of the Act is discussed below. In considering what factors might constitute threats to this species, we must look beyond the exposure of the species to a particular factor to evaluate whether the species may respond to that factor in a way that causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat and, during the status review, we attempt to determine how significant a threat it is. The threat is significant if it drives, or contributes to, the risk of extinction of the species so that the species warrants listing as an endangered or threatened species as those terms are defined in the Act. However, the identification of factors that could impact a species negatively may not be sufficient to compel a finding that the species warrants listing. The information must include evidence sufficient to suggest that these factors are threats that operate on the species to the point that the species may meet the definition of an

endangered or threatened species under the Act.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The stream habitats of freshwater mussels are vulnerable to degradation and modification from a number of threats associated with modern civilization. Within the Suwannee River Basin, a rapidly growing human population and changing land use represent significant threats to the aquatic ecosystem, primarily through pollution and water withdrawal (Katz and Raabe 2005, p. 14). The Suwannee moccasinshell's habitat is subject to degradation as a result of polluted runoff from croplands and poultry and dairy operations, discharges from industries, mines, and sewage treatment facilities, and from decreased flows due to groundwater extraction (pumping) (Williams 2015, pp. 7–10). Based on our current knowledge of the Suwannee moccasinshell and related mussel species, the habitat characteristics needed to sustain healthy populations generally include (1) stable stream channels and banks; (2) stable bottom substrates that are free of excessive algae growth; (3) flows that are adequate to maintain benthic habitats, provide food and oxygen, transport sperm, and remove wastes; (4) good water quality including normal temperature, conductivity, and pH ranges, and adequate oxygen content; and (5) an environment free of toxic levels of pollutants.

Pollution

Water quality in the basin has been impaired due to a number of point and nonpoint sources of pollutants. As a group, mussels are more sensitive to pollution than many other aquatic organisms, and are one of the first species to respond to water quality impacts (Haag 2012, p. 355). Descriptions of localized mortality resulting from chemical spills and other discrete point source discharges have been reported. However, rangewide decreases in mussel density and diversity may result from the more damaging effects of chronic, low-level contamination (Newton 2003, p. 2,543; Newton *et al.* 2003, p. 2,554). There is no specific information on the sensitivity of the Suwannee moccasinshell to common agricultural, municipal, and industrial pollutants. A multitude of bioassays conducted on other mussels show that freshwater mussels, especially in early life stages, are more sensitive than previously known to some pollutants including chlorine, ammonia, copper, nickel, fungicides, and surfactants used in pesticides and household products (Keller and Zam 1991, p. 542; Jacobson *et al.* 1993, pp. 879–883; Jacobson *et al*. 1997, pp. 2,387–2,389; Augspurger *et al.* 2003, pp. 2,571–2,574; Wang *et al.* 2007, pp. 2,039–2,046; Gibson 2015, pp. 90–91).

Ammonia poses a serious threat to mussels due to its ubiquity in aquatic systems and its high toxicity to aquatic organisms. It originates primarily from agricultural sources (from fertilizers, which are often applied as ammonia and animal wastes), but also from municipal and industrial wastewater, and atmospheric deposition. Although ammonia may be taken up by plants or converted to less toxic nitrates by naturally occurring nitrifying bacteria, nitrates also have harmful effects on juvenile and adult mussels and may act as endocrine disrupters (Bauer 1988, p. 244; Patzner and Muller 2001, pp. 330–333; Pelley 2003, p. 162; Camargo and Alonso 2006, pp. 831–849).

Moreover, ammonia may occur in sediments at greater concentrations than the water column (Frazier *et al*. 1996, pp. 92–99); such occurrences may go undetected by common water quality monitoring methods, but may have lethal or sublethal effects on mussels (Augspurger *et al.* 2003, pp. 2,571–2,574; Wang *et al.* 2007, pp. 2,039–2046), which burrow and feed (with their foot) in sediments. The Environmental Protection Agency (EPA) recently revised its water quality standards to levels considered protective of freshwater mollusks, but it will be several years before facilities must comply with the new limits (see discussion under Factor D).

Pesticides are other widespread contaminants that have long been implicated in mussel declines. Pesticides have been linked to freshwater mussel die-offs (Fleming *et al*. 1995, pp. 877–879), and lab studies show that mussel glochidia and juveniles are particularly sensitive to common pesticides (Conners and Black 2004, pp. 362–371; Bringolf *et al*. 2007a, pp. 2,089–2,093). A surfactant (MON 0818) used in the common herbicide Roundup® was found to be severely toxic to juvenile mussels and glochidia (Bringolf *et al*. 2007b, pp. 2,096–2,097). The potential role of pesticides in mussel declines has received more attention in recent years, but the full range of long-term effects of pesticides, and their ingredients and metabolites, remain unknown (Haag 2012, pp. 374–379).

An emerging category of contaminant threats to aquatic species is pharmaceuticals, including birth control drugs, antidepressants, and livestock growth hormones originating from municipal, agricultural, and industrial wastewater sources. These chemicals may act as endocrine disrupters and can affect mussel reproduction in a number of ways, including causing feminization of male mussels (Gagne *et al*. 2001, pp.

260–268; Gagne *et al*. 2011, pp. 99–106).

High levels of nutrients such as nitrogen and phosphorus may indirectly impact mussels by stimulating algae growth. In excess, these nutrients lead to algal blooms, which deplete oxygen and can also cause dense mats of filamentous algae to form that can entrain juvenile mussels (Hartfield and Hartfield 1996, p. 373). Juveniles may be particularly sensitive to hypoxic (oxygen-deprived) and eutrophic (nutrient-rich) conditions since they inhabit interstitial spaces in stream substrates rather than the sediment surfaces occupied by adults (Sparks and Strayer 1998, pp. 132–133).

As discussed under Factor D below, State and Federal regulatory mechanisms have helped to reduce the negative effects of point source discharges since the 1970s, yet discharges continue to impact water quality in the Suwannee River Basin. There are 246 National Pollutant Discharge Elimination System (NPDES) permitted facilities within the basin; most of them discharge into streams that ultimately flow into the middle and lower Suwannee River main channel where the majority of the moccasinshell population occurs. According to 2014 monitoring data, the top pollutants discharged into the Suwannee River Basin by weight were (in decreasing order of value) total suspended solids, nitrogen, phosphorus, fluoride, and ammonia (EPA 2014). Additionally, the toxic-weighted pound equivalent (TWPE), used to compare the potential toxic nature of one pollutant to another, indicates that the most hazardous pollutants discharged into the Suwannee River Basin are (in decreasing order of toxicity) toxaphene (a pesticide), fluoride, chlorine, iron, and ammonia (EPA 2014). In previous years, top toxicants discharged into the basin also included copper and cyanide.

Facilities permitted to discharge substantial amounts of wastewater into areas that may affect Suwannee moccasinshell populations include the Valdosta wastewater treatment plant (WWTP), which is permitted to discharge 12 million gallons per day (mgd) to the Withlacoochee River in Lowndes County, GA; Packaging Corp. of America, which is permitted to discharge 55 mgd to the Withlacoochee River in Lowndes County, GA; PCS Phosphate Company, Inc., which is permitted to discharge 200 mgd to creeks that flow to the Suwannee River in Hamilton County, FL; Florida Power Corp., which is permitted to discharge 342 mgd to the Suwannee River in Suwannee County, FL; and Pilgrim's Pride Poultry Processing Facility, which is permitted to discharge 1.5 mgd to the Suwannee River in Suwannee County, FL (EPA 2014).

Pollutants released by these facilities in 2014, and considered significant (either because of the amount or potential to affect mussels) include total suspended solids, nitrogen, phosphorus, ammonia, fluoride, iron, and copper (EPA 2014). In addition, spills of municipal wastewater at the treatment plant in Valdosta, GA, have leaked untreated sewage into the Withlacoochee River on multiple occasions. This facility has been a source of periodic releases of millions of gallons of untreated sewage, the most recent occurring in the summer of 2013 (Williams 2015, p. 8). This issue is currently being addressed by the City of Valdosta, which is making numerous improvements, including a new WWTP, which is scheduled for completion in 2016. PCS Phosphate Company, Inc., is a large phosphate strip mining and fertilizer manufacturing operation near White Springs, FL. The facility is currently permitted to discharge effluent into creeks that flow to the Suwannee River, but surface runoff and periodic overflow of

settling ponds as a result of heavy rain events may have resulted in inputs of total suspended solids, phosphorus, and ammonia into the river (Williams 2015, p. 8).

Nonpoint source pollution is another significant threat throughout the Suwannee Basin, entering the system by surface runoff or through groundwater. Nonpoint source impacts are attributable primarily to the conversion of forests and wetlands to agricultural lands; agriculture accounts for most of the developed land uses within the basin, and includes silviculture, row crops, and pasture (Katz and Raabe 2005, p. 9). Surface runoff from these lands may transport numerous pollutants including pesticides, fertilizers, metals, sediments, and pathogens into stream channels. Surface drainage is more prevalent in the upper two-thirds of the basin and the upper Santa Fe River sub-basin where the soils are resistant to infiltration (Katz and Raabe 2005, p. 5).

Pollutants can also enter stream channels via groundwater inflow. The Suwannee River Basin has the highest density of springs globally (FDEP 2003, p. 29). The majority of flow in the middle Suwannee River Basin originates from groundwater sources, as the region is highly connected to the underlying Floridan aquifer (FDEP 1985, p. iv). This is evidenced by the relative lack of surface water bodies in the middle Suwannee River Basin since most water flows through the overlying karst features and directly into the aquifer (FDEP 2003, p. 27). For these reasons, the middle and lower portions of the Basin are particularly vulnerable to groundwater contamination. Katz *et al.* (1999, pp. 49–50) observed groundwater nitrate levels that were seven times greater than background levels in areas dominated by cropland, and estimate that it may take several decades for nitrogen concentrations to return to their original state. Additionally, all nine springs in the basin monitored by the Florida Department of Environmental Protection

(FDEP) from 2012–2013 exceeded the nitrate criterion for spring vents (FDEP 2014a, p. 228), suggesting that contamination is persistent and widespread in the central and lower Suwannee River Basin.

Trends suggest that certain nonpoint source pollutants are becoming more abundant in the Suwannee River Basin. According to FDEP (2003, pp. 76, 83) nitrates are by far the biggest water quality concern in the middle and lower portions of the Suwannee Basin. Total estimated nitrogen increased continuously from 1955 to 1997 in Gilchrist and Lafayette counties (Katz *et al*. 1999, pp. 45–48). Nitrates have been monitored at the U.S. Geological Survey (USGS) monitoring site at Branford, FL, since 1954 and the overall trend is increasing (Thom *et al*. 2015, p. 100). Of seven Florida surface water quality stations monitored by FDEP in the basin during 1999–2012, increases in total nitrogen were observed at four sites, levels of algae and nitrates increased at three sites, and phosphorus and fecal coliform increased at two sites (FDEP 2014a, pp. 106–123). Nitrogen levels in the Suwannee River Basin have likely increased due to nonpoint sources such as runoff from croplands, dairy farms, and poultry facilities (Katz *et al*. 1999, p. 49). Fertilizer use in the area probably peaked in the late 1970s (FDEP 2008, pp. 95–100), yet fertilizer-based nitrogen inputs remain high and have increased in parts of the Suwannee River Basin (Katz *et al*. 1999, pp. 49–50; FDEP 2014a, pp. 106–123).

For the 2000 water year, the FDEP determined that the middle Suwannee and lower Santa Fe watersheds contributed more than three-quarters of the basin-wide nitrate–nitrogen load, although these watersheds comprise less than 20 percent of the drainage area (FDEP 2003, p. 35). In 2007, the FDEP (2008, pp. 40–41) found that more

than 40 percent of total nitrogen in the middle and lower Suwannee River Basin originates from fertilizer inputs, but also that dairy, poultry, and beef production are prominent nitrogen contributors in the area. The same report showed that atmospheric deposition contributed less than 20 percent of total nitrogen in the area (FDEP 2008, pp. 40–41), suggesting that modern nitrogen concentrations in the basin greatly surpass historical background levels. In addition, the area is also naturally rich in phosphorus, and active and inactive phosphate mining operations exist in the central part of the basin. Historically, discharges from phosphate-fertilizer production have been correlated with major changes in physiochemical properties of basin waters. Spikes in total phosphorus, fluoride, and soluble inorganic nitrogen, as well as depressed dissolved oxygen (DO) levels, were observed immediately downstream of the mouth of Swift Creek, a tributary accepting phosphate mine effluent (FDEP 1985, pp. iv–19).

Section 303(d) of the Clean Water Act (33 U.S.C. 1251 et seq.) requires States to identify waters that do not fully support their designated use classification. These impaired waters are placed on the State's 303(d) list, and a total maximum daily load (TMDL) must be developed for the pollutant of concern. A TMDL is an estimate of the total load of pollutants that a segment of water can receive without exceeding applicable water quality criteria. The Georgia Environmental Protection Division's (GEPD) draft 303(d) list for 2014 identifies a total of 64 impaired stream segments (a total of 695 stream miles) within the Suwannee River Basin (GEPD 2014, pp. 263–273). The list of causes of impairment with established TMDLs in Georgia include mercury, lead, low dissolved oxygen (DO), fecal coliform, pH, algae, and condition of the macroinvertebrate community (GEPD 2014, pp. 263–273). The potential sources of these violations are

primarily attributed to nonpoint or unknown sources but also to municipal facilities and urban runoff. FDEP's 303(d) list identifies 52 impaired stream segments or water bodies in the Suwannee River Basin. Florida's list identifies coliform bacteria, specific conductance, dissolved oxygen, nutrients, and unionized ammonia as impaired parameters (FDEP 2014b). Impairments within the range of the Suwannee moccasinshell include mercury in the lower Suwannee River, and DO and nutrients (algal mats) in the lower Santa Fe River (FDEP 2003 pp. 138–139).

Water Withdrawals

Perhaps the most significant threat to the Suwannee moccasinshell is flow reduction due to the withdrawal of groundwater for agricultural purposes. Stream flows in the Suwannee River Basin are heavily dependent on groundwater contributions. Sufficient groundwater flows are essential for maintaining good mussel habitat in the Basin (Williams *et al*. 2014, p. 46). In the past 25 years, center pivot irrigation has increased in the Apalachicola–Chattahoochee–Flint (ACF) River Basin which borders the Suwannee River Basin to the northwest (Torak *et al*. 2010, p. 2). Most of the groundwater used for irrigation in the ACF Basin is withdrawn from the Upper Floridan aquifer. Increased pumping in the ACF Basin has lowered groundwater levels along the boundary with neighboring Ochlockonee and Suwannee River Basins by more than 24 feet. In southeastern Colquitt County, GA, the aquifer has experienced unprecedented 40- to 50-foot declines since 1969 (Torak *et al.* 2010, p. 44). Periods of extreme dry conditions causing insufficient recharging flows into the Upper Floridan aquifer

occurred in the 1980s-2000s (Torak *et al*. 2010, p. 47). The lower aquifer levels reduced the hydraulic gradient, thus the amount of groundwater flowing south and east into the Suwannee Basin (Torak *et al*. 2010, pp. 2, 40).

Declines in groundwater levels have the potential to lower stream base flows by decreasing the amount groundwater discharged to streams. This may also reduce high-magnitude flows (10,000–15,000-cubic feet per second), which could decrease floodplain connectivity and the transfer of matter and energy from overbank to riverine systems (Light *et al*. 2002, p. 85; Pringle 2003, entire). Mean annual flow discharge in the lower Suwannee River near Wilcox, FL, has declined more than 30 percent between 1942 and 2012 (USGS 2014). Similar discharge declines of approximately 30 percent have been observed in the Santa Fe River near Fort White between 1928 and 2013 (USGS 2014). Reductions in flow can alter hydraulically mediated sediment sorting throughout the river, which may displace or otherwise alter habitat for Suwannee moccasinshell and its host fishes. Groundwater pumping during long periods of drought can result in extremely reduced flow rates. The upper reaches of the Santa Fe River mainstem and the New River, a major tributary, have ceased to flow due to groundwater pumping during drought (Williams 2015, p. 9). Biologists conducting mussel surveys on the Santa Fe River near Worthington Springs during a dry period in June 2011 observed that a section of the channel was completely dewatered (FFWCC 2011a, p. 2). While pumping does not completely dewater the Withlacoochee River, flow rates are greatly reduced (Williams 2015 p. 9). Reduced flows may exacerbate drought conditions (elevating temperature, pH, and pollutant concentrations (causing biotic die-off, and reducing DO), which in turn may have lethal or other harmful effects (prematurely aborting glochidia, reduced growth

rates) to the species, or may cause stranding mortality.

Sedimentation

Numerous potential sources of sand and silt sediments occur throughout the basin, and include development, silviculture, livestock grazing, croplands, and unpaved roads. Habitat may be degraded or destroyed in localized areas where sediments accumulate, and suspended fine particles can increase turbidity levels for considerable distances downstream. High levels of suspended sediments may reduce mussel feeding and respiratory efficiency (Dennis 1984, pp. 207–212; Brim Box and Mossa 1999, pp. 101–102). Highly turbid conditions may also affect mussel recruitment by impeding the ability of sight-feeding fishes to find glochidia and mussel lures. The Suwannee moccasinshell uses small mantel lures to attract its darter host fish (see *Habitat and Biology* section above) and, therefore, is reliant on good water clarity during times that it is reproducing. Another important issue related to sedimentation is that it may serve as a vehicle for pollutants (like pesticides and surfactants) to enter streams (Haag 2012, p. 378).

The Suwannee River main channel is relatively unimpacted by sedimentation, where inputs are generally low and impacts are mostly localized; however, sedimentation is a problem in the Santa Fe River sub-basin. Surface drainage is more prevalent in the Santa Fe watershed, which is more developed because of its proximity to Gainesville, FL, and several other incorporated areas (FDEP 2003, p. 23). Excessive silt sediment has been cited as a reason for the decline of mussel populations in the Santa Fe sub-basin

(FFWCC 2011b, p. 14) and is considered a factor in the decline of the Suwannee moccasinshell in that system.

Conservation Efforts to Reduce Habitat Destruction, Modification, or Curtailment of Its Range

We are not aware of any conservation efforts that may help ameliorate threats specific to the Suwannee moccasinshell. However, the moccasinshell may be indirectly benefited by Federal, State, local, and private programs that acquire or manage lands within the basin, particularly along stream corridors. Florida's Suwannee River Water Management District (SRWMD) owns, manages, or co-manages a significant portion of the basin's riparian lands (more than 48,000 acres, CBI 2010) adjacent to or upstream of Suwannee moccasinshell habitats. Tracts are managed to maintain adequate water supply and water quality for natural systems by preserving riparian habitats and restricting development (SRWMD 2014, p. 3). The SRWMD also established minimum flows and levels for the river channel in the lower basin, downstream of Fanning Springs. Minimum flow and level criteria were not designed with specific consideration for freshwater mussels, but do establish a limit at which further withdrawals would be detrimental to water resources, taking into consideration fish and wildlife habitats, the passage of fish, sediment loads, and water quality, among others (SRWMD 2005, pp. 6–8).

Summary of Factor A

Habitat degradation is occurring throughout the entire range of the Suwannee

moccasinshell and is due primarily to pollutants discharged from municipal and industrial facilities, polluted runoff from agricultural areas, and reduced flows as a result of groundwater pumping and drought. In portions of the species' range, sedimentation has also impacted the species' habitat. These threats are greater in the two tributary systems, as evidenced by the species' possible disappearance from the Withlacoochee River, and its dramatic decline in the Santa Fe River sub-basin. Currently, nearly the entire population resides in the middle and lower reach of the Suwannee River main channel. The two greatest threats to the species, pollutants and reduced flows, are somewhat attenuated in the main channel, where flows are generally sustained and pollutant concentrations may be diluted by higher flow volumes. While there are programs in place that may indirectly alleviate some detrimental impacts on aquatic habitats, there currently are no conservation efforts designed specifically to protect or recover Suwannee moccasinshell populations. Therefore, we conclude that habitat degradation is presently a significant threat to Suwannee moccasinshell populations in the Withlacoochee and Santa Fe River sub-basins, and a moderate threat to populations in the Suwannee River main channel. This threat is expected to continue into the future and, because it is linked to human activities, is expected to increase as the human population within the Suwannee River Basin grows.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The Suwannee moccasinshell is not a commercially valuable species, and the

Suwannee River is not subject to commercial mussel harvesting activities. Suwannee moccasinshell individuals have been taken for scientific and private collections in the past, but collecting is not considered a factor in its decline. Collection interest may increase as the Suwannee moccasinshell becomes an interest of scientific study, and as its rarity becomes better known. However, individuals are very difficult to locate because the species occurs in a large mainstem river in low abundance. Therefore, we do not consider overutilization to be a threat to the Suwannee moccasinshell at this time.

Factor C. Disease or Predation

Juvenile and adult mussels are preyed upon by several aquatic predators (for example, dragonfly larvae, crayfishes, turtles, and some fishes), and are prey items for some terrestrial species (for example, raccoon, otter, feral hogs, and birds) (summarized in Hart and Fuller 1974, pp. 225–240; and in Williams *et al.* 2014, pp. 90–91). Although predation by native predators is a natural occurrence, it may exacerbate declines in mussel populations already diminished by other threats (Neves and Odom 1989, p. 940). However, we have no specific information indicating that predation is negatively impacting Suwannee moccasinshell populations.

Mussels commonly are hosts for a variety of parasites, including trematodes, copepods, and water mites, and also harbor bacteria and viruses (Grizzle and Brunner 2007, p. 4; Haag 2012, pp. 382–383). Heavy infestations by mites and trematodes have shown to adversely affect mussel reproductive and physiological fitness (Gangloff 2008, pp. 28–30). In addition, exposure to stressors like pollutants can weaken mussel immune

systems, making them more prone to diseases. However, the role of diseases in mussel declines has received little attention, and diseases of freshwater mussels remain largely unstudied (Grizzle and Bruner 2007, p. 6; Haag 2012, p. 382). We have no specific information indicating that disease is negatively impacting Suwannee moccasinshell populations. Therefore, we do not consider disease or predation to be threats to the Suwanee moccasinshell at this time.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Point source discharges within the range of the Suwannee moccasinshell have been reduced since the inception of the Clean Water Act, but this statute still may not provide adequate protection for sensitive aquatic organisms like freshwater mussels, which can be impacted by extremely low levels of pollutants. Municipal wastewater plants continue to discharge large amounts of effluent and, in some circumstances, in excess of permitted levels (see discussion under Factor A). There is no specific information on the sensitivity of the Suwannee moccasinshell to common industrial and municipal pollutants, and very little information on other freshwater mussel species. Current State and Federal regulations regarding pollutants are designed to be protective of aquatic organisms; however, freshwater mollusks may be more susceptible to some pollutants than the test organisms commonly used in bioassays. Additionally, water quality criteria may not incorporate data available for freshwater mussels (March *et al.* 2007, pp. 2,066–2,067). A multitude of bioassays conducted on 16 mussel species (summarized by Augspurger *et al.* 2007, pp. 2025–2028) show that freshwater mollusks

are more sensitive than previously known to some chemical pollutants, including chlorine, ammonia, copper, fungicides, and herbicide surfactants. Another study found that nickel and chlorine were toxic to a federally threatened mussel species at levels below the current criteria (Gibson 2015, pp. 90–91). The study also found the mussel was sensitive to SDS (sodium dodecyl sulfate), a surfactant commonly used in household detergents, for which water quality criteria do not currently exist.

Several studies have demonstrated that the criteria for ammonia developed by EPA in 1999 were not protective of freshwater mussels (Augspurger *et al.* 2003, p. 2,571; Newton *et al.* 2003, pp. 2,559–2,560; Mummert *et al.* 2003, pp. 2,548–2,552). However, in 2013 EPA revised its recommended criteria for ammonia. The new criteria are more stringent and reflect new toxicity data on sensitive freshwater mollusks (78 FR 52192, August 22, 2013; p. 2). Georgia and Florida have not yet adopted the new ammonia criteria. Although Florida's next triennial review will occur in 2015 and Georgia's in 2016, NPDES permits are valid for 5 years, so even after the new criteria are adopted, it could take several years before facilities must comply with the new limits.

In summary, despite existing authorities such as the Clean Water Act, pollutants continue to impair the water quality throughout the current range of the Suwannee moccasinshell. State and Federal regulatory mechanisms have helped reduce the negative effects of point source discharges since the 1970s, yet these regulations are difficult to implement and regulate. While new water quality criteria are being developed that take into account more sensitive aquatic species, most criteria currently do not. Thus, we conclude that existing regulatory mechanisms do not adequately protect the Suwannee moccasinshell.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Catastrophic Weather Events

The Gulf coastal region is prone to extreme hydrologic events. Extended droughts result from persistent high-pressure systems, which inhibit moisture from the Gulf of Mexico from reaching the region (Jeffcoat *et al*. 1991, pp. 163–170). Warm, humid air from the Gulf of Mexico can produce strong frontal systems and tropical storms resulting in heavy rainfall events that cause severe flooding (Jeffcoat *et al*. 1991, pp. 163–170). Although floods and droughts are a natural part of the hydrologic processes that occur in these river systems, these events may exacerbate the decline of mussel populations suffering the effects of other threats. During high flows, flood scour can dislodge mussels (particularly juveniles) where they may be injured, buried, or swept into unsuitable habitats, or mussels may be stranded and perish when flood waters recede (Vannote and Minshall 1982, p. 4,105; Tucker 1996, p. 435; Hastie *et al.* 2001, pp. 107–115; Peterson *et al*. 2011, unpaginated). Flood scour generally is attenuated in larger stream channels but can radically alter smaller streams and cause mussel mortality (Hastie *et al.* 2001, pp. 107–115; Peterson *et al*. 2011, unpaginated).

During drought, stream channels may be dewatered entirely, or become disconnected pools where mussels are exposed to higher water temperatures, lower dissolved oxygen levels, and predators. Johnson *et al*. (2001, p. 6) monitored mussel responses during a severe drought in 2000 in tributaries of the lower Flint River in

Georgia, and found that most mortality occurred when dissolved oxygen levels dropped below 5 mg/L. Increased demand for surface and ground water resources for irrigation and human consumption during drought can cause drastic reductions in stream flows and alterations to hydrology (Golladay *et al.* 2004, p. 504; Golladay *et al.* 2007 unpaginated). Extended periods of drought have occurred in the region during the last two decades (Torak *et al*. 2010, p. 47). Substantial declines in mussel diversity and abundance as a direct result of drought have been documented in smaller southeastern streams; however, assemblages in larger streams may be relatively unaffected (Golladay *et al.* 2004, pp. 494–503; Haag and Warren 2008, p. 1165). Reduced flows as a result of drought and water consumption has been cited as a factor negatively affecting mussels in the Suwannee River Basin (FFWCC 2011b, p. 14), and has been identified as a threat to Suwannee moccasinshell populations in the Withlacoochee and Santa Fe Rivers (Williams 2015, p. 9)

Contaminant Spills

The linear nature of the Suwannee moccasinshell's habitat and its reduced range makes it vulnerable to contaminant spills. Spills as a result of transportation accidents are a constant potential threat to the species, as numerous highways and railroads traverse the basin. Spills emanating from industrial, agricultural, and municipal facilities are a threat as numerous potential sources are present within the basin, and these spills have occurred in the past. As discussed under Factor A, spills at the municipal WWTP in Valdosta, GA, have leaked raw sewage into the Withlacoochee River on multiple

occasions, and the PCS Phosphate Company, Inc. mining operation has had periodic overflows of effluent ponds. Nearly the entire moccasinshell population resides within the Suwannee River main channel; therefore, a spill has the potential to impact a large portion of the population, depending on the type of contaminant and its concentration, amount, and location. In addition, because the species has limited ability to disperse, it may not be able recolonize areas after conditions have improved.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our

consideration of various aspects of climate change.

There is a growing concern that climate change may lead to increased frequency of severe storms and droughts (McLaughlin *et al.* 2002, p. 6,074; Golladay *et al.* 2004, p. 504; Cook *et al.* 2004, p. 1,015). The present conservation status, complex life histories, and specific habitat requirements of freshwater mussels suggest that they may be quite sensitive to climate change (Hastie *et al.* 2003, p. 45). Specific effects of climate change to mussels, their habitat, and their fish hosts could include changes in hydrologic and temperature regimes, the timing and levels of precipitation causing more frequent and severe floods and droughts, and alien species introductions.

Mussel distributions seem to be closely associated with complex hydraulic metrics (Morales *et al*. 2006 pp. 669–673; Zigler *et al*. 2008, p. 358) that may be altered by climate change. Mussels are particularly vulnerable to these changes since they are generally sessile and restricted in their ability to adjust their range in response to hydrology and physiochemical alterations mediated by climate change (Strayer 2008, p. 30). Additionally, increases in temperature and reductions in flow may lower dissolved oxygen levels in interstitial habitats, which can be lethal to juveniles (Sparks and Strayer 1998, pp. 131–133). Effects to mussel populations from these environmental changes could include reduced abundance and biomass, altered species composition, and host fish considerations (Galbraith *et al.* 2010, pp. 1,180–1,182). Since ammonia concentrations may increase with increasing temperatures and low stream flow (Cherry *et al*. 2005, p. 378; Cooper *et al*. 2005, p. 381), nitrogen-mediated threats may be intensified by climate change. In addition, saltwater encroachment, as a result of rising sea levels, has the potential to impact freshwater habitats in the lower reaches of coastal rivers.

Long-term sea level trends available from the Cedar Key tide gage suggest the local sea level is rising about 1.8 mm (0.7 inches) per year based on data from 1914 to 2006 (Thom *et al*. 2015, pp. 47–48). At this rate, this is equivalent to 0.14 meters (0.46 feet) by 2100. However, all indications are that sea level rise (SLR) is accelerating (Thom *et al*. 2015, p. 47), and, although there is a range of estimates, recent studies suggest that global mean sea level will rise at least 0.2 meters (0.66 ft) and no more than 2.0 meters (6.6 ft) by 2100 (Parris *et al*. 2012, pp. 1–2).

The effects of climate change may amplify stressors currently impacting the Suwannee moccasinshell, including the prospect of more frequent and intense droughts and increased temperatures, which would further reduce flows, increase pollutant toxicity levels, and exacerbate current problems of low DO and excessive algae growth (see discussions under Factor A). Saltwater encroachment also has the potential to impact moccasinshell populations in the lower river, especially during times of low flow conditions. The variables related to climate change are complex, and it is difficult to predict all of the possible ways climate change will affect Suwannee moccasinshell populations and habitat. However, information available is sufficient to indicate that climate change is a significant threat to the Suwannee moccasinshell in the future, as it will likely exacerbate certain stressors already affecting the species, such as reduced flows and degraded water quality.

Small Population Size

The Suwannee moccasinshell's reduced range and small population size may increase its vulnerability to many threats. Species with small ranges, few populations, and small or declining population sizes are the most vulnerable to extinction (Primack 2008, p. 137). The effects of certain environmental pressures, particularly habitat degradation and loss, catastrophic weather events, and introduced species, are greater when population size is small (Soulé 1980, pp. 33, 71; Primack 2008, pp. 133–137, 152). Suwannee moccasinshell populations are small and declining and are vulnerable to habitat degradation, droughts, and competition from the introduced Asian clam. In addition, its current range is relatively small, consisting of a stream channel segment of about 103 miles in length (see Distribution and Abundance discussion).

Nonindigenous Species

The Asian clam (*Corbicula fluminea*) was first detected in eastern Gulf drainages in the early 1960s and is presently widespread in the Suwannee River Basin. Anecdotal observations suggest that, when the Asian clam became established in other Gulf coast drainages, native mussel abundance declined drastically (Heard 1975, p. 2; Shelton 1995, p. 4). It is unknown, however, if the Asian clam competitively excluded the native mussels, are tolerant of whatever caused them to disappear, or, as Haag (2012, p. 371) suggests, the Asian clam is a poor competitor and can only become dense after a decline in mussel abundance. Mechanisms by which the Asian clam may negatively affect mussels include as a competitor for food and space; by ingesting mussel sperm, glochidia, and newly metamorphosed juveniles; and by displacing newly metamorphosed

mussels from the substrate, causing them to be washed downstream (Neves and Widlak 1987, p. 6; Leff *et al*. 1990, p. 415; Strayer 1999, p. 82; Yeager *et al.* 2000, pp. 255–257). Although the specific interaction between the Asian clam and native mussels is not well understood, enough information exists to conclude that dense Asian clam populations would negatively affect juvenile mussel survival (Haag 2012, p. 370). Surveys within the range of the Suwannee moccasinshell found Asian clam densities varied from relatively low in some areas to relatively high in other areas (S. Pursifull 2014 pers. obs.). The introduced Asian clam is negatively affecting the Suwannee moccasinshell, although we consider this threat to be low at present.

The flathead catfish (*Pylodictis olivaris*) has been introduced to the Suwannee River Basin and may be adversely impacting native fish populations. As discussed in the *Habitat and Biology* section above, the Suwannee moccasinshell requires a fish host in order to complete its life cycle, and the blackbanded darter and the brown darter were found to serve as larval hosts for the moccasinshell. The flathead catfish is a large predator native to the central United States, and since its introduction outside its native range, it has altered the composition of native fish populations through predation (Boschung and Mayden 2004, p. 350). Many feeding studies have found that flathead catfish prey heavily on other fishes, especially sunfishes (*Centrarchidae*) (Weller and Robbins 1999, p. 40; Pine *et al.* 2005, p. 904). One study in the Flint River system in Georgia found that young-of-the-year flatheads consumed several fish species including darters (*Etheostoma* spp.) (Quinn 1988, p. 88). The loss or reduction of darters, which are essential during the moccasinshell's parasitic larval stage, would affect the Suwannee moccasinshell's ability to recruit and disperse. However, it is not known if the specific

darter species needed by this mussel to reproduce are being predated by introduced flatheads; therefore, it is difficult for us to evaluate this potential threat at this time.

In summary, the Suwannee moccasinshell is adversely affected by other natural or manmade factors including droughts that (along with groundwater consumption) cause reduced flows, past and future contaminant spills, and the introduced Asian clam. In addition, numerous future impacts associated with changing climatic patterns (increased drought frequency, altered water quality, saltwater encroachment) are anticipated, some of which could intensify stressors currently affecting the species, including reduced flows and low DO. For this reason, problems related to reduced flows and degraded water quality are expected to increase in the future. Finally, the Suwannee moccasinshell's small population size and restricted range makes it more vulnerable to certain threats. Therefore, we find that these threats, as a whole, pose a significant threat to the Suwannee moccasinshell, both now and continuing into the future. The Suwannee moccasinshell may also be affected by flood events, and predation of its host fishes by introduced flathead catfish. However, we do not have information indicating that these are currently acting on the species at this time.

Proposed Determination

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Suwannee moccasinshell. The primary reason for the Suwannee moccasinshell's decline is the degradation of its habitat due to polluted runoff from agricultural lands, discharges from industrial and

municipal wastewater sources and from mining operations, and decreased flows due to groundwater extraction and drought (Factor A). These threats occur throughout its range, but are more intense in the two tributaries, the Withlacoochee and Santa Fe River systems. In portions of its range, sedimentation has also impacted its habitat. Other threats to the species include State and Federal water quality standards that are inadequate to protect sensitive aquatic organisms like mussels (Factor D); contaminant spills as a result of transportation accidents or from industrial, agricultural, and municipal facilities (Factor E); increased drought frequency as a result of changing climatic conditions (Factor E); greater vulnerability to certain threats because of small population size and range (Factor E); and competition and disturbance from the introduced Asian clam (Factor E). These threats have resulted in the decline of the species throughout its range, and pose the highest risk to populations in the two tributary systems, as evidenced by the species' decline and possible disappearance in the Withlacoochee River, and its decline in the Santa Fe River sub-basin. In addition, the species likely has a limited ability to disperse and, therefore, may not be able recolonize areas from which it has been extirpated. Currently, nearly the entire population resides in the middle and lower reach of the Suwannee River main channel, where the two greatest threats, pollutants and reduced flows, are attenuated by higher flow volumes. Therefore, Suwannee moccasinshell populations in the Withlacoochee and Santa Fe River sub-basins are presently facing threats that are high in magnitude, and populations in the Suwannee River main channel are presently facing threats that are moderate in magnitude. Most of these threats, including reduced flows, pollutants, droughts, and climate change, are expected to increase in the future.

The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as any species "that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future." We find that the Suwannee moccasinshell is likely to become endangered throughout all or a significant portion of its range within the foreseeable future based on the overall severity and immediacy of threats currently impacting the species. The Suwannee moccasinshell's range and abundance have been reduced, and its remaining habitat and populations are threatened by a variety of factors acting in combination to reduce the overall viability of the species. The risk of becoming endangered is high because remaining Suwannee moccasinshell populations in the main channel are small and numerous threats impact those populations. However, we find that endangered species status is not appropriate, because despite low population densities and numerous threats, the populations in the main channel, which are the largest, appear to be stable, which has been attributed to the threats being attenuated and the streambed habitat being stable. Therefore, on the basis of the best available scientific and commercial information, we propose listing the Suwannee moccasinshell as threatened in accordance with sections 3(6) and 4(a)(1) of the Act.

Significant Portion of the Range

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. Because we have determined that the Suwannee moccasinshell is threatened throughout all of its

range, no portion of its range can be "significant" for purposes of the definitions of "endangered species" and "threatened species." See the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (79 FR 37578; July 1, 2014).

Critical Habitat

Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 3(3) of the Act (16 U.S.C. 1532(3)) also defines the terms "conserve," "conserving," and "conservation" to mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter Act are no longer necessary.

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations in title 50 of the Code of Federal Regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when one or

both of the following situations exist:

(1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species, or

(2) Such designation of critical habitat would not be beneficial to the species.

There is currently no imminent threat of take attributed to collection or vandalism under Factor B for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In the absence of finding that the designation of critical habitat would increase threats to a species, if there are any benefits to a critical habitat designation, a finding that designation is prudent is warranted. Here, the potential benefits of designation include: (1) Triggering consultation under section 7 of the Act, in new areas for actions in which there may be a Federal nexus where it would not otherwise occur because, for example, it is unoccupied; (2) focusing conservation activities on the most essential features and areas; (3) providing educational benefits to State or county governments or private entities; and (4) preventing people from causing inadvertent harm to the species.

Because we have determined that the designation of critical habitat will not likely increase the degree of threat to the species and may provide some measure of benefit, we determine that designation of critical habitat is prudent for the Suwannee moccasinshell.

Our regulations (50 CFR 424.12(a)(2)) further state that critical habitat is not determinable when one or both of the following situations exists: (1) Information sufficient to perform required analysis of the impacts of the designation is lacking; or (2) the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Delineation of critical habitat requires, within the geographical area occupied by the Suwannee moccasinshell, identification of the physical or biological features essential to the conservation of the subspecies. While we have significant information on the habitat of the species, we need more information on biological needs of the species (i.e., specific habitat features on the landscape) in order to identify specific areas appropriate for critical habitat designation. In addition, as we have not determined the areas that may qualify for designation, the information sufficient to perform a required analysis of the impacts of the designation is lacking. Accordingly, we find designation of critical habitat to be not determinable at this time.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the

protective measures of the Act. Subsection 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for downlisting or delisting, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. If this species is listed as proposed, a recovery outline, draft recovery plan, and the final recovery plan would be made available on our website (*http://www.fws.gov/endangered*), or from our Panama City Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental

organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Florida and Georgia would be eligible for Federal funds to implement management actions that promote the protection or recovery of the Suwannee moccasinshell. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants*.

Although the Suwannee moccasinshell is only proposed for listing under the Act at this time, please let us know if you are interested in participating in conservation efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for conservation planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any

action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands administered by the Service and the U.S. Department of Agriculture's (USDA) U.S. Forest Service; issuance of section 404 Clean Water Act permits by the U.S. Army Corps of Engineers; construction and maintenance of roads, highways, or bridges by the U.S. Department of Transportation's Federal Highway Administration; and funding assistance for various projects administered by USDA's Natural Resources Conservation Service and the Federal Emergency Management Agency.

Under section 4(d) of the Act, the Service has discretion to issue regulations that we find necessary and advisable to provide for the conservation of threatened species. The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to threatened wildlife. The prohibitions of section 9(a)(1) of the Act, as applied to threatened wildlife and codified at 50 CFR 17.31, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of

these) threatened wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any listed species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species and for incidental take in connection with otherwise lawful activities. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of species proposed for listing. Based on the best available information, the following activities may potentially result in a violation of section 9 the Act; this list is not comprehensive:

Activities that the Service believes could potentially harm the Suwannee moccasinshell and result in ‘‘take,’’ include, but are not limited to:

(1) Unauthorized handling or collecting of the species;

(2) Destruction or alteration of the species’ habitat by discharge of fill material, dredging, snagging, impounding, channelization, or modification of stream channels or banks;

(3) Discharge of pollutants into a stream or into areas hydrologically connected to a stream occupied by the species; and

(4) Diversion or alteration of surface or ground water flow.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Panama City Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act, need not be prepared in connection with listing a species as an endangered or threatened species under the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of references cited in this rulemaking is available on the Internet at *http://www.regulations.gov* and upon request from the Panama City Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed rule are the staff members of the Panama City Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245; unless otherwise noted.

2. In § 17.11(h), add an entry for “Moccasinshell, Suwannee” to the List of Endangered and Threatened Wildlife in alphabetical order under CLAMS to read as set forth below:

§ 17.11 Endangered and threatened wildlife

* * * * *

(h) * * *

SPECIES		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	**Scientific name**						
* * * * * * *							
CLAMS							
* * * * * * *							
Moccasinshell, Suwannee	*Medionidus walkeri*	U.S.A. (FL, GA)	NA	T	XX	NA	NA
* * * * * * *							

* * * * *

Dated**: September 9, 2015**

Signed: _____ _____

Stephen Guertin

Director, U.S. Fish and Wildlife Service.

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