DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R2–ES–2022–0026; FF09E21000 FXES1111090FEDR 234]

RIN 1018–BE46

Endangered and Threatened Wildlife and Plants; Endangered Species Status With Critical Habitat for Texas Heelsplitter, and Threatened Status With Section 4(d) Rule and Critical Habitat for Louisiana Pigtoe

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the Texas heelsplitter (*Potamilus amphichaenus*) as an endangered species and the Louisiana pigtoe (*Pleurobema riddellii*) as a threatened species under the Endangered Species Act of 1973, as amended (Act). Both species are freshwater mussels. This document serves as our 12-month finding on a petition to list the Texas heelsplitter and Louisiana pigtoe. For the Louisiana pigtoe, we also propose a rule issued under section 4(d) of the Act (a ''4(d) rule'') to provide for the conservation of the species. In addition, we propose to designate critical habitat for the Texas heelsplitter and Louisiana pigtoe under the Act. In total, approximately 831.8 river miles (1,338.6 river kilometers) in 31 counties in Texas fall within the boundaries of the proposed critical habitat designation for the Texas heelsplitter, and approximately 1,028.2 river miles (1,654.3 river kilometers) in 3 counties in Arkansas, 6 parishes in Louisiana, 2 counties in Mississippi, 1 county in Oklahoma, and 21 counties in Texas fall within the boundaries of the proposed critical habitat designation for the Louisiana pigtoe. We announce the availability of a draft economic analysis of the proposed designation of critical habitat for the Texas heelsplitter and Louisiana pigtoe. Finally, we announce an informational meeting followed by a public hearing on this proposed rule. If we finalize this rule as proposed, it would extend the Act's protections to these species and their critical habitats.

DATES: We will accept comments received or postmarked on or before May 19, 2023. 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.

Public informational meeting and public hearing: We will hold a public informational session from 5 p.m. to 6 p.m., central time, followed by a public hearing from 6:30 p.m. to 8 p.m., central time, on May 2, 2023.

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

(1) *Electronically:* Go to the Federal eRulemaking Portal: *https://www.regulations.gov.* In the Search box, enter FWS–R2–ES–2022–0026, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ''Comment.''

(2) *By hard copy:* Submit by U.S. mail to: Public Comments Processing, Attn: FWS–R2–ES–2022–0026, U.S. Fish and Wildlife Service, MS: PRB/3W, 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 *https://www.regulations.gov.* This generally means that we will post any personal information you provide us (see Information Requested, below, for more information).

Availability of supporting materials: For the proposed critical habitat designation, the coordinates or plot points or both from which the maps are generated are included in the decision file and are available at *https://www.fws.gov/southwest/es/arlingtontexas/,* at *https://www.regulations.gov* under Docket No. FWS–R2–ES–2022–0026, and at the Arlington Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**). Additional supporting information that we developed for this critical habitat designation will be available on the Service's website, at *https://www.regulations.gov,* or both.

Public informational meeting and public hearing: The public informational meeting and the public hearing will be held virtually using the Zoom online video platform and via teleconference. See *Public Hearing,* below, for more information.

FOR FURTHER INFORMATION CONTACT: Debra Bills, Field Supervisor, U.S. Fish and Wildlife Service, Arlington Ecological Services Field Office, 501 West Felix Street, Suite 1105, Fort Worth, Texas 76115; telephone 817–277–1100. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, a species warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become endangered within the foreseeable future throughout all or a significant portion of its range). If we determine that a species warrants listing, we must list the species promptly and designate the species' critical habitat to the maximum extent prudent and determinable. We have determined that the Texas heelsplitter meets the definition of an endangered species and that the Louisiana pigtoe meets the definition of a threatened species; therefore, we are proposing to list them as such and proposing a designation of critical habitat for both species. Both listing a species as an endangered or threatened species and designating critical habitat can be completed only by issuing a rule through the Administrative Procedure Act rulemaking process.

What this document does. We propose to list the Texas heelsplitter as an endangered species and to list the Louisiana pigtoe as a threatened species with a 4(d) rule. We also propose to designate critical habitat for both species.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of 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 habitat loss through changes in water quality, the gradual accumulation of additional layers of fine sediments, and altered hydrology (Factor A) are the primary threats to these species, all of which are exacerbated by the ongoing and expected future effects of climate change (Factor E). Additionally, predation (Factor C) and collection (Factor B), as well as other natural or human-induced events/activities that result in direct mortality, are also

affecting those populations already experiencing low stream flow, and reservoirs and other instream barriers to fish movement (Factor E) that limit dispersal and prevent recolonization after stochastic events.

Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. 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 protections; 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 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.

Information Requested

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 other 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 species' 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 ranges, including distribution patterns and the locations of any additional populations of these species;

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

(e) Past and ongoing conservation measures for the species, their habitats, or both.

(2) Threats and conservation actions affecting these species, including:

(a) 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.

(b) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to these species.

(c) Existing regulations or conservation actions that may be addressing threats to these species.

(3) Additional information concerning the historical and current status of these species.

(4) Information on regulations that are necessary and advisable to provide for the conservation of the Louisiana pigtoe and that we can consider in developing a 4(d) rule for the species. We particularly seek information concerning the extent to which we should include any of the section 9 prohibitions in the 4(d) rule or whether we should consider any additional exceptions from the prohibitions in the 4(d) rule.

(5) Specific information on:

(a) The amount and distribution of Texas heelsplitter and Louisiana pigtoe habitat;

(b) Any additional areas occurring within the range of the Louisiana pigtoe, *i.e.,* Howard, Little River, and Sevier Counties, Arkansas; Allen, Beauregard, Rapides, St. Tammany, Vernon, and Washington parishes, Louisiana; Marion and Pearl River Counties, Mississippi; McCurtain County, Oklahoma; and Anderson, Angelina, Cherokee, Gregg, Hardin, Harrison, Houston, Jasper, Jefferson, Liberty, Montgomery, Nacogdoches, Orange, Panola, Polk, Rusk, Smith, Trinity, Tyler, Upshur, and Wood Counties, Texas, and Texas heelsplitter, *i.e.,* Anderson, Angelina, Cherokee, Ellis, Freestone, Gregg, Grimes, Hardin, Harrison, Henderson, Houston, Jasper, Jefferson, Kaufman, Leon, Madison, Navarro, Orange, Panola, Polk, Rains, Rusk, Sabine, Shelby, Smith, Trinity, Tyler, Upshur, Van Zandt, Walker, and Wood Counties, Texas, that should be included in the designation because they (i) are occupied at the time of listing and contain the physical or biological features that are essential to the conservation of the species and that may require special management considerations, or (ii) are unoccupied at the time of listing and are essential for the conservation of the species; and

(c) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; and

(d) To evaluate the potential to include areas not occupied at the time of listing, we particularly seek comments regarding whether occupied areas are adequate for the conservation of the species. Additionally, please provide specific information regarding whether or not unoccupied areas would, with reasonable certainty, contribute to the conservation of the species and contain at least one physical or biological feature essential to the conservation of the species. We also seek comments or information regarding whether areas not occupied at the time of listing qualify as ''habitat'' for the species.

(7) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat.

(8) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation, and the related benefits of including or excluding specific areas.

(9) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts and any additional information regarding probable economic impacts that we should consider.

(10) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act. If you think we should exclude any additional areas, please provide information supporting a benefit of exclusion.

(11) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments.

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, do not provide substantial information necessary to support a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made solely on the basis of the best scientific and commercial data available and section

4(b)(2) of the Act directs that the Secretary shall designate critical habitat on the basis of the best scientific information 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 *https://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 *https://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 *https://www.regulations.gov.*

Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that Texas heelsplitter is threatened instead of endangered or that Louisiana pigtoe is endangered instead of threatened, or we may conclude that one or both species do not warrant listing as either an endangered species or a threatened species. For critical habitat, our final designations may not include all areas proposed, may include some additional areas that meet the definition of critical habitat, or may exclude some areas if we find the benefits of exclusion outweigh the benefits of inclusion. In addition, we may change the parameters of the prohibitions or the exceptions to those prohibitions in the 4(d) rule if we conclude it is appropriate in light of comments and new information we receive. For example, we may expand the prohibitions to include prohibiting additional activities if we conclude that those additional activities are not compatible with conservation of the species. Conversely, we may establish additional exceptions to the prohibitions in the final rule if we conclude that the activities would facilitate or are compatible with the conservation and recovery of the species.

Public Hearing

We have scheduled a public informational meeting and public hearing on this proposed rule. We will hold the public informational meeting and public hearing on the date and at the times provided above under *Public informational meeting and public hearing* in **DATES**. We are holding the public informational meeting and public hearing via the Zoom online video platform and via teleconference so that participants can attend remotely. For security purposes, registration is required. You must register in order to listen and view the meeting and hearing via Zoom, listen to the meeting and hearing by telephone, or provide oral public comments at the public hearing by Zoom or telephone. For information on how to register, or if you encounter problems joining Zoom the day of the meeting, visit *https://www.fws.gov/office/arlington-ecological-services.* Registrants will receive the Zoom link and the telephone number for the public informational meeting and public hearing. If applicable, interested members of the public not familiar with the Zoom platform should view the Zoom video tutorials (*https://support.zoom.us/hc/en-us/articles/206618765-Zoom-video-tutorials*) prior to the public informational meeting and public hearing.

The public hearing will provide interested parties an opportunity to present verbal testimony (formal, oral comments) regarding this proposed rule. The public informational meeting will be an opportunity for dialogue with the Service. The public hearing is a forum for accepting formal verbal testimony. In the event there is a large attendance, the time allotted for oral statements may be limited. Therefore, anyone wishing to make an oral statement at the public hearing for the record is encouraged to provide a prepared written copy of their statement to us through the Federal eRulemaking Portal, or U.S. mail (see **ADDRESSES**, above). There are no limits on the length of written comments submitted to us. Anyone wishing to make an oral statement at the public hearing must register before the hearing (*https://www.fws.gov/office/arlington-ecological-services*). The use of a virtual public hearing is consistent with our regulations at 50 CFR 424.16(c)(3).

Previous Federal Actions

The Texas heelsplitter was identified as a category 2 candidate species on January 6, 1989 (54 FR 554). The category 2 designation was assigned to taxa for which information indicated that proposing to list as endangered or threatened was possibly warranted, but for which conclusive data on biological vulnerability and threats were not currently available to support proposed rules. The species remained so designated in subsequent candidate notices of review (CNORs) (56 FR 58804, November 21, 1991; 59 FR 58982, November 15, 1994). In the February 28, 1996, CNOR (61 FR 7596), we discontinued the designation of category 2 species as candidates; therefore, with the publication of that CNOR, the Texas heelsplitter was no longer a candidate species.

On June 25, 2007, we were petitioned to list both the Texas heelsplitter and Louisiana pigtoe. We published a substantial 90-day finding for Texas heelsplitter on December 15, 2009 (74 FR 66260), and for Louisiana pigtoe on December 16, 2009 (74 FR 66866).

This document constitutes our 12-month warranted petition finding, our proposed listing rule, and our proposed critical habitat rule for the Texas heelsplitter and Louisiana pigtoe.

Supporting Documents

A species status assessment (SSA) team prepared an SSA report for the Texas heelsplitter and Louisiana pigtoe. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of 11 appropriate specialists regarding the SSA. We received 6 responses.

I. Proposed Listing Determination

Background

General Mussel Biology

A thorough review of the taxonomy, life history, and ecology of the Texas heelsplitter and Louisiana pigtoe is presented in the SSA report (USFWS 2022, entire), and briefly summarized here.

Freshwater mussels, including the Texas heelsplitter and Louisiana pigtoe, have a complex life history involving parasitic larvae, called glochidia, which are wholly dependent on host fish. As freshwater mussels are generally sessile (immobile), dispersal is accomplished primarily through the behavior of host fish and their tendencies to travel upstream and against the current in rivers and streams. Mussels are broadcast spawners; males release

sperm into the water column, which is taken in by the female through the incurrent aperture (the tubular structure used to draw water into the body of the mussel). The developing larvae remain with the female until they mature and are ready for release as glochidia, to attach on the gills, head, or fins of fishes (Vaughn and Taylor 1999, p. 913; Barnhart *et al.* 2008, pp. 371–373).

Glochidia die if they fail to find a host fish, attach to the wrong species of host fish, attach to a fish that has developed immunity from prior infestations, or attach to the wrong location on a host fish (Neves 1991, p. 254; Bogan 1993, p. 599). Successful glochidia encyst (enclose in a cyst-like structure) on the host's tissue, draw nutrients from the fish, and develop into juvenile mussels (Arey 1932, pp. 214–215). The glochidia will remain encysted for about a month through a transformation to the juvenile stage. Once transformed, the juveniles will excyst from the fish and drop to the substrate.

Freshwater mussel species vary in both onset and duration of spawning, how long developing larvae are held in the marsupial gill chambers (gills used for holding eggs and glochidia), and which fish species serve as hosts. The mechanisms employed by mussel species to increase the likelihood of interaction between host fish and glochidia vary by species.

Mussels are generally immobile; their primary opportunity for dispersal and movement within the stream comes when glochidia attach to a mobile host fish (Smith 1985, p. 105). Upon release from the host, newly transformed juveniles drop to the substrate on the bottom of the stream. Those juveniles that drop in unsuitable substrates die because their immobility prevents them from relocating to more favorable habitat. Juvenile freshwater mussels burrow into interstitial substrates and grow to a larger size that is less susceptible to predation and displacement from high-flow events (Yeager *et al.* 1994, p. 220). Adult mussels typically remain within the same general location where they dropped off (excysted) from their host fish as juveniles.

Host specificity can vary across mussel species, which may have specialized or generalized relationships with one or more taxa of fish. Mussels have evolved a wide variety of adaptations to facilitate transmission of glochidia to host fish, including mantle displays (lures) mimicking fish or invertebrates; packages of glochidia (conglutinates) that mimic worms, insect larvae, larval fish, or fish eggs; and release of glochidia in mucous webs that entangle fish (Strayer *et al.* 2004, p. 431). Polymorphism (existence of multiple forms) of mantle lures and conglutinates frequently exists within mussel populations (Barnhart *et al.* 2008, p. 383), representing important adaptive capacity in terms of genetic diversity and ecological representation.

Texas Heelsplitter

The Texas heelsplitter was first described as the species *Unio amphichaenus* by Frierson (1898, p. 109) from the Sabine River near Logansport, Louisiana. The current recognized scientific name for Texas heelsplitter is *Potamilus amphichaenus* (Williams *et al.* 2017a, pp. 35, 42). The Texas heelsplitter is a medium- to large-sized freshwater mussel (up to 177 millimeters (mm) (7 inches (in)) shell length) that has a tan to brown or black elliptical shell, with lighter coloration on the beaks, and a relatively straight hinge line. Texas heelsplitters exhibit slight sexual dimorphism; females have a broadly rounded posterior margin and males are more pointed (Howells 2010b, p. 2). The base of the anterior margin exhibits a long, narrow gape, while a shorter, much wider gape is located along the posterior margin, presumably to accommodate the incurrent and excurrent apertures (Neck and Howells 1995, p. 4).

Although information specific to Texas heelsplitter reproduction is unavailable, other species from the tribe Lampsilini release glochidia in packets, called conglutinates, and are known to use mantle lures to attract sight feeding fishes that attack and rupture the marsupium, thereby becoming infested by glochidia (Barnhart *et al.* 2008, pp. 377, 380). Related species are long-term brooders (bradytictic), spawning and becoming gravid in the fall and releasing glochidia in the spring (Barnhart *et al.* 2008, p. 384). Freshwater drum (*Aplodinotus grunniens*) have been confirmed as host fish for the Texas heelsplitter (Bosman *et al.* 2015, p. 15).

A related freshwater mussel species, bleufer (*Potamilus purpuratus*), from the southeastern United States was reported to reach a maximum age of 9–26 years, and other related species ranged from 4–50 years with a higher growth rate compared to other species (Haag and Rypel 2011, pp. 229, 234, 239). The Texas heelsplitter has been reported mature at approximately 60 mm (2.4 in) (Ford *et al.* 2016, p. 31).

Texas heelsplitters occur in streams and rivers of the Trinity, Neches, and Sabine drainages in east Texas and in the Sabine River at the western border of Louisiana on substrates consisting of ''firm mud, sand, or finer gravels bottoms, in still to moderate flows'' and sometimes associated with fallen timber (Howells 2014, p. 69; Howells 2010b, p. 3 and table 2.3). Additionally, Texas heelsplitters can tolerate manmade impoundments and have been found in several East Texas reservoirs (Howells 2010b, p. 3).

Louisiana Pigtoe

The Louisiana pigtoe was originally described as the species *Unio riddellii* (Lea 1862, p. 228) from the Trinity River near the City of Dallas, Dallas County, Texas. The current recognized scientific name for Louisiana pigtoe is *Pleurobema riddellii* (Williams *et al.* 2017a, pp. 35, 42). The Louisiana pigtoe is a medium-sized freshwater mussel (shell lengths to greater than 62 mm (2.4 in)) with a brown to black, triangular to subquadrate shell without external sculpturing, sometimes with greenish rays. For a detailed description, see Howells *et al.* 1996 (pp. 91–92) and Howells 2014 (p. 65). Other native mussel species (*e.g.,* pimpleback (*Cyclonaias pustulosa*), Texas pigtoe (*Fusconaia askewi*), Trinity pigtoe (*F. chunii*), and Wabash pigtoe (*F. flava*)) can easily be mistaken for Louisiana pigtoe when identified by shell morphology alone.

Louisiana pigtoe are bradytictic (*i.e.,* long-term brooders; spawning occurs during the summer, and glochidia are held by the female over winter and released the following spring); however, gravid females have been observed in July (Marshall 2014, pp. 46–47). A closely related congener, the rough pigtoe (*Pleurobema plenum*), is known to utilize the tachytictic reproductive cycle (*i.e.,* short-term brooders; fertilization occurs in the spring, and glochidia are expelled during the summer or early fall) (EPA 2007, p. 37).

The primary host fish for Louisiana pigtoe has not been confirmed. Bullhead minnow (*Pimephales vigilax*), blacktail shiner (*Cyprinella venusta*), and red shiner (*Cyprinella lutrensis*) have been suggested as potential fish hosts based on a fish host distribution modeling effort (Marshall 2014, pp. 59–60).

A single juvenile Louisiana pigtoe from the Neches River, Texas, was reported to grow 15 mm (0.6 in) during its first year from an initial shell length of 2 mm (0.08 in) (Ford *et al.* 2016, p. 30). Sexual maturity is achieved at shell lengths around 40 mm (1.6 in) (Ford *et al.* 2016, pp. 28, 30), and Louisiana pigtoe could reach maturity in 3 to 4 years. Based on egg production, sexually mature females were estimated by external annuli to be between 4 and 12 years of age with shell lengths ranging

from 29–59 mm (1.1–2.3 in) (Hinkle 2018, p. 19).

Louisiana pigtoes occur in medium- to large-sized streams throughout portions of east Texas, Louisiana, west Mississippi, southeast Oklahoma, and southwest Arkansas (Vidrine 1993, p. 66; Howells *et al.* 1997, p. 22; Randklev *et al.* 2013, p. 269; Randklev 2018, entire) in flowing waters (0.3–1.4 meters per second (m/s)) over substrates of cobble and rock or sand, gravel, cobble, and woody debris; they are often associated with riffle, run, and sometimes larger backwater tributary habitats (Ford *et al.* 2016, pp. 42, 52; Howells 2010a, pp. 3–4; Williams *et al.* 2017b, p. 21). Specimens are typically found in shallower waters (0.1–1.2 m (0.3–3.9 feet (ft) in depth; Howells 2010a, p. 3)); however, recent surveys found Louisiana pigtoe as deep as 3.33 m (10.9 ft) in the lower Neches River (Corbett 2020, pp. 2, 4).

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for endangered and threatened species. In 2019, jointly with the National Marine Fisheries Service, the Service issued a final rule that revised the regulations in 50 CFR part 424 regarding how we add, remove, and reclassify endangered and threatened species and the criteria for designating listed species' critical habitat (84 FR 45020; August 27, 2019). On the same day, the Service also issued final regulations that, for species listed as threatened species after September 26, 2019, eliminated the Service's general protective regulations automatically applying to threatened species the prohibitions that section 9 of the Act applies to endangered species (84 FR 44753; August 27, 2019).

The Act defines an ''endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ''threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following 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.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term ''threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ''threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ''threat'' may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ''endangered species'' or a ''threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ''endangered species'' or a ''threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term ''foreseeable future,'' which appears in the statutory definition of ''threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ''foreseeable future'' extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ''Reliable'' does not mean ''certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened species under the Act. It does, however, provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS–R2–ES–2022–0026 on *https://www.regulations.gov.*

To assess the viability of the Texas heelsplitter and Louisiana pigtoe, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the

ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated each individual species' life-history needs. The next stage involved an assessment of the historical and current condition of each species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about each species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and their resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability. We analyze these factors both individually and cumulatively to determine the current condition of the species and project the future condition of the species under several plausible future scenarios.

Using various timeframes and the current and projected future resiliency, redundancy, and representation, we describe the species' levels of viability over time. For the Texas heelsplitter and Louisiana pigtoe to maintain viability, their populations or some portion thereof must be sufficiently resilient. A number of factors influence the resiliency of their populations, including occupied stream length, abundance, and recruitment. Elements of the species' habitat that determine whether Texas heelsplitter and Louisiana pigtoe populations can grow to maximize habitat occupancy influence those factors, thereby increasing the resiliency of populations. These resiliency factors and habitat elements are discussed in detail in the SSA report and summarized here.

Species Needs

Occupied Stream Length

Most freshwater mussels, including the Texas heelsplitter and Louisiana pigtoe, are found in aggregations called mussel beds that vary in size from about 50 to over 5,000 square meters (m^2), separated by stream reaches in which mussels are absent or rare (Vaughn 2012, p. 2). Mussel populations in streams are highly patchy, especially at a small scale (less than 100 stream meters) (Strayer 1999, p. 468). We define a mussel population at a larger scale than a single mussel bed; it is the collection or series of mussel beds within a stream reach between that infested host fish may travel, allowing for ebbs and flows in mussel bed density and abundance over time throughout the population's occupied reach. Therefore, adequately resilient mussel populations must occupy stream reaches that are long enough such that stochastic events that adversely affect individual mussel beds do not eliminate the entire population. Repopulation by glochidia-infested fish from other mussel beds within the reach, if present and connected, allow the population to recover from the temporary loss of individuals due to occasional disruptive events.

For our analysis, we consider populations extending greater than 50 river miles (river mi) (80 kilometers (km)) to have a high probability of persistence to stochastic events because a single event is unlikely to affect the entire population. Populations occupying reaches between 20 and 50 river mi (32 and 80 km) have moderate resiliency to stochastic events, while populations occupying reaches less than 20 mi (32.19 km) have low resiliency. Note that we define populations occupying a stream length at or approaching zero miles as being functionally extirpated (populations with abundance that is currently at such low levels that we expect them to become extirpated in the near future) or extirpated.

Abundance

Populations require a minimum number of individuals to ensure stability and persistence. This threshold is often referred to as the minimum viable population and is generally calculated through a population viability analysis that estimates extinction risk given a number of input variables. There are no published minimum viable population estimates for the Texas heelsplitter or Louisiana pigtoe; therefore, it is unknown how many individuals are required to sustain populations of these mussels. However, population health is dependent on species abundance as well as water availability and the ability for mussels to meet life-history needs within their habitats, which were evaluated as part of the SSA.

It is important to recognize that Louisiana pigtoe observations used to determine abundance in the SSA report may include misidentified individuals. Without genetic confirmation, identification of Louisiana pigtoe in the field based on shell morphology is questionable, with seasoned experts accurately identifying the species only 76 percent of the time (Inoue 2018, p. 1). Unfortunately, genetic testing was not available for the majority of reported Louisiana pigtoe historical observations, which relied solely on shell morphological characteristics for species identification (Randklev 2018, entire). Since there is no way to know the margin of error or to otherwise account for potential misidentifications, we determined abundance for Louisiana pigtoe based on reported observations (as is) and did not adjust or modify the survey data to compensate for potential misidentifications. We do not consider misidentification to be an issue for Texas heelsplitter observations, since they are recognizable based on morphological characteristics observed in the field and not easily confused with other species.

Mussel abundance in a given stream reach is a product of the number of mussel beds and the density of mussels within those beds. For populations of Texas heelsplitter and Louisiana pigtoe to be healthy (*i.e.,* adequately resilient), mussel beds of sufficient number and density must be present to allow recovery from natural and local stochastic events, allowing the mussel bed to persist and the overall local population to survive within a stream reach. Mussel abundance is indicated by the number of individuals found during a sample event. Mussel surveys are rarely a complete census of the population, but density can be estimated by the number of individuals found during a survey effort using various statistical techniques (*i.e.,* estimate the total population from a subset of surveyed individuals). Population estimates are not available for all Texas heelsplitter and Louisiana pigtoe populations, and techniques for available surveys are not always directly comparable (*i.e.,* same area size searched, similar search time, etc.). When available, we used the number of

individuals captured relative to the amount of time surveys were conducted to estimate population abundance, hereafter referred to as overall catch per unit effort (CPUE). Although overall CPUE was the preferred metric to estimate population abundance, when overall CPUE was not available, the number of individuals detected during the most recent comprehensive survey effort was used as a surrogate metric. Calculation of abundance in this manner is intended to be an estimate and is considered the best available information when population trend data do not exist and precise population abundance cannot be determined. Using CPUE, we are able to estimate if the species is currently (since year 2000) common or rare within populations. Abundance for each population is rated from ''high'' to ''low'' (or functionally extirpated/extirpated) based on overall CPUE (or number of individuals found when survey effort is not reported) according to live or recent dead found during surveys since the year 2000, as follows: ''high'' is overall CPUE of greater than or equal to 4.0 (or 100 or more individuals); ''moderate'' is overall CPUE greater than or equal to 2.0 and less than 4.0 (or between 25 individuals and 99 individuals); ''low'' is overall CPUE greater than or equal to 0.5 and less than 2.0 (or between 3 and 24 individuals); and ''functionally extirpated/extirpated'' is overall CPUE less than 0.5 (or fewer than 3 individuals).

Reproduction/Recruitment

Sufficiently resilient Texas heelsplitter and Louisiana pigtoe populations must also be reproducing and recruiting young individuals into the population to replace individuals lost to old age, disease, or predation. Population size and abundance are a reflection of habitat conditions, environmental stressors, and other past influences on the population. The ability of populations to successfully reproduce and recruit will determine if a population may be stable, increasing, or decreasing over time. For example, a large, dense mussel population that contains mostly old individuals is not likely to remain large and dense into the future if there are few young individuals to sustain the population over time (*i.e.,* death rates exceed birth rates resulting in negative population growth). Conversely, a population that is less dense but has many young and/or gravid individuals is likely to grow, becoming more densely populated in the future (*i.e.,* birth rates, and subsequent recruitment of reproductive adults, exceed death rates, resulting in positive population growth). Detection rates of very young juvenile mussels during routine abundance and distribution surveys are extremely low due to sampling bias because sampling involves tactile searches and mussels less than 35 mm (1.4 in) can be difficult to detect (Strayer and Smith 2003, pp. 47–48). For this evaluation, we concluded there was evidence of reproduction/recruitment for a population when surveys detected small-sized individuals (near the low end of the detectable range or approximately 35 mm (1.4 in) in size) since the year 2000 or gravid females (eggs and/or glochidia visible) were observed during the reproductively active time of year.

Risk Factors for Texas Heelsplitter and Louisiana Pigtoe

We reviewed the potential risk factors (*i.e.,* threats, stressors) that could be affecting the Texas heelsplitter and Louisiana pigtoe now and in the future. In this proposed rule, we will discuss only those factors in detail that could meaningfully impact the status of the species. Many of the threats and risk factors are the same or similar for both species. Where the effects are expected to be similar, we present one discussion that applies to both species. Where the effects may be unique to one species, we will address that specifically. The primary risk factors (*i.e.,* threats) affecting the status of the Texas heelsplitter and Louisiana pigtoe all fall under Factor A of the Act and are: (1) Water quality changes, (2) altered hydrology, (3) changes to habitat structure and substrate, and (4) habitat fragmentation. These factors are all exacerbated by the ongoing and expected effects of climate change (Factor E). Additionally, predation (Factor C) and collection (Factor B), as well as other natural or human induced events/activities that result in direct mortality, are also affecting those populations already experiencing low stream flow, and reservoirs and instream barriers to fish movement (Factor E) limit dispersal and prevent recolonization after stochastic events.

Changes to Water Quality

Freshwater mussels require water in sufficient quantity and quality on a consistent basis to complete their life cycles and those of their host fishes. Water quality can be degraded through contamination or alteration of water chemistry. Environmental contaminants include a broad array of natural, synthetic, and chemical substances introduced to the environment that can be hazardous to living organisms. Chemical contaminants are ubiquitous throughout the environment and are a major contributor to the current declining status of freshwater mussel species nationwide (Augspurger *et al.* 2007, p. 2025). Contaminants enter the environment through both point (*e.g.,* hazardous spills, industrial wastewater, municipal effluents) and non-point (*e.g.,* urban stormwater and agricultural runoff) sources. These sources contribute organic compounds, trace metals, pesticides, plastics, petroleum hydrocarbons, flame retardants, and a wide variety of emerging contaminants (*e.g.,* pharmaceuticals and personal care products). Ammonia is of particular concern below wastewater treatment plant outfalls because freshwater mussels have been shown to be particularly sensitive to increases in ammonia levels (Augspurger *et al.* 2003, p. 2569). The extent to which environmental contaminants adversely affect aquatic biota can vary depending on many site-specific variables, but species diversity and abundance consistently ranks lower in waters that are known to be polluted or otherwise impaired by contaminants. For example, freshwater mussels are not generally found for many miles downstream of municipal wastewater treatment plants (treatment plants) (Gillis *et al.* 2017, p. 460; Goudreau *et al.* 1993, p. 211; Horne and McIntosh 1979, p. 119).

There are approximately 386 treatment plant discharge permits issued for the Trinity River Basin from its headwaters above the Dallas-Fort Worth metroplex down to the Gulf of Mexico (Texas Commission on Environmental Quality (TCEQ) 2018, entire). The San Jacinto Basin, although geographically smaller than most other basins in Texas, has approximately 1,052 treatment plant outfalls, while the Neches and Sabine rivers have 218 and 191 outfalls, respectively. In addition, some industrial permits can discharge millions of gallons per day and have ammonia limits that exceed levels that inhibited growth in juvenile fatmucket (*Lampsilis siliquoidea*) and rainbow mussel (*Villosa iris*) during 28-day chronic tests (Wang *et al.* 2007, entire). Immature mussels (juveniles and glochidia) are especially sensitive to water quality degradation and contaminants (Cope *et al.* 2008, p. 456; Wang *et al.* 2017, pp. 791–792; Wang *et al.* 2018, p. 3041).

An additional type of water quality impairment is the alteration of water quality parameters such as dissolved oxygen, temperature, total dissolved solids (TDS), and salinity levels. Dissolved oxygen levels may be reduced from increased nutrients in the water

from runoff or wastewater effluent, and juveniles seem to be particularly sensitive to low dissolved oxygen (Sparks and Strayer 1998, pp. 132–133). Increases in water temperature from water diversions, climate change, or low flows during droughts can exacerbate low dissolved oxygen levels as well as have its own effects on juvenile and adult mussels.

Total dissolved solids, a measure of the mineral content of water (*i.e.,* inorganic salts, metals, cations, or anions dissolved in water, including calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates), is commonly elevated in watersheds impacted by a variety of industrial, commercial, urban, and agricultural activities and has been associated with acute and chronic toxicity to aquatic organisms. Watersheds with increasing trends in conductivity or TDS are experiencing declines in water quality that can be harmful to mussels and other aquatic organisms. Increasing trends in TDS are common in watersheds impacted by anthropogenic activities.

Contaminant spills are also a concern. Texas leads the nation in crude oil and natural gas production, and various chemicals, refined fuels, and wastewater related to oil and natural gas exploration are routinely transported along highways. These facilities and equipment used for extraction, transportation, and refinement of hazardous materials are all potential sources of hazardous spills, and can originate from human error, equipment failure, or catastrophic events like industrial accidents, fires, or floods. Although spills are relatively short-term events and may be localized, water resources nearby can be severely impacted and degraded for years after the incident along with the biological resources that inhabit the area. A reduction in surface flow drought, instream diversions, or groundwater extraction serve to concentrate contaminant and salinity levels, increases water temperatures in streams, and exacerbates effects to Texas heelsplitter and Louisiana pigtoe.

Poor water quality affects most Texas heelsplitter and Louisiana pigtoe populations currently to some degree, and future water quality is expected to decrease due to decreasing stream flow and increasing temperatures. We foresee threats to water quality increasing into the future due to the effects of climate change as demand and competition for limited water resources grows (USFWS 2022, pp. 61–62).

Altered Hydrology

Altered hydrology, through changes to historical flow regimes, leads to inundation, or low- or high-flow conditions that may reduce the quality of affected habitats to the point where they are no longer suitable for freshwater mussels. While Texas heelsplitter and Louisiana pigtoe have adapted to survive natural fluctuations in flows, populations that experience sustained higher than normal flows, prolonged flooding, or unnatural fluctuations in the frequency or intensity of high/low flows or extended (or repeated) drying events will not persist. Virtually every watershed within the range of these two freshwater mussels has experienced some level of alteration, a trend that has continued into the 21st century, particularly in areas with rapid population growth.

Inundation of previously free-flowing rivers and streams by impoundments has arguably had the single largest human-related impact on the distribution of freshwater mussels. The construction of reservoirs and other impoundments permanently alters the hydrology and, hence, the ecology of rivers, often with deleterious effects to water quality, water quantity, host fish movement, and dispersal of mussel glochidia, nutrient cycling, sediment deposition, fate and transport of contaminants, and numerous other changes to the physical, chemical, and biological characteristics of affected areas (upstream and downstream). The close relationship of flow to mussels makes them uniquely vulnerable to hydrology changes.

Both mussel species are adapted to flowing water (lotic habitats) rather than standing water (lentic habitats). Louisiana pigtoe require free-flowing water to survive. The Texas heelsplitter has also been observed in lentic habitats and appears to be tolerant of reservoir conditions; this species may occur in higher densities in areas of reservoirs that are influenced by stream inflows where conditions more closely resemble their preferred riverine habitat (Whisenant 2019, p. 1; Neck and Howells 1995, p. 15).

Inundation of mussel habitat has primarily occurred upstream of dams, including major flood control and water supply reservoirs, such as Toledo Bend Reservoir, and smaller structures like low water vehicle crossings and diversion dams typically found along tributaries on privately owned land. These structures alter the hydrology of rivers by slowing, impeding, or diverting normal flow patterns, and increasing deposition in some areas and eliminating the interstitial spaces that juvenile Texas heelsplitters and Louisiana pigtoes inhabit.

Large reservoirs that release water from the hypolimnion, the deeper water is cold and often devoid of oxygen and necessary nutrients, can adversely affect mussel survival, as cold water can stunt mussel growth and delay or hinder spawning (Vaughn and Taylor 1999, p. 917). Cold water releases from reservoirs like Broken Bow Lake in southeast Oklahoma can affect water temperatures for miles downstream. These cold releases create an extinction gradient, where freshwater mussels are absent or presence is low near the dam, and abundance does not rebound until some distance downstream where ambient conditions raise the water temperature to within the tolerance limits of mussels (Davidson *et al.* 2014, p. 29; Vaugh and Taylor 1999, pp. 915, 916).

The construction of dams for flood control and drinking water supply, and the subsequent management of water releases from those reservoirs (*e.g.,* timing, intensity, and duration), often resulting in higher base flows and peak flows of reduced intensity but longer duration, has significant impacts on the natural function and hydrology of rivers and streams. The additional shear stress caused by these sustained high base flows can incise channels, erode river banks, scour mussel beds, and remove substrate preferred by mussels. Over time, the physical force of these higher base flows can dislodge mussels from the sediment and permanently alter the geomorphology of rivers.

During flood events, along with water, rivers transport sediment, mostly as solids, suspended in the water column. The increase in flooding severity results in greater sediment transport, with important effects to substrate stability and benthic habitats for freshwater mussels, as well as other organisms that are dependent on stable benthic habitats. Further, water released by dams is usually clear due to reduced sediment load and results in incision (downcutting of the bed) and coarsening of the bed material until a new equilibrium is reached (Kondolf 1997, p. 535). The extent to which downcutting and erosion occurs as a result of dam releases varies, but in some cases leads to bank collapse, burial of mussel beds, and mortality. Conversely, depending on how dam releases are conducted, reduced flood peaks can lead to accumulations of fine sediment in the river bed (*i.e.,* loss of flushing flows; Kondolf 1997, pp. 535, 548).

Operation of reservoirs for flood control, water supply, and recreation results in altered hydrologic regimes,

including an attenuation of both high- and low-flow events. The changes to flood flows alters sediment dynamics, as sediments are trapped above and scoured below major impoundments, and negatively affect freshwater mussels and their habitats (Gascho Landis and Stoeckel 2016, p. 234; Ford 2013, p. 3). Evidence that the Texas heelsplitter is able to tolerate reservoir conditions leads us to believe the overall impacts of reservoirs may be more pronounced for the Louisiana pigtoe (Howells 2010b, p. 3).

Very low flows and low water levels are also detrimental to Texas heelsplitter and Louisiana pigtoe populations. Droughts that occurred in the recent past led to extremely low flows in several east Texas rivers. Some rivers, or portions thereof, are resilient to drought because they are spring-fed (Calcasieu, Neches rivers), contain large volumes of water (Trinity River), have large reservoirs in the upper reaches that release water for downstream users (all, excluding Calcasieu River), or have significant return flows (Pearl, Sabine, Trinity rivers); however, drought in combination with increasing trends in groundwater extraction may lead to lower river flows of longer duration than previously recorded. Reservoir releases can be managed to some extent, but in many cases dam operators must stop releases during droughts to conserve water and protect water supplies, or to maximize flood releases during major floods to protect public safety and property, both can negatively affect mussels downstream.

Streamflow and overall discharge for rivers inhabited by the Texas heelsplitter and Louisiana pigtoe are expected to decline due to climate change and projected increases in temperatures and evaporation rates, resulting in more frequent and intense droughts (Lafontaine *et al.* 2019, entire) (Factor E). Return flows, consisting primarily of treated municipal wastewater, are projected to continue to increase in areas with population growth and may serve to ameliorate some of the effects of climate change downstream of metropolitan areas, albeit with notable impacts to water quality; however, these benefits may become less significant as municipalities increase wastewater reuse as a conservation measure. The Trinity River, for example, has been a significantly modified, highly controlled, and highly regulated system since the 1960s, with low flows steadily increasing as the population has grown, resulting in base flows that are significantly higher compared to historical flows (Clark and Mangham 2019, p. 9). The increase in base flows can be attributed to substantial return flows from Dallas/Fort Worth metropolitan area wastewater treatment plants and are projected to continue to increase in the future. Surface and alluvial aquifer groundwater withdrawals will likely increase in the future due to the effects of more intense droughts, with reductions in stream flows putting an additional strain on aquatic resources. However, with the exception of stream segments where municipal effluent return flows supplement base flows, most streams experience lower base flows and reduced high-flow events after major reservoirs are constructed (U.S. Geological Survey (USGS) 2008, pp. 964, 966).

Many streams within the range of these two freshwater mussel species receive significant groundwater inputs from multiple springs associated with aquifers. As spring flows decline due to drought, climate change, or groundwater pumping, habitat for freshwater mussels in affected streams is reduced and could eventually cease to exist. While the Texas heelsplitter and Louisiana pigtoe may survive short periods of low flow, as low flows persist, mussels can be subjected to oxygen deprivation, increased water temperature, stranding, increased predation, and, ultimately, desiccation which leads to reduced survivorship, reproduction, and recruitment to the population. High-flow events can lead to increased risk of mortality through physical removal, transport, or burial of mussels as unstable substrates are transported downstream by flood waters (entrainment) and dislodged mussels are later redeposited in locations that may not be suitable habitat.

The distribution of mussel communities and their habitats is affected by large floods returning at least once during the typical life span of an individual mussel (generally from 3–30 years), as mediated by the presence of flow refuges, where shear stress is relatively low, sediments are relatively stable, and mussels must either tolerate high-frequency disturbances or be eliminated and can colonize only areas that are infrequently disturbed between events (Strayer 1999, pp. 468–469). Shear stress and relative shear stress are limiting to mussel abundance and species richness (Randklev *et al.* 2017, p. 7), and riffle habitats may be more resilient to high-flow events than bank habitats.

The Texas heelsplitter and Louisiana pigtoe undoubtedly evolved in the presence of extreme hydrological conditions, including severe droughts leading to dewatering, and heavy rains leading to damaging scour events and movement of mussels and substrate, although the frequency, duration, and intensity of these events may be different from what is observed today. These same patterns led to the development of flood control and storage reservoirs throughout Texas in the 20th century. The increasing variability, frequency, and severity of extreme weather events is a contributing factor to the contraction of populations for both species.

Another source of alteration to hydrology is from sand and gravel mining directly from rivers or from adjacent alluvial deposits (Kondolf 1997, p. 541). Instream mining directly impacts river habitats by removal of substrates used by mussels, and can indirectly affect river habitats through channel incision, bed coarsening, and lateral channel instability (Kondolf 1997, p. 541). Excavation of pits in or near to the channel can create a knickpoint, which can contribute to erosion (and mobilization of substrate) associated with head cutting (Kondolf 1997, p. 541). Pits associated with off-channel mining of the floodplain can become involved during floods, such that the pits become hydrologically connected, and thus can affect sediment dynamics in the stream or river (Kondolf 1997, p. 545). Sand and gravel mines occurred historically and continue to operate in some basins throughout the ranges of the Texas heelsplitter and Louisiana pigtoe.

Specifically, a change to the number of days with zero flow was limiting for the Louisiana pigtoe, and the number of high pulses was limiting for the Texas heelsplitter. In summary, results to date indicate natural flow regimes have been altered in east Texas rivers, as was expected, which has led to modification of instream habitats and contributed to declines in freshwater mussels (Khan and Randklev 2019, entire). These findings agree with the estimate of many experts, who based on their research believe: (1) Portions of the Trinity River have been significantly modified and may no longer support mussels (particularly in the upper basin where stream hydrology and geomorphology have been permanently altered), and (2) the Neches River is the least altered and has some of the best remaining mussel habitat, along with the most abundant and diverse mussel populations, in east Texas.

Changes to Habitat Structure/Substrate

Texas heelsplitters and Louisiana pigtoes inhabit microhabitat along river stream beds that have abundant

interstitial spaces or small openings in an otherwise closed matrix of stable substrates created by gravel, cobble, boulders, bedrock crevices, tree roots, and other vegetation, with some amount of fine sediment (*i.e.,* clay and silt) necessary to provide appropriate shelter. Excessive amounts of fine sediments can reduce available microhabitat by filling in these interstitial spaces, effectively smothering mussels in place. Interstitial spaces provide essential habitat for juvenile mussels, offering protection from predation and vital nutrients. While adult mussels can be physically buried by excessive sediment, the main impacts of excess sedimentation on freshwater mussels are often sublethal and include interference with feeding mediated by valve closure (Box and Mossa 1999, p. 101).

Under a natural flow regime, sediments are naturally washed away from one microhabitat to another, the amount of sediment in the substrate is relatively stable, and different reaches within a river or stream may be aggrading or degrading sediment at any given time (Poff *et al.* 1997, pp. 770–772). Current (and past) human activities often result in enhanced sedimentation in river systems, including legacy sediment from past land disturbances and reservoir construction. These activities continue in many basins occupied by the Texas heelsplitter and Louisiana pigtoe, and influence river processes and sediment dynamics (Wohl 2015, pp. 31, 39), with legacy effects that can result in degradation of mussel habitat. Sediments deposited by large-scale flooding or other disturbance may persist for several years until adequate cleansing flows can redistribute that sediment downstream. Conversely, when water velocity decreases from reduced streamflow or inundation, water loses its ability to carry sediment in suspension and sediment falls to the substrate, eventually smothering mussels not adapted to soft substrates (Watters 2000, p. 263).

Sediment accumulation can be exacerbated when there is a simultaneous increase in the sources of fine sediments in a watershed, including streambank erosion from development, agricultural activities, livestock and wildlife grazing, in-channel disturbances, roads, and crossings, among others (Poff *et al.* 1997, p. 773). In areas with ongoing development, runoff can transport substantial amounts of sediment from ground disturbance related to construction activities with inadequate or absent sedimentation controls. While these construction impacts can be transient (lasting only during the construction phase), the long-term effects of development on water quantity and quality are long lasting and can result in hydrological alterations as increased impervious cover increases run off and resulting shear stress causes streambank instability and additional sedimentation.

Habitat Fragmentation

Historically, the Texas heelsplitter and Louisiana pigtoe were likely distributed in areas with suitable habitat throughout the river basins described above under Background. Today, the remaining Texas heelsplitter and Louisiana pigtoe populations are isolated from one another by major reservoirs, habitat alterations, and de-watering events, prolonged drought, among other reasons, such that natural recolonization of areas previously extirpated is extremely unlikely, if not impossible, due to barriers to host fish movement. With the exception of the Louisiana pigtoe populations in the Red River Basin in Arkansas and Oklahoma, there is currently no opportunity for substantial interaction among extant Texas heelsplitter and Louisiana pigtoe populations, resulting in genetic isolation.

The impacts of reservoirs are significant, causing permanent changes to fish movement, water quality, and hydrology, with cascading effects to river ecology and aquatic species that utilize areas downstream. Small populations are more affected by limited host fish immigration potential because they are susceptible to genetic drift (random loss of genetic diversity) and inbreeding depression. At the species level, populations that are eliminated due to stochastic events cannot be recolonized naturally, leading to reduced overall redundancy and representation.

The confirmed or assumed primary host fish species for both the Texas heelsplitter and Louisiana pigtoe are known to be common and widespread throughout the range of both mussel species and are therefore not believed to be a limiting factor to dispersal at this time (Nico and Sturtevant 2022, entire; Nico *et al.* 2022, entire; Nico and Fuller 2022, entire; Fuller *et al.* 2022, entire). Each of the identified fish hosts are known to tolerate lake environments and may utilize impoundments as corridors to facilitate migration between hydrologically connected tributaries, thus aiding mussel dispersal. If fish host species are indeed abundant, existing dams, the construction of new major dams and reservoirs, and other barriers to fish movement are the primary mechanism through which remaining populations are isolated. Furthermore, reservoir impacts to river ecosystems can be difficult and costly to manage or minimize.

Most reservoirs function primarily to provide water supply and/or flood control, and meeting those objectives typically involves holding on to as much water as possible (*i.e.,* not releasing); this may limit the ability of reservoir managers to modify releases for the purpose of meeting wildlife conservation or recovery goals. Although dams have been managed to allow fish passage for spawning, to our knowledge, fish passage has not been facilitated specifically to allow movement of host fish for the benefit of freshwater mussels, nor would this be cost-effective considering host fish for the Texas heelsplitter and Louisiana pigtoe are believed to be abundant. Nevertheless, reservoirs represent a permanent barrier to freshwater mussel dispersal. The overall impact of reservoirs is believed to be greater for the Louisiana pigtoe than for the Texas heelsplitter, which is able to persist in reservoir conditions although questions remain about their reproductive success in lake environments.

Direct Mortality

Direct mortality includes any activity or event, whether human-induced or natural, that results in the death of mussels within a localized area due to removal, crushing, burying, consumption, desiccation, or poisoning. Potential activities or events causing direct mortality include, but are not limited to, development projects (such as bridge replacement, stream channelization, and impoundment construction), undeveloped low-water crossings with vehicular traffic that intersect mussel beds, bank collapse, accidental release of hazardous materials, predation, vandalism, and collection (whether for scientific purposes or recreation) (USFWS 2022, pp. 57–58). The frequency, intensity, and magnitude of these impacts likely vary in time and by location and are difficult to quantify with any certainty other than to acknowledge that they exist and negatively affect mussel survival to some degree.

Predation on freshwater mussels is a natural ecological interaction. Raccoons, feral hogs, muskrats, snapping turtles, and fish are known to prey upon mussels (East *et al.* 2013, p. 692; Walters and Ford 2013, p. 480; Kaller *et al.* 2007, p. 174; Neves and Odom 1989, p. 939). Under natural conditions, the level of predation occurring is not likely to pose

a significant risk to any given population; however, during periods of low flow, terrestrial predators have increased access to portions of the river that are otherwise too deep under normal flow conditions, resulting in unnaturally high levels of predation that can decimate mussel populations. Predation during drought has been observed for the Texas heelsplitter on the Sabine River (Walters and Ford 2013, p. 479). Drought, low-flow conditions, and reductions in minimum summer base flows are predicted to occur more often and for longer periods due to the effects of future climate change; therefore, the tributaries and upper portions of focal areas for the Texas heelsplitter and Louisiana pigtoe are expected to experience increased predation pressure into the future (Lafontaine *et al.* 2019, entire).

Additionally, certain mussel beds within some populations, due to ease of access, are vulnerable to over-collection and vandalism. These areas have well known and well documented mussel beds that are often sampled multiple times annually by various researchers for various scientific projects. Populations subjected to repeated sampling or monitoring may experience increased stress or higher rates of mortality. Mortality may also occur in areas where local fishing enthusiasts have been observed using freshwater mussels as bait. The risk of direct mortality from recreation or over-collection for scientific purposes are compounded by the additional stressors discussed in this section, which can influence mussel survival in a cumulative manner. Because collection of Louisiana pigote is localized and could affect populations, we carried this risk factor forward as a population-level threat. Service biologists recently hosted a meeting with State biologists, consultants, and academia who are involved in mussel research to discuss ongoing monitoring and scientific collections and to reduce the likelihood of over-harvesting mussels from any given population (USFWS 2018, p. 1), and we anticipate this collaboration among researchers will continue into the future with ongoing coordination and annual meetings.

Invasive Species

Invasive species, such as Asian clam (*Corbicula fluminea*), zebra mussel (*Dreissena polymorpha*), feral hog (*Sus scrofa*), floating water hyacinth (*Eichhornia crassipes*), giant salvinia (*Salvinia molesta*), and hydrilla (*Hydrilla verticillata*), occur throughout the ranges of the Texas heelsplitter and Louisiana pigtoe and can negatively impact mussel survival. These impacts include predation (feral hog), habitat destruction or modification (feral hog, floating water hyacinth, giant salvinia, hydrilla), changes to water quality (feral hog, zebra mussel), increased resource competition (Asian clam, zebra mussel), or physical impairment (zebra mussel, hydrilla) (Kaller and Kelso 2006, pp. 172–174; Howells 2010a, p. 13; Howells 2010b, pp. 14–15).

Although zebra mussel infestations occur in several Texas reservoirs, including Lewisville Lake and Lake Livingston, populations have not yet become established in nearby river habitats occupied by the Texas heelsplitter and Louisiana pigtoe (Ford *et al.* 2016, p. 47; Texas Parks and Wildlife Department (TPWD) 2019, entire; USGS 2019e, entire).

Feral hogs occur throughout the range of both mussel species and are known to engage in a variety of activities that cause bank and streambed damage, contribute to erosion and increased sedimentation, and their presence appears to cause native mussel diversity and abundance to decrease through organic enrichment of the water and unfavorable changes to microbial community composition (Kaller *et al.* 2007, p. 174; Howells 2010b, p. 10).

Invasive macrophyte infestations of floating water hyacinth, hydrilla, and giant salvinia negatively impact native mussels and their host fish throughout the southern half of the ranges of the Texas heelsplitter and Louisiana pigtoe by creating hypoxic conditions through respiration and during decay (Karatayev and Burlakova 2007, p. 298; USGS 2019b, entire; USGS 2019c, entire; USGS 2019d, entire). Dense mats of hydrilla can also impede native mussel movement during periods of fluctuating surface water levels, leaving them stranded as water levels recede.

Climate Change

Climate change in the form of the change in timing and amount of precipitation and air temperature increase is occurring, and continued greenhouse gas emissions at or above current rates will cause further warming (Intergovernmental Panel on Climate Change (IPCC) 2021, pp. 1–13–1–15). Warming in Texas is expected to be greatest in the summer (Maloney *et al.* 2014, p. 2236, figure 3), with the number of extremely hot days (high temperatures exceeding 35 °C (95 °F)) projected to double by around 2050 (Kinniburgh *et al.* 2015, p. 83). Changes in stream temperatures are expected to reflect changes in air temperature, at a rate of an approximately 0.6–0.8 °C (33 °F) increase in stream water temperature for every 1 °C (33 °F) increase in air temperature (Morrill *et al.* 2005, pp. 1–2, 15), with implications for temperature-dependent water quality parameters such as dissolved oxygen and ammonia toxicity. Given that freshwater mussels in Texas exist at or near the ecophysiological edge of climate and habitat gradients of freshwater mussel biogeography in North America, they may be particularly vulnerable to future climate changes in combination with current and future stressors (Burlakova *et al.* 2011a, pp. 156, 161, 163; Burlakova *et al.* 2011b, pp. 395, 403).

While projected changes to rainfall in Texas may seem relatively small (U.S. Global Change Research Program (USGCRP) 2017, p. 217), higher temperatures caused by anthropogenic activity will lead to increased soil water deficits because of higher rates of evapotranspiration. In turn, higher evapotranspiration rates will likely result in increasing drought severity in future climate scenarios, and the warming atmosphere is projected to continue across the United States (USGCRP 2017, p. 231). Even if precipitation and groundwater recharge remain at current levels, increased groundwater pumping and resulting aquifer shortages due to increased temperatures are nearly certain (Loaiciga *et al.* 2000, p. 193; Mace and Wade 2008, pp. 662, 664–665; Taylor *et al.* 2013, p. 3).

Effects of climate change, such as changes to seasonal rainfall patterns, air temperature increases, and increases in drought frequency and intensity, have been shown to be occurring throughout the ranges of the Texas heelsplitter and Louisiana pigtoe (Andreadis and Lettenmaier 2006, p. 3; USGCRP 2017, p. 188); these effects are expected to exacerbate several of the stressors discussed above, such as water temperature and flow loss (Wuebbles *et al.* 2013, p. 16). A recent review of future climate projections for Texas concludes that both droughts and floods could become more common in east Texas, with droughts like 2011 (the driest on record) becoming commonplace by the year 2100 (Mullens and McPherson 2017, pp. 3, 6). This trend of more frequent droughts is driven by increases in hot temperatures (*e.g.,* daily maximum) and the number of days projected to be at or above 37.8 °C (100 °F), which is set to ''increase in both consecutive events and the total number of days'' (Mullens and McPherson 2017, pp. 14–15). Similarly, floods and extreme runoff are projected to become more common and severe in the 21st century as the frequency,

magnitude, and intensity of heavy precipitation events increase (Mullens and McPherson 2017, p. 20; USGCRP 2017, p. 224).

In the analysis of the future condition for the Texas heelsplitter and Louisiana pigtoe, climate change is considered further under various plausible future scenarios, serving to exacerbate already deteriorating conditions through an increase of fine sediments, changes to water quality, loss of flowing water, and predation, among others.

Summary of Risk Factors for Texas Heelsplitter and Louisiana Pigtoe

Our analysis of the past, current, and future influences on the needs of the Texas heelsplitter and Louisiana pigtoe for long-term viability revealed that there are four that pose the greatest impact on current condition and future viability: degradation of water quality, altered hydrology, substrate changes, and habitat fragmentation, all of which are exacerbated by climate change.

Conservation Efforts and Regulatory Mechanisms

The level of interest among stakeholders, regulatory agencies, and partners to better understand the status, threats, and conservation of freshwater mussels in Texas has increased significantly since 2017, when the Service initiated reviews of several Texas mussel species for possible listing under the Act. This led to improved communication among interested parties and multiple partnerships seeking to conduct research and improve our understanding of the health and distribution of mussel populations across Texas, as well as increased efforts to protect and conserve known populations. Although there are currently no formal conservation agreements in place designed to specifically provide benefits to the Texas heelsplitter or Louisiana pigtoe, we are in discussions with multiple stakeholders who are interested in strengthening partnerships to conserve rare species, including several river authorities that are in the process of developing candidate conservation agreements with assurances (CCAAs). The CCAAs, if finalized, would implement voluntary conservation actions in river basins that would result in a net conservation benefit for the species. Additionally, several stakeholders have voluntarily funded research to ensure that we have the best available information upon which to base a listing decision, and we commend them for their efforts to improve the science of freshwater mussels in Texas. Interested stakeholders and potential future conservation partners include the Trinity River Authority, Lower Neches Valley Authority, North Texas Municipal Water District, Sabine River Authority, the Cities of Dallas and Fort Worth, Tarrant Regional Water District, Texas Department of Transportation, Texas Parks and Wildlife Department, U.S. Army Corps of Engineers, Texas Comptroller of Public Accounts, Texas A&M University, Texas State University, and others.

With regard to silvicultural operations that occur on forested areas across the range of the species, we recognize that private timber companies routinely implement State-approved best management practices (BMPs; as reviewed by Cristan *et al.* 2018, entire). Adherence to these BMPs, such as citing river crossings away from sensitive areas and leaving intact habitat as buffers for areas adjacent to streams, broadly protects water quality by reducing timber harvest-related impacts, particularly erosion and sedimentation (as reviewed by Cristan *et al.* 2018; Warrington *et al.* 2017, entire; and Schilling *et al.* 2021, entire). However, it is important to recognize that while BMPs reduce timber harvest impacts, they do not eliminate impacts; therefore, sensitive species and their habitats may still be impacted even when BMP guidelines are followed.

Some voluntary habitat restoration projects have been completed on private lands within the river basins currently known to be occupied by one or both species. These restoration projects include upland and riparian habitat enhancements coordinated by our State, Federal, and nongovernmental partners, as well as our Partners for Fish and Wildlife Program. There are also regulatory mechanisms in place to protect water quality and quantity, such as protections afforded by the Clean Water Act (33 U.S.C. 1251 *et seq.*), that are implemented by the States with oversight by the EPA. While these regulations are in place and provide some level of protection, population declines continue to be documented in some species of freshwater mussels, indicating that existing regulations may not be sufficient to prevent extinction.

Species Condition

Here we discuss the current and future condition of each known population, taking into account the risks to those populations that are currently occurring, as well as management actions that are currently occurring to address those risks. We consider climate change to be currently occurring, resulting in changes to the timing and amount of rainfall affecting streamflow, which can alter stream characteristics such as an increase in stream temperatures, erosion, and the accumulation of fine sediments. The current condition of each species and population is based upon the cumulative effects of these factors. In the SSA report, for each species and population, we developed and assigned condition categories for three population factors (occupied stream length, abundance, reproduction/recruitment; see *Species Needs,* above) and three habitat factors (habitat structure/substrate, hydrological regime, and water quality; see *Risk Factors for Texas Heelsplitter and Louisiana Pigtoe,* above) that are important for the viability of each species. The summation of all six condition scores assigned to each factor were then used to determine the overall condition of each population: high (healthy), moderate (moderately healthy), low (unhealthy), or functionally extirpated/extirpated. All six factors were weighted equally in importance except abundance, which was viewed as the most relevant and direct measure of current biological condition; therefore, overall condition was capped by the abundance score such that no population's overall condition could exceed the abundance score. These overall conditions translate to our presumed probability of persistence of each population, with healthy populations having the highest probability of persistence over 20 years (greater than 90 percent), moderately healthy populations having a probability of persistence that falls between 60 and 90 percent, unhealthy populations having the lowest probability of persistence (between 10 and 60 percent). Functionally extirpated populations (less than 10 percent) are not expected to persist over 20 years or are already extirpated.

Texas Heelsplitter

There are five remaining Texas heelsplitter populations, occurring in three adjacent river basins (Neches, Sabine, and Trinity River basins) in east Texas and on the Sabine River to the western border of Louisiana. Historically, populations likely occurred throughout the entirety of each basin where connectivity was not an issue and conditions were suitable. Based on our analysis, three populations are considered to have a low current condition, and two populations are considered functionally extirpated/extirpated (see Table 1, below).

Neches River Basin: There are two Texas heelsplitter populations in the

Neches River Basin, one in the Neches River/B.A. Steinhagen Reservoir and the other in the Lower Neches River; these populations are fragmented and isolated from each other by the dam that forms B.A. Steinhagen Reservoir. The Neches River/B.A. Steinhagen Reservoir population occurs in habitat on a fairly long reach (240.9 river mi (387.6 km)) of the Neches River that extends from just below Lake Palestine to B.A. Steinhagen Reservoir and includes the portion of mainstem Angelina River between B.A. Steinhagen and Sam Rayburn reservoirs. This population is characterized by low abundance and a lack of evidence of reproductive success, resulting in low recruitment of new individuals. Further, water quality in tributaries and segments of the occupied habitat is affected by a variety of point and non-point source pollution, and infrequent but substantial drawdowns of the B.A. Steinhagen Reservoir have resulted in direct mortality of Texas heelsplitters. The Lower Neches River population extends 74.2 river mi (119.4 km) downstream from Lake B.A. Steinhagen Reservoir's Town Bluff Dam to approximately 4.5 river mi (7.2 km) downstream of the Village Creek confluence. This population is also characterized by low abundance and lack of evidence of reproductive success, with subsequent low recruitment of new individuals. Further, hydrology and water quality in this reach are affected by water releases from the B.A. Steinhagen Reservoir. The Neches River/B.A. Steinhagen Reservoir population and the Lower Neches River population have a low overall current condition, resulting in low resiliency for both populations.

Sabine River Basin: This Texas heelsplitter population occurs in a fairly long reach (245.8 river mi (395.5 km)) of the Sabine River Basin, that includes the Toledo Bend Reservoir, Sabine River upstream to Lake Tawakoni's Iron Bridge Dam, a portion of Lake Fork Creek upstream from its confluence with the Sabine River, and a portion of Patroon Bayou upstream from its confluence with Toledo Bend Reservoir. While the overall water quality, habitat structure/substrate, and occupied habitat reach length are in high condition, construction of Lake Tawakoni and Toledo Bend Reservoir have altered the natural hydrologic conditions through dam releases causing substrate scouring and elimination of habitat downstream. Due to lack of evidence of reproduction and recruitment, as well as extremely low abundance (CPUE = 0.14) based on 99 surveys since 2000, this population of Texas heelsplitter is considered functionally extirpated/extirpated.

Trinity River Basin: There are two populations of the Texas heelsplitter in the Trinity River Basin, one within Grapevine Lake and another within the Trinity River/Lake Livingston, that are hydrologically isolated from one another by the dam that forms Grapevine Lake. The habitat structure/substrate rating for the Grapevine Lake population is in high condition, with stormwater runoff and the discharge of municipal wastewater and associated pollutants limiting water quality to moderate condition. Reservoir-related changes to natural flow regimes likewise limited the hydrology rating to moderate condition. However, with only two individuals found during population surveys, abundance is extremely low, this combined with the lack of juveniles and gravid females, the Grapevine Lake population is considered to be functionally extirpated. The Trinity River population is characterized by high current condition for the relatively large habitat reach length currently occupied, while habitat structure/substrate is affected by unnaturally elevated base flows and is in moderate current condition. Large daily volumes of municipal wastewater discharge and associated pollutants are impacting water quality and hydrology, which are in low current condition. This population is also characterized by low abundance and lack of evidence of reproductive success, with subsequent low recruitment of new individuals. The Trinity River/Lake Livingston population has a low overall current condition and low resiliency.

TABLE 1—ESTIMATED CURRENT OVERALL CONDITION OF TEXAS HEELSPLITTER POPULATIONS

[USFWS 2022, pp. 40–44]

River basin	Population	Overall current condition
Sabine	Sabine River/Toledo Bend.	FE/E.[1] [2]
Neches	Neches River/B.A. Steinhagen.	Low.[2]
	Lower Neches River	Low.[2]
Trinity	Grapevine Lake	FE/E.[1] [2]
	Trinity River/Lake Livingston.	Low.[2]

[1] FE/E = Functionally extirpated/extirpated.
[2] Indicates representation areas where overall condition was capped by abundance.

Redundancy describes the ability of a species to withstand and recover from catastrophic events. High redundancy is achieved through multiple populations that serve to spread risk, thereby reducing the impact that any one event might have in terms of overall loss to the species. Redundancy is characterized by having multiple healthy, resilient populations distributed across the range of the species. It can be measured by population number, resiliency, spatial extent, and degree of connectivity. Our analysis explored the influence of the number, distribution, and connectivity of populations on the species' ability to withstand catastrophic events.

Within the identified representation areas (Neches, Sabine, and Trinity River basins), only the Neches and Trinity River basins currently have at least one known population (the Sabine River/Toledo Bend population in the Sabine River Basin and Grapevine Lake in the Trinity River Basin are considered functionally extirpated). The Neches River Basin currently has two populations (Neches River and Lower Neches River populations); however, these populations are hydrologically isolated, and therefore provide only minimal redundancy.

Representation describes the ability of a species to adapt to changing environmental conditions over time. It is characterized by the breadth of genetic and environmental diversity within and among populations. Our analysis explores the relationship between the species life history and the influence of genetic and ecological diversity and the species ability to adapt to changing environmental conditions over time.

We consider the Texas heelsplitter to have representation in the form of genetic, geographic, and ecological diversity in the three currently occupied river basins. Because there are no freshwater connections between the three basins, we treated each river basin as separate areas of representation.

Louisiana Pigtoe

Overall, there are 13 remaining populations of Louisiana pigtoe in multiple river drainages throughout portions of east Texas (Big Cypress-Sulphur, Neches-Angelina, Sabine, and San Jacinto river basins), Louisiana (Calcasieu, Sabine, and Pearl river systems), west Mississippi (Pearl River), southeast Oklahoma (Little River), and southwest Arkansas (Cossatot, Saline, Rolling Fork, and Little rivers). Because reported populations from the Ouachita River system in Arkansas were determined to be phylogenetically distinct (a separate species) from Louisiana pigtoe, they were not considered in the SSA. In 2019, an additional population was discovered within the Lower Neches Valley River

Authority canal system in Beaumont, Texas (Bio-West 2021, p. 1). Because this population occupies artificially maintained habitat that may not persist without active operational management by the Lower Neches Valley River Authority, it was not considered for analysis in the SSA.

Historically, the Louisiana pigtoe likely occurred throughout each basin wherever conditions were suitable and connectivity was not an issue, with populations connected by fish migration; however, due primarily to impoundments, the populations are currently isolated from one another, and repopulation of functionally extirpated/extirpated locations is unlikely to occur without human assistance. Two populations are currently considered to be in high condition, four populations are in moderate condition, five populations are in low condition, and two populations are considered functionally extirpated/extirpated (see Table 2, below).

Big Cypress-Sulphur Basin: Although Louisiana pigtoes have not been genetically confirmed and observations may be misidentified as Wabash pigtoe (*Fusconaia flava*), past surveys indicated Louisiana pigtoe presence (Randklev 2018, entire) in this basin. Therefore, we included this population in this assessment. The Louisiana pigtoe population in Big Cypress Bayou includes approximately 32.0 river mi (51.5 km) of Big Cypress Bayou and Little Cypress Bayou upstream of their confluence. This population is characterized by moderate condition for occupied habitat stream length, abundance, habitat structure/substrate, hydrology, and water quality; the habitat factors are influenced by a variety of anthropogenic activities that vary by watershed, including stormwater runoff and discharges from multiple wastewater treatments plants. However, there has been a lack of reported juveniles or gravid females, so this population is in low condition for reproduction and recruitment.

Calcasieu River Basin: Louisiana pigtoe has a single population in the Calcasieu-Mermentau Basin that occurs along an approximately 134-river-mi (216-km) section of hydrologically connected portions of the mainstem Calcasieu River, and the Whisky Chitto and Tenmile creeks located in Allen, Rapides, and Vernon parishes, Louisiana. This population is characterized as being in high condition for occupied habitat reach length and habitat structure/substrate, while hydrology and water quality are in moderate condition due to fluctuations in flow rates and municipal wastewater effluent discharges, among other sources of pollution. However, abundance, reproduction, and recruitment are in low condition, which corresponds to low resiliency.

Neches River Basin: The Neches River Basin in Texas has three populations of Louisiana pigtoe, one each in the Angelina (above Sam Rayburn Reservoir), Neches (above B.A. Steinhagen Reservoir), and Lower Neches rivers (below B.A. Steinhagen Reservoir). These three populations combined extend over 400 river mi (644 km) in a basin that many experts believe contains some of the best remaining habitat and most diverse populations of freshwater mussels in Texas. The Neches River and Lower Neches River populations are hydrologically isolated from each other by the Town Bluff Dam that forms B.A. Steinhagen Reservoir, and the Angelina River population is isolated from the Neches River population by Sam Rayburn Dam and Reservoir. The Neches River population's current condition is characterized as high condition for the occupied habitat reach length (203 river mi (326.7 km)), abundance, habitat structure/substrate, and hydrology, and moderate condition for reproduction/recruitment and water quality. The Lower Neches River population is characterized by high current condition for occupied habitat reach length (160.4 river mi (258.1 km)) and habitat structure/substrate, and a moderate current condition for hydrology, water quality, and reproduction/recruitment due to the impacts of fluctuating stream flows, pollution loading from point and non-point sources, and few reports of gravid females or juvenile mussels. In addition, few individuals have been observed, resulting in a low current condition for population abundance. The Angelina River population is in high condition for occupied habitat reach length (53.2 river mi (85.6 km)), habitat structure/substrate, and hydrology; however, water quality impacts such as elevated bacteria, fecal coliform, and ammonia resulted in a moderate current condition for water quality. Like the Lower Neches River population, due to the few numbers of individuals observed and a lack of juvenile or gravid female presence, abundance and reproduction/recruitment are in low condition for the Angelina River population. The Neches River population has a high overall current condition, and the Lower Neches River and Angelina River populations have a low overall current condition (primarily due to being capped by low abundance).

Pearl River Basin: The Pearl River Basin in Louisiana and Mississippi has a single population of the Louisiana pigtoe within the main stem that extends approximately 280 river mi (450 km) below Ross Barnett Dam near Jackson to Picayune, Mississippi (upstream of Interstate 59). A new impoundment proposed by the Rankin-Hinds Pearl River Flood and Drainage Control District, located 9 mi (14.5 km) downstream of Ross Barnett Reservoir, intended for flood control, is still under review. For the Pearl River population, we determined that occupied habitat reach length is in high condition, and habitat structure/substrate, hydrology, and water quality are in moderate condition due to erratic flows and pollutants from urban areas and industry wastewater discharge. Because few individuals have been reported and there is a lack of juvenile or gravid female presence, abundance and reproduction/recruitment are in low condition. The Pearl River population has an estimated overall low current condition and low resiliency.

Red River Basin: The Red River Basin contains four distinct populations of the Louisiana pigtoe that extend along 88.3 river mi (142.1 km) within the Little River drainage in Arkansas and Oklahoma, including populations in the Cossatot River, Little River/Rolling Fork, Lower Little River, and Saline River. Millwood Lake, located in southwest Arkansas, hydrologically separates the Cossatot River, Saline River, and Little River/Rolling Fork populations from the Lower Little River population. The current condition evaluation for the Cossatot River population determined that abundance, reproduction/recruitment, and habitat structure/substrate are in high condition, and occupied habitat reach length, hydrology, and water quality are in moderate condition due to fluctuations of stream flows from Gillham Lake, as well as pollutant discharges from agriculture and other sources. No habitat or population factors are determined to be in low condition. The Little River/Rolling Fork population's current condition evaluation determined occupied habitat reach length and reproduction/recruitment are in high condition. All other population and habitat factors are in moderate condition due to lower abundance, fluctuations in instream flow (which affect benthic habitat, substrate, and stream hydrology), and increased levels of zinc, lead, and salinity (among other pollutants), leading to moderate water quality. The Saline River population's current condition evaluation found

occupied habitat reach length, abundance, hydrology, and water quality in moderate condition caused by prolonged high water levels and low levels of dissolved oxygen. Due to the lack of evidence of reproductive success and subsequent recruitment of new individuals, and altered flow conditions downstream of Dierks Lake, reproduction/recruitment and habitat structure/substrate are in low condition. The Lower Little River population's current condition evaluation determined that reproduction/recruitment and all habitat factors are in low condition primarily because of its short reach length (8.5 river mi (14.16 km)), altered flow regime, and paucity of survey data. This population is located downstream of Millwood Lake and Dam, a flood control reservoir, and is subject to altered hydrology that further impacts habitat structure and substrates during flood events. Agricultural runoff associated with the lower section of this reach impacts water quality. Due to the extremely low numbers of individuals observed (abundance), this population is considered functionally extirpated/extirpated. In summary, the Cossatot River population has a high overall current condition and high resiliency, the Little River/Rolling Fork and Saline River populations have a moderate overall current condition and moderate resiliency, and the Lower Little River population is considered functionally extirpated/extirpated.

Sabine River: There are two known populations of the Louisiana pigtoe within the Sabine River, one located along 87 river mi (140 km) between Hawkins and Tatum, Texas, and a second population within a 9-river-mi (15-km) segment of Bayou Anacoco in Louisiana. These populations are hydrologically separated by Toledo Bend Dam and Reservoir. The Sabine River population's current condition evaluation determined that occupied habitat reach length and habitat structure/substrate are in high condition. Dam releases from Lake Tawakoni and Toledo Bend Reservoir, wastewater releases, and water quality degradation (including elevated levels of bacteria) are primary causes for moderate current conditions for hydrology and water quality. Due to an extremely low number of individuals detected during surveys, and the lack of juveniles or gravid females observed, abundance and reproduction/recruitment are in low condition, and this population is considered functionally extirpated/extirpated. The Bayou Anacoco population's current condition evaluation found habitat structure/substrate is high condition, and abundance, hydrology, and water quality are in moderate condition. However, the occupied habitat reach length and reproduction/recruitment are in low condition due to the distribution of observed individuals and lack of reported juveniles or gravid females. The Bayou Anacoco population is in moderate current overall condition and has moderate resiliency.

East Fork San Jacinto River: There is one known population of Louisiana pigtoe that occurs within a short (1.3-river-mi (2-km)) segment of the East Fork San Jacinto River near Plum Grove, Texas. The population's current condition evaluation determined that hydrology and water quality are in moderate condition, whereas sand and gravel mining are affecting the habitat structure/substrate, which is in low condition. Due to a low number of individuals detected and lack of juveniles or gravid females observed, population abundance and reproduction/recruitment are in low condition. The East Fork San Jacinto River population is determined to be in overall low condition and has low resiliency.

TABLE 2—ESTIMATED CURRENT OVERALL CONDITION OF KNOWN LOUISIANA PIGTOE POPULATIONS

[USFWS 2022, pp. 34–40]

River basin	Population	Overall current condition
Red	Little River/Rolling Fork	Moderate.
	Cossatot River	High.
	Saline River	Moderate.
	Lower Little River	FE/E. [1] [2]
Big Cypress-Sulphur	Big Cypress Bayou	Moderate.
Calcasieu-Mermentau	Calcasieu River	Low. [2]
Pearl	Pearl River	Low. [2]
Sabine	Sabine River	FE/E. [1] [2]
	Bayou Anacoco	Moderate.
Neches	Angelina River	Low. [2]
	Neches River	High.
	Lower Neches River	Low. [2]
San Jacinto	East Fork San Jacinto River	Low.

[1] FE/E = Functionally extirpated/extirpated.
[2] Indicates representation areas where overall condition was capped by abundance.

Within identified representation areas, the Big Cypress-Sulphur, Calcasieu-Mermentau, Pearl, and San Jacinto River basins each have only one known current population, and therefore lack redundancy should catastrophic events occur that cause extirpation of one or a few populations. The Sabine River Basin has two separate populations (Sabine River and Bayou Anacoco populations) but lacks redundancy due to the Sabine River population being functionally extirpated. The Neches and Red River basins each currently have three known populations (the Lower Little River population in the Red River Basin is considered functionally extirpated), however each population is hydrologically isolated within their respective river basins and are, therefore, considered to provide only limited redundancy.

We consider Louisiana pigtoe to have representation in the form of genetic, ecological, and geographical diversity between each of seven river basins: Big Cypress-Sulphur, Calcasieu-Mermentau, Neches, Pearl, Red, Sabine, and San Jacinto. Because there are no un-impounded, freshwater connections that allow movement between the seven basins, each river was considered a separate area of representation.

Future Conditions

As part of the SSA, we developed multiple future condition scenarios to capture the range of uncertainties

regarding future threats and the projected responses by the Texas heelsplitter and Louisiana pigtoe. Our scenarios included a status quo scenario, which incorporated the current risk factors continuing on the same trajectory that they are on now. We also evaluated two future scenarios that incorporated varying levels of increasing risk factors with elevated negative effects on Texas heelsplitter and Louisiana pigtoe populations. However, because we determined that the current condition of the Texas heelsplitter is consistent with an endangered species (see *Texas Heelsplitter: Determination of Status,* below), we are not presenting the results of the future scenarios in this proposed rule. Please refer to the SSA report (Service 2022) for the full analysis of future scenarios.

We forecasted the Louisiana pigtoe's responses to two plausible future scenarios of environmental conditions projected across the next 10, 25, and 50 years. Ten years represents one to two generations of mussels, assuming an average reproductive life span of five to 10 years. Twenty-five years similarly represents at least two to four mussel generations and 50 years represents at least five or more generations of mussels. The scenarios project the threats into the future and consider the impacts those threats could have on the viability of the Louisiana pigtoe. We apply the concepts of resiliency, redundancy, and representation to the future scenarios to describe possible future conditions of the Louisiana pigtoe. The scenarios described in the SSA report represent only two possible future conditions. Uncertainty is inherent in any projection of future condition, so we must consider plausible scenarios to make our determinations. When assessing the future, viability is not a specific state, but rather a continuous measure of the likelihood that the species will sustain populations over time.

We included climate change in our future scenarios as a factor that would add to the negative impacts of the primary threats on the species' habitat. Climate change is expected to alter the natural flow regime through increased drought and flooding worsening desiccation, scour, and sedimentation. Global climate models project changes in global temperature and other associated climatic changes based on potential future scenarios of greenhouse gas concentrations in the atmosphere (*i.e.,* Representative Concentration Pathways, or RCPs). RCP 4.5 assumes major near-future cuts to carbon dioxide emissions, and RCP 8.5 assumes that current emissions practices continue with no significant change (Terando et al. 2020, p. 10). Thus, these RCPs represent conditions in the upper and lower ends of the range of what can reasonably be expected for the future effects of climate change (Terando et al. 2020, p. 17).

Scenario 1 assesses the species' responses to moderate increases in stressors influencing Louisiana pigtoe populations. Scenario 1 is based on RCP 4.5 emission trajectory and associated model projections, and represents medium-term increases in emissions followed by a decline through the rest of the century. Scenario 2 assesses the species' responses to severe increases in stressors and is based on RCP 8.5 projections. Scenario 2 also includes anthropogenic actions, such as the construction of new reservoirs, wastewater treatment plants, and other currently proposed projects, and manifests as a future where the hydrological conditions of many of the rivers and streams currently occupied by Louisiana pigtoe are altered such that base flows are diminished, floods are more severe if not more frequent, and mussels and their habitats are adversely affected through degradation of water quality and quantity. These altered hydrological conditions are primarily caused by a combination of increasing anthropogenic stressors and climate change. Due to a lack of resolution of the available data, we were unable to distinguish any meaningful difference between a moderate increase in stressors and a moderate decrease in stressors. As a result, we limited the future forecasts to these two scenarios, which we projected over a 50-year period. We restricted our evaluation to 50 years primarily due to limitations projecting non-modeled, extrapolated future conditions for water quality, road density, and habitat fragmentation. Fifty years encompasses about 5 generations of the Louisiana pigtoe; additionally, projected human population growth and the limitations of existing resources are expected to increase and interact with climate effects to exacerbate the effects of drought which is likely to impact water quality and quantity (*i.e.,* the ability to provide the minimum flow needed by the Louisiana pigtoe). A full description of the future scenarios and our methods is available in the SSA report (USFWS 2022, pp. 63–73).

Under Scenario 1, populations of the Louisiana pigtoe decline in resiliency, redundancy, and representation over time as conditions moderately decline from current conditions. One population will remain in moderate condition, seven in low condition, and five functionally extirpated in 50 years. This species will lose two areas of representation, diminishing the overall adaptive capacity to future environmental change in the next 50 years (see Table 3).

TABLE 3—FUTURE CONDITION OF LOUISIANA PIGTOE POPULATIONS WITH A MODERATE INCREASE IN STRESSORS

[Scenario 1]

Species	River basin	Population	Scenario 1 future condition		
			10 years	25 years	50 years
Louisiana Pigtoe	Red Little River/Rolling Fork.	Moderate	Low	Low.	
		High	High	Moderate.	
	Cossatot River	Moderate	Moderate	Low.	
	Saline River	FE/E [1]	FE/E [1]	FE/E.[1]	
	Lower Little River				
	Big Cypress-Sulphur	Big Cypress Bayou	Moderate	Moderate	Low.
	Calcasieu	Calcasieu River	Low	Low	FE/E.[1]
	Pearl	Pearl River	Low	Low	Low.
	Sabine	Sabine River	FE/E [1]	FE/E [1]	FE/E.[1]
		Bayou Anacoco	Low	Moderate	Low.
	Neches	Angelina River	Low	Low	FE/E.[1]
		Neches River	High	Low	Low.
		Lower Neches River	Low	Low	Low.

TABLE 3—FUTURE CONDITION OF LOUISIANA PIGTOE POPULATIONS WITH A MODERATE INCREASE IN STRESSORS—Continued

[Scenario 1]

Species	River basin	Population	Scenario 1 future condition		
			10 years	25 years	50 years
	San Jacinto	East Fork San Jacinto River.	Low	Low	FE/E.[1]

[1] FE/E = Functionally extirpated/extirpated.

Under Scenario 2, populations of the Louisiana pigtoe further decline in resiliency, redundancy, and representation over time as the effects of climate change impact populations through extremely low stream flows, severe increases in sedimentation, reductions in water quality, and an increase in potential for desiccation of habitat. Eight populations of Louisiana pigtoe are expected to become either functionally extirpated or extirpated within 50 years, with the remaining five populations in low condition. The Louisiana pigtoe is projected to lose four of the seven current representation areas in 50 years, with eight populations remaining or becoming extirpated; therefore, the adaptive capacity of this species is projected to be severely reduced in the future (see Table 4).

TABLE 4—FUTURE CONDITION OF LOUISIANA PIGTOE POPULATIONS WITH A SEVERE INCREASE IN STRESSORS

[Scenario 2]

Species	River basin	Population	Scenario 2 future condition		
			10 years	25 years	50 years
Louisiana Pigtoe	Red	Little River/Rolling Fork.	Moderate	Low	Low.
			High	High	Low.
		Cossatot River	Moderate	Low	Low.
		Saline River	FE/E[1]	FE/E[1]	FE/E.[1]
		Lower Little River			
	Big Cypress-Sulphur	Big Cypress Bayou	Moderate	Moderate	Low.
	Calcasieu-Mermentau	Calcasieu River	Low	Low	FE/E.[1]
	Pearl	Pearl River	Low	Low	FE/E.[1]
	Sabine	Sabine River	FE/E[1]	FE/E[1]	FE/E.[1]
		Bayou Anacoco	Low	Moderate	FE/E.[1]
	Neches	Angelina River	Low	Low	FE/E.[1]
		Neches River	High	Low	Low
		Lower Neches River	Low	Low	FE/E.[1]
	San Jacinto	East Fork San Jacinto River.	Low	FE/E[1]	FE/E.[1]

[1] FE/E = Functionally extirpated/extirpated.

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Water quality degradation, altered hydrology, changes to habitat structure/substrate, habitat fragmentation, invasive species, climate change, and collecting are all factors that influence or could influence the viability of these two freshwater mussel species. These factors also have the potential to act cumulatively to impact Texas heelsplitter and Louisiana pigtoe viability and their cumulative impacts were considered in our characterization of the species' current and future condition in the SSA. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Determination of Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an ''endangered species'' as a species in danger of extinction throughout all or a significant portion of its range, and a ''threatened species'' as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of an endangered species or a threatened species because of any of the following 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.

Status Throughout All of Its Range

After evaluating threats to the Texas heelsplitter and Louisiana pigtoe and

assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we found that both species of freshwater mussels have declined significantly in overall distribution and abundance. At present, most of the known populations exist in very low abundances and show limited evidence of recruitment. Furthermore, existing available habitats are reduced in quality and quantity, relative to historical conditions. Our analysis revealed six primary threats that caused these declines and pose a meaningful risk to the viability of the species. These threats are primarily related to habitat changes (Factor A): impairment of water quality, altered hydrology, the accumulation of fine sediments, and habitat fragmentation, all of which are exacerbated by the effects of climate change (Factor E). Predation (Factor C) and collection (Factor B), as well as other natural or human-induced events/activities that result in direct mortality, are also affecting those populations already experiencing low stream flow, and reservoirs and instream barriers to fish movement (Factor E) limit dispersal and prevent recolonization after stochastic events.

Populations of the Texas heelsplitter and Louisiana pigtoe are faced with a myriad of stressors from natural and anthropogenic sources that pose a risk to their survival in both large and small river segments. Climate change has the noteworthy distinction of being able to directly or indirectly exacerbate the most relevant stressors to freshwater mussels wherever they occur. Climate projections suggest persistent droughts over the continental United States that are longer, cover more area, and are more intense than what has been experienced in the 20th century (APA 2019, p. 4; Terando *et al.* 2018, p. 786; Wehner *et al.* 2017, p. 237). Humans are likely to respond to climate change in predictable ways to meet their needs, such as increased groundwater pumping and surface water diversions, and increased use of reverse osmosis to treat sources of water that are of poor quality (thereby generating increasing volumes of wastewater). These activities will increase overall demand for freshwater resources at a time when those very resources are strained and less abundant (reviewed in Banner *et al.* 2010, entire). We expect climate change impacts to occur throughout the range of both the Texas heelsplitter and the Louisiana pigtoe.

The threats to the species, acting alone or in combination with each other and climate change, could result in the extirpation of additional mussel populations, further reducing the overall redundancy and representation of the Texas heelsplitter and Louisiana pigtoe. Historically, each species, bolstered by large, interconnected populations (*i.e.,* with meta-population dynamics), would have been more resilient to stochastic events such as drought, excessive sedimentation, and scouring floods. As locations became extirpated by catastrophic events, they could be recolonized over time by dispersal from nearby surviving populations, facilitated by movements of host fish. This connectivity across potential habitats made for highly resilient species overall, as evidenced by the long and successful evolutionary history of freshwater mussels as a taxonomic group, and in North America in particular. However, under current conditions, restoration of that connectivity on a regional scale is not feasible. Because of these current conditions, the viability of the Texas heelsplitter and Louisiana pigtoe now primarily depends on maintaining the remaining isolated populations and potentially restoring new populations where feasible.

Texas Heelsplitter: Status Throughout All of Its Range

The Texas heelsplitter has declined significantly in overall distribution and abundance over the past 100 or more years. Most known populations of the Texas heelsplitter are isolated and currently exist in very low numbers (low abundance), have limited evidence of recruitment, and are believed to occupy much less habitat than in the past (range contraction). Of the five remaining populations of Texas heelsplitter, three are small in abundance and have low resiliency, and two are considered functionally extirpated/extirpated. While the three low resiliency populations (Neches River/B.A. Steinhagen Reservoir, Lower Neches River, and Trinity River/Lake Livingston) have habitat in high or moderate current condition, all three have very little evidence of reproduction and are therefore likely to decline due to a lack of young individuals joining the population as the population ages. Low abundance, combined with the lack of evidence of reproduction and recruitment, results in populations with very little population resiliency. Overall, these low levels of resiliency, redundancy, and representation currently result in the Texas heelsplitter having a high risk of extinction.

Our analysis of the species' current condition, as well as the conservation efforts discussed above, show that the Texas heelsplitter is in danger of extinction throughout all of its range due to the severity and immediacy of threats currently impacting their populations. The risk of extinction is high because the remaining fragmented populations have a high risk of extirpation, are isolated, and have limited potential for recolonization. We find that a threatened species status is not appropriate for the Texas heelsplitter because its current range is already contracted, all populations are fragmented and isolated from one another, the threats are occurring across the entire range of this species, and the species currently exhibits low resiliency, redundancy, and representation. Because these conditions place the species already in danger of extinction throughout its range, a threatened status is not appropriate.

Texas Heelsplitter: Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the Texas heelsplitter is in danger of extinction throughout all of its range and accordingly did not undertake an analysis of any significant portion of its range. Because the Texas heelsplitter warrants listing as endangered throughout all of its range, our determination does not conflict with the decision in *Center for Biological Diversity* v. *Everson,* 2020 WL 437289 (D.D.C. Jan. 28, 2020), because that decision related to significant portion of the range analyses for species that warrant listing as threatened, not endangered, throughout all of their range.

Texas Heelsplitter: Determination of Status

Our review of the best available scientific and commercial information indicates that the Texas heelsplitter meets the Act's definition of an endangered species. Therefore, we propose to list the Texas heelsplitter as an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.

Louisiana Pigtoe: Status Throughout All of Its Range

Many Louisiana pigtoe populations are relatively abundant, but populations are isolated from one another; therefore, the species is unable to recolonize following stochastic events that may reduce or eliminate populations. Additionally, many populations occur in degraded habitats. Although some

conservation efforts are underway, they are not sufficient to prevent the decline of the species. Thirteen populations of Louisiana pigtoe remain. Two populations are in high condition, four in moderate condition, five are in low condition, and two are functionally extirpated/extirpated. The Red River Basin has four populations, and only one is in high condition (Cossatot River), two are in moderate overall condition, and one (Lower Little River) is functionally extirpated/extirpated. The Neches River is the only other population with a high overall current condition. Only two populations, Little River/Rolling Fork and Cossatot River (both within the Red River Basin), have strong evidence of reproduction and recruitment as indicated by presence of fish hosts, juveniles, and gravid females; two (Neches and Lower Neches rivers) have moderate evidence of reproduction and recruitment; the remaining nine populations have low evidence of reproduction and recruitment. Two populations have high abundance (Cossatot and Neches rivers) four populations have moderate abundance (Little River/Rolling Rock, Saline River, Big Cypress Bayou, and Bayou Anacoco), and five populations have extremely low abundance (Calcasieu, Pearl, Angelina, Lower Neches, and East Fork San Jacinto rivers), and population abundance is too low to support resiliency of two populations (Lower Little River (tributary to the Red River) and Sabine River), which are functionally extirpated/extirpated

We considered whether the Louisiana pigtoe is presently in danger of extinction throughout all of its range and determined that endangered status is not appropriate. The current conditions as assessed in the SSA report show two of the populations in two of the representative units are in high current condition, and four are in moderate current condition; they are not currently subject to declining flows or extreme flow events. While threats are currently acting on the species and many of those threats are expected to continue into the future, we did not find that the species is currently in danger of extinction throughout all of its range.

In the future, as extreme flow events become more frequent as rainfall patterns change, and increased urbanization results in reduced groundwater levels, we expect even these populations to be at an increased risk of extirpation. Given the likelihood of climate change and other anthropogenic effects in the foreseeable future, within 50 years we estimate at least five populations will become (or remain) functionally extirpated/extirpated, seven will be in low condition, and one population will be in moderate condition. In the future, we anticipate that the Louisiana pigtoe will have reduced viability, with no highly resilient populations and limited representation and redundancy.

According to our assessment of plausible future scenarios in the SSA report, the species is likely to become an endangered species in the foreseeable future of 50 years throughout all of its range. Fifty years encompasses about 5 generations of the Louisiana pigtoe; additionally, projected human population growth and the limitations of existing resources are expected to increase and interact with climate effects to exacerbate the effects of drought on surface water resources throughout all of its range. These effects are likely to impact the ability to provide the minimum flow needed by the Louisiana pigtoe. As a result, we expect increased incidences of low flows followed by scour events, as well as persistent decreased water quality, to be occurring in 50 years.

After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we find that the Louisiana pigtoe populations will continue to decline over the next 50 years so that this species is likely to become in danger of extinction throughout all of its range within the foreseeable future due to increased frequency of drought and extremely high-flow events, decreased water quality, and decreased substrate suitability.

Thus, after assessing the best available information, we determine that the Louisiana pigtoe is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range.

Louisiana Pigtoe: Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity* v. *Everson,* 2020 WL 437289 (D.D.C. Jan. 28, 2020) (Everson), vacated the aspect of 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'' (Final Policy) (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ''significance'' question or the ''status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Following the court's holding in Everson, we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (*i.e.,* endangered). In undertaking this analysis for the Louisiana pigtoe, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species may be endangered.

For the Louisiana pigtoe, we consider abundance to be the most direct measure of the health and status of the species (see *Species Condition,* above). Measures like water quality and hydrology may rank moderate or high, indicating higher quality habitat—but that does not necessarily indicate the presence of Louisiana pigtoe, only presence of suitable habitat. All six factors were weighted equally in importance except abundance, which was viewed as the most relevant and direct measure of current biological condition; therefore, overall condition was capped by the abundance score such that no population's overall condition could exceed the abundance score. By capping abundance, we ensured that the overall current condition score is based on species-specific information. There are five populations that are considered to be in low overall current condition (with between 3–25 individuals found per population survey) and two that are considered functionally extirpated/extirpated (with less than 3 individuals found per population survey). In addition to low abundance, there was a lack of evidence of reproduction in 9 of the 13 populations; these two population factors are similar in scope, scale, and distribution across the range of the species (See Reproduction/

Recruitment in *Species Needs* above). We then considered whether these populations that are at higher risk of extirpation are geographically concentrated in any portion of the species' range at a biologically meaningful scale.

We examined the range of Louisiana pigtoe for biologically meaningful portions that may be at higher risk of extirpation, as reflected by current population resiliency. The range of Louisiana pigtoe is relatively large, and populations are distributed in varying conditions across the range. Therefore, we examined the range based on accepted mussel faunal provinces (*i.e.,* Haag 2010, p. 18), which reflect phylogenetic relationships as well as physiogeographical differences in stream habitat. The faunal provinces germane to the range of the Louisiana pigtoe are Interior Highlands (includes the Little River and tributaries), Mississippi Embayment (includes Big Cypress Bayou), Sabine-Trinity (includes Upper Calcasieu, Sabine, Angelina, Neches, and East Fork San Jacinto Rivers, and Bayou Anacoco), and Pontchartrain-Pearl-Pascagoula (includes Pearl River). Of these faunal provinces, the Interior Highlands, Sabine-Trinity, and Pontchartrain-Pearl-Pascagoula faunal provinces contain populations in low condition or that are functionally extirpated and therefore are at higher risk of extirpation.

The Interior Highlands faunal province is characterized by upland streams in the Ozark and Ouachita mountains. This province has numerous endemic aquatic species of both fish and freshwater mussels, due to the isolation of the river systems within the province from each other and from other upland river systems (Haag 2012, pp. 82–83). In this faunal province, the Lower Little River is functionally extirpated, with the remaining populations in moderate (Little River and Saline River) or high (Cossatot River) condition. While the populations in this faunal province are subject to threats such as erratic flows capable of causing bed movement or dislocation of mussels, increased sedimentation, altered water chemistry (*e.g.,* low temperatures), and decreased water quality due to higher pollutant loads from urban areas and industrial wastewater discharges, the threats are primarily occurring in the future. Under a moderate increase in stressors based on the lower greenhouse gas emissions trajectory (RCP 4.5), model projections expect an increase in global mean surface temperatures that will alter precipitation events resulting in drought and flooding in the next 25–50 years, this combined with future human demand for water resources indicate an overall decline in populations in the future. Louisiana pigtoe within the Interior Highlands faunal province are not currently in danger of extinction; therefore, they do not have a different status from the remainder of the species' range.

The Sabine-Trinity faunal province is located in the central Gulf Coast of Texas, and characterized by lowland streams and rivers, with lentic and wetland habitats bordering the main channels (Haag 2012, pp. 86–87). In this faunal province, the Upper Calcasieu River, Angelina River, Lower Neches River, and the East Fork San Jacinto River are in low condition, the Sabine River is functionally extirpated, with the remaining populations in moderate (Big Cypress Bayou) or high condition (Neches River). While the populations in this faunal province are being affected by impoundments resulting in threats such as excessive sedimentation and water quality degradation, as well as ongoing agricultural activities, groundwater withdrawals, and surface water diversions, these threats are primarily occurring in the future. Under a moderate increase in stressors based on the lower greenhouse gas emissions trajectory (RCP 4.5), model projections expect an increase in global mean surface temperatures that will alter precipitation events resulting in more extreme drought and flooding conditions that reduces water quality, mobilizes substrates, eroded habitat or deposits sentiments on Louisiana pigtoe populations in the next 25–50 years. The Sabine-Trinity faunal province are not currently in danger of extinction; therefore, they do not have a different status from the remainder of the species' range.

The Pontchartrain-Pearl-Pascagoula faunal province lies entirely within the Coastal Plain and is characterized by lowland streams filled with sandy and fine sediments, with lentic and wetland habitats alongside the main stream channels (Haag 2012, p. 87.). This province has numerous endemic aquatic species of both fish and freshwater mussels, the majority of which are shared with the Mobile Basin province (Haag 2012, pp. 87–89), and includes the Pearl River population in an overall low condition. The Pearl River population in this faunal province is subject to threats such as erratic flows from water releases from the Ross Barrett Dam that are capable of causing bed movement or dislocation of mussels, increased sedimentation, and altered water chemistry (*e.g.,* low temperatures), the threats are primarily occurring in the future. Under a moderate greenhouse gas emission trajectory (RCP 4.5), model projections no changes from current condition are expected within 10-years. Within 25-years, hydrologic conditions would be negatively affected by the construction of a flood control reservoir proposed for the upper portion of the focal area, resulting in a moderate decline in substrate condition as sediments accumulate on mussel beds from a lack or cleansing flows, and water quality degradation. Although these threats are not unique to this area, they may be acting at a greater intensity here, either individually or in combination, than elsewhere in the range, given the low abundance of Louisiana pigtoe in this reach. The small size of this population, coupled with the current condition information in the SSA report suggesting the population in this area has low resiliency, indicates the populations in the Pontchartrain-Pearl-Pascagoula faunal province *may* be in danger of extinction now.

We evaluated the available information about this portion of the range of Louisiana pigtoe that occupies the upper Pearl River in this context, assessing its biological significance in terms of the three habitat criteria (habitat/structure, hydrology, and water quality; see *Species Condition*) used to assign the current condition of Louisiana Pigtoe populations, and determined the information did not indicate it may be significant. Louisiana pigtoe in this population exhibit similar habitat and host fish use to Louisiana pigtoe in the remainder of its range; thus, there is no unique observable environmental usage or behavioral characteristics attributable to just this area's population. The Pearl River is not essential to any specific life-history function of the Louisiana pigtoe that is not found elsewhere in the range. Further, the habitat in the Pearl River does not contain higher quality or higher value than the remainder of the species' range of the Louisiana pigtoe (see Table 3). Additionally, this population does not interact with other populations of the species. Overall, we found no substantial information that would indicate the population in the Pearl River may be significant. While this reach provides some contribution to the species' overall ability to withstand catastrophic or stochastic events (redundancy and resiliency, respectively), the species has larger populations in adjacent faunal provinces. The best scientific and commercial information available indicate that this populations' contribution is very limited in scope

due to small population size and isolation from other populations. Therefore, because we could not answer both the status and significance questions in the affirmative, we conclude that the Pearl River does not warrant further consideration as a significant portion of the range of the Louisiana pigtoe.

Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This does not conflict with the courts' holdings in *Desert Survivors* v. *Department of the Interior,* 321 F. Supp. 3d 1011, 1070–74 (N.D. Cal. 2018), and *Center for Biological Diversity* v. *Jewell,* 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not need to consider whether any portions are significant and, therefore, did not apply the aspects of the Final Policy's definition of ''significant'' that those court decisions held were invalid.

Louisiana Pigtoe: Determination of Status

Our review of the best available scientific and commercial information indicates that the Louisiana pigtoe meets the Act's definition of a threatened species. Therefore, we propose to list the Louisiana pigtoe as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of 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, including the Service, 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. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. 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.

The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions while a recovery plan is being developed. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) may be established to develop and implement recovery plans. The recovery planning process involves the identification of actions that are necessary to halt and reverse the species' decline by addressing the threats to its survival and recovery. The recovery plan identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (''downlisting'') or removal from protected status (''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. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery outline, draft recovery plan, final recovery plan, and any revisions will be available on our website as they are completed (*https://www.fws.gov/program/endangered-species*).

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 ranges 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 these species are 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 Arkansas, Oklahoma, Louisiana, Mississippi, and Texas would be eligible for Federal funds to implement management actions that promote the protection or recovery of the Texas heelsplitter and Louisiana pigtoe. Information on our grant programs that are available to aid species recovery can be found at: *https://www.fws.gov/service/financial-assistance.*

Although the Texas heelsplitter and Louisiana pigtoe are only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for these species. Additionally, we invite you to submit any new information on these species whenever it becomes available and any information you may have for recovery 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 Federal Emergency Management Agency (related to disaster recovery projects), National Park Service, Natural Resources Conservation Service, National Wildlife Refuge System, U.S. Army, U.S. Army Corps of Engineers, and the U.S. Forest Service.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21, 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) endangered 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 species listed as an endangered 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 Marine Fisheries Service, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22. With regard to endangered 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. The statute also contains certain 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 the species proposed for listing. The Act allows the Secretary to promulgate protective regulations for threatened species pursuant to section 4(d) of the Act. The discussion in the following section, Proposed Rule Issued Under Section 4(d) of the Act, regarding protective regulations under section 4(d) of the Act for the Louisiana pigtoe complies with our policy.

For the Texas heelsplitter, based on the best available information, the following actions are unlikely to result in a violation of section 9, if these activities are carried out in accordance with existing regulations and permit requirements; this list is not comprehensive:

(1) Normal agricultural and silvicultural practices, including herbicide and pesticide use, that are carried out in accordance with any existing regulations, permit and label requirements, and best management practices; and

(2) Normal residential landscaping activities.

Based on the best available information, the following activities may potentially result in a violation of section 9 of the Act, if they are not authorized in accordance with applicable law; this list is not comprehensive:

(1) Unauthorized handling or collecting of the species;

(2) Unauthorized destruction or alteration of Texas heelsplitter habitat by dredging, channelization, impoundment, diversion, recreational vehicle operation within the stream channel, sand or gravel removal, or other activities that result in the destruction or significant degradation of channel or bank stability, streamflow/water quantity, substrate composition, and water quality used by the species for foraging, cover, and reproduction;

(3) Modification of the channel or water flow of any stream, including the withdrawal (decrease) or supplementation (increase) of surface or ground waters where the Texas heelsplitter is known to occur;

(4) Livestock grazing that results in direct or indirect destruction of riparian or instream habitat; and

(5) Unauthorized discharge of chemicals (including pesticides and fertilizers in violation of label restrictions), household waste, silt, sediments, fill material, or other pollutants (*e.g.,* sewage, oil and gasoline, heavy metals), into any waters or their adjoining riparian areas where the Texas heelsplitter is known to occur.

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

II. Proposed Rule Issued Under Section 4(d) of the Act

Background

Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S. Supreme Court has noted that statutory language similar to the language in section 4(d) of the Act authorizing the Secretary to take action that she ''deems necessary and advisable'' affords a large degree of deference to the agency (see *Webster* v. *Doe,* 486 U.S. 592 (1988)). Conservation is defined in the Act to mean 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 the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld, as a valid exercise of agency authority, rules developed under section 4(d) that included limited prohibitions against takings (see *Alsea Valley Alliance* v. *Lautenbacher,* 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service,* 2002 WL 511479 (W.D. Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana* v. *Verity,* 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ''once an animal is on the threatened list, the Secretary has an almost infinite number of options available to [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species, or [she] may choose to forbid both taking and importation but allow the transportation of such species'' (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

The provisions of this proposed 4(d) rule would promote conservation of the Louisiana pigtoe by encouraging riparian landscape conservation while also meeting the conservation needs of the Louisiana pigtoe. By streamlining those projects that follow best management practices and improve instream habitat (such as streambank

stabilization, instream channel restoration, and upland restoration that improves instream habitat), conservation is more likely to occur for Louisiana pigtoe, improving the condition of populations in those reaches. The provisions of this proposed rule are several of many tools that we would use to promote the conservation of the Louisiana pigtoe. This proposed 4(d) rule would apply only if and when we make final the listing of the Louisiana pigtoe as a threatened species.

As mentioned previously in Available Conservation Measures, section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action that is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of Federal actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

These requirements are the same for a threatened species with a species-specific 4(d) rule. For example, a Federal agency's determination that an action is ''not likely to adversely affect'' a threatened species will require the Service's written concurrence. Similarly, a Federal agency's determination that an action is ''likely to adversely affect'' a threatened species will require formal consultation and the formulation of a biological opinion.

Provisions of the Proposed 4(d) Rule

Exercising the Secretary's authority under section 4(d) of the Act, we have developed a proposed rule that is designed to address the Louisiana pigtoe's specific conservation needs. As discussed previously in Summary of Biological Status and Threats, we have concluded that the Louisiana pigtoe is likely to become in danger of extinction within the foreseeable future primarily due to habitat changes such as the accumulation of fine sediments, altered hydrology, and impairment of water quality; predation and collection; and barriers to fish movement. Section 4(d) requires the Secretary to issue such regulations as she deems necessary and advisable to provide for the conservation of each threatened species and authorizes the Secretary to include among those protective regulations any of the prohibitions that section 9(a)(2) of the Act prescribes for endangered species. We find that, if finalized, the protections, prohibitions, and exceptions in this proposed rule as a whole satisfy the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the Louisiana pigtoe.

The protective regulations we are proposing for the Louisiana pigtoe incorporate prohibitions from section 9(a)(1) to address the threats to the species. Section 9(a)(1) prohibits the following activities for endangered wildlife: importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce. This protective regulation includes most of these prohibitions for the Louisiana pigtoe because the Louisiana pigtoe is at risk of extinction in the foreseeable future and putting these prohibitions in place will help to preserve the species' remaining populations, slow its rate of decline, and decrease synergistic, negative effects from other stressors.

In particular, this proposed 4(d) rule would provide for the conservation of the Louisiana pigtoe by prohibiting the following activities, unless they fall within specific exceptions or are otherwise authorized or permitted: Importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce.

Under the Act, ''take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3. Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating incidental and intentional take would help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other stressors. Therefore, we propose to prohibit take of the Louisiana pigtoe, except for take resulting from those actions and activities specifically excepted by the 4(d) rule.

Exceptions to the prohibition on take would include most of the general exceptions to the prohibition against take of endangered wildlife, as set forth in 50 CFR 17.21 and certain other specific activities that we propose for exception, as described below.

The proposed 4(d) rule would also provide for the conservation of the species by allowing exceptions that incentivize conservation actions or that, while they may have some minimal level of take of the Louisiana pigtoe, are not expected to rise to the level that would have a negative impact (*i.e.,* would have only de minimis impacts) on the species' conservation. The proposed exceptions to these prohibitions include the following activities that are expected to have negligible impacts to the Louisiana pigtoe and its habitat:

(1) Channel restoration projects that create natural, physically stable (streambanks and substrate remaining relatively unchanging over time), ecologically functioning streams or stream and wetland systems (containing an assemblage of fish, mussels, other invertebrates, and plants) that are reconnected with their groundwater aquifers. These projects can be accomplished using a variety of methods, but the desired outcome is a natural channel with low shear stress (force of water moving against the channel); bank heights that enable reconnection to the floodplain; a reconnection of surface and groundwater systems, resulting in perennial flows in the channel; riffles and pools composed of existing soil, rock, and wood instead of large imported materials; low compaction of soils within adjacent riparian areas; and inclusion of riparian wetlands and woodland buffers. This exception to the

proposed 4(d) rule for incidental take would promote conservation of Louisiana pigtoe by creating stable stream channels that are less likely to scour during high-flow events, thereby increasing population resiliency.

(2) Bioengineering methods such as streambank stabilization using live native stakes (live, vegetative cuttings inserted or tamped into the ground in a manner that allows the stake to take root and grow), live native fascines (live branch cuttings, usually willows, bound together into long, cigar-shaped bundles), or native brush layering (cuttings or branches of easily rooted tree species layered between successive lifts of soil fill). These methods must not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures. In addition, to reduce streambank erosion and sedimentation into the stream, work using these bioengineering methods must be performed at base flow or low water conditions and when significant rainfall is not predicted. Further, streambank stabilization projects must keep all equipment out of the stream channels and water. Similar to channel restoration projects, this exception to the proposed 4(d) rule for incidental take would promote conservation of Louisiana pigtoe by creating stable stream channels that are less likely to scour during high-flow events, thereby increasing population resiliency.

(3) Soil and water conservation practices and riparian and adjacent upland habitat management activities that restore instream habitats for the species, restore adjacent riparian habitats that enhance stream habitats for the species, stabilize degraded and eroding stream banks to limit sedimentation and scour of the species' habitats, and restore or enhance nearby upland habitats to limit sedimentation of the species' habitats. We recommend that these practices and activities comply with specifications and technical guidelines developed by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), as soil and water conservation practices and aquatic species habitat restoration projects associated with NRCS conservation plans are designed to improve water quality and enhance fish and aquatic species habitats. This exception to the proposed 4(d) rule for incidental take would promote conservation of Louisiana pigtoe by creating stable stream channels and reducing sediment inputs to the stream, thereby increasing population resiliency.

We include other standard exceptions to the prohibitions in the proposed 4(d) rule for the Louisiana pigtoe.

Despite these prohibitions regarding threatened species, we may under certain circumstances issue permits to carry out one or more otherwise-prohibited activities, including those described above. The regulations that govern permits for threatened wildlife state that the Director may issue a permit authorizing any activity otherwise prohibited with regard to threatened species. These include permits issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act (50 CFR 17.32). The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist us in implementing all aspects of the Act. In this regard, section 6 of the Act provides that we must cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with us in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve Louisiana pigtoe that may result in otherwise prohibited take without additional authorization.

Nothing in this proposed 4(d) rule would change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or our ability to enter into partnerships for the management and protection of the Louisiana pigtoe. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between us and other Federal agencies, where appropriate. We ask the public, particularly State agencies and other interested stakeholders that may be affected by the proposed 4(d) rule, to provide comments and suggestions regarding additional guidance and methods that we could provide or use, respectively, to streamline the implementation of this proposed 4(d) rule (see Information Requested, above).

III. Critical Habitat

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (*i.e.,* range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (*e.g.,* migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land

ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation also does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would likely result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ''reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat).

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of this species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts calls for a different outcome.

Prudency Determination

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 (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances:

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

(ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act;

(iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States;

(iv) No areas meet the definition of critical habitat; or

(v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific data available.

As discussed earlier in this document, there are well documented beds of Louisiana pigtoe that are sampled for scientific projects, and to a lesser degree collected by fishing enthusiasts for use as bait. Because these areas are already well known, and they are not being collected for private collections, there is currently no additional imminent threat of collection or vandalism identified under Factor B for these species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA and proposed listing determination for the Texas heelsplitter and Louisiana pigtoe, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to these species and that those threats in some way can be addressed by section 7(a)(2) consultation measures. These species occur wholly in the jurisdiction of the United States, and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because

the Secretary has not identified other circumstances for which this designation of critical habitat would be not prudent, we have determined that the designation of critical habitat is prudent for the Texas heelsplitter and Louisiana pigtoe.

Critical Habitat Determinability

Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the Texas heelsplitter and Louisiana pigtoe is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

(i) Data sufficient to perform required analyses are lacking, or

(ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ''critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C. 1533(b)(6)(C)(ii)).

We reviewed the available information pertaining to the biological needs of the species and habitat characteristics where these species are located. This and other information represent the best scientific data available and led us to conclude that the designation of critical habitat is determinable for the Texas heelsplitter and Louisiana pigtoe.

Physical or Biological Features Essential to the Conservation of the Species

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection. The regulations at 50 CFR 424.02 define ''physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species.

In considering whether features are essential to the conservation of the species, we may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance.

We derive the specific physical or biological features (PBFs) essential for the conservation of the Texas heelsplitter and Louisiana pigtoe from studies of these species' habitat, ecology, and life history. The life histories of these two freshwater mussel species are very similar—mussels need suitable water quality, flowing water, suitable substrate, flow refuges, and appropriate host fish—and so we will discuss their common habitat needs and then describe their species-specific needs.

Physiological Requirements: Water Quality Requirements

Freshwater mussels, as a group, are sensitive to changes in water quality, including parameters such as dissolved oxygen, salinity, ammonia, and environmental pollutants (*e.g.,* pesticides and trace metals). Habitats with appropriate levels of these parameters that are pollutant-free or have low levels of pollutants are considered suitable, while those habitats with levels outside of the appropriate ranges or that contain elevated pollutants are considered less suitable. We have used information for the Texas heelsplitter and Louisiana pigtoe, where available, and data from other species when species-specific information is not available. Juvenile freshwater mussels are particularly susceptible to low dissolved oxygen levels. Juveniles will reduce feeding behavior when dissolved oxygen is between 2–4 milligrams per liter (mg/L), and mortality has been shown to occur at dissolved oxygen levels below 1.3 mg/L. Increased salinity levels may also be stressful to freshwater mussels, with some species showing signs of stress at salinity levels of 2 ppt or higher (Bonner *et al.* 2018; pp. 155–156).

The release of pollutants into streams from point and nonpoint sources have immediate impacts on water quality conditions and may make environments unsuitable for habitation by mussels. Early life stages of freshwater mussels are some of the most sensitive organisms of all species to ammonia and copper (Augspurger *et al.* 2007, p. 2025). Additionally, sublethal effects of contaminants over time can result in reduced feeding efficiency, reduced growth, decreased reproduction, changes in enzyme activity, and behavioral changes to all mussel life stages. Even wastewater discharges with low ammonia levels have been shown to negatively affect mussel populations.

Finally, water temperature plays a critical role in the life history of freshwater mussels. High water temperatures can cause valve closure, reduced reproductive output, and death. Laboratory studies investigating the effects of thermal stress on glochidia and adults have indicated thermal stress may occur at 27 °C (80.6 °F) (Bonner *et al.* 2018; Khan *et al.* 2019, entire)).

Based on the above information, we determine that stream reaches with the following water quality parameters are suitable for the Texas heelsplitter and Louisiana pigtoe:

- Water temperature below 27 °C (80.6 °F);
- Dissolved oxygen levels greater than 3 mg/L;
- Low salinity (less than 2 ppt) and total dissolved solids;
- Low total ammonia and nitrogen (below 0.3–0.7 mg/L total ammonia nitrogen);
- Low levels of copper, nickel, and other trace metals;
- Low levels of pesticides, sulfate, chloride, potassium, and other harmful constituents; and
- Low pollutants and environmental contaminants common to wastewater.

Space for Individual and Population Growth and for Normal Behavior

Most freshwater mussels, including the Texas heelsplitter and Louisiana pigtoe, are found in aggregations, called mussel beds, that vary in size from about 50 to greater than 5,000 square meters (m^2), separated by stream reaches in which mussels are absent or rare (Vaughn 2012, p. 983). Freshwater mussel larvae (called glochidia) are parasites that must attach to a host fish. A population incorporates more than one mussel bed; it is the collection of mussel beds within a stream reach between which infested host fish may travel, allowing for ebbs and flows in mussel bed density and abundance over time throughout the population's occupied reach. Accordingly, sufficiently resilient mussel populations must occupy stream reaches long enough so that stochastic events that affect individual mussel beds do not eliminate the entire population. Repopulation by infested host fish from other mussel beds within the reach can allow the population to recover from these events. Longer stream reaches are more likely to support populations of the Texas heelsplitter and Louisiana pigtoe into the future than shorter stream reaches. Therefore, we determine that long stream reaches, over 50 river miles (80.5 km), are an important component of a riverine system with habitat to support all life stages of the Texas heelsplitter and Louisiana pigtoe. Populations occupying reaches shorter than 50 miles can still provide population redundancy and, if habitat factors are of sufficiently high quality, can be an important component of the recovery of Texas heelsplitter and Louisiana pigtoe.

The Texas heelsplitter needs low to moderately flowing streams, and tolerates impoundments (lakes, reservoirs, or pools without flow). All life stages of the Texas heelsplitter require substrates consisting of firm mud, sand, finer gravels, and mixtures of those with high organic matter content. The Louisiana pigtoe needs flowing water for survival and occurs in medium- to large-sized streams and rivers associated with riffle, run, and sometimes larger backwater tributary habitats. All life stages of the Louisiana pigtoe require substrates consisting of cobble/rock, sand/gravel/woody debris, and runs with subdominant gravel mixtures. River reaches with continuous flow support all life stages of these two species of freshwater mussels, while those with little or no flow do not. Flow rates needed by each species will vary depending on the species and the river size, location, and substrate type. Habitat locations must be relatively free of fine sediments for both species such that the mussels are not smothered.

Sites for Development of Offspring

As discussed above, freshwater mussel larvae are parasites that must attach to a host fish to develop into juvenile mussels. The Texas heelsplitter and Louisiana pigtoe use a variety of host fish, many of which are widely distributed throughout their ranges. The presence of these fish species, either singly or in combination, supports the life-history needs of these two species of freshwater mussels:

- Texas heelsplitter: freshwater drum (*Aplodinotus grunniens*).
- Louisiana pigtoe: red shiner (*Cyprinella* (=*Notropis*) *lutrensis*), blacktail shiner (*Cyprinella venusta*), and bullhead minnow (*Pimephales vigilax*).

Summary of Essential Physical or Biological Features

In summary, we derive the specific PBFs essential to the conservation of Texas heelsplitter and Louisiana pigtoe from studies of these species' habitat, ecology, and life history as described above. Additional information can be found in the SSA report available on *https://www.regulations.gov* under Docket No. FWS–R2–ES–2022–0026.

Texas Heelsplitter

We have determined that the following PBFs are essential to the conservation of the Texas heelsplitter:

1. Water quality parameters within the following ranges:

a. Water temperature below 27 °C (80.6 °F);

b. Dissolved oxygen levels greater than 3 mg/L;

c. Low salinity (less than 2 ppt) and total dissolved solids;

d. Low total ammonia and nitrogen (below 0.3–0.7 mg/L total ammonia nitrogen);

e. Low levels of copper, nickel, and other trace metals;

f. Low levels of pesticides, sulfate, chloride, potassium, and other harmful constituents; and

g. Low pollutants and environmental contaminants common to wastewater.

2. Moderately flowing water rates suitable to prevent excess sedimentation but not so high as to dislodge individuals or sediment; or no water flow, if in an impoundment (lake, reservoir, or pool without flow).

3. Substrate including bedrock and boulder crevices, point bars, and vegetated run habitat comprising sand, gravel, and larger cobbles.

4. Freshwater drum (*Aplodinotus grunniens*) present.

Louisiana Pigtoe

We have determined that the following PBFs are essential to the conservation of the Louisiana pigtoe:

1. Water quality parameters within the following ranges:

a. Water temperature below 27 °C (80.6 °F);

b. Dissolved oxygen levels greater than 3 mg/L;

c. Low salinity (less than 2 ppt) and total dissolved solids;

d. Low total ammonia and nitrogen (below 0.3–0.7 mg/L total ammonia nitrogen);

e. Low levels of copper, nickel, and other trace metals;

f. Low levels of pesticides, sulfate, chloride, potassium, and other harmful constituents; and

g. Low pollutants and environmental contaminants common to wastewater.

2. Moderately flowing water rates suitable to prevent excess sedimentation but not so high as to dislodge individuals or sediment.

3. Stable bank and riffle habitats with bedrock and boulder crevices, point bars, and vegetated run habitat comprising sand, gravel, and larger cobbles.

4. Red shiner (*Cyprinella* (=*Notropis*) *lutrensis*), blacktail shiner (*Cyprinella venusta*), and bullhead minnow (*Pimephales vigilax*) present.

Special Management Considerations or Protection

When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of the Texas heelsplitter and Louisiana pigtoe may require special management considerations or protections to reduce the following threats: increased fine sediment, changes in water quality impairment, altered hydrology from both inundation and flow loss/scour, predation and collection, and barriers to fish movement.

Management activities that could ameliorate these threats include, but are not limited to: Use of best management practices (BMPs) designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and retention of sufficient canopy cover along banks; exclusion of livestock and nuisance wildlife (feral hogs, exotic ungulates); moderation of

surface and ground water withdrawals to maintain natural flow regimes; increased use of stormwater management and reduction of stormwater flows into the systems; use of highest water quality standards for wastewater and other return flows; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water.

In summary, we find that the occupied areas we are proposing to designate as critical habitat contain the PBFs that are essential to the conservation of the species and that may require special management considerations or protection. Special management considerations or protection may be required of the Federal action agency to eliminate, or to reduce to negligible levels, the threats affecting the PBFs of each unit.

Criteria Used To Identify Critical Habitat

As required by section 4(b)(2) of the Act, we use the best scientific data available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We are not currently proposing to designate any areas outside the geographical area occupied by the Texas heelsplitter and Louisiana pigtoe because we have determined that the occupied areas are sufficient to conserve the species.

We anticipate that recovery will require conserving the genetic diversity of extant populations across the species' current ranges and maintaining and, where necessary, improving habitat and habitat connectivity to ensure the long-term viability of the Texas heelsplitter and Louisiana pigtoe. This proposed critical habitat designation delineates the habitat that is physically occupied and used by the species rather than delineating all land or aquatic areas that influence the species. We recognize that there may be additional occupied areas outside of the proposed areas designated as critical habitat that we are not aware of at the time of this designation that may be necessary for the conservation of the species. We have determined that the areas currently occupied by the Texas heelsplitter and Louisiana pigtoe would maintain each species' resiliency, redundancy, and representation and are sufficient to conserve these two species. Therefore, we are not currently proposing to designate any areas outside the geographical area occupied by the species.

Sources of data for this proposed critical habitat include multiple databases maintained by universities and State agencies, scientific and agency reports, and numerous survey reports on streams throughout the species' range (Service 2022, pp. 16–24).

Areas Occupied at the Time of Listing

The proposed critical habitat designations do not include all rivers and streams known to have been occupied by the species historically; instead, they focus on rivers and streams occupied at the time of listing that have retained the necessary PBFs that will allow for the maintenance and expansion of existing populations. A stream reach may not have all of the PBFs to be included as proposed critical habitat; in such reaches, our goal is to recover the species by restoring the missing PBFs. We defined ''occupied'' units as stream channels with observations of one or more live individuals. Specific habitat areas were delineated based on reports of live individuals and recently dead shells. We include ''recent dead shell material'' to delineate the boundaries of a unit because recently dead shell material at a site indicates the species is present in that area. Recently dead shells have tissue remaining on the shells or have retained a shiny nacre, indicating the animal died within days or weeks of finding the shell. It is highly unlikely that a dead individual represents the last remaining individual of the population, and recently dead shells are an accepted indicator of a species' presence (*e.g.,* Howells 1996, pp. ii, 4; Randklev *et al.* 2011, p. 17).

We are relying on evidence of occupancy from data collected in 2000 to the present. This is because freshwater mussels may be difficult to detect, and some sites are not visited multiple times. Additionally, these species live at least 15 to 20 years. Because adults are less sensitive to habitat changes than juveniles, changes in population sizes usually occur over decades rather than years. As a result, areas where individuals were collected within the last 20 years are expected to remain occupied now. Additionally, any areas that were surveyed around 20 years ago and do not have subsequent surveys were reviewed for any large-scale habitat changes (*i.e.,* major flood or scour event, drought) to confirm that general habitat characteristics remained constant over this time. None of the relatively few areas without more recent survey information had experienced changes to general habitat characteristics. Therefore, data from around 2000 would be considered a strong indicator a species remains extant at a site if general habitat characteristics have remained constant over that time.

For areas proposed as critical habitat, we delineated critical habitat unit boundaries using the following criterion: Evaluate habitat suitability of stream segments within the geographic area occupied at the time of listing, and retain those segments that contain some or all of the PBFs to support life-history functions essential for conservation of the species. Humanmade reservoirs are not considered natural habitat for either species and may not contain all of the PBFs; therefore, they were not delineated as critical habitat for Texas heelsplitter, which occurs in some reservoirs. The recovery vision for Texas heelsplitter will not be focused on enhancing the species in these areas.

As a final step, we evaluated those occupied stream segments retained through the above analysis and refined the starting and ending points by evaluating the presence or absence of appropriate PBFs. We selected upstream and downstream cutoff points to reference existing easily recognizable geopolitical features including confluences, highway crossings, and county lines. Using these features as end points allows the public to clearly understand the boundaries of critical habitat. Unless otherwise specified, any stream beds located directly beneath bridge crossings or other landmark features used to describe critical habitat spatially, such as stream confluences, are considered to be wholly included within the critical habitat unit. Critical habitat stream segments were then mapped using ArcMap version 10.6.1 (ESRI, Inc.), a Geographic Information Systems program.

We consider the following streams and rivers to be occupied by the Texas heelsplitter at the time of proposed listing: Neches River, Sabine River, and Trinity River.

We consider the following streams and rivers to be occupied by the Louisiana pigtoe at the time of proposed listing: Angelina River, Big Cypress Bayou, Calcasieu River, Cossatot River, Little River, Neches River, Pearl River, Rolling Fork, Sabine River, Saline River, San Jacinto River, and Sulphur River.

General Information on the Maps of the Proposed Critical Habitat Designations

When determining proposed critical habitat boundaries, we made every

effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features necessary for the Texas heelsplitter and Louisiana pigtoe. Critical habitat for these mussels includes only stream channels up to bankfull height, where the stream base flow is contained within the channel. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat.

We are proposing to designate as critical habitat three units for the Texas heelsplitter and six units for the Louisiana pigtoe based on one or more of the PBFs being present to support the Texas heelsplitter's or Louisiana pigtoe's life-history processes. Some units contain all of the identified physical or biological features and support multiple life-history processes. Some units contain only some of the PBFs necessary to support the Texas heelsplitter's or Louisiana pigtoe's particular use of that habitat.

The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on *https://www.regulations.gov* at Docket No. FWS–R2–ES–2022–0026, on our internet site *https://www.fws.gov/office/arlington-ecological-services.*

Proposed Critical Habitat Designation

We are proposing to designate approximately 832 river mi (1,339 km) in three units as critical habitat for Texas heelsplitter and approximately 1,028 river mi (1,654 km) in six units for the Louisiana pigtoe. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for Texas heelsplitter and Louisiana pigtoe. All units are occupied by their respective species. The three areas we propose as critical habitat for Texas heelsplitter are all in Texas and are: (1) Trinity River, (2) Sabine River, and (3) Neches River. The six areas we propose as critical habitat for Louisiana pigtoe are: (1) Little River (Arkansas/Oklahoma), (2) Sabine River (Louisiana/Texas), (3) Neches River (Texas), (4) San Jacinto River (Texas), (5) Calcasieu River (Louisiana), and (6) Pearl River (Louisiana/Mississippi). One proposed Louisiana pigtoe critical habitat subunit, LAPT–1a (Upper Little River, Oklahoma; 25.7 river miles (41.4 km)), is located within the Choctaw Reservation, but not on any lands held in trust for the Tribe, or owned or managed by the Tribe. Tables 5 and 6 show the proposed critical habitat units, the adjacent riparian area ownership, and the approximate area of each unit.

TABLE 5—PROPOSED CRITICAL HABITAT UNITS FOR THE TEXAS HEELSPLITTER

Unit	Subunit	Riparian ownership	Occupied?	River miles (kilometers)
TXHS–1: Trinity River	TXHS–1a: Trinity River	Private, State	Yes	212.8 (342.4)
	TXHS–1b: Bedias Creek	Private	Yes	28.9 (46.5)
Unit Total				241.7 (388.9)
TXHS–2: Sabine River	TXHS–2a: Upper Sabine River	Private, State, Local, Federal	Yes	237.4 (382.0)
	TXHS–2b: Lake Fork Creek	Private	Yes	13.8 (22.2)
	TXHS–2c: Patroon Bayou	Private, Federal	Yes	19.9 (32.0)
Unit Total				271.1 (436.2)
TXHS–3: Neches River	TXHS–3a: Upper Neches River	Private, Federal	Yes	227.9 (366.7)
	TXHS–3b: Lower Angelina River	Private, Federal	Yes	14.7 (23.7)
	TXHS–3c: Lower Neches River	Private, State, Federal	Yes	76.3 (122.8)
Unit Total				318.9 (513.1)
Total				831.8 (1,338.6)

Note: Lengths may not accurately sum due to rounding.

TABLE 6—PROPOSED CRITICAL HABITAT UNITS FOR THE LOUISIANA PIGTOE

Unit	Subunit	Riparian ownership	Occupied?	River miles (kilometers)
LAPT–1: Little River	LAPT–1a: Upper Little River	Private, State, Federal, Tribal	Yes	88.0 (141.6)
	LAPT–1b: Rolling Fork	Private	Yes	29.9 (47.9)
	LAPT–1c: Cossatot River	Private, Federal	Yes	47.2 (75.9)
	LAPT–1d: Saline River	Private	Yes	42.6 (68.5)
Unit Total				207.7 (334.2)
LAPT–2: Sabine River	LAPT–2a: Upper Sabine River	Private, State, Federal	Yes	110.1 (177.2)

TABLE 6—PROPOSED CRITICAL HABITAT UNITS FOR THE LOUISIANA PIGTOE—Continued

Unit	Subunit	Riparian ownership	Occupied?	River miles (kilometers)
	LAPT–2b: Anacoco Bayou	Private	Yes	12.2 (19.6)
Unit Total				122.3 (196.8)
LAPT–3: Neches River	LAPT–3a: Upper Neches River	Private, Federal	Yes	200.4 (322.4)
	LAPT–3b: Upper Angelina River	Private, Federal	Yes	67.4 (108.4)
	LAPT–3c: Lower Neches River	Private, State, Federal	Yes	76.2 (122.6)
	LAPT–3d: Village Creek	Private, State, Federal	Yes	54.9 (88.3)
	LAPT–3e: Big Sandy Creek	Private, Federal	Yes	43.7 (70.3)
Unit Total				442.6 (712.1)
LAPT–4: East Fork San Jacinto River.		Private	Yes	23.3 (37.5)
Unit Total				23.3 (37.5)
LAPT–5: Calcasieu River	LAPT–5a: Upper Calcasieu River	Private, Federal	Yes	92.0 (148.0)
	LAPT–5b: Whisky Chitto Creek	Private, State	Yes	21.7 (34.9)
	LAPT–5c: Tenmile Creek	Private, State	Yes	32.0 (51.5)
Unit Total				145.7 (234.4)
LAPT–6: Pearl River		Private, State, Federal	Yes	86.6 (139.3)
Unit Total				86.6 (139.3)
Total				1,028.2 (1,654.3)

Note: Lengths may not accurately sum due to rounding.

We present brief descriptions of all units, and reasons why they meet the definition of critical habitat for the Texas heelsplitter (TXHS) or Louisiana pigtoe (LAPT) below.

Texas Heelsplitter

Unit TXHS–1: Trinity River

Subunit TXHS–1a: Trinity River. The Trinity River Subunit includes 212.8 river mi (342.4 km) in Anderson, Ellis, Freestone, Henderson, Houston, Kaufman, Leon, Madison, and Navarro Counties, Texas. The subunit begins at Lake Livingston (estimated from the State Highway 24 bridge located 4.7 mi (7.6 km) northeast of Midway, Texas) and continues upstream to the State Highway 34 bridge, located 2.5 miles (4 km) southwest of Rosser, Texas. Ownership of adjacent riparian areas is 95 percent private and 5 percent State. Although this reach is approximately 20 mi (32.2 km) southeast and downstream of the Dallas-Fort Worth Metroplex, activities occurring across the Metroplex continue to affect both water quality and quantity downstream, including in this subunit, even though it is located in a largely rural area and predominately within riparian woodlands and agricultural lands. The Trinity River Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, hydrologic conditions have been significantly altered by wastewater return flows, and flooding in the Trinity River can be extreme, causing the species to experience a variety of environmental stressors that degrade habitat quality, such as shear stress, scouring, erosion, sediment deposition and siltation, and bank collapse.

The Trinity River Subunit is being affected by impoundments, wastewater return flows, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit TXHS–1b: Bedias Creek. The Bedias Creek Subunit is comprised of 28.9 river mi (46.5 km) in Grimes, Madison, and Walker Counties, Texas. The subunit continues upstream from Livingston Lake, as estimated from the Farm to Market Road 247 bridge located 9.2 mi (14.8 km) south-southeast of Midway, Texas, to the State Highway 90 bridge located approximately 6.3 mi (10.1 km) south-southwest of Madisonville, Texas. Adjacent riparian areas are privately owned. This reach is largely rural and predominately within riparian woodlands and agricultural lands. The Bedias Creek Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, fluctuating drought conditions and flooding in Bedias Creek can cause the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations.

The Bedias Creek Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit TXHS–2: Sabine River

Subunit TXHS–2a: Upper Sabine River. The Upper Sabine River Subunit includes 237.4 river mi (382 km) in Gregg, Harrison, Panola, Rains, Rusk,

Smith, Upshur, Van Zandt, and Wood Counties, Texas. The subunit extends upstream from the Louisiana/Texas State line, located approximately 2.4 mi (3.9 km) north-northeast of Joaquin, Texas, to a utility easement approximately 0.9 river mile (1.4 km) below Tawakoni Lake dam. Ownership of adjacent riparian areas is approximately 93 percent private, 4 percent State, 1 percent local, and 2 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Upper Sabine River Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Sabine River can be significant, resulting in either extreme low-flow conditions with related reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations. The City of Longview, Texas, is located north of the subunit approximately mid-reach. Industrial and municipal wastewater associated with this urban area are discharged into the Sabine River Basin, negatively affecting water quality in some areas downstream.

The Upper Sabine River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is an overlap of 110.05 river mi (177.11 km) of this unit with proposed critical habitat for the Louisiana pigtoe.

Subunit TXHS–2b: Lake Fork Creek. The Lake Fork Creek Subunit consists of 13.8 river mi (22.2 km) in Wood County, Texas. The subunit extends upstream from its confluence with the Sabine River to the FM 49 bridge, located approximately 5 mi (8 km) northeast of Mineola, Texas. Adjacent riparian areas are privately owned. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Lake Fork Creek Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Lake Fork Creek can cause the species to experience either extreme low-flow conditions with related reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations.

The Lake Fork Creek Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit TXHS–2c: Patroon Bayou. The Patroon Bayou Subunit includes 19.9 river mi (32 km) in Sabine and Shelby Counties, Texas. This subunit begins at the mouth of Patroon Bayou (location estimated at the Reeves Road bridge, approximately 7 mi (11.3 km) north of Milam, Texas) and continues upstream to the State Highway 87 bridge located 11.3 mi (18.2 km) southeast of Shelbyville, Texas. Ownership of adjacent riparian areas are 93 percent private and 7 percent Federal. The Patroon Bayou Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Patroon Bayou can cause low-flow conditions with related reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations.

The Patroon Bayou Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit TXHS–3: Neches River

Subunit TXHS–3a: Upper Neches River. The Upper Neches River Subunit includes 227.9 river mi (366.7 km) of stream in Anderson, Angelina, Cherokee, Houston, Jasper, Polk, Trinity, and Tyler Counties, Texas. The subunit originates at B.A. Steinhagen Lake (estimated at a point located approximately 13 mi (20.9 km) east of Colmesneil, Texas) and continues upstream to a transmission line right-of-way (ROW) located approximately 1.1 river mi (1.8 km) below Palestine Lake Dam. Ownership of adjacent riparian areas is approximately 88 percent private and 12 percent Federal. This reach is rural and predominately within riparian woodlands bordered by agricultural lands. The Upper Neches River Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Neches River can cause either extreme low-flow conditions with related reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations.

The Upper Neches River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is an overlap of 200.38 river mi (322.48 km) of this unit with proposed critical habitat for the Louisiana pigtoe.

Subunit TXHS–3b: Lower Angelina River. The Lower Angelina River Subunit consists of 14.7 river mi (23.7 km) in Jasper County, Texas. The subunit extends upstream from B.A. Steinhagen Lake, estimated at a point located approximately 5.7 mi (9.2 km) west of Curtis, Texas, to a transmission line ROW located approximately 0.3 mile (0.5 km) below Sam Rayburn Reservoir. Ownership of adjacent riparian areas is approximately 89 percent private and 11 percent Federal. This reach is rural and predominately within riparian woodlands bordered by agricultural lands. The Lower Angelina River Subunit is occupied by the Texas heelsplitter and contains all the necessary PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Angelina River can be compounded by hydroelectric dam operations at Sam Rayburn Reservoir, causing the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates,

erode habitat, or deposit sediment on Texas heelsplitter populations.

The Lower Angelina River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit TXHS–3c: Lower Neches River. The Lower Neches River Subunit occupies 76.3 river mi (122.8 km) in Hardin, Jasper, Jefferson, Orange, and Tyler Counties, Texas. The subunit extends upstream from the Lower Neches Valley Authority weir, located north of Beaumont, Texas, to the Walnut Run confluence, which is approximately 2.6 mi (4.2 km) southeast of the B.A. Steinhagen Dam. The Lower Neches River Subunit is hydrologically isolated from the Upper Neches River Subunit by B.A. Steinhagen Lake. Ownership of adjacent riparian areas is approximately 88 percent private, 7 percent State, and 5 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Lower Neches River Subunit is occupied by the Texas heelsplitter and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Neches River can cause low-flow conditions with related reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediment on Texas heelsplitter populations.

The Lower Neches River Subunit is influenced by drought, low flows, and flooding (leading to scour); and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, groundwater withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is an overlap of 76.35 river mi (122.87 km) of this unit with proposed critical habitat for the Louisiana pigtoe.

Louisiana Pigtoe

Unit LAPT–1: Little River

Subunit LAPT–1a: Upper Little River. The Upper Little River Subunit consists of approximately 88.0 river mi (141.6 km) of the mainstem Little River upstream of Millwood Lake, Arkansas, occupying portions of Little River and Sevier Counties, Arkansas, and McCurtain County, Oklahoma. This subunit extends upstream from the U.S. Highway 69/71 bridge near Millwood Lake, Arkansas, to the Glover River confluence, located 2.6 mi (4.2 km) west-southwest of Golden, Oklahoma. This subunit is hydrologically connected to the Rolling Fork Subunit (Subunit LAPT–1b). Ownership of adjacent riparian areas is approximately 42 percent private, 1 percent State, 26 percent Federal, and 23 percent private land within the Choctaw Reservation, but not any lands held in trust for the Tribe, or owned or managed by the Tribe. This reach is entirely rural, with long sections of intact riparian woodlands bordered by agricultural lands. The Upper Little River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year.

Drought conditions and flooding in the Little River are seldom extreme; however, this subunit is affected by hydroelectric dam-related cold water releases in the Mountain Fork from Broken Bow Reservoir and ongoing agricultural activities, resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. The Upper Little River Subunit is occupied by four federally listed freshwater mussels, the endangered pink mucket (*Lampsilis abrupta*), the threatened rabbitsfoot (*Theliderma cylindrica,* listed as *Quadrula cylindrica cylindrica*), the endangered winged mapleleaf (*Quadrula fragosa*), and the endangered Ouachita rock pocketbook (*Arcidens wheeleri,* listed as *Arkansia wheeleri*). There is overlap of 88.3 river mi (142.1 km) of this unit with designated critical habitat for rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015).

Subunit LAPT–1b: Rolling Fork. The Rolling Fork Subunit consists of approximately 29.9 river mi (47.9 km) in Sevier County, Arkansas. The subunit extends upstream from the Little River confluence to the falls/bedrock ledge located approximately 0.5 river mile (0.8 km) downstream of DeQueen Lake Dam. Ownership of adjacent riparian areas is privately held. This reach is entirely rural, and predominately agricultural lands and riparian woodlands. The Rolling Fork Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year.

Drought conditions and flooding in Rolling Fork are seldom extreme; however, this subunit is affected by impoundments and ongoing agricultural activities, resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–1c: Cossatot River. The Cossatot River Subunit consists of approximately 47.2 river mi (75.9 km) of stream located within Sevier County, Arkansas. This subunit extends upstream from the U.S. Highway 69/71 bridge near Millwood Lake, Arkansas, to the Howard/Sevier County line in southeast Arkansas. Ownership of adjacent riparian areas is approximately 85 percent private and 15 percent Federal. This reach is entirely rural, and predominately riparian woodlands bordered by agricultural lands. The Cossatot River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year.

Drought conditions and flooding in the Cossatot River are seldom extreme; however, this subunit is affected by impoundments and ongoing agricultural activities, resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–1d: Saline River. The Saline River Subunit consists of approximately 42.6 river mi (68.5 km) of stream located along the Howard/Sevier County line in southeast Arkansas. This subunit extends upstream from the Bright Star Road bridge, which is located immediately north of Millwood Lake, to the Thirty Thousand Road (County Road 80) bridge located

approximately 3.8 mi (6.1 km) west-northwest of Dierks, Arkansas. Adjacent riparian areas are privately owned. This reach is entirely rural, and predominately riparian woodlands bordered by agricultural lands. The Saline River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year.

Drought conditions and flooding in the Saline River are seldom extreme; however, this subunit is affected by impoundments and ongoing agricultural activities, resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit LAPT–2: Sabine River

Subunit LAPT–2a: Upper Sabine River. The Upper Sabine River Subunit consists of 110.1 river mi (177.2 km) occupying portions of Gregg, Harrison, Panola, Rusk, Smith, Upshur, and Wood Counties, Texas. This subunit continues upstream from the State Highway 43 bridge, which is 5 mi (8 km) northeast of Tatum, Texas, and terminates at the Farm-to-Market Road 1804 bridge located 3.3 mi (5.3 km) southeast of Mineola, Texas. Ownership of adjacent riparian areas is approximately 96 percent private, 2 percent State, and 2 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands.

The Upper Sabine River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Sabine River can be extreme, causing the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations. The City of Longview, Texas, is located north of the subunit at approximately one-third of the reach length upstream from the downstream terminus. Industrial and municipal wastewater associated with this urban area are discharged into the Sabine River Basin. The Upper Sabine River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is an overlap of 110.05 river mi (177.11 km) of this unit with proposed critical habitat for the Texas heelsplitter.

Subunit LAPT–2b: Anacoco Bayou. The Anacoco Bayou Subunit consists of 12.2 river mi (19.6 km) in Vernon Parish, Louisiana. The subunit extends upstream from the Beauregard/Vernon parish line, situated approximately 8 mi (12.9 km) northwest of DeRidder, Louisiana, and terminates at the Hawks Road bridge, located approximately 4.8 mi (7.7 km) northwest of Rosepine, Louisiana. Adjacent riparian areas are privately owned. This reach is mostly rural and predominately within riparian woodlands. The Anacoco Bayou Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in Anacoco Bayou can be extreme, causing the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

Three sand and gravel mining operations and one paper mill that exist adjacent to this subunit likely negatively affect water quality from activities that generate point and non-point source pollution. Wastewater and storm water runoff associated with these activities are discharged into Anacoco Bayou drainage. The Anacoco Bayou Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, as well as ongoing mining and industrial activities resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit LAPT–3: Neches River

Subunit LAPT–3a: Upper Neches River. The Upper Neches River Subunit extends for 200.4 river mi (322.4 km) through parts of Anderson, Angelina, Cherokee, Houston, Polk, Trinity, and Tyler Counties, Texas. The downstream boundary corresponds to U.S. Highway 59 bridge, approximately 4 mi (6.4 km) south of Diboll, Texas, and the upstream boundary is located at a transmission line ROW approximately 1.1 river mi (1.8 km) below Palestine Lake Dam. Ownership of adjacent riparian areas is approximately 89 percent private and 11 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Upper Neches River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Neches River can be significant, causing the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations.

The Upper Neches River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. The entire subunit overlaps with proposed critical habitat for the Texas heelsplitter.

Subunit LAPT–3b: Upper Angelina River. The Upper Angelina River Subunit includes 67.4 river mi (108.4 km) in Angelina, Cherokee, and Nacogdoches Counties, Texas. The subunit extends upstream from the Union Pacific Railroad crossing, located approximately 3.7 mi (6 km) north-northwest of Redland, Texas, to the State Highway 204 bridge located 1.6 mi (2.6 km) west of Sacul, Texas. This subunit is hydrologically isolated from the Upper Neches River Subunit by Sam Rayburn Reservoir. Ownership of adjacent riparian areas is approximately 50 percent private and 50 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Upper Angelina River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Angelina River can result in either extreme low-flow conditions with

associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

The Upper Angelina River Subunit is influenced by drought, low flows, and flooding (leading to scour); the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–3c: Lower Neches River. The Lower Neches River Subunit occupies 76.2 river mi (122.6 km) in Hardin, Jasper, Jefferson, Orange, and Tyler Counties, Texas. The subunit extends upstream from the Lower Neches Valley Authority weir, located north of Beaumont, Texas, to the Walnut Run confluence, which is approximately 2.6 mi (4.2 km) southeast of the B.A. Steinhagen Dam. The Lower Neches River Subunit is hydrologically isolated from the Upper Neches River Subunit by B.A. Steinhagen Lake. Ownership of adjacent riparian areas is approximately 88 percent private, 7 percent State, and 5 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Lower Neches River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Neches River can cause the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

The Lower Neches River Subunit is influenced by drought, low flows, and flooding (leading to scour); the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, groundwater withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. The entire subunit overlaps with proposed critical habitat for the Texas heelsplitter.

Subunit LAPT–3d: Village Creek. The Village Creek Subunit includes 54.9 river mi (88.3 km) of stream in Hardin County, Texas. The subunit originates at the Village Creek confluence with the Neches River, located approximately 1.6 mi (2.6 km) north-northwest of Lakeview, Texas, and continues up Village Creek to its terminus at the confluence of Big Sandy and Kimball creeks, located approximately 1.6 mi (2.6 km) south-southeast of Wildwood, Texas. Ownership of adjacent riparian areas is approximately 20 percent private, 2 percent State, and 78 percent Federal. Although some urban encroachment occurs in the lower half of the reach, it is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Village Creek Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in Village Creek can be extreme, causing the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

The Village Creek Subunit is influenced by drought, low flows, and flooding (leading to scour); the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–3e: Big Sandy Creek. The Big Sandy Creek Subunit consists of 43.7 river mi (70.3 km) of stream in Hardin, Polk, and Tyler Counties, Texas. The subunit continues upstream from its confluence with Kimball Creek, located approximately 1.6 mi (2.6 km) south-southeast of Wildwood, Texas, to the Alabama-Coushatta Reservation boundary. This boundary is 1.4 river mi (2.25 km) southeast of the U.S. Highway 190 bridge, which is located approximately 12.8 mi (20.6 km) east of Livingston, Texas. Ownership of adjacent riparian areas is approximately 5 percent private and 95 percent Federal. This reach is mostly rural and predominately within riparian woodlands bordered by agricultural lands. The Big Sandy Creek Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in Big Sandy Creek can be significant, resulting in low-flow conditions with associated reduced water quality or high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

The Big Sandy Creek Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit LAPT–4: East Fork San Jacinto River

The East Fork San Jacinto River Unit includes 23.3 river mi (37.5 km) of the East Fork San Jacinto River in Liberty and Montgomery Counties, Texas. The downstream boundary of this unit is located at the FM 1485 bridge approximately 1 mile (1.6 km) east of Lake Houston Wilderness Park. The upstream boundary coincides with the Low Water Bridge Road (FM 388) bridge approximately 1.6 mi (2.6 km) northwest of Cleveland, Texas. Adjacent riparian areas are privately owned. Although located 10 mi northwest of the Houston metropolitan area, this reach is mostly rural and predominately within riparian woodlands, but it is bordered by developed areas. Four sand and gravel mining operations are located adjacent to this unit. The East Fork San Jacinto River Unit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the East Fork San Jacinto River can be extreme, causing the species to experience either extreme low-flow conditions with associated reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediments on Louisiana pigtoe populations.

The East Fork San Jacinto River Unit is influenced by drought, low flows, and flooding (leading to scour), and the unit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality

degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit LAPT–5: Calcasieu River

Subunit LAPT–5a: Upper Calcasieu River. The Upper Calcasieu River Subunit includes 92.0 river mi (148.0 km) located in Allen and Rapides parishes, Louisiana. The subunit originates at the Union Pacific Railroad crossing located south of U.S. Highway 190 approximately 4 mi (6.4 km) west of Kinder, Louisiana, and continues upstream to the Price Road bridge, located 3.1 mi (5 km) northwest of Hineston, Louisiana. Ownership of adjacent riparian areas is 78 percent private and 22 percent Federal. This reach is rural and predominately within riparian woodlands. The Upper Calcasieu River Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Calcasieu River can be extreme, causing the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations.

The Upper Calcasieu River Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–5b: Whisky Chitto Creek. The Whisky Chitto Creek Subunit includes 21.7 river mi (34.9 km) located in Allen Parish, Louisiana. The subunit extends from its confluence with Calcasieu River to the Tenmile Creek confluence, which is located approximately 0.7 mi (1.1 km) northeast of Mittie, Louisiana. Ownership of adjacent riparian areas is 1 percent private and 99 percent State. This reach is rural and predominately within riparian woodlands. The Whisky Chitto Creek Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Whisky Chitto Creek can be extreme, causing the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations.

The Whisky Chitto Creek Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Subunit LAPT–5c: Tenmile Creek. The Tenmile Creek Subunit consists of 32.0 river mi (51.5 km) in Allen, Rapides, and Vernon parishes, Louisiana. The Tenmile Creek Subunit continues upstream from the Whisky Chitto Creek confluence located 0.7 mi (1.1 km) northeast of Mittie, Louisiana, to the 10 Mile Road bridge located approximately 5 mi (8 km) north of Elizabeth, Louisiana. Ownership of adjacent riparian areas is 98 percent private and 2 percent State. This reach is rural and predominately within riparian woodlands. The Tenmile Creek Subunit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Tenmile Creek can be extreme, causing the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations.

The Tenmile Creek Subunit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by ongoing agricultural activities and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. There is no overlap with any designated critical habitat for other listed species.

Unit LAPT–6: Pearl River

The Pearl River Unit consists of 86.6 river mi (139.3 km) in St. Tammany and Washington parishes, Louisiana, and Marion and Pearl River Counties, Mississippi. The Pearl River splits into two significant channels within Bogue Chitto National Wildlife Refuge, and a navigation channel is associated with the west channel. Proposed critical habitat river mileage is calculated from the east channel only, but the Pearl River Unit does include the west channel by definition. The navigation channel is excluded from the unit. Following the east channel, the Pearl River Unit extends upstream along the Louisiana/Mississippi State line from the I–59 bridge located 1 mile (1.6 km) south of Nicholson, Mississippi, to where the Pearl River enters Louisiana from Mississippi, which is located 3.9 mi (6.3 km) southeast of Sandy Hook, Mississippi. The west channel extends from the I–59 bridge located 0.9 mi (1.4 km) northeast of Pearl River, Louisiana, and continues upstream to its confluence with the east channel, which is located approximately 2.7 mi (4.3 km) west of Industrial, Mississippi. Ownership of adjacent riparian areas is 44 percent private, 14 percent State, and 42 percent Federal. This reach is largely rural and predominately within riparian woodlands. The Pearl River Unit is occupied by the Louisiana pigtoe and contains all the PBFs essential to the conservation of the species most of the year. However, drought conditions and flooding in the Pearl River can be extreme, causing the species to experience either extreme low-flow conditions with related reduced water quality or extreme high flows that mobilize substrates, erode habitat, or deposit sediment on Louisiana pigtoe populations.

The Pearl River Unit is influenced by drought, low flows, and flooding (leading to scour), and the subunit is being affected by impoundments, ongoing agricultural activities, and development resulting in excessive sedimentation, water quality degradation, ground water withdrawals, and surface water diversions. Therefore, special management considerations may be required to reduce sedimentation, improve water quality, maintain adequate flows, and improve habitat connectivity. The entire subunit overlaps with critical habitat for the federally listed Gulf sturgeon (*Acipenser oxyrinchus* (=*oxyrhynchus*) *desotoi*) (see 50 CFR 17.95(e)).

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat.

We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

Compliance with the requirements of section 7(a)(2) is documented through our issuance of:

(1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or

(2) A biological opinion for Federal actions that may affect, and are likely to adversely affect, listed species or critical habitat.

When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ''reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that:

(1) Can be implemented in a manner consistent with the intended purpose of the action,

(2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction,

(3) Are economically and technologically feasible, and

(4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat.

Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action.

In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but Congress also enacted some exceptions in 2018 to the requirement to reinitiate consultation on certain land management plans on the basis of a new species listing or new designation of critical habitat that may be affected by the subject Federal action. See 2018 Consolidated Appropriations Act, Public Law 115–141, Div, O, 132 Stat. 1059 (2018).

Application of the ''Destruction or Adverse Modification'' Standard

The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species.

Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation.

Activities that we may, during a consultation under section 7(a)(2) of the Act, consider likely to destroy or adversely modify critical habitat include, but are not limited to, actions that would: (1) Alter the minimum flow or the existing flow regime (for example, impoundment, channelization, water diversion, water withdrawal, or hydropower generation); (2) significantly alter water chemistry or temperature (for example, release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater at a point source or by dispersed release (nonpoint source)); (3) significantly increase sediment deposition within the stream channel (for example, excessive sedimentation from livestock grazing; road construction; channel alteration; timber harvest; off-road vehicle use; agricultural, industrial, or urban development; or other watershed and floodplain disturbances); and (4) significantly alter channel morphology or geometry (for example, channelization, impoundment, road and bridge construction, mining, dredging, or destruction of riparian vegetation). These activities may lead to changes in water flows and levels that would degrade or eliminate the mussel or its fish host and/or their habitats. These actions can also lead to increased sedimentation and degradation in water quality to levels that are beyond the tolerances of the mussels or their fish hosts.

Exemptions

Application of Section 4(a)(3) of the Act

Section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) provides that the Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan (INRMP) prepared under section 101 of the Sikes Act Improvement Act of 1997 (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. No DoD lands with a completed INRMP are within the proposed critical habitat designations.

Consideration of Impacts Under Section 4(b)(2) of the Act

Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. Exclusion decisions are governed by the regulations at 50 CFR 424.19 and the Policy Regarding Implementation of Section 4(b)(2) of the Endangered Species Act (hereafter, the ''2016 Policy''; 81 FR 7226, February 11, 2016), both of which were developed jointly with the National Marine Fisheries Service (NMFS). We also refer to a 2008 Department of the Interior Solicitor's opinion entitled ''The Secretary's Authority to Exclude Areas from a Critical Habitat Designation under section 4(b)(2) of the Endangered Species Act'' (M–37016).

In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise discretion to exclude the area only if such exclusion would not result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. In our final rules, we explain any decision to exclude areas, as well as decisions not to exclude, to demonstrate that the decision is reasonable. We describe below the process that we use for taking into consideration each category of impacts and any initial analyses of the relevant impacts.

Consideration of Economic Impacts

Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate the impacts that a specific critical habitat designation may have on restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for the particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both ''with critical habitat'' and ''without critical habitat.''

The ''without critical habitat'' scenario represents the baseline for the analysis, which includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat (*e.g.,* under the Federal listing as well as other Federal, State, and local regulations). The baseline, therefore, represents the costs of all efforts attributable to the listing of the species under the Act (*i.e.,* conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The ''with critical habitat'' scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary 4(b)(2) exclusion analysis.

For this particular designation, we developed an incremental effects memorandum (IEM) considering the probable incremental economic impacts that may result from this proposed designations of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the Texas heelsplitter and the Louisiana pigtoe (IEc 2021, entire). We began by conducting a screening analysis of the proposed designations of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (*i.e.,* absent critical habitat designation) and includes any probable economic impacts where land and water use may already be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If the proposed critical habitat designation contains any unoccupied units, the screening analysis assesses whether those units require additional management or conservation efforts that may incur incremental economic impacts (although here the proposed critical habitat designations does not contain any unoccupied units). This screening analysis, combined with the information contained in our IEM, are what we consider our draft economic analysis (DEA) of the proposed critical habitat designations for the Texas heelsplitter and Louisiana pigtoe; our DEA is summarized in the narrative below.

Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O. regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient data are available, we assess to the extent practicable the probable impacts to both directly and indirectly

affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designations. In our evaluation of the probable incremental economic impacts that may result from the proposed designations of critical habitat for the Texas heelsplitter and Louisiana pigtoe, first we identified, in the IEM dated September 1, 2021, probable incremental economic impacts associated with the following categories of activities: (1) Federal lands management (National Park Service, National Wildlife Refuge System, U.S. Forest Service, U.S. Army Corp of Engineers, Natural Resources Conservation Service, Department of the Army); (2) industrial, municipal, and agricultural water users and dischargers (including wastewater treatment plants); (3) water supply delivery and treatment; (4) reservoir and dam operations; (5) transportation; (6) petroleum pipelines that may cross proposed designated stream reaches; (7) residential, commercial, industrial, and agricultural development; and (8) disaster recovery from hurricanes and flooding. We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. If we list these species, in areas where the Texas heelsplitter and Louisiana pigtoe are present, Federal agencies would be required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If, when we list the species, we also finalize this proposed critical habitat designation, Federal agencies would be required to consider the effects of their actions on the designated habitat, and if the Federal action may affect critical habitat, our consultations would include an evaluation of measures to avoid the destruction or adverse modification of critical habitat.

In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (*i.e.,* difference between the jeopardy and adverse modification standards) for the Texas heelsplitter's and Louisiana pigtoe's critical habitat. Because the designations of critical habitat for Texas heelsplitter and Louisiana pigtoe are being proposed concurrently with their listings, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which will result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to the Texas heelsplitter and Louisiana pigtoe would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for these species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of these proposed designations of critical habitat.

The proposed critical habitat designations for the Texas heelsplitter and Louisiana pigtoe include a total of nine units, all of which are occupied by their respective species. Ownership of riparian lands adjacent to the nine proposed units includes 1,214 river mi (1,954 km; 82.2 percent) in private ownership, and 262 river mi (422 km; 17.8 percent) in public (Federal, State, or Local) ownership. In these areas, any actions that may affect the two species or their habitats would also affect designated critical habitat.

Total incremental costs of critical habitat designation for the Texas heelsplitter and Louisiana pigtoe are not expected to exceed $51,800 (2021 dollars) per year. The costs are reflective of: (1) All proposed units are considered occupied, (2) project modifications requested to avoid adverse modification are likely to be the same as those recommended to avoid jeopardy in occupied habitat for these species, and (3) a portion of the proposed designations receive baseline protection from the presence of critical habitat for co-occurring listed mussel species with similar habitat needs. Because consultation would be required as a result of the listing of the Texas heelsplitter and Louisiana pigtoe and is already required in some of these areas as a result of the presence of other listed species and critical habitats, the economic costs of the critical habitat designation would likely be primarily limited to additional administrative efforts to consider adverse modification for these two species in section 7 consultations.

Based on the consultation history regarding historical projects and activities overlapping the proposed critical habitat areas for the Texas heelsplitter and Louisiana pigtoe, the number of future consultations, including technical assistance efforts, is likely to be no more than nine per year across all nine units. Overall, transportation and utilities activities are expected to result in the largest portion of consultations for both the Texas heelsplitter and Louisiana pigtoe and, therefore, to incur the highest costs. The geographic distribution of future section 7 consultations and associated costs are likely to be most heavily concentrated in all three proposed units for the Texas heelsplitter, and in proposed Units 2 and 3 for the Louisiana pigtoe. However, even assuming consultation activity increases substantially, incremental administrative costs are still likely to remain well under $100 million per year. Therefore, based on the definition of significance in E.O. 12866, they would not be significant.

The entities most likely to incur incremental costs are parties to section 7 consultations, including Federal action agencies and, in some cases, third parties, most frequently State agencies or municipalities. Activities we expect would be subject to consultations that may involve private entities as third parties are farms and ranches acquiring funding through Federal agricultural programs, oil and gas production regulated by the Federal Energy Regulatory Commission, and infrastructure projects that involve Federal funding or authorization. However, based on coordination efforts with State and local agencies, the cost to private entities in these sectors is expected to be relatively minor (administrative costs of less than $10,000 per consultation effort) and would not be significant (*i.e.,* would not exceed $100 million in a single year).

We are soliciting data and comments from the public on the DEA discussed above. During the development of a final designation, we will consider the information presented in the DEA and any additional information on economic impacts we receive during the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 424.19. We may exclude an area from critical habitat if we determine that the benefits of

excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.

Consideration of National Security Impacts or Homeland Security Impacts

Section 4(a)(3)(B)(i) of the Act may not cover all DoD lands or areas that pose potential national-security concerns (*e.g.,* a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i), national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ''critical habitat.'' However, the Service must consider impacts on national security, including homeland security, on those lands or areas not covered by section 4(a)(3)(B)(i) because section 4(b)(2) requires the Service to consider those impacts whenever it designates critical habitat. Accordingly, if DoD, Department of Homeland Security (DHS), or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns, or we have otherwise identified national-security or homeland-security impacts from designating particular areas as critical habitat, we generally have reason to consider excluding those areas.

However, we cannot automatically exclude requested areas. When DoD, DHS, or another Federal agency requests exclusion from critical habitat on the basis of national-security or homeland-security impacts, we must conduct an exclusion analysis if the Federal requester provides information, including a reasonably specific justification of an incremental impact on national security that would result from the designation of that specific area as critical habitat. That justification could include demonstration of probable impacts, such as impacts to ongoing border-security patrols and surveillance activities, or a delay in training or facility construction, as a result of compliance with section 7(a)(2) of the Act. If the agency requesting the exclusion does not provide us with a reasonably specific justification, we will contact the agency to recommend that it provide a specific justification or clarification of its concerns relative to the probable incremental impact that could result from the designation. If we conduct an exclusion analysis because the agency provides a reasonably specific justification or because we decide to exercise the discretion to conduct an exclusion analysis, we will defer to the expert judgment of DoD, DHS, or another Federal agency as to: (1) Whether activities on its lands or waters, or its activities on other lands or waters, have national-security or homeland-security implications; (2) the importance of those implications; and (3) the degree to which the cited implications would be adversely affected in the absence of an exclusion. In that circumstance, in conducting a discretionary section 4(b)(2) exclusion analysis, we will give great weight to national-security and homeland-security concerns in analyzing the benefits of exclusion.

In preparing this proposal, we have determined that the lands within the proposed designations of critical habitat for Texas heelsplitter and Louisiana pigtoe are not owned or managed by the DoD or DHS, and, therefore, we anticipate no impact on national security or homeland security.

Consideration of Other Relevant Impacts

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security discussed above. To identify other relevant impacts that may affect the exclusion analysis, we consider a number of factors, including whether there are permitted conservation plans covering the species in the area—such as HCPs, safe harbor agreements (SHAs), or candidate conservation agreements with assurances (CCAAs)—or whether there are non-permitted conservation agreements and partnerships that may be impaired by designation of, or exclusion from, critical habitat. In addition, we look at whether Tribal conservation plans or partnerships, Tribal resources, or government-to-government relationships of the United States with Tribal entities may be affected by the designation. We also consider any State, local, social, or other impacts that might occur because of the designation.

When analyzing other relevant impacts of including a particular area in a designation of critical habitat, we weigh those impacts relative to the conservation value of the particular area. To determine the conservation value of designating a particular area, we consider a number of factors, including, but not limited to, the additional regulatory benefits that the area would receive due to the protection from destruction or adverse modification as a result of actions with a Federal nexus, the educational benefits of mapping essential habitat for recovery of the listed species, and any benefits that may result from a designation due to State or Federal laws that may apply to critical habitat.

In the case of the Texas heelsplitter and Louisiana pigtoe, the benefits of critical habitat include public awareness of the presence of these species and the importance of habitat protection, and, where a Federal nexus exists, increased habitat protection for the Texas heelsplitter and Louisiana pigtoe due to protection from destruction or adverse modification of critical habitat. Continued implementation of an ongoing management plan that provides conservation equal to or more than the protections that result from a critical habitat designation would reduce those benefits of including that specific area in the critical habitat designation.

We evaluate the existence of a conservation plan when considering the benefits of inclusion. We consider a variety of factors, including, but not limited to, whether the plan is finalized; how it provides for the conservation of the essential physical or biological features; whether there is a reasonable expectation that the conservation management strategies and actions contained in a management plan will be implemented into the future; whether the conservation strategies in the plan are likely to be effective; and whether the plan contains a monitoring program or adaptive management to ensure that the conservation measures are effective and can be adapted in the future in response to new information.

After identifying the benefits of inclusion and the benefits of exclusion, we carefully weigh the two sides to evaluate whether the benefits of exclusion outweigh those of inclusion. If our analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, we then determine whether exclusion would result in extinction of the species. If exclusion of an area from critical habitat will result in extinction, we will not exclude it from the designation.

Private or Other Non-Federal Conservation Plans Related to Permits Under Section 10 of the Act

HCPs for incidental take permits under section 10(a)(1)(B) of the Act provide for partnerships with non-Federal entities to minimize and mitigate impacts to listed species and their habitat. In some cases, HCP permittees agree to do more for the conservation of the species and their habitats on private lands than designation of critical habitat would provide alone. We place great value on the partnerships that are developed

during the preparation and implementation of HCPs.

CCAAs and SHAs are voluntary agreements designed to conserve candidate and listed species, respectively, on non-Federal lands. In exchange for actions that contribute to the conservation of species on non-Federal lands, participating property owners are covered by an ''enhancement of survival'' permit under section 10(a)(1)(A) of the Act, which authorizes incidental take of the covered species that may result from implementation of conservation actions, specific land uses, and, in the case of SHAs, the option to return to a baseline condition under the agreements. We also provide enrollees assurances that we will not impose further land-, water-, or resource-use restrictions, or require additional commitments of land, water, or finances, beyond those agreed to in the agreements.

When we undertake a discretionary section 4(b)(2) exclusion analysis based on permitted conservation plans such as CCAAs, SHAs, and HCPs, we consider the following three factors:

(i) Whether the permittee is properly implementing the conservation plan or agreement;

(ii) Whether the species for which critical habitat is being designated is a covered species in the conservation plan or agreement; and

(iii) Whether the conservation plan or agreement specifically addresses the habitat of the species for which critical habitat is being designated and meets the conservation needs of the species in the planning area.

In preparing this proposal, we have determined that there are currently no HCPs or other management plans for the Texas heelsplitter or Louisiana pigtoe. The proposed designation of critical habitat for the Louisiana pigtoe includes the Choctaw Reservation in Oklahoma, but not any lands held in trust for the tribe, or owned or managed by the tribe. No Tribal lands fall within the range of the Texas heelsplitter or the boundaries of the proposed critical habitat designations. Therefore the proposed designations do not include any Tribal lands or trust resources. We anticipate no impact on Tribal lands, partnerships, or HCPs from the proposed critical habitat designations.

We are currently working with the Sabine River Authority of Louisiana, State of Louisiana, and Sabine River Authority of Texas to develop CCAAs that address activities conducted by the River Authorities and States with conservation measures specifically designed to provide a net conservation benefit to the covered species, including the Texas heelsplitter and Louisiana pigtoe, in the covered area for the term for each of the CCAAs. We are also working with the Trinity River Authority of Texas to develop a CCAA that would address activities conducted by the Trinity River Authority and State with conservation measures specifically designed to provide a net conservation benefit to the covered species, including the Texas heelsplitter, in the covered area for the term of the CCAA. While these agreements are not yet completed, if and when they are, we may consider excluding areas covered by the completed agreements from our critical habitat designations.

Summary of Exclusions Considered Under Section 4(b)(2) of the Act

At this time, we are not considering any exclusions from the proposed designations based on economic impacts, national security impacts, or other relevant impacts—such as partnerships, management, or protection afforded by cooperative management efforts—under section 4(b)(2) of the Act. In preparing this proposal, we have determined that the proposed designation of critical habitat for the Louisiana pigtoe includes Choctaw Reservation in Oklahoma, but not any lands held in trust for the Tribe, or owned or managed by the Tribe. No tribal lands fall within the range of the Texas heelsplitter or the boundaries of the proposed critical habitat designations. Therefore we have determined that no HCPs or other management plans for the Texas heelsplitter or Louisiana pigtoe currently exist, and the proposed designations do not include any Tribal lands or trust resources. Therefore, we anticipate no impact on Tribal lands, partnerships, or HCPs from the proposed critical habitat designations, and, thus, as described above, we are not considering excluding any particular areas on the basis of the presence of conservation agreements or impacts to trust resources. Some areas within the proposed designations are included in proposed CCAAs. If finalized, we will consider the lands covered in the CCAAs for exclusion in the development of the final designations. However, we have contacted the Choctaw Nation of Oklahoma to request information on any possible impacts and will include such information in our final review.

If through the public comment period we receive information that we determine indicates that there are economic, national security or other relevant impacts from designating particular areas as critical habitat, then as part of developing the final designation of critical habitat, we will evaluate that information and may conduct a discretionary exclusion analysis to determine whether to exclude those areas under authority of section 4(b)(2) and our implementing regulations at 50 CFR 424.19. If we receive a request for exclusion of a particular area and after evaluation of supporting information we do not exclude, we will fully explain our decision in the final rule for this action. (Please see **ADDRESSES**, above, for instructions on how to submit comments).

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.

Regulatory Planning and Review (Executive Orders 12866 and 13563)

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this proposed rule is not significant.

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory

objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this proposed rule in a manner consistent with these requirements.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C. 801 *et seq.*), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (*i.e.,* small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ''significant economic impact'' is meant to apply to a typical small business firm's business operations.

Under the RFA, as amended, and as understood in light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designations. The RFA does not require evaluation of the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if made final as proposed, the proposed critical habitat designations will not have a significant economic impact on a substantial number of small entities.

In summary, we have considered whether the proposed designations would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if made final, the proposed critical habitat designations would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Facilities that provide energy supply, distribution, or use occur within some units of the proposed critical habitat designations (for example, dams, pipelines) and may potentially be affected. We determined that consultations, technical assistance, and requests for species lists may be necessary in some instances. In our economic analysis, we did not find that the proposed critical habitat designations would significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), we make the following finding:

(1) This proposed rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ''Federal intergovernmental mandates'' and ''Federal private sector mandates.'' These terms are defined in 2 U.S.C. 658(5)–(7). ''Federal intergovernmental mandate'' includes a regulation that ''would impose an enforceable duty upon State, local, or Tribal governments'' with two exceptions. It excludes ''a condition of Federal assistance.'' It also excludes ''a duty arising from participation in a voluntary Federal program,'' unless the regulation ''relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ''increase the stringency of conditions of assistance'' or ''place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ''lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ''Federal private sector mandate'' includes a regulation that ''would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.''

The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or

authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments.

(2) We do not believe that this proposed rule would significantly or uniquely affect small governments because the vast majority of the lands being proposed for critical habitat designation are owned by the Federal Government; States of Arkansas, Louisiana, Mississippi, Oklahoma, and Texas; and private individuals. These entities do not fit the definition of ''small governmental jurisdiction.'' One proposed unit (TXHS–2a) includes a very small portion of land owned by the local government, but that is only 1 percent of that one unit. Therefore, a Small Government Agency Plan is not required.

Takings—Executive Order 12630

In accordance with E.O. 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for the Texas heelsplitter and Louisiana pigtoe in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for the proposed designation of critical habitat for the Texas heelsplitter and the Louisiana pigtoe, and it concludes that, if adopted, these designations of critical habitat do not pose significant takings implications for lands within or affected by the designations.

Federalism—Executive Order 13132

In accordance with E.O. 13132 (Federalism), this proposed rule does not have significant federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of the proposed critical habitat designations with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designations may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary for the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur.

Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.

Civil Justice Reform—Executive Order 12988

In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the proposed rule would not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the physical or biological features essential to the conservation of the species. The proposed areas of critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This proposed rule does not contain information collection requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) is not required. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

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

It is our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)). However, when the range of the species includes States within the Tenth Circuit, such as that of the Louisiana pigtoe, under the Tenth Circuit ruling in *Catron County Board of Commissioners* v. *U.S. Fish and Wildlife Service,* 75 F.3d 1429 (10th Cir. 1996), we undertake a NEPA analysis for critical habitat designation. We invite the public to comment on the extent to which these proposed critical habitat designations may have a significant impact on the human environment or fall within one of the categorical exclusions for actions that have no individual or cumulative effect on the quality of the human environment. We will complete our analysis, in compliance with NEPA, before making a final determination on this proposed rule.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with federally recognized Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that no Tribal lands fall within the boundaries of the proposed critical habitat for the Texas heelsplitter or Louisiana pigtoe, so no Tribal lands would be affected by the proposed designations.

References Cited

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

Authors

The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Arlington Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

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

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—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

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

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

■ 2. Amend § 17.11(h) by adding entries for ''Heelsplitter, Texas'' and ''Pigtoe, Louisiana'' to the List of Endangered and Threatened Wildlife in alphabetical order under CLAMS to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
*	*	*	*	*
CLAMS				
*	*	*	*	*
Heelsplitter, Texas	*Potamilus amphichaenus*	Wherever found	E	[**Federal Register** citation when published as a final rule]; 50 CFR 17.95(f).[CH]
*	*	*	*	*
Pigtoe, Louisiana	*Pleurobema riddellii*	Wherever found	T	[**Federal Register** citation when published as a final rule]; 50 CFR 17.45(g);[4d] 50 CFR 17.95(f).[CH]
*	*	*	*	*

■ 3. Further amend § 17.45, as proposed to be amended on September 29, 2020, at 85 FR 61384, on August 26, 2021, at 86 FR 47916, and on September 7, 2021, at 86 FR 50010, and by adding paragraphs (f) and (g) to read as follows:

§ 17.45 Special rules—snails and clams.

* * * * *

(f) [Reserved]

(g) Louisiana pigtoe (*Pleurobema riddellii*).

(1) *Prohibitions.* The following prohibitions that apply to endangered wildlife also apply to the Louisiana pigtoe. Except as provided under paragraph (g)(2) of this section and §§ 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to Louisiana pigtoe:

(i) Import or export, as set forth at § 17.21(b) for endangered wildlife.

(ii) Take, as set forth at § 17.21(c)(1) for endangered wildlife.

(iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.

(iv) Interstate or foreign commerce in the course of commercial activity, as set forth at § 17.21(e) for endangered wildlife.

(v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.

(2) *Exceptions from prohibitions.* In regard to this species, you may:

(i) Conduct activities as authorized by a permit under § 17.32.

(ii) Take, as set forth at § 17.21(c)(2) through (4) for endangered wildlife.

(iii) Take as set forth at § 17.31(b).

(iv) Possess and engage in other acts with unlawfully taken wildlife, as set forth at § 17.21(d)(2) for endangered wildlife.

(v) Take incidental to an otherwise lawful activity caused by:

(A) Channel restoration projects that create natural, physically stable, ecologically functioning streams (or stream and wetland systems) that are reconnected with their groundwater aquifers.

(B) Bioengineering methods such as streambank stabilization using live native stakes (live, vegetative cuttings inserted or tamped into the ground in a manner that allows the stake to take root and grow), live native fascines (live branch cuttings, usually willows, bound together into long, cigar-shaped bundles), or native brush layering (cuttings or branches of easily rooted tree species layered between successive lifts of soil fill). These methods must not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures. In addition, to reduce streambank erosion and sedimentation

into the stream, work using these bioengineering methods must be performed at base-flow or low-water conditions and when significant rainfall is not predicted. Further, streambank stabilization projects must keep all equipment out of the stream channels and water.

(C) Soil and water conservation practices and riparian and adjacent upland habitat management activities that restore instream habitats for the species, restore adjacent riparian habitats that enhance stream habitats for the species, stabilize degraded and eroding stream banks to limit sedimentation and scour of the species' habitats, and restore or enhance nearby upland habitats to limit sedimentation of the species' habitats. We recommend that these practices and activities comply with specifications and technical guidelines developed by the U.S. Department of Agriculture's Natural Resources Conservation Service.

■ 4. Amend § 17.95(f) by adding an entry for ''Texas Heelsplitter (*Potamilus amphichaenus*)'' after the entry for ''Carolina Heelsplitter (*Lasmigona decorata*)'', and by adding an entry for ''Louisiana Pigtoe (*Pleurobema riddellii*)'' after the entry for ''Georgia Pigtoe (*Pleurobema hanleyianum*)'', to read as follows:

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(f) *Clams and Snails.*

* * * * *

Texas Heelsplitter (Potamilus amphichaenus)

(1) Critical habitat units are depicted for Anderson, Angelina, Cherokee, Ellis, Freestone, Gregg, Grimes, Hardin, Harrison, Henderson, Houston, Jasper, Jefferson, Kaufman, Leon, Madison, Navarro, Orange, Panola, Polk, Rains, Rusk, Sabine, Shelby, Smith, Trinity, Tyler, Upshur, Van Zandt, Walker, and Wood Counties, Texas, on the maps in this entry.

(2) Within these areas, the physical or biological features essential to the conservation of Texas heelsplitter consist of the following components within impoundments and streambeds:

(i) Water quality parameters within the following ranges:

(A) Water temperature below 27 °C (80.6 °F);

(B) Dissolved oxygen levels greater than 3 milligrams per liter (mg/L);

(C) Low salinity (less than 2 parts per thousand) and total dissolved solids;

(D) Low total ammonia and nitrogen (below 0.3–0.7 mg/L total ammonia nitrogen);

(E) Low levels of copper, nickel, and other trace metals;

(F) Low levels of pesticides, sulfate, chloride, potassium, and other harmful constituents; and

(G) Low pollutants and environmental contaminants common to wastewater.

(ii) Moderately flowing water rates suitable to prevent excess sedimentation but not so high as to dislodge individuals or sediment; or no water flow, if in an impoundment (lake, reservoir, or pool without flow).

(iii) Substrate including bedrock and boulder crevices, point bars, and vegetated run habitat comprising sand, gravel, and larger cobbles.

(iv) Freshwater drum (*Aplodinotus grunniens*) present.

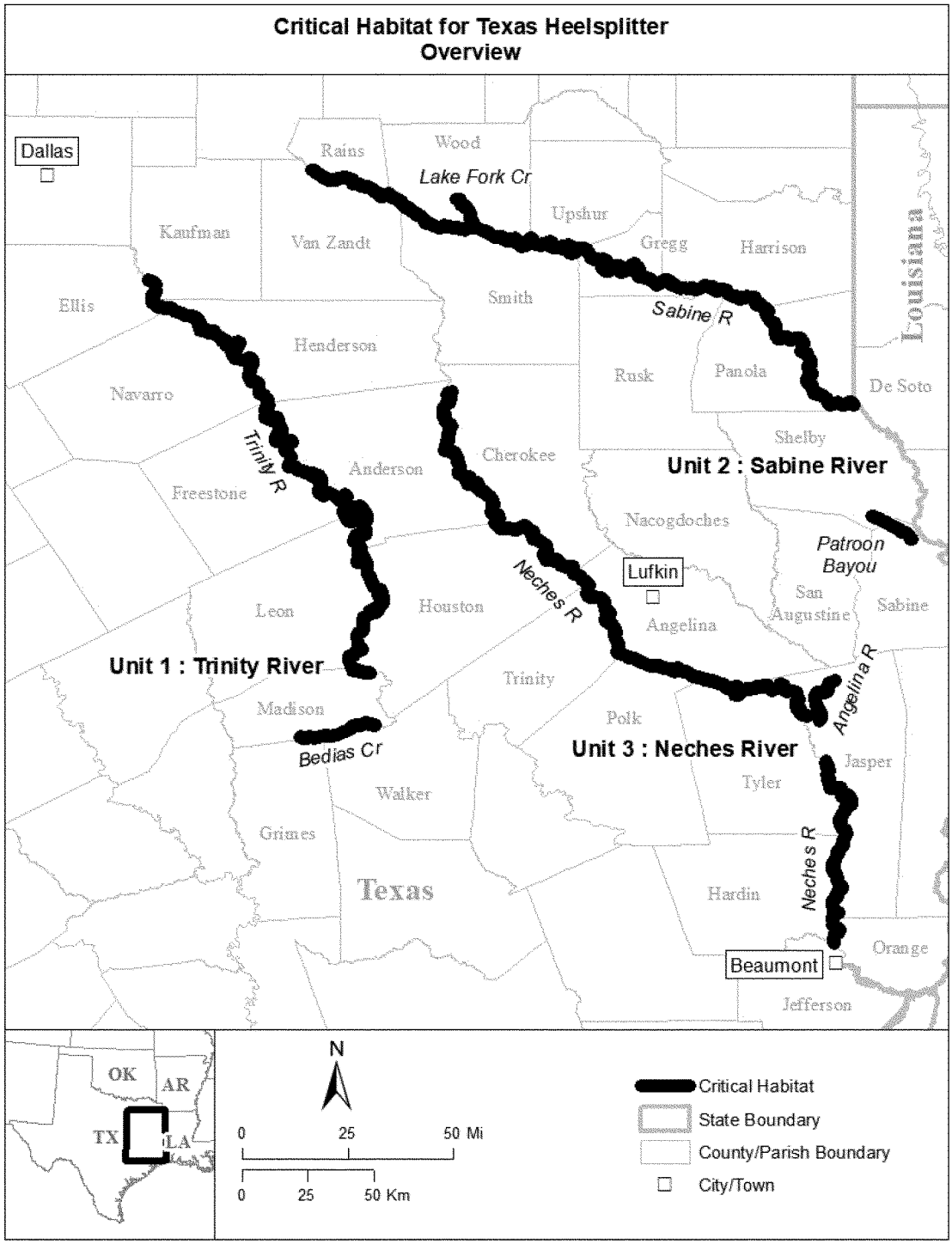
(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the final rule.

(4) Data layers defining map units were created on a base of U.S. Geological Survey digital ortho-photo quarter-quadrangles, and critical habitat units were then mapped using Universal Transverse Mercator (UTM) Zone 14N coordinates. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at *https://www.fws.gov/office/arlington-ecological-services,* at *https://www.regulations.gov* at Docket No. FWS–R2–ES–2022–0026, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Index map of critical habitat units for the Texas heelsplitter follows:

Figure 1 to Texas Heelsplitter (*Potamilus amphichaenus*) paragraph (5)

BILLING CODE 4333–15–P



(6) Unit TXHS–1: Trinity River Unit; Anderson, Ellis, Freestone, Grimes, Henderson, Houston, Kaufman, Leon, Madison, Navarro, and Walker Counties, Texas.

(i) Unit TXHS–1 consists of two subunits:

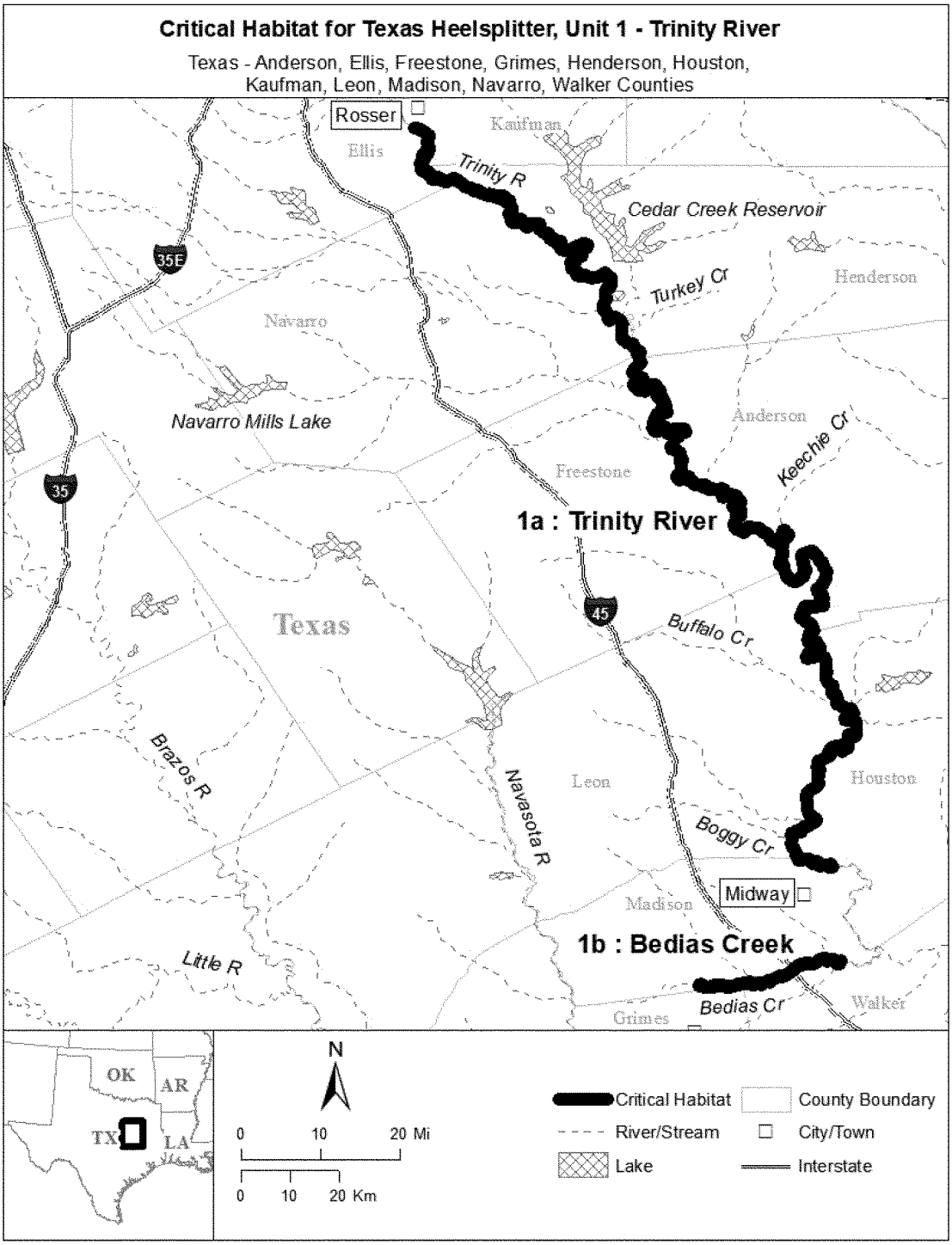
(A) Subunit TXHS–1a (Trinity River) is comprised of 212.8 river miles (mi) (342.4 kilometers (km)) in Anderson, Ellis, Freestone, Henderson, Houston, Kaufman, Leon, Madison, Navarro, and Walker Counties, Texas. All of the riparian lands that border this subunit are in private ownership.

(B) Subunit TXHS–1b (Bedias Creek) is comprised of 28.9 river mi (46.5 km) in Grimes, Madison, and Walker Counties, Texas. This subunit is composed of lands in State (5 percent) and private (95 percent) ownership.

(ii) Unit TXHS–1 includes stream channel up to bankfull height.

(iii) Map of Unit TXHS–1 follows:

Figure 2 to Texas Heelsplitter (*Potamilus amphichaenus*) paragraph (6)(iii)



(7) Unit TXHS–2: Sabine River Unit; Gregg, Harrison, Panola, Rains, Rusk, Sabine, Shelby, Smith, Upshur, Van Zandt, and Wood Counties, Texas.

(i) Unit TXHS–2 consists of three subunits:

(A) Subunit TXHS–2a (Upper Sabine River) is comprised of 237.4 river mi (382 km) in Gregg, Harrison, Panola, Rains, Rusk, Smith, Upshur, Van Zandt, and Wood Counties, Texas. The riparian lands that border this subunit include Federal (2 percent), State (4 percent), local (1 percent), and private (93 percent) ownership.

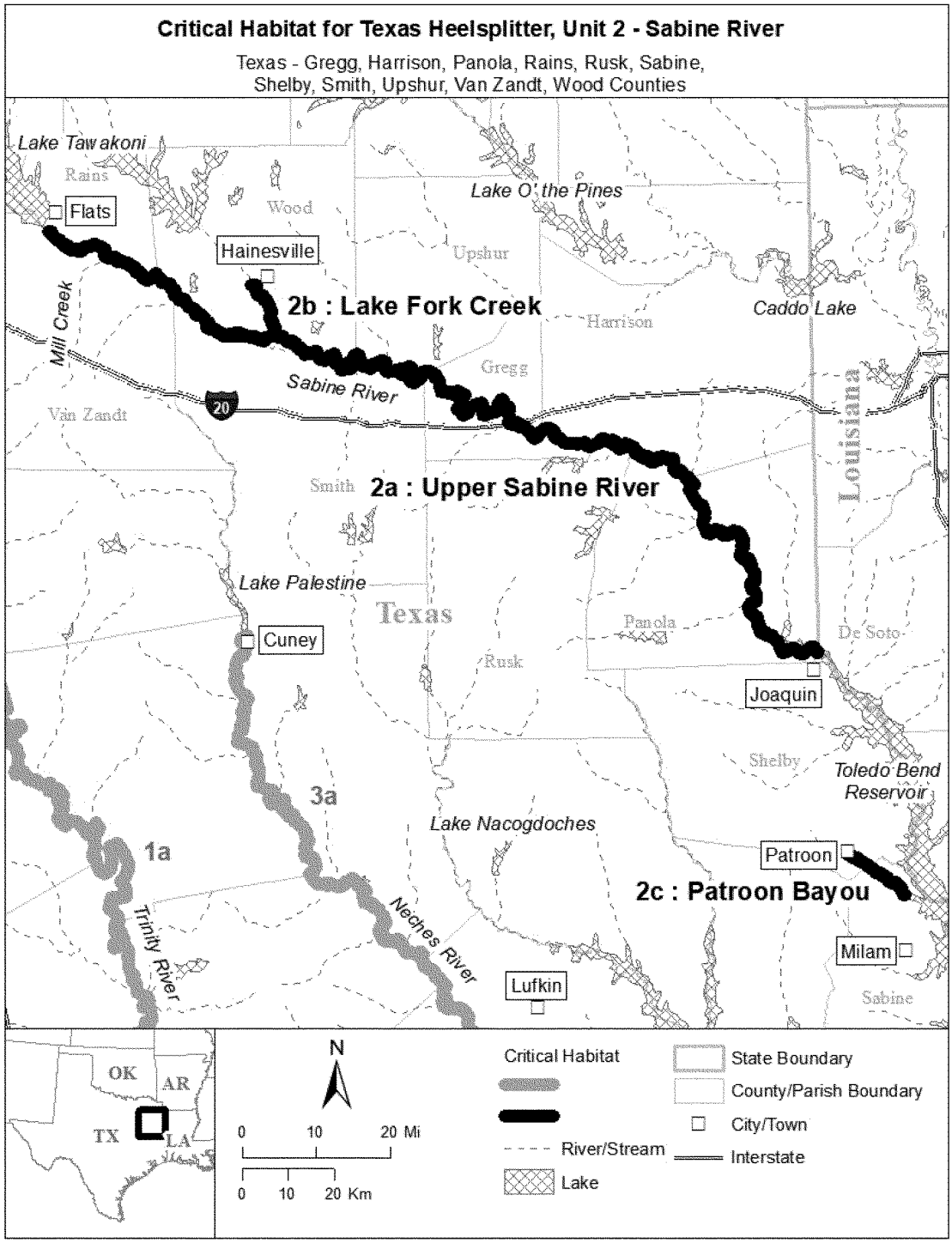
(B) Subunit TXHS–2b (Lake Fork Creek) consists of 13.8 river mi (22.2 km) in Wood County, Texas. All of the riparian lands that border this subunit are in private ownership.

(C) Subunit TXHS–2c (Patroon Bayou) includes 19.9 river mi (32 km) in Sabine and Shelby Counties, Texas. The riparian lands that border this subunit are in Federal (7 percent) and private (93 percent) ownership.

(ii) Unit TXHS–2 includes stream channel up to bankfull height.

(iii) Map of Unit TXHS–2 follows:

Figure 3 to Texas Heelsplitter (*Potamilus amphichaenus*) paragraph (7)(iii)



(8) Unit TXHS–3: Neches River Unit; Anderson, Angelina, Cherokee, Hardin, Houston, Jasper, Jefferson, Orange, Polk, Trinity, and Tyler Counties, Texas.

(i) Unit TXHS–3 consists of three subunits:

(A) Subunit TXHS–3a (Upper Neches River) is comprised of 227.9 river mi (366.7 km) of stream in Anderson, Angelina, Cherokee, Houston, Jasper, Polk, Trinity, and Tyler Counties, Texas. The riparian lands that border this subunit are in Federal (12 percent) and private (88 percent) ownership.

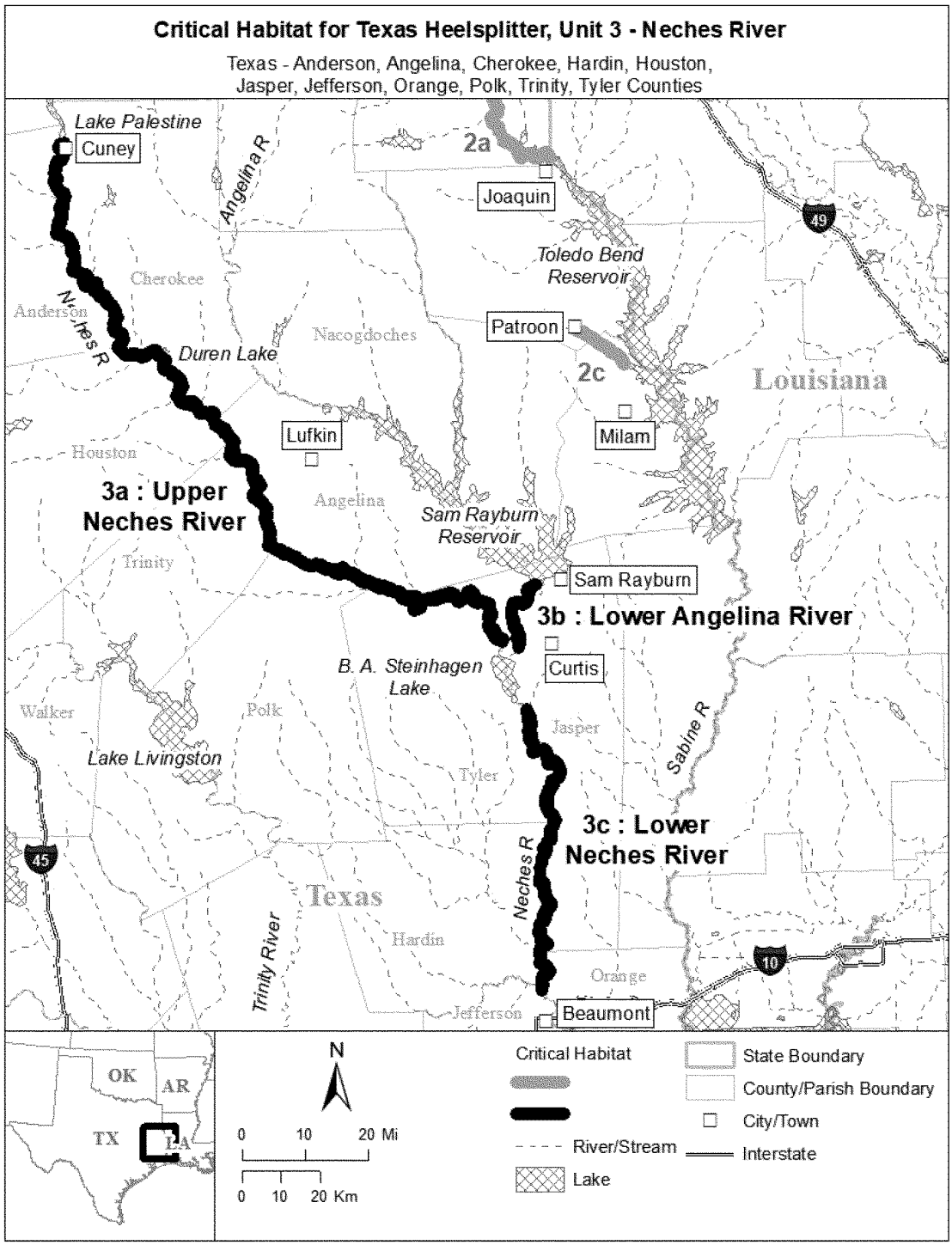
(B) Subunit TXHS–3b (Lower Angelina River) consists of 14.7 river mi (23.7 km) in Jasper County, Texas. The riparian lands that border this subunit are in Federal (11 percent) and private (89 percent) ownership.

(C) Subunit TXHS–3c (Lower Neches River) includes 76.3 river mi (122.8 km) in Hardin, Jasper, Jefferson, Orange, and Tyler Counties, Texas. The riparian lands that border this subunit are in Federal (5 percent), State (7 percent), and private (88 percent) ownership.

(ii) Unit TXHS–3 includes stream channel up to bankfull height.

(iii) Map of Unit TXHS–3 follows:

Figure 4 to Texas Heelsplitter (*Potamilus amphichaenus*) paragraph (8)(iii)



* * * * *

Louisiana Pigtoe (Pleurobema riddellii)

(1) Critical habitat units are depicted for Howard, Little River, and Sevier Counties, Arkansas; Allen, Beauregard, Rapides, St. Tammany, Vernon, and Washington parishes, Louisiana; Marion and Pearl River Counties, Mississippi; McCurtain County, Oklahoma; and Anderson, Angelina, Cherokee, Gregg, Hardin, Harrison, Houston, Jasper, Jefferson, Liberty, Montgomery, Nacogdoches, Orange, Panola, Polk, Rusk, Smith, Trinity, Tyler, Upshur, and Wood Counties, Texas, on the maps in this entry.

(2) Within this area, the physical or biological features essential to the conservation of Louisiana pigtoe consist of the following components within streambeds:

(i) Water quality parameters within the following ranges:

(A) Water temperature below 27 °C (80.6 °F);

(B) Dissolved oxygen levels greater than 3 milligrams per liter (mg/L);

(C) Low salinity (less than 2 parts per thousand) and total dissolved solids;

(D) Low total ammonia and nitrogen (below 0.3–0.7 mg/L total ammonia nitrogen);

(E) Low levels of copper, nickel, and other trace metals;

(F) Low levels of pesticides, sulfate, chloride, potassium, and other harmful constituents; and

(G) Low pollutants and environmental contaminants common to wastewater.

(ii) Moderately flowing water rates suitable to prevent excess sedimentation but not so high as to dislodge individuals or sediment.

(iii) Stable bank and riffle habitats with bedrock and boulder crevices, point bars, and vegetated run habitat comprising sand, gravel, and larger cobbles.

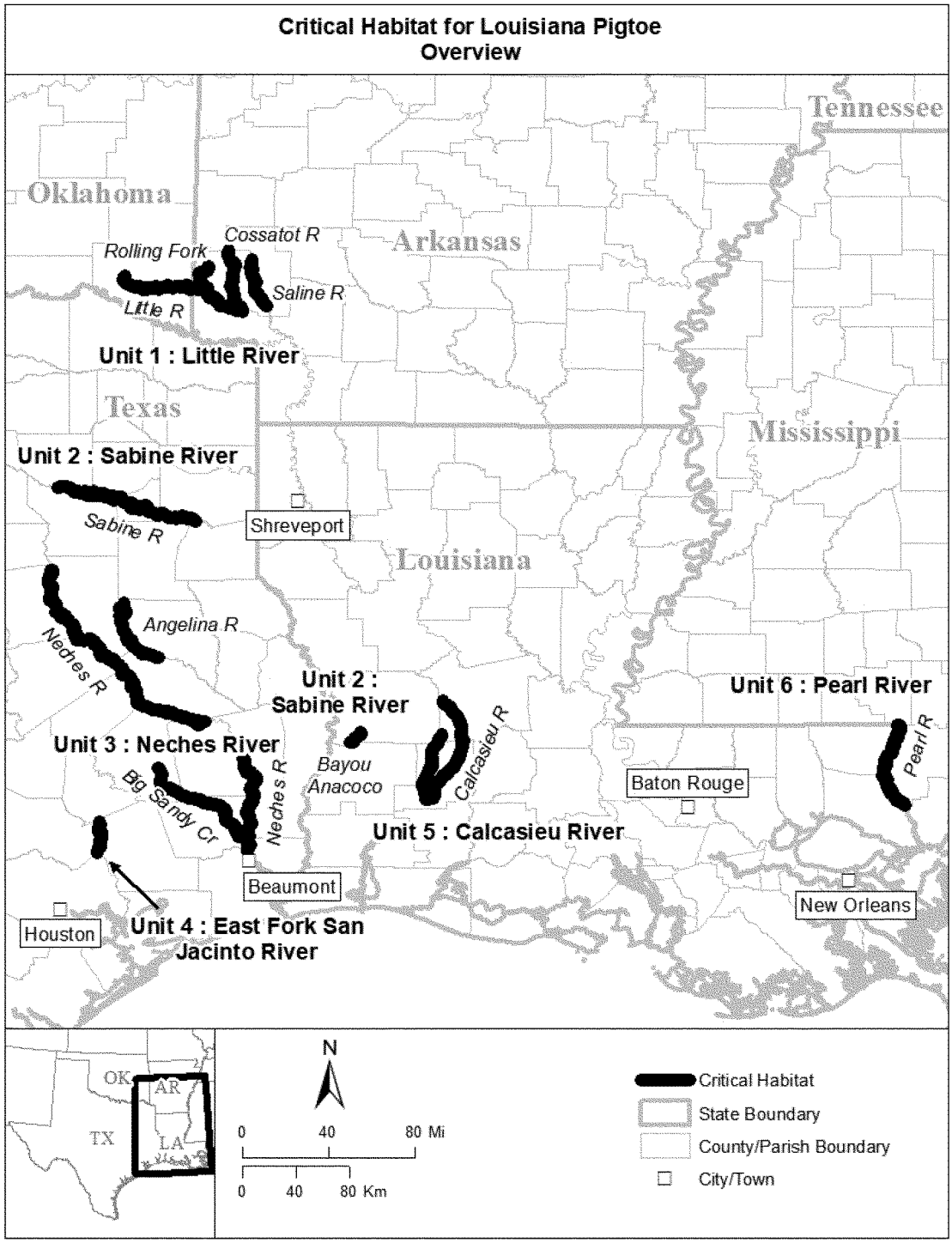
(iv) Red shiner (*Cyprinella* (=*Notropis*) *lutrensis*), blacktail shiner (*Cyprinella venusta*), and bullhead minnow (*Pimephales vigilax*) present.

(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the final rule.

(4) Data layers defining map units were created on a base of U.S. Geological Survey digital ortho-photo quarter-quadrangles, and critical habitat units were then mapped using Universal Transverse Mercator (UTM) Zone 14N coordinates. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at *https://www.fws.gov/office/arlington-ecological-services,* at *https://www.regulations.gov* at Docket No. FWS–R2–ES–2022–0026, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Index map of critical habitat units for the Louisiana pigtoe follows:

Figure 1 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (5)



(6) Unit LAPT–1: Little River Unit; Howard, Little River, and Sevier Counties, Arkansas, and McCurtain County, Oklahoma.

(i) Unit LAPT–1 consists of four subunits:

(A) Subunit LAPT–1a (Upper Little River) is comprised of consists of approximately 88 river miles (mi) (141.6 kilometers (km)) in Little River and Sevier Counties, Arkansas, and McCurtain County, Oklahoma. The riparian lands that border this subunit are in Federal (26 percent), State (1 percent), and private (42 percent) ownership, and private land with the Choctaw Reservation (23 percent), but not any lands held in trust for the Tribe, or owned or managed by the Tribe.

(B) Subunit LAPT–1b (Rolling Fork) is comprised of 29.9 river mi (47.9 km) in Sevier County, Arkansas. All of the riparian lands that border this subunit are in private ownership.

(C) Subunit LAPT–1c (Cossatot River) includes 47.2 river mi (75.9 km) in Sevier County, Arkansas. The riparian lands that border this subunit are in Federal (15 percent) and private (85 percent) ownership.

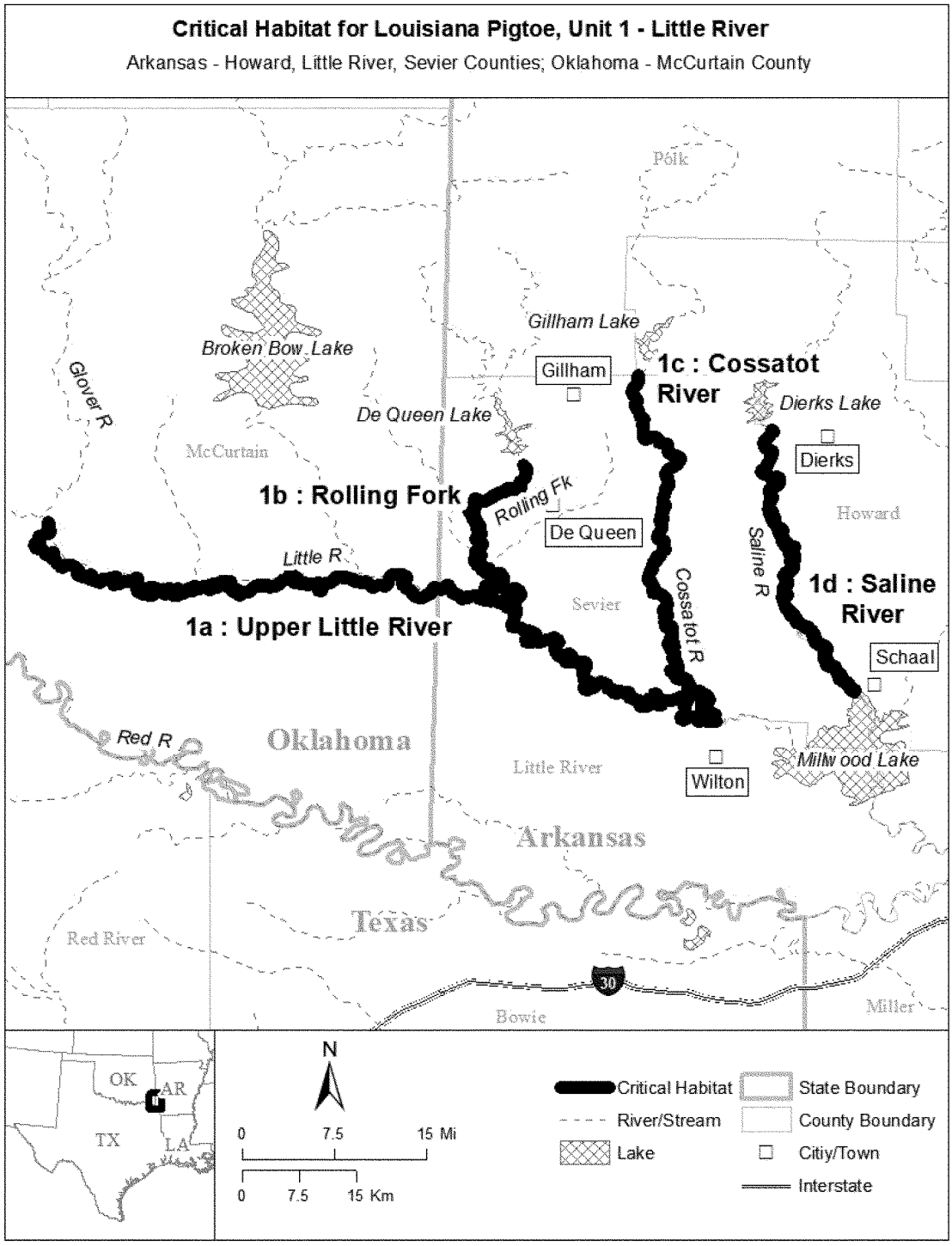
(D) Subunit LAPT–1d (Saline River) consists of 42.6 river mi (68.5 km) along the Howard/Sevier County line in southeast Arkansas. All of the riparian

lands in this subunit are in private ownership.

(ii) Unit LAPT–1 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–1 follows:

Figure 2 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (6)(iii)



(7) Unit LAPT–2: Sabine River Unit; Beauregard and Vernon parishes, Louisiana, and Gregg, Harrison, Panola, Rusk, Smith, Upshur, and Wood Counties, Texas.

(i) Unit LAPT–2 consists of two subunits:

(A) Subunit LAPT–2a (Upper Sabine River) consists of 110.1 river mi (177.2 km) in Gregg, Harrison, Panola, Rusk, Smith, Upshur, and Wood Counties, Texas. The riparian lands that border this subunit are in Federal (2 percent), State (2 percent), and private (96 percent) ownership.

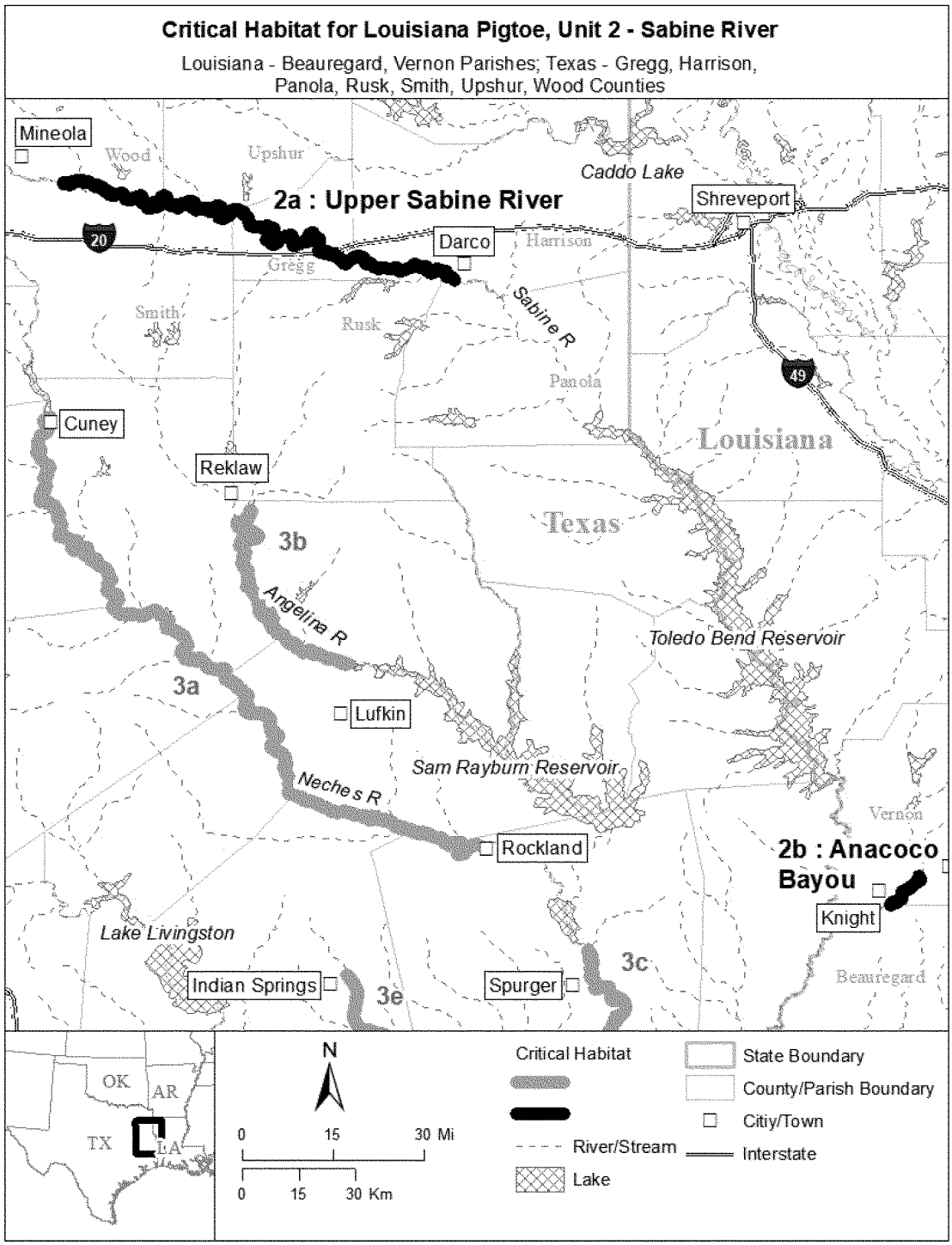
(B) Subunit LAPT–2b (Anacoco Bayou) includes 12.2 river mi (19.6 km)

in Vernon and Beauregard parishes, Louisiana. All of the riparian lands that border this subunit are in private ownership.

(ii) Unit LAPT–2 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–2 follows:

Figure 3 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (7)(iii)



(8) Unit LAPT–3: Neches River Unit; Anderson, Angelina, Cherokee, Hardin, Houston, Jasper, Jefferson, Nacogdoches, Orange, Polk, Trinity, and Tyler Counties, Texas.

(i) Unit LAPT–3 consists of five subunits:

(A) Subunit LAPT–3a (Upper Neches River) consists of 200.4 river mi (322.4 km) through parts of Anderson, Angelina, Cherokee, Houston, Polk, Trinity, and Tyler Counties, Texas. The riparian lands that border this subunit are in Federal (11 percent) and private (89 percent) ownership.

(B) Subunit LAPT–3b (Upper Angelina River) consists of 67.4 river mi (108.4 km) in Angelina, Cherokee, and Nacogdoches Counties, Texas. The riparian lands that border this subunit are in Federal (50 percent) and private (50 percent) ownership.

(C) Subunit LAPT–3c (Lower Neches River) includes 76.2 river mi (122.6 km) in Hardin, Jasper, Jefferson, Orange, and Tyler Counties, Texas. The riparian lands that border this subunit are in Federal (5 percent), State (7 percent), and private (88 percent) ownership.

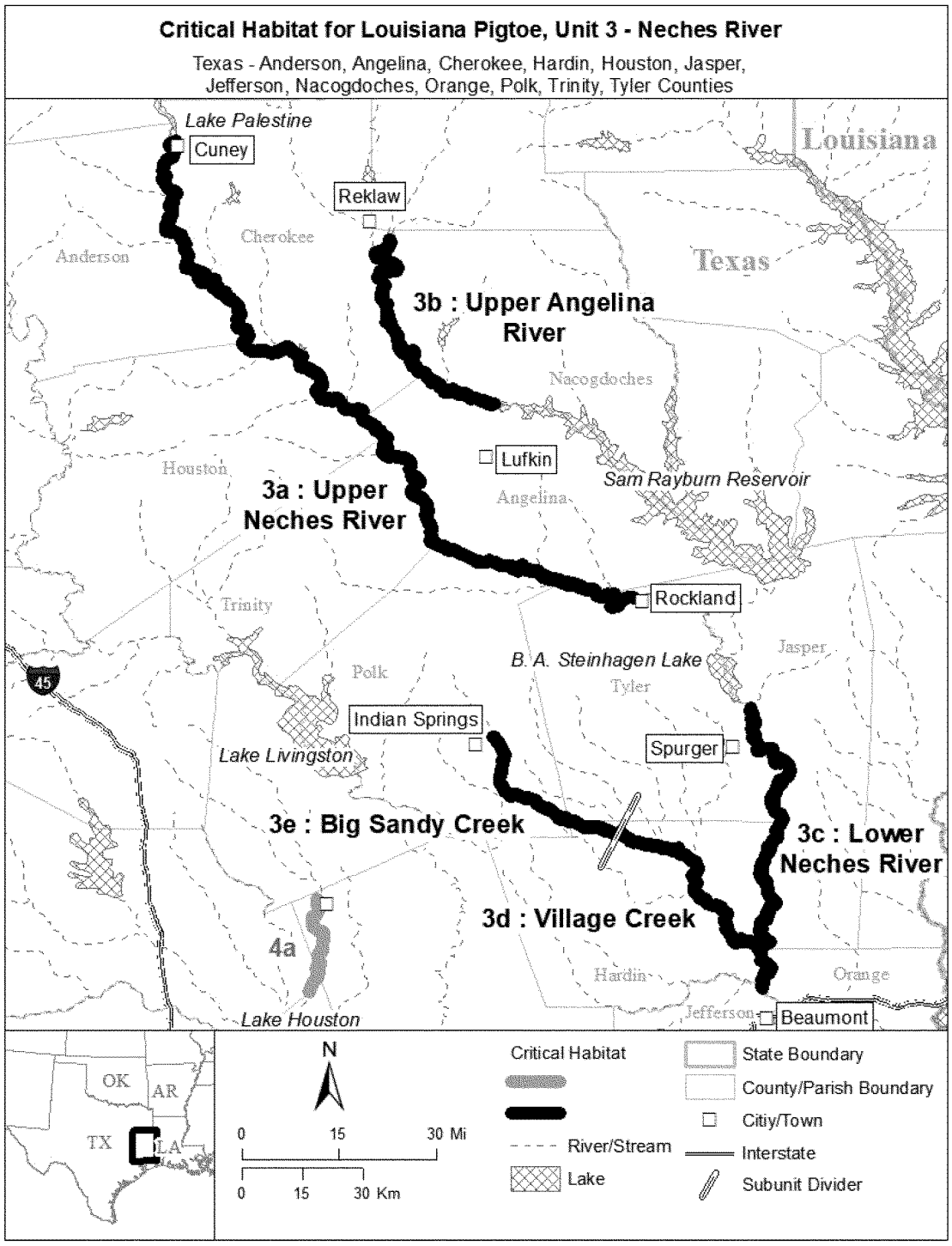
(D) Subunit LAPT–3d (Village Creek) consists of 54.9 river mi (88.3 km) of stream in Hardin County, Texas. The riparian lands that border this subunit are in Federal (78 percent), State (2 percent), and private (20 percent) ownership.

(E) Subunit LAPT–3e (Big Sandy Creek) consists of 43.7 river mi (70.3 km) of stream in Hardin, Polk, and Tyler Counties, Texas. The riparian lands that border this subunit are in Federal (95 percent) and private (5 percent) ownership.

(ii) Unit LAPT–3 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–3 follows:

Figure 4 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (8)(iii)



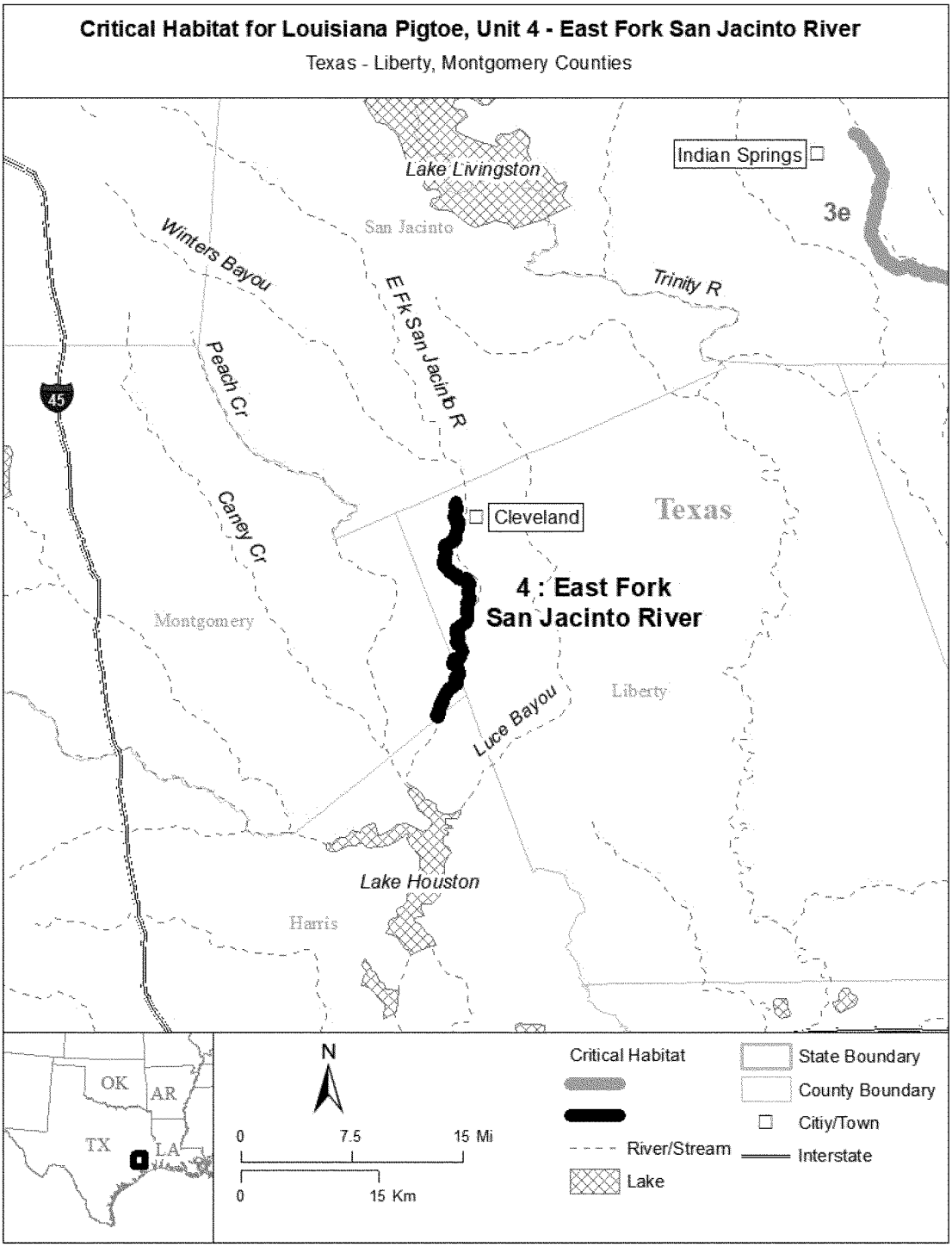
(9) Unit LAPT–4: East Fork San Jacinto River Unit; Liberty and Montgomery Counties, Texas.

(i) Unit LAPT–4 consists of 23.3 river mi (37.5 km) in Liberty and Montgomery Counties, Texas. All of the riparian lands that border this unit are in private ownership.

(ii) Unit LAPT–4 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–4 follows:

Figure 5 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (9)(iii)



(10) Unit LAPT–5: Calcasieu River Unit; Allen, Rapides, and Vernon parishes, Louisiana.

(i) Unit LAPT–5 consists of three subunits:

(A) Subunit LAPT–5a (Upper Calcasieu River) includes 92 river mi (148 km) in Allen and Rapides parishes, Louisiana. The riparian lands that border this subunit are in Federal (22 percent) and private (78 percent) ownership.

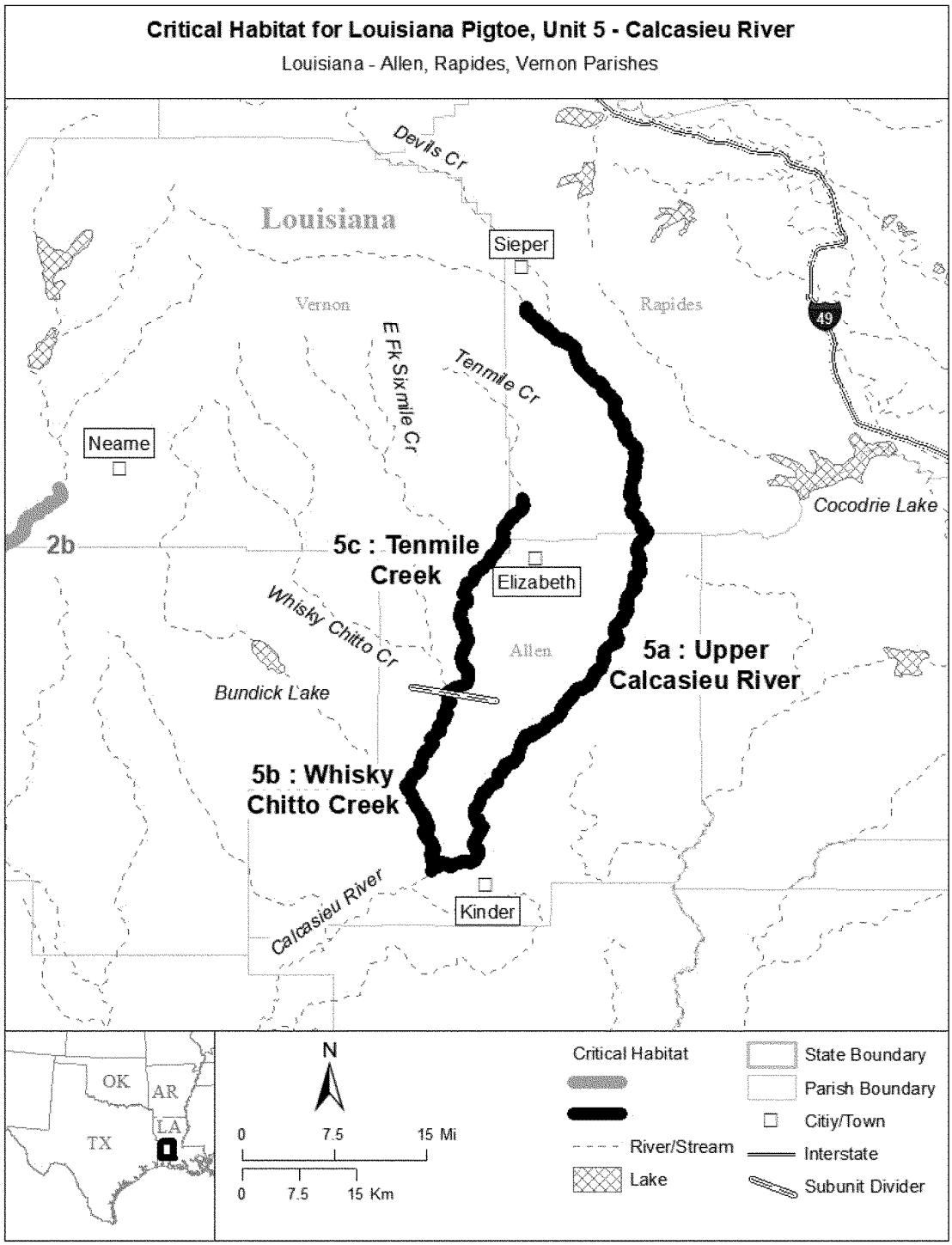
(B) Subunit LAPT–5b (Whisky Chitto Creek) includes 21.7 river mi (34.9 km) in Allen Parish, Louisiana. The riparian lands that border this subunit are in State (99 percent) and private (1 percent) ownership.

(C) Subunit LAPT–5c (Tenmile Creek) consists of 32 river mi (51.5 km) in Allen, Rapides, and Vernon parishes, Louisiana. The riparian lands that border the subunit are in State (2 percent) and private (98 percent) ownership.

(ii) Unit LAPT–5 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–5 follows:

Figure 6 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (10)(iii)



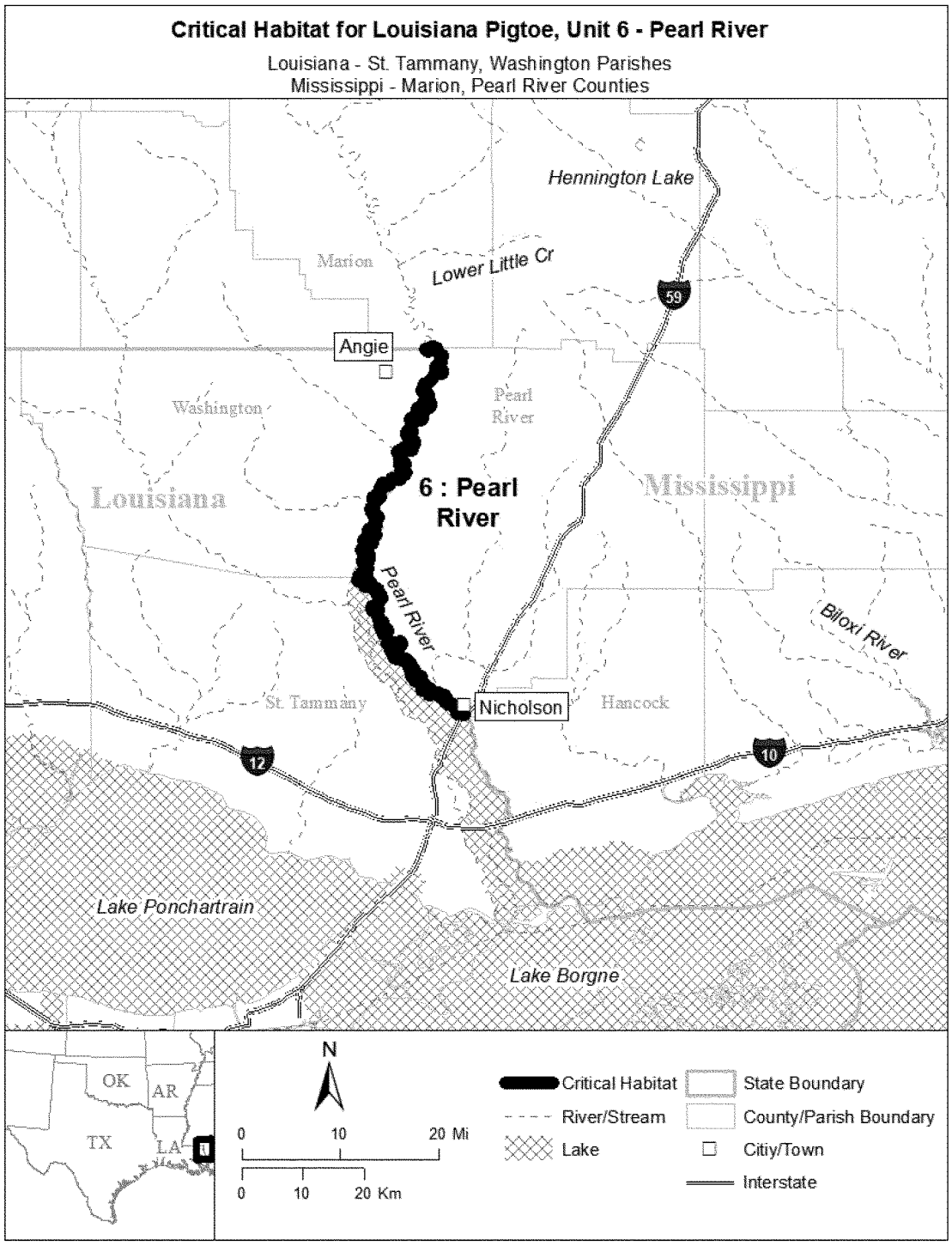
(11) Unit LAPT–6: Pearl River Unit; St. Tammany and Washington parishes, Louisiana, and Marion and Pearl River Counties, Mississippi.

(i) Unit LAPT–6 consists of 86.6 river mi (139.3 km) in St. Tammany and Washington parishes, Louisiana, and Marion and Pearl River Counties, Mississippi. The riparian lands that border this unit are in Federal (42 percent), State (14 percent), and private (44 percent) ownership.

(ii) Unit LAPT–6 includes stream channel up to bankfull height.

(iii) Map of Unit LAPT–6 follows:

Figure 7 to Louisiana Pigtoe (*Pleurobema riddellii*) paragraph (11)(iii)



* * * * *

Martha Williams,

Director, U.S. Fish and Wildlife Service.

[FR Doc. 2023–05107 Filed 3–17–23; 8:45 am]

BILLING CODE 4333–15–C