a necessary and productive study for June sucker recovery is exempted. Incidental and limited direct take resulting from research to benefit June sucker is not prohibited.

(5) *Refuges and stocking.* Any take resulting from activities undertaken for the long-term maintenance of June sucker at facilities outside of Utah Lake and its tributaries or for the production of June sucker for stocking in Utah Lake is not prohibited.

Dated: September 24, 2019.

**Margaret E. Everson,**

*Principal Deputy Director, Exercising the Authority of the Director, for the U.S. Fish and Wildlife Service.*

[FR Doc. 2019–25549 Filed 11–25–19; 8:45 am]

**BILLING CODE 4333–15–P**

## DEPARTMENT OF THE INTERIOR

### Fish and Wildlife Service

### 50 CFR Part 17

**[Docket No. FWS–R4–ES–2018–0062; FXES11130900000–189–FF0932000]**

**RIN 1018–BD02**

## Endangered and Threatened Wildlife and Plants; Removal of the Nashville Crayfish From the Federal List of Endangered and Threatened Wildlife

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Proposed rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), propose to remove the Nashville crayfish (*Orconectes shoupi*), a relatively large crayfish native to the Mill Creek watershed in Davidson and Williamson Counties, Tennessee, from the Federal List of Endangered and Threatened Wildlife (List). This determination is based on the best available scientific and commercial data, which indicate that the threats to the species have been eliminated or reduced to the point that the species has recovered and no longer meets the definition of an endangered or a threatened species under the Endangered Species Act of 1973, as amended (Act). We also announce the availability of a draft post-delisting monitoring (PDM) plan for the Nashville crayfish. We seek information, data, and comments from the public regarding this proposal to remove the Nashville crayfish from the List (*i.e.,* ''delist'' the species) and regarding the draft PDM plan.

**DATES:** We will accept comments received or postmarked on or before January 27, 2020. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by January 10, 2020.

**ADDRESSES:** *Written comments:* You may submit comments on this proposed rule by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. In the Search box, enter FWS–R4–ES–2018–0062, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rule box to locate this document. You may submit a comment by clicking on ''Comment Now!''

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R4–ES–2018–0062; U.S. Fish and Wildlife Service, MS: BPHC, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

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

*Document availability:* This proposed rule, the draft PDM plan, and supporting documents (including the species status assessment (SSA) report, references cited, and the 5-year review) are available at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0062.

**FOR FURTHER INFORMATION CONTACT:** Lee Andrews, Field Supervisor, U.S. Fish and Wildlife Service, Tennessee Ecological Services Field Office, 446 Neal Street, Cookeville, TN 38506; telephone 931–528–6481. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

**SUPPLEMENTARY INFORMATION:**

### 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 and information from other concerned governmental agencies, Native American tribes, the scientific community, industry, or any other interested party concerning this proposed rule. Because we will consider all comments and information we receive during the comment period, our final determination may differ from this proposal. We particularly seek comments on:

(1) Information concerning the biology and ecology of the Nashville crayfish;

(2) Relevant data concerning any threats (or lack thereof) to the Nashville crayfish, particularly any data on the possible effects of climate change as it relates to habitat, and the extent of State protection and management that would be provided to this crayfish as a delisted species;

(3) Current or planned activities within the geographic range of the Nashville crayfish that may negatively impact or benefit the species; and

(4) The draft PDM plan and the methods and approach detailed in it.

Please include sufficient information (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include. All comments submitted electronically via *http://www.regulations.gov* will be presented on the website in their entirety as submitted. For comments submitted via hard copy, we will post your entire comment—including your personal identifying information—on *http://www.regulations.gov*. You may request at the top of your document that we withhold personal information such as your street address, phone number, or email address from public review; however, we cannot guarantee that we will be able to do so.

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

Please note that submissions merely stating support for or opposition to the listing action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act (16 U.S.C. 1531 *et seq.*) 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.''

### *Public Hearing*

Section 4(b)(5)(E) of the Act provides for a public hearing on this proposal, if

requested. Requests must be received within 45 days after the date of publication of this proposed rule in the **Federal Register** (see **DATES**). Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the **Federal Register** at least 15 days before the hearing.

**Previous Federal Actions**

On September 26, 1986, we published a final rule in the **Federal Register** (51 FR 34410) listing the Nashville crayfish as endangered due to siltation, stream alterations, and water quality deterioration resulting from urban development pressures. On February 8, 1989, we released a recovery plan for the Nashville crayfish (USFWS 1989, entire). The latest 5-year review for the species, completed in February 2017, recommended reclassifying the Nashville crayfish to a threatened species due to recovery (USFWS 2017a, entire). Based on this recommendation, a species status assessment (SSA) was initiated and completed. Six peer reviewers were requested to review the SSA and provide feedback. Reviewers were selected based on their knowledge of the species' biology and habitat. Two peer reviewers submitted feedback. One of the commenters informed us that Nashville crayfish have been observed to be active on the surface diurnally during certain times of the year and suggested we add otters as predators to the crayfish. Another commenter asked about the conservation work being done by two Tennessee agencies. This information was incorporated into the final SSA and this proposed rule.

**Background**

A thorough review of the taxonomy, life history, ecology, and overall viability of the Nashville crayfish is presented in the SSA report (USFWS 2017b; available at *https://www.fws.gov/southeast/* and at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0062).

The Nashville crayfish is endemic to the Mill Creek watershed south of Nashville in Davidson and Williamson Counties, Tennessee. The species is currently known to occur in Mill Creek and its tributaries, including Collins Creek, Owl Creek, Edmonson Branch, Sims Branch, Sevenmile Creek, Sorghum Branch, Whittemore Branch, Turkey Creek, Indian Creek, Holt Creek, four unnamed tributaries to Mill Creek, and one unnamed tributary to Owl Creek (USFWS 2017b, p. 5). There has been no change in the distribution of the species within its historical range (USFWS 2016, unpublished data).

Biologists conducting the pre-listing status survey for the species surveyed 148 streams in the following central Tennessee drainages (Korgi and O'Bara 1985, entire): Collins River, Stones River, Caney Fork River, Cumberland River, Red River, Mill Creek, Harpeth River, and Elk River. Nashville crayfish were only found in Mill Creek and its tributaries.

Nonetheless, at the time of listing in 1986, the species was thought to have occurred historically in several locations outside of the Mill Creek watershed, including Big Creek in Giles County (Elk River drainage), the South Harpeth River in Davidson County (Harpeth River drainage), and Richland Creek in Davidson County (Cumberland River drainage) (USFWS 1987, entire). The Service now believes that the Big Creek and South Harpeth River records are the result of accidental introduction by anglers using the species as bait and are no longer thought to be historical locations for the crayfish (USFWS 2017b, p. 4). The Service originally believed that the Richland Creek occurrence had been displaced by a more competitive crayfish species (USFWS 2017b, p. 4). However, it was later determined that specimens of Nashville crayfish (*Orconectes shoupi*) collected from Richland Creek were misidentified, and the collections were subsequently correctly identified as the bigclaw crayfish (*Orconectes placidus*) (USFWS 1989, entire). In short, we now conclude that Mill Creek and its tributaries constitute both the historical and current ranges of the species.

The Nashville crayfish is a relatively large crayfish ranging from young-of-the-year at about 0.6 centimeters (cm) (0.24 inches (in)) total length (TL) to adults at about 17.8 cm (7 in) (TDNA 2009, p. 11; O'Bara *et al.* 1985, entire). Other *Orconectes* species reported from the Mill Creek watershed, including *O. rhoadesi* and *O. durelli,* can easily be distinguished from the Nashville crayfish by gonopod (reproductive) structure and body coloration. However, even young-of-the-year crayfish from the Mill Creek watershed often can be identified as the Nashville crayfish, as no other saddle-bearing species are present in the system. The saddle-bearing features include elongate pincers with red tips and adjacent narrow black banding, a usually light-colored ''saddle'' on the carapace extending from the posterior to the anterior and terminating as lateral stripes on both sides, and distinctive gonopods markedly different from any of its congeners.

The Nashville crayfish has been found in a wide range of environments, including gravel and cobble runs, pools with up to 10 cm (3.9 in) of settled sediment, and in small pools with intermittent flow (Stark 1986, 44 pp; Miller and Hartfield 1985, entire). The species has also been found in impoundments that include overflow pools and retention ponds adjacent to Mill Creek and its tributaries (Cook and Walton 2008, p. 121; Service 2011, entire). It is estimated that approximately 54 percent (104 stream miles) of the 192 stream miles of the Mill Creek watershed that have the potential to support Nashville crayfish is currently occupied by the species (USFWS 2017b, p. 30).

Population estimates from surveys are limited to the mainstem of Mill Creek and Sevenmile Creek, although surveys in other streams have detected Nashville crayfish and indicate consistent presence over time (USFWS 2017, pp. 29–30, 35–40). Between 1999 and 2001, surveys conducted within the mainstem and Sevenmile Creek led to overall estimates of 1,854 to 3,217 individuals and 404 to 1,425 individuals per 100 linear meters, respectively. (USFWS 2017b, p. 29). Long-term monitoring, conducted between 2011 and 2015, has documented a total of 1,763 crayfish per 100 linear meters at five main stem Mill Creek sampling sites. This long-term monitoring, conducted by the Nashville Zoo, found Nashville crayfish to be the predominant species, comprising more than 90 percent of all crayfish documented at all five sites surveyed. According to these surveys, the Nashville crayfish has remained stable throughout the Mill Creek watershed.

**Summary of Biological Status and Threats**

The Act directs us to determine whether any species is an endangered or a threatened species because of any factors affecting its continued existence. The SSA report documents the results of our comprehensive biological status review for the Nashville crayfish, including an assessment of the potential stressors to the species. The SSA report does not represent a decision by the Service on whether the species should be listed as an endangered or a threatened species under the Act. It does, however, provide the scientific basis for our regulatory decision, which involves 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 on the Southeast Region website at *https://www.fws.gov/southeast/* and at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0062.

*Summary of SSA Report*

To assess the Nashville crayfish's viability, we used the three conservation biology principles of resiliency, representation, and redundancy (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); representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes); and redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, hazardous spills). In general, the more redundant and resilient 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 divided into three sequential stages. During the first stage, we use the conservation biology principles of resiliency, redundancy, and representation (together, the 3Rs) to evaluate individual life-history needs. The next stage involves an assessment of the historical and current condition of species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involves making predictions about the species' responses to positive and negative environmental and anthropogenic influences. This process uses the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We used this information to inform our decision in this proposed rule.

*Species Needs*

For the Nashville crayfish to maintain viability, its populations or some portion thereof must be resilient. Stochastic factors that have the potential to affect Nashville crayfish include impacts to water quality, particularly phosphorus loading, sedimentation, and significant alterations to dissolved oxygen.

Silt deposition in streams contributes to several of the impairments in the Mill Creek watershed, and can also be a risk factor for crayfish. Stream channelization and silt deposition has been reported to be directly responsible for the permanent loss of some crayfish populations (Reynolds et al. 2013, p. 197–218). As crayfish are primarily active at night, the chief requirement of all size classes is for hiding spaces during the daytime. Where loss of hiding spaces occurs through bank reconstruction or siltation from natural or human causes, the habitat's carrying capacity for crayfish diminishes (Reynolds et al. 2013, p. 197–218). Therefore, good quality habitat for Nashville crayfish has minimal silt deposition such that availability of vital hiding spaces, and thus carrying capacity, are maximized.

Dissolved oxygen (DO) levels are an important water quality parameter for all aquatic life, including crayfish. Oxygen is dissolved into the water in streams through diffusion, aeration, and as the waste product of plants that are photosynthesizing. The amount of DO found in water can vary due to several factors including water temperature, level of pollutants and water velocity. Extended periods of supersaturation can occur in highly aerated waters, often near hydropower dams and waterfalls, or due to excessive photosynthetic activity. Algae blooms can cause air saturations of over 100% due to large amounts of oxygen as a photosynthetic byproduct. This is often coupled with higher water temperatures, which also affects saturation (Fondriest 2013, entire). High levels of DO may be stressful to crayfish because of physiological effects, such as gas bubble disease, or because higher oxygen levels allow invasion of invasive crayfish species, who better tolerate higher DO concentrations. If DO levels are very low, it is harder for individual crayfish to take in oxygen, and in extreme cases the lack of DO results in death. Although the tolerance level of Nashville crayfish for DO is not known, levels below 2.0 mg/L typically result in invertebrates abandoning the area (Fondriest 2013, entire).

Other factors that influence the resiliency of Nashville crayfish populations include population size and the presence of slab rock (TDNA 2009, entire). Influencing those factors are elements of Nashville crayfish ecology (*e.g.,* dispersal and reproductive success) that determine whether populations can grow to maximize habitat occupancy, thereby increasing resiliency of populations (USFWS 2017b, p. 22). Slab rock is defined as moderately to large sized rocks in the stream channel, typically limestone, found on top of bedrock, cobble, or gravel. Adult Nashville crayfish occur in various habitats in streams with slab rocks or other debris for cover. Adults tend to be solitary, seeking cover under large rocks, logs, debris, or rubble; the largest individuals generally selected the largest cover available (USFWS 1987, entire). Cover, particularly presence of large rocks, is also important to Nashville crayfish (Cook and Walton 2008, p. 121). Nashville crayfish were found half of the time in runs, using rocks with a surface area of 0.05 $m^2$ (0.54 $ft^2$) as cover, and half of the time in pools, when cover rock area increased to 0.10 $m^2$ (1.1 $ft^2$). Larger rock areas may be needed in pools to decrease risk of predation, whereas smaller rock areas would provide adequate protection in runs (Cook and Walton 2008, p. 121). Reproductive females are typically found under large slab rocks. Females seek out large slab rocks when they are carrying eggs and young, and these secluded places are also needed for molting. Cover rocks of at least 0.02 $m^2$ (2.15 $ft^2$) may be important habitats for females releasing broods and for protection during molting after releasing broods (USFWS 1987, entire). Gravel-cobble substrate provided good cover for juveniles (Stark 1986, Miller and Hartfield 1985, entire).

Representation can be measured by the breadth of genetic or environmental diversity within and among populations, and gauges the probability that a species is capable of adapting to environmental changes. In the absence of species-specific genetic and ecological diversity information, we evaluated representation based on the extent and variability of habitat characteristics across the geographical range of the species.

For the Nashville crayfish to maintain viability, the species as a whole also needs to exhibit some degree of redundancy. We measured redundancy for Nashville crayfish in terms of the number and distribution of resilient populations across the range of the species. It is important to note that Nashville crayfish has a naturally limited range, so measures of redundancy reflect the distribution within a relatively small area.

*Current Condition*

Resiliency

The Nashville crayfish is restricted to the Mill Creek watershed, which we now understand to represent the species' historical range. For this assessment, we measured resiliency at

the population segment level, but also reported resiliency in total stream miles across the species' range. Because resiliency is a population-level attribute, key to assessing it is the ability to delineate populations. Because there is insufficient information on dispersal and genetics to accurately delineate demographic populations for Nashville crayfish, we delineated population segments. These were delineated based on habitat quality (*i.e.,* presence of slab rock and qualitative assessments of water quality) and species occurrence data from natural heritage data of the Tennessee Department of Environment and Conservation (TDEC) and opinions of species experts. We identified 174 stream segments based on watershed features, stream characteristics, and expert opinion (USFWS 2017b, p. 19). This resulted in delineation of 10 population segments within 3 representative units: Upper Mill Creek, Middle Mill Creek, and Lower Mill Creek watershed catchments (Table 1; and Figure 1).

TABLE 1—LIST OF DELINEATED POPULATION SEGMENTS OF NASHVILLE CRAYFISH

| Upper Mill Creek (MCW–A) | Middle Mill Creek (MCW–B) | Lower Mill Creek (MCW–C) |
|---|---|---|
| Upper Mill Creek Streams | Middle Mill Creek Streams | Lower Mill Creek Streams. |
| Upper Mill Creek and Tributaries | Owl Creek | Sevenmile Creek and Tributaries. |
| Mainstem Mill Creek* | Holt Creek | Mainstem Mill Creek.* |
| | Indian Creek. | |
| | Collins Creek. | |
| | Mainstem Mill Creek*. | |

* Mainstem Mill Creek runs through all three watershed catchments.

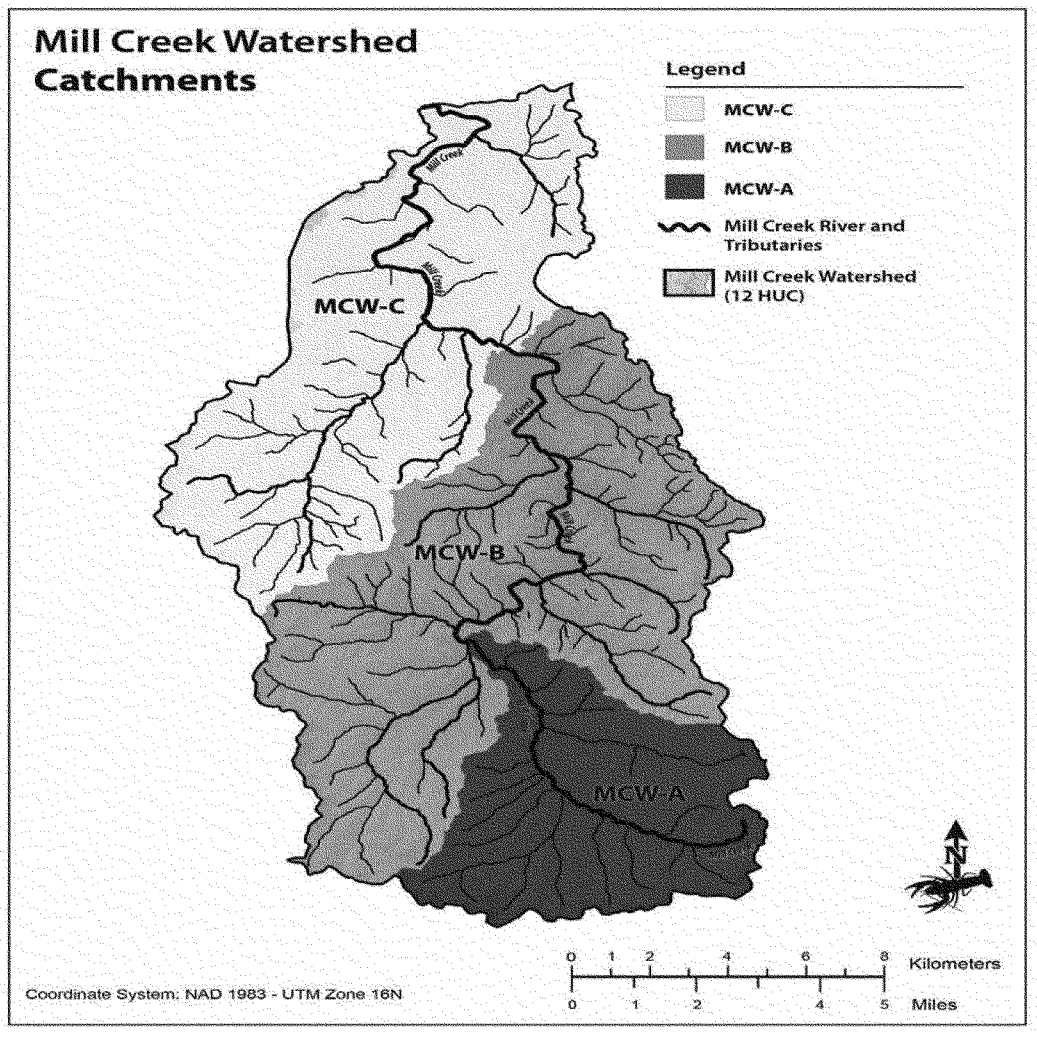


**Figure 1–**Nashville crayfish population segments within the Mill Creek Watershed.

Element Occurrence (EO; an area of land or water where a species is or was present) data were available through TDEC Natural Heritage Data shapefiles. These data represent survey detections for Nashville crayfish conducted since

1985, and each EO has an associated EO viability score. The EO viability scores provide a succinct assessment of the estimated viability of the species, or an estimation of the likelihood that, if current conditions prevail, a species occurrence will persist for a period of time. The EO viability scores for Nashville crayfish were delineated by Service biologists following NatureServe descriptions (Hammerson et al. 2008) as follows:

- Excellent—species occurrence exhibits optimal or at least exceptionally favorable characteristics with respect to population size and/or quantity and quality of occupied habitat, and if current conditions prevail, the occurrence is very likely to persist for the foreseeable future (*i.e.,* at least 20–30 years).
- Good—species occurrence exhibits favorable characteristics with respect to population size and/or quantity and quality of occupied habitat, and if current conditions prevail, the occurrence is very likely to persist for the foreseeable future (*i.e.,* at least 20–30 years).
- Fair—species occurrence characteristics (size, condition, and landscape context) are non-optimal such that occurrence persistence is uncertain under current conditions, but may persist for the foreseeable future with appropriate management or protection.
- Poor—If current conditions prevail, occurrence has a high risk of extirpation because of small population size or area of occupancy, deteriorated habitat, poor conditions for reproduction, or other factors.

We looked at EO viability scores based on the element occurrence data, and elicited the opinions of Nashville crayfish experts as to how we should characterize resiliency of that population segment. The EO viability scores provided a succinct assessment of the estimated viability of the species, or an estimation of the likelihood that, if current conditions prevail, a species occurrence will persist for a period of time.

The EO data, combined with other survey efforts and expert opinion resulted in the delineation of 174 stream segments. These stream segments were scaled up to the population segment scale based on watershed features such as physical hydrology and stream characteristics, and species expert opinion, resulting in identification of 10 population segments. We categorized resiliency for each of these population segments using stream segment viability scores (*e.g.,* excellent, good, fair, poor, and uncertain) and expert opinion. We considered stream segment viability scores of excellent and good as a single category, with fair, poor, and uncertain being the other three stream viability scores used in the resilience categorization. We considered populations to be high resiliency when more than 50 percent of its stream segments had EO viability scores of Excellent or Good. Populations where greater than 50 percent of stream segments had EO viability scores of Fair were considered to be moderate resiliency. We considered populations to be low resiliency if more than 50 percent of its stream segments had Poor EO viability scores. Finally, for populations where over 50 percent of stream segment viability scores were uncertain, we used a combination of EO viability scores (where this was available) and expert opinion to determine whether they were high, moderate, or low resiliency. Within each of the 10 population segments, we calculated the total stream miles within each stream segment viability category to determine the proportion of various viability ranks represented (USFWS 2017b, p. 21).

Of the 10 population segments, currently six (145 stream miles; 76 percent of the total range) display high resiliency (likely to persist for at least 20 to 30 years); two (20 stream miles; 10 percent of the total range) display moderate resiliency (may persist for at least 20 to 30 years); and two (26.5 stream miles; 14 percent of the total range) display low resiliency (high risk of extirpation in 20 to 30 years).

Representation

We lack genetic and ecological diversity data to characterize representation for Nashville crayfish. In the absence of this information, we evaluated representation based on the extent and variability of habitat characteristics across the species' geographical range. For the Nashville crayfish, we characterized representative units by using physical stream hydrology, and measured representation as the number of resilient populations within three delineated representative units as originally proposed in Jones (2006, p. 6)—MCW–A or Upper, MCW–B or Middle, and MCW–C or Lower (see discussion and Table 1 above). The three units have different stream and watershed characteristics, such as stream order, surrounding drainage landscapes, depth, and flow, but are primarily delineated based on amount of development. The landscape in unit MCW–A is primarily agricultural, unit MCW–B encompasses the suburban subwatersheds, and unit MCW–C is primarily urban (Jones 2006, p. 6). The representative units are catchments created by using flow direction, flow accumulation, and a 3-meter resolution digital elevation model (Jones 2006, entire).

Differences in hydrology in these three areas could result in differences in how the species may adapt to changing environmental conditions. Because the mainstem population segment crosses representative unit boundaries, we report representation as the percentage of stream miles categorized as low, moderate, and high within each representative unit:

- Upper (MCW–A): There are 61.8 total stream miles within this unit. Of those, 49.6 miles (80 percent) are portions of population segments classified as high resiliency; 12.2 miles (20 percent) are classified as low resiliency.
- Middle (MCW–B): There are 72.6 total stream miles within this unit. Of those, 43.6 miles (60 percent) are portions of population segments classified as high resiliency; 19.7 miles (27 percent) are classified as moderate resiliency; and 9.3 miles (13 percent) are classified as low resiliency.
- Lower (MCW–C): There are 57.1 total stream miles within this unit. Of those, 52.1 miles (91 percent) are portions of population segments classified as high resiliency; 5.0 miles (9 percent) are classified as low resiliency.

For the Nashville crayfish, our expert noted that the sub-watersheds we used were a good way to spatially delineate adaptive capacity. In fact, our spatial analysis was confirmed by a dissertation done previously that looked at variability within that watershed discussed in the SSA (Jones 2006, entire). From north to south the species clearly showed some adaptive capacity, as evidenced by the differences in habitat from north to south. Because of this we established the three representative units (upper, middle, lower).

To measure representation we then looked at the number of resilient stream segments and their resiliency score, assuming that a high number of stream segments in a high resiliency status means there is sufficient representation in that unit. If, for example, we had a representative unit with a majority of low resiliency stream segments we would then be concerned the species may lose some of its representation. As this was not the case, we believe that representation is not limiting the species' ability to maintain resilient populations. We therefore conclude that representation is high because the

majority of stream miles in each segment are highly resilient.

Redundancy

For the Nashville crayfish to maintain viability, the species needs to exhibit some degree of redundancy. Redundancy describes the ability of a species to withstand catastrophic events. Measured by the number of populations, their resiliency, and their distribution (and connectivity), redundancy gauges the probability that the species has a margin of safety to withstand or return from catastrophic events (such as a rare destructive natural event or episode involving many populations). We report redundancy for Nashville crayfish as the total number of population segments and their distribution within and among representative units.

As discussed above, there are 10 population segments distributed across the range of the Nashville crayfish between the three representative units. Six of these population segments are highly resilient; two population segments are moderately resilient; and two population segments are of low resiliency. As also discussed above, there is adequate redundancy based on the distribution in the three representative units for the Nashville crayfish to withstand catastrophic events. The catastrophic events likely to affect the Nashville crayfish are spills associated with increasing human population and urbanization (see Summary of Threats below). However, the likelihood of such events occurring is not equal across the three units: They are far more likely to occur in the lower, highly urbanized unit MCW–C (the farthest downstream) and much less likely to occur in the middle (MCW–B) and upper (MCW–A) units because these units are less developed. Therefore, if a spill were to occur, it is more likely to affect only one unit and not all three.

In any case, even in the unlikely circumstance a catastrophic event would impact the entire range of the species, the Nashville crayfish has demonstrated a high degree of resistance to disturbance. In the Mill Creek watershed, there have been frequent spills/releases of raw sewage and hazardous substances, particularly in the lower reaches (USFWS 2018, p. 50–51). However, despite these events, the species has been found in large numbers at several locations that are already heavily developed. Although the Metropolitan Nashville area is experiencing significant growth, with numerous residential, commercial, utility, and other infrastructure developments occurring in the watershed, Nashville crayfish populations have been documented to be stable or increasing in size.

Based on our analysis of these three factors, the species demonstrates high viability, indicating that it is likely to persist in the future. Since the Nashville crayfish was listed, individuals have been found in large numbers at several locations in the watershed that are heavily developed and subjected to consistent storm water and sediment inputs, as well as frequent spills and releases of raw sewage and hazardous substances. Despite these stressors, Nashville crayfish density has increased in all three representative units (McGinnity 2016, p. 3)

**Summary of Threats and Conservation Measures That Affect the Species**

Section 4(a)(1) of the Act directs us to 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.

In the assessment report, we reviewed the factors (*i.e.,* threats, stressors) that could be affecting the Nashville crayfish now or in the future. However, in this proposed rule, we will focus our discussion on those factors that could meaningfully impact the status of the species. The primary risk factor affecting the status of the Nashville crayfish is development in the Mill Creek watershed that results in destruction or alteration of habitat. This was a primary factor in our decision to list the species in 1986. Specifically, increased development in the watershed leads to increased impervious cover, which in turn often leads to water quality deterioration. This takes the form of siltation, stream alteration, and urban runoff (particularly of phosphorus), resulting from development in Nashville and surrounding urbanized areas, all of which have the potential to negatively impact the Nashville crayfish. Secondary risk factors include the species' limited distribution, which makes it vulnerable to catastrophic events, such as chemical spills or other contamination sources. Development in the watershed can also increase the probably of catastrophic spills as well as increase road density and create new contaminant sources. Competition with invasive crayfish species could also be problematic, but presently, this is not a known threat for the species. Similarly, climate change and its associated effects will not have a negative impact on the Nashville crayfish now or in the foreseeable future.

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

The primary threat to the continued existence of the Nashville crayfish is still development in the Mill Creek watershed that results in destruction or alteration of the aquatic habitat. The population of Davidson County grew by 5.1 percent between 2010 and 2013. Adjacent Williamson County grew by 8.6 percent in the same time period (USFWS 2017a, p. 12). As Nashville and the surrounding areas have grown, commercial and residential development has increased within the Mill Creek watershed. Areas in the upper reaches of the Mill Creek watershed that were once rural agricultural areas are now being developed for residential purposes. Development often results in removal of riparian vegetation and canopy cover over the stream that may result in bank collapse. Runoff from denuded areas can result in heavy input of sediment into the stream, excessive in-stream sediment deposition, and increased water turbidity and temperatures. Sediment has been shown to break down and or suffocate bottom-dwelling algae and other organisms by clogging gills and reducing aquatic insect diversity and abundance (Waters 1995, p. 251). We anticipate population growth in the Nashville metropolitan area to continue, with associated increases in development. Five of the ten counties in Tennessee with the highest projected growth rates through 2040—Williamson, Rutherford, Wilson, Robertson, and Sumner—are in the Nashville metropolitan area. Approximately 69 percent of the population growth in Tennessee from 2010 to 2040 is expected to occur in 10 counties across the state, including Davidson and Williamson counties (Boyd Center 2015, entire). However, despite the increased development, the species has been found in several locations and in large numbers.

Highway and road construction, as well as utility line construction and right-of-way maintenance, within and adjacent to streams, may also alter or destroy habitat. Additionally, short-term dewatering to excavate trenches for utility lines could also result in temporary loss of habitat. The settling

and filling in of crevices and interstitial spaces with sediment under slab rocks is likely to result in increased biological oxygen demand and longer term or permanent loss of habitat for crayfish (Cook and Walton 2008, p. 121). These are all potential impacts to crayfish habitat. We know that these actions result in degradation of riparian areas and stream health, but there is uncertainty regarding how tolerant the Nashville crayfish is to such changes. The only area where we know the species was negatively impacted was near the airport where toxic releases caused abandonment of that stream reach. However, years later, the area was recolonized, albeit at a lower abundance (USFWS 2017b, p. 51).

To avoid direct adverse impacts to the crayfish and its habitat, developers increasingly use directional boring under the stream as a means of accomplishing crossings for utility and communication lines; however, if not done properly, boring can cause fracturing of the stream bottom. This can result in release of bentonite and other slurries as well as toxic materials from the bore hole into the stream. Dewatering of short or long reaches of the stream channel downstream from the fracture may also occur. Dewatering can be permanent if the fracture causes the entire surface flow to go underground. Materials released into the stream from bore holes range from inert slurries to potentially toxic chemicals and lubricants; however, inert slurry, if released in large amounts, could result in mortality to crayfish and other benthic fauna by smothering adults and juveniles. In 2000, during installation of fiber optic cables in the Mill Creek drainage, several incidents of fracturing occurred resulting in the release of large amounts of bentonite slurry into the streams. In 2013, a Piedmont Natural Gas Pipeline boring under Sevenmile Creek impacted its tributary, releasing a bentonite slurry that resulted in mortality of six individual crayfish. Due to these incidents, areas where known bedrock fracturing potential exists are now being trenched (surface cut) for projects involving utility line crossings (USFWSb 2017, p. 52).

Another potential threat to the species' continued existence is the improper use or overuse of lawn pesticides and fertilizers. Intentional or inadvertent application of chemicals to the stream or runoff from yards after application has resulted in significant mortality of aquatic organisms, including Nashville crayfish. We have received periodic reports of mortality of stream fauna that likely resulted from input of pesticides into streams in the Mill Creek watershed. This threat is likely to increase in the future as residential development increases (USFWS 2017b, p. 50).

Additionally, there have been consistent stormwater and sediment inputs to the Mill Creek watershed, as well as frequent spills/releases of raw sewage and hazardous substances, yet the Nashville crayfish persists in high numbers. The species exhibits a high degree of resistance to disturbance, indicating that the species has a low susceptibility to threats and high degree of stability (USFWS 2017a, p. 16).

As of 2014, numerous stream segments in Mill Creek and its tributaries were listed as impaired on the State of Tennessee's 303(d) list (TDEC 2018, entire). Impairment of stream reaches in the drainage is the result of low dissolved oxygen, siltation, removal of riparian vegetation, nutrient enrichment and high bacteria levels from stormwater discharges, sewage collection system failures, land development, and unrestricted cattle access (TDEC 2018, entire).

Our analysis of threats and risk factors, as well as the past, current, and future influences on what the Nashville crayfish needs for long term viability revealed that the most risk to future viability of the species is posed by water quality issues: The risk of a catastrophic spill and impairment of water quality associated with increasing human populations and urbanization. However, the species has been found in large numbers at several locations that are already heavily developed, and the species has been found in several additional tributaries to Mill Creek since its original listing under the ESA (USFWSb 2017, p. 73). Although the Metropolitan Nashville area is experiencing significant growth, with numerous residential, commercial, utility, and other infrastructure developments occurring in the watershed, Nashville crayfish populations have been documented to be stable or increasing in size (USFWS 2017b, entire). Additionally, there have been consistent stormwater and sediment inputs to the Mill Creek watershed, as well as frequent spills/releases of raw sewage and hazardous substances, yet the Nashville crayfish persists in high numbers. The species exhibits a high degree of resistance to disturbance, indicating the species has a low susceptibility to threats and a high degree of stability.

*Factor B. Overutilization for Commercial, Sporting, Scientific, or Educational Purposes*

We have received reports over the past five years (2010–2015) that fish and aquatic invertebrates, including Nashville crayfish, are being harvested from Mill Creek for food (USFWS 2016, entire). Although we do not know the full impact of harvesting on the species at this time, populations are stable or improving across the range, indicating any harvesting that is occurring is not affecting population resiliency.

*Factor C. Disease or Predation*

This factor was determined to not apply to the Nashville crayfish at the time of its 1986 listing. Currently, porcelain disease (*Thelohania contejeani),* known from crustaceans in Australia, may pose a threat if infected crustaceans are accidently introduced into the Mill Creek watershed from the pet trade (see Factor E discussion, below). There is anecdotal evidence that porcelain disease was observed in *Cambarus sphenoides* on the Cumberland Plateau. The Cumberland Plateau is the southern part of the Appalachian Plateau in the Appalachian Mountains of the United States. It includes much of eastern Kentucky, Tennessee, and portions of Alabama and Georgia.

Although our earlier determination that a population of Nashville crayfish was displaced by another crayfish species turned out to be incorrect (see Background, above), competition or predation by released nonnative crayfish also could potentially pose a threat to the species in the future (Bizwell and Mattingly 2010, p. 359). Urbanization may result in increased numbers of scavengers, such as raccoons, that might prey on aquatic organisms. However, we currently have no information to indicate that disease or predation are threats to this crayfish.

*Factor D. The Inadequacy of Existing Regulatory Mechanisms*

In our discussions under Factors A, B, C, and E, we evaluate the significance of threats as mitigated by any conservation efforts and existing regulatory mechanisms. Where threats exist, we analyze the extent to which conservation measures and existing regulatory mechanisms address the specific threats to the species. Regulatory mechanisms, if they exist, may reduce or eliminate the impacts from one or more identified threats. The following provides an overview of the existing regulatory protections that

protect the Nashville crayfish ecosystem and the Nashville crayfish.

Tennessee Wildlife Resources Agency has regulations in place to address the collection of baitfish, including amphibians and crayfish, which specifically prohibit the taking of and possession of crayfish from Mill Creek and its tributaries in Davidson and Williamson Counties (TWRA 1994, rule 1660–1–26–.04). The Tennessee Fish and Wildlife Commission also issued a proclamation (TFWC 2014, p. 13–15) which states that the collection of crayfish from Mill Creek in Davidson and Williamson Counties is specifically prohibited. It is also prohibited to possess or use crayfish for bait in Mill Creek, which is key to preventing accidental introductions of nonnative species.

Currently there are no State laws that provide specific protection for the species' habitat. However, the CWA and the Tennessee Water Quality Control Act of 1977 provide water quality protections for streams in the State. Agencies implementing these laws routinely issue notices of violation (NOVs) when actions are reported that have adverse impacts on waters in the State. NOVs are typically issued after the fact—*i.e.,* after destruction or alteration of the species and habitat has occurred. Agencies are not staffed to oversee, supervise, or inspect all of the actions for which permits have been issued. Also, penalties levied on violators by the State are likely not severe enough to deter future violations. Even if more drastic enforcement action is taken by Federal agencies, the time between the violation and conclusion of the law enforcement action is likely long enough to suppress the deterrent effect of the penalty.

TDEC and Metropolitan Nashville Water Services (MNWS) routinely issue CWA NOVs for incidents in the Mill Creek watershed. Service Law Enforcement personnel have assisted the State in numerous investigations. As an example, in 2011, a contractor constructing a replacement sewage forcemain bypassed a section of an existing sewage forcemain by pumping past the section of forcemain to be replaced. The pump failed, releasing a significant amount of sewage into Mill Creek. Crayfish mortality was observed; however, the Service did not pursue an enforcement action under the Act because this was an accidental release. The Service will continue to provide technical assistance to the state agency to address future incidents within the Mill Creek watershed. Mill Creek is currently listed as an impaired stream with the U.S. Environmental Protection Agency (EPA).

Although numerous NOVs have been issued in the Mill Creek watershed since 2009, State and Federal water quality laws have not prevented pollution from development activities or from municipal and industrial sources. Portions of Mill Creek and some of its tributaries are currently listed on TDEC's impaired stream list (TDEC 2018, in draft). State and Federal agencies have identified impairments to address which include low dissolved oxygen, siltation, other anthropogenic habitat alterations, *Escherichia coli* (*E. coli*), total phosphorus, nitrate-nitrite, and propylene glycol.

The CWA makes it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit is obtained. Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material in waters of the United States, including wetlands. The basic purpose of the program is that no discharge of dredged or fill material may be permitted if: (1) A practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded. An individual permit is required for potentially significant impacts. Individual permits are reviewed by the U.S. Army Corps of Engineers, which evaluates applications under a public interest review, as well as the environmental criteria set forth in the CWA Section 404(b)(1) Guidelines, regulations promulgated by EPA. For the Nashville crayfish, the Corps permits would still be applicable and have relevant conditions. Furthermore, through our authorities under the Fish and Wildlife Coordination Act, the Service will provide technical assistance to the Corps during the permit review process. The state would also require Aquatic Resource Alteration Permits with conditions as well.

TDEC and the Service conducted a natural resource damage assessment (NRDA) and developed specific recommendations for stormwater treatment, monitoring, and compliance to the Metropolitan Nashville Airport Authority (MNAA). The purpose of the NRDA program is to restore natural resources injured as a result of oil spills or hazardous substance releases into the environment. The NRDA process evaluates and restores wildlife, habitats, and human resources impacted by oil spills, hazardous waste sites, and vessel groundings. Damage assessments provide the basis for determining the extent of restoration needed to address the public's natural resource losses. Should a future oil spill or hazardous substance release adversely affect the Nashville crayfish, the State, acting as a natural resource trustee, would assess injury and determine appropriate restoration. Once the damages are assessed, the NRDA Restoration Program negotiates legal settlements or takes other legal actions against the responsible parties for the spill or release. Funds from these settlements are then used to restore the injured resources at no expense to the taxpayer. Settlements often include the recovery of the costs incurred in assessing the damages. These funds may also be used to fund damage assessments in future incidents. Civil penalties were also assessed by TDEC (USFWS 2017b, p. 51). In cooperation with the Service and our partners, MNAA made substantial improvements to the stormwater collection and treatment system at the airport. The Service also provided specific recommendations to TDEC in the revision of MNAA's national pollutant discharge elimination system permit.

Summary of Factor D

*Factor E. Other Natural or Man-Made Factors Affecting the Species' Continued Existence*

In this section, we will discuss other natural and man-made threats affecting the species including limited geographic range, vehicle accident spills, introduction of invasive crayfish and climate change.

The Nashville crayfish's limited geographic range and apparent small population size leave the species vulnerable to localized extinctions from accidental toxic chemical spills or other stochastic disturbances. Species that are restricted in range and population size are more likely to suffer loss of genetic diversity due to genetic drift, potentially increasing their susceptibility to inbreeding depression and decreasing their ability to adapt to environmental changes (Allendorf and Luikart 2007, p. 642). However, the Nashville crayfish has always occupied a small range. The crayfish is endemic to one watershed and still occupies the watershed. Highly resilient populations are more than likely to survive stochastic events and there are several highly resilient populations spread across the range.

Potential sources of such spills include accidents involving vehicles transporting chemicals over road crossings of streams and accidental or intentional release into streams of chemicals used in industrial, agricultural, or residential applications. Dead crayfish, including Nashville

crayfish, have been collected downstream from construction sites and sewage releases on numerous occasions. For instance, in 2010 and 2011, discharges of propylene glycol de-icing fluids from the runways and tarmac at the Metropolitan Nashville International Airport adversely affected Sims Branch. Response agencies located affected Nashville crayfish. An attempt to translocate these individuals to the Cumberland River Aquatic Center failed, as the specimens died during transport.

With regard to the effects of invasive species on Nashville crayfish, most crayfish experts believe the introduction of invasive crayfish species is not occurring at a rate that could negatively impact native species, especially species with small distributions. In east Tennessee, there have been several introductions; the most serious is the Kentucky River crayfish (*O. juvenilis*), which has replaced the surgeon crayfish (*O. forceps*) in most of the Holston River system above Cherokee Reservoir. Although these water bodies are not within the Mill Creek system, it is conceivable that one of these extremely aggressive species could be introduced into that system and, once established, there is no known method to remove them. A simple aquarium release of a single ovigerous (egg bearing) female or other live specimens would be detrimental to the Nashville crayfish. However, we have no information suggesting the invasive crayfish are utilized in the local pet trade or as bait for fishing in the Mill Creek watershed.

Our analyses under the Act include consideration of ongoing and projected changes in climate. A recent compilation of climate change and its effects is available from reports of the IPCC (IPCC 2014, entire).

The IPCC concluded that evidence of warming of the climate system is unequivocal (IPCC 2014, pp. 2, 40). Numerous long-term climate changes have been observed including changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, and aspects of extreme weather including heavy precipitation and heat waves (IPCC 2014, pp. 40–44). Since 1970, the average annual temperature across the Southeast has increased by about 0.8 degrees Celsius (°C) with the greatest increases occurring during winter months. The geographic extent of areas in the Southeast region affected by moderate to severe spring and summer drought has increased over the past three decades by 12 and 14 percent, respectively (Karl *et al.* 2009, p. 111). These trends are expected to increase. Rates of warming are predicted to more than double in comparison to what the Southeast has experienced since 1975, with the greatest increases projected for summer months. Depending on the emissions scenario used for modeling change, average temperatures are expected to increase by 2.5 °C (lower emissions scenario, or IPCC SRES B1) to 5 °C (higher emissions scenario, or A2) by the 2080s (Karl *et al.* 2009, p. 111). While there is considerable variability in rainfall predictions throughout the region, increases in evaporation of moisture from soils and loss of water by plants in response to warmer temperatures are expected to contribute to increased frequency, intensity, and duration of drought events (Karl *et al.* 2009, p. 112).

There is also a growing concern that climate change may lead to increased frequency of severe storms and droughts (McLaughlin *et al.* 2002, p. 6074; Golladay *et al.* 2004, p. 504; Cook *et al.* 2004, p. 1015). Specific effects of climate change to crayfish habitat could include changes in stream temperature regimes; the timing and levels of precipitation, causing more frequent and severe floods and droughts; and alien species introductions. The following systematic changes are expected to be realized to varying degrees in the southeastern United States (NCILT 2012, p. 27; IPCC 2013, p. 7):

- More frequent drought;
- More extreme heat (resulting in increases in air and water temperatures);
- Flooding;
- More intense storms (*e.g.,* frequency of major hurricanes increases).

Despite the recognition of potential climate effects on ecosystem processes, there is uncertainty about what the exact climate future for the southeastern United States will be and how the ecosystems and species in this region will respond. Effects from climate change may also result from synergistic effects. That is, factors associated with a changing climate may act as risk multipliers by increasing the risk and severity of more imminent threats. As a result, impacts from rapid urbanization in the region might be exacerbated under long-term climate change. However, our approach to assessing the future condition of the species (see Future Conditions, below) is focused on a 20- to 25-year projection timeframe, because beyond this time, much uncertainty remains in both the degree of climate change and the species' response to changes in precipitation and temperature. We currently do not have information on the effect of future drought on specific stream segments the species occupies within the watershed. We also do not know the species temperature tolerance in response to long-term temperature increases within those streams. While the Nashville crayfish has multiple populations, future impacts due to the effects of climate change may reduce the resiliency of the species although the long-term effects remain unknown.

*Conservation Measures That Affect the Species*

The Mill Creek Watershed Association (MCWA) was formed in 2009. The MCWA was strengthened in 2013 by the Cumberland River Compact with the support of the Tennessee Department of Agriculture Division of Forestry. The goal of the MCWA is to provide education and support for improving and protecting the Mill Creek Watershed. It endeavors to clean the water in Mill Creek, eliminate water pollution in local neighborhoods, and make the water safe for wildlife and human use. Focal activities for the MCWA include adopt a stream, riparian buffers, pollution prevention, rain gardens and barrels, and protecting the Nashville crayfish.

The Cumberland River Compact sponsors meetings every other month to bring all interested stakeholders together to reach a realistic approach to ensure a brighter future for the Mill Creek Watershed. These meetings provide stakeholders an opportunity to learn and provide perspective on current conditions, recommendations for improvements, and plan activities to address the current concerns and needs in the watershed. Current participants include Cumberland River Compact, Tennessee Department of Agriculture, Tennessee Division of Forestry, Metro Water Services, Nashville Zoo at Grassmere, Tennessee Department of Environment and Conservation, Tennessee Scenic Rivers Association, Tennessee Wildlife Resources Agency, the Corps, and the Service (USFWS 2017b, p. 57).

The Tennessee Stream Mitigation Program (TSMP) was established under the Tennessee Wildlife Resources Foundation in 2002, as a statewide in-lieu fee wetlands mitigation program. The TSMP provides mitigation for improving instream and riparian habitat, and overall water quality. It funds projects on significantly degraded streams to arrest bank erosion, improve water quality, and restore aquatic and riparian habitat. The TSMP has implemented 28 projects, restoring over 45 miles of degraded stream and over 800 acres of riparian habitat. One of these projects was initiated in the Mill

Creek Watershed in 2009. The project encompassed 2,385 feet of Mill Creek near Nolensville in Williamson County, in the Upper Mill Creek segment (MCW–A). The existing channel was highly degraded due to channelization, vegetation removal, and infrastructure including roadway fills, and had been listed on the 303(d) list due to impacts from unrestricted livestock access. The primary goals of the project were to restore riparian buffer function by the excluding of livestock from the channel and riparian corridor which would reduce non-point source pollutants (such as sedimentation and nutrients). This work resulted in improved water quality, channel stability, aquatic habitat, and elimination of accelerated bank erosion problems; reestablishment of instream habitat by restoring bed form diversity in the form of riffles and pools; and enhancement of the riparian zone by planting native plants. The restored riparian buffer resulted in decreased stream temperatures, which improved water quality for the crayfish. The floodplain basins helped improve water quality, decrease peak flows, and provide valuable flood plain habitat (USFWS 2017b, p. 58). All of the goals of this project were met, which has improved the habitat for the Nashville crayfish, thereby increasing the resiliency of the species.

The Nashville Zoo at Grassmere has been heavily involved in Nashville crayfish recovery efforts. In March 2017, the zoo, in collaboration with the Cumberland River Compact, Tennessee Wildlife Resource Agency, and KCI Technologies Inc., removed two dams on Cathy Jo Branch in the Lower Mill Creek segment (USFWS 2017b, p. 58). The dams, which were located on zoo property, created a barrier to crayfish, small fish, and other small aquatic life, preventing the migration of aquatic species upstream and reducing the biodiversity of the aquatic systems. Dam removal generally allows for the migration of aquatic species that were previously blocked by dams within a watershed, including the Nashville crayfish, and improves aquatic biodiversity. These dam removals opened up 3 miles of habitat and restored the stream as a free-flowing system. Nashville crayfish now have access to 10 miles of creek and improved habitat and this reach is now occupied by a highly resilient population of Nashville crayfish.

The Nashville Zoo has also implemented a stormwater management project that benefits the Nashville crayfish and other aquatic organisms. The Nashville Zoo had a stormwater detention pond on the edge of its property that captured runoff from a large office park next door to the zoo, but several times a year, excess water was discharged from the pond's outlet pipe, where it carried sediment and other pollutants into Cathy Jo Branch. Runoff from the office park also damaged the perimeter fence and carried trash and debris into the pond. The project retrofitted the detention pond to modify the two inlet structures and expand the water holding capacity. In addition, the brushy area below the outfall pipe was transformed into an infiltration zone to slow, spread, and soak in the excess water discharges after rain events. This project has directly improved water quality in known occupied Nashville crayfish habitat.

**Future Conditions**

In the SSA, our analysis of threats and risk factors, as well as the past, current, and future influences on what the Nashville crayfish needs for long-term viability, revealed that there are two factors that pose the largest risk to future viability of the species: The risk of a catastrophic spill and impairment of water quality (USFWS 2017b, p. 59). Both factors are primarily related to habitat changes. We did not assess overutilization for scientific and commercial purposes, disease, or competition with invasive crayfish because these risks do not appear to be occurring at levels that affect Nashville crayfish populations. Accordingly, the risk of a catastrophic spill and impairment of water quality, as well as management efforts (aside from those associated with the 2010 biological opinion with the Corps), were carried forward in our assessment of future conditions of Nashville crayfish populations.

We assessed viability under three scenarios—status quo, worst case, and conservation—projected over 20 to 25 years. We chose this timeframe as the ''foreseeable future'' for two reasons. First, the main threats influencing viability for the Nashville crayfish (the risk of a catastrophic spill and impairment of water quality) are all measurable within this timeframe. Also, the E.O. scores that underlie the resilience of the population segments were determined based on a 20–30 year future time horizon. Qualitative assessments of urban development for each population segment are based on the Slope, Land-use, Exclusion, Urban, Transportation and Hillshade (SLEUTH) model predictions (USFWS 2017b, p. 59). The next metric, element occurrence (E.O.), data were available through TDEC Natural Heritage Data shapefiles. These data represent survey detections for Nashville crayfish conducted since 1985, and each E.O. has an associated E.O. viability score. The E.O. scores provide a succinct assessment of the estimated viability or likelihood of persistence of the species; as such, the scores underlie the resilience of the population segments. These scores were determined based on a 20- to 30-year future time horizon based on Nature Serve criteria. Because occurrence ranks are used to represent the relative overall ''quality'' of an occurrence as it currently exists, they are based solely on criteria that reflect the present status of that occurrence (Hammerson et al. 2008, entire). Therefore, based on the species' lifespan and the uncertainty in the models, a 20- to 25-year time frame for ''foreseeable future'' is appropriate for determining whether threatened status is appropriate for this species.

The three scenarios are intended to capture the range of changes, likely to be observed in the Mill Creek watershed, to which the Nashville crayfish will be exposed. These scenarios considered the three elements described above: Water quality, catastrophic spill risk, and conservation effort. While we considered these scenarios to be plausible, we acknowledge that each scenario has a different probability of materializing at different times. To account for this difference in probability, a range of probabilities was used to describe the likelihood each scenario will occur. We assumed rates of increase in human population and, therefore, increase in impervious cover, to be similar across all three scenarios. The differences in the likelihood of the three scenarios represented our best assessment of: (1) The degree to which projected increases in human population and impervious cover will manifest in water quality degradation and increased spill risk; (2) how the Nashville crayfish will actually respond to these changes based on past observations; and (3) how likely conservation measures will be implemented within population segments in the Mill Creek watershed. For more information about how the scenarios were developed, please see the SSA (USFWS 2017b, pp. 60–61).

Under the status quo scenario in the SSA, we analyzed the factors that influence populations of Nashville crayfish (*e.g.,* human population growth, urban development, impervious cover, and catastrophic spills) would continue at current rates. Human population increases at currently predicted rates would lead to substantial increases in urban development and impervious cover in a

few high-intensity areas throughout the watershed (*e.g.,* MCW–B) (USFWS 2017b, p. 61). In this scenario, the risk of a contaminant spill increased in and around the high urban growth areas of development and resulted in some decreases in water quality. Impairment of stream reaches in the drainage was the result of low dissolved oxygen, siltation, removal of riparian vegetation, nutrient enrichment and high bacteria levels from stormwater discharges, sewage collection system failures, land development and unrestricted cattle access (TDEC 2014, entire). However, the species is currently thriving in very poor quality streams in downtown Nashville, it has shown since its listing that it is more resilient to the threat of development than previously thought and we would expect it to respond in the same manner to future development stressors. Therefore, under the status quo scenario, the Nashville crayfish's viability would remain high. There would be a small loss in population resiliency (Owl Creek drops from moderate to low; Upper Mill Creek System drops from high to moderate), but with no loss in redundancy. Representation would be impacted, in that the two populations predicted to lose resiliency were both in the same representative unit, but all representative units were predicted to retain the same number of populations.

Under the worst case scenario, the factors that influence populations of Nashville crayfish would continue at increased rates compared to the status quo scenario. Human population would increase at currently predicted rates, which would lead to substantial increases in urban development and impervious cover in the same high-intensity areas throughout the watershed as the status quo scenario. However, in this scenario, effects associated with increasing human populations and impervious cover (water quality degradation and catastrophic spill risk) would be much greater in magnitude compared to the status quo scenario. The risk of a contaminant spill increased significantly in the urban and suburban high-growth areas and resulted in substantial decreases in water quality in several population segments (*e.g.,* MCW–C).

We included this scenario because there is uncertainty as to the magnitude of effects on water quality, spill risk associated with a growing human population, and subsequent increases in impervious cover, as well as uncertainty concerning how fast the development will take place. However, even with this higher risk, our modeling predicted that there would only be a moderate loss in Nashville crayfish population resiliency (Mainstem, Sevenmile, Collins Creek, and Upper Mill Creek System drop from high to moderate; Owl Creek drops from moderate to low; possible extirpation of Sims Branch in the Lower Mill Creek Streams population segment), with no loss in redundancy. Also, all representative units were predicted to retain the same number of populations, although many at a lower resilience level. Therefore, under the worst case scenario, the Nashville crayfish's viability would sustain moderate losses in population resiliency (Mainstem, Sevenmile, Collins Creek, and Upper Mill Creek System drop from high to moderate; Owl Creek drops from moderate to low; possible extirpation of Sims Branch in the Lower Mill Creek Streams population segment), with no loss in redundancy. All representative units are predicted to retain the same number of populations, although many at a lower resilience level.

Under the conservation scenario, the factors that influence populations of Nashville crayfish would continue at current rates, but targeted conservation, such as the TSMP (see *Conservation Measures that Affect the* Species, above), would ameliorate some of the associated impacts of water quality degradation. Human population increases would continue at currently predicted rates, leading to increases in urban development and impervious cover in a few high-intensity areas throughout the watershed. In this scenario, the risk of a contaminant spill would increase in and around some of the urban growth areas, and increases in population and impervious cover would result in some decreases in water quality. However, this scenario assumes some targeted conservation actions would be implemented, including riparian protection and restoration; therefore, water quality degradation in some streams would be reduced (USFWS 2017b, p. 61–62). Because of the implementation of these conservation measures, our modeling predicted that there would be no losses in resiliency, redundancy, or representation for the Nashville crayfish. The Lower Mill Creek streams were predicted to increase their resiliency due to targeted conservation implemented by the City of Nashville, and minimization of spills by the nearby Nashville International airport. Upper Mill Creek Streams were predicted to increase their resiliency due, in part, to targeted conservation implemented by the TSMP. Therefore, under the conservation scenario, the Nashville crayfish's viability sustains no losses in resiliency, redundancy, or representation. In fact, the Lower Mill Creek Streams are predicted to increase their resiliency due to targeted conservation implemented by the City of Nashville, and minimization of spills by the nearby Nashville International airport. Upper Mill Creek Streams are predicted to increase their resiliency due, in part, to targeted conservation implemented by the Tennessee Stream Mitigation Program.

**Recovery and Recovery Plan Implementation**

The Nashville Crayfish Recovery Plan was issued by the Service on August 12, 1987, and revised on February 8, 1989. The recovery plan did not contain delisting criteria, as it was thought unlikely that the species would be sufficiently protected from all threats associated with the rapid development occurring in the Nashville area such that it could be delisted. Furthermore, no quantitative recovery level was defined due to the lack of data on historical population levels, population trends, and apparent historical population size. However, the recovery plan provided the following criteria that were to be met before reclassification to a threatened species could be considered (USFWS 1989, p. 4):

• *Criterion 1. Through protection of the existing Mill Creek basin population and by reintroduction of the species into some as yet unknown historic habitat or by discovery of an additional distinct population, there must exist two distinct viable populations.* This criterion has been partially met due to implementation of monitoring of water quality and, where needed, initiation of enforcement actions by State and local agencies to ensure the protection of the existing Mill Creek Basin population. However, we believe this criterion is not appropriate given the best available information concerning the historical range of the species. At the time of listing, the species was thought to exist in multiple locations outside the Mill Creek drainage, but subsequently those determinations were found to be in error (see Background, above). Current information indicates that the species is endemic to the Mill Creek drainage. Thus, we have determined that it is no longer appropriate to introduce or recover the species in locations outside of the Mill Creek drainage. Within the Mill Creek watershed, the species is present throughout the drainage; therefore, if some portion of the range was impacted by a catastrophic event, the impacted area could be repopulated. Therefore, we also have determined that

the intent of this criterion—to provide an additional refuge—is not necessary.

• *Criterion 2. A newly discovered or reintroduced population must (a) have been established or be self-sustaining for a minimum of 10 years without augmentation from an outside source, (b) represent a significant component of the crayfish fauna throughout most of that creek, and (c) be stable or increasing in numbers.* For the same reason as for Criterion 1, this criterion has not been met and is likely unachievable. No new populations of the species have been reintroduced. A population of the species has not been discovered outside of the Mill Creek drainage (USFWS 2017b, p. 14). As described above, we have determined that the establishment of a second population outside of the Mill Creek drainage is not appropriate. The Nashville crayfish has faced stressors from degraded water quality and potential catastrophic spills associated with increasing human populations and urbanization. However, the species has been found in large numbers at several locations that are already heavily developed. The Nashville crayfish population is stable or increasing throughout its range despite significant human population growth, consistent storm water drainage, and frequent spills. Furthermore, our analysis of possible future scenarios demonstrated that, even under a worst-case scenario, the species will remain viable in the Mill Creek watershed within the foreseeable future.

• *Criterion 3. The species and its habitat in the Mill Creek system and one other system are protected from human-related and natural threats that would be likely to cause the species' extinction in the foreseeable future.* This criterion has been partially met. Service biologists have worked with other agencies, groups, and individuals to protect the species and its habitat from human-related threats within the Mill Creek watershed. During project reviews for routine Corps' section 404 permits and TDEC aquatic resource alteration permits, recommended measures to protect the species are included as permit conditions. These permits will remain applicable upon the delisting of the species. Furthermore, we have authority under the FWCA to provide technical assistance to the Corps during permit reviews. We also routinely interact with Metro Water Services on stormwater best management practices and compliance activities for project developments in the watershed. This, too, will continue upon delisting. Finally, the Service is also actively involved with nongovernmental organizations to address potential habitat loss for the species. (USFWS 2017a, p. 16).

In summary, we consider the recovery plan to be outdated. We now know the species is endemic only to the Mill Creek watershed; therefore, establishing a population outside of the Mill Creek watershed is not appropriate, and we will not find additional populations outside of the watershed. The SSA highlights that Nashville crayfish exhibits a high degree of resistance to disturbance, indicating the species has a low susceptibility to threats and a high degree of stability. In fact, the Nashville crayfish is widely distributed, stable and increasing throughout most of its range. The species is also more resilient to poor water quality conditions that we understood at the time the recovery plan was developed.

**Determination**

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 ''endangered species'' or ''threatened species.'' 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.'' We may determine that a species is an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (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 must consider these same five factors in reclassifying or delisting a species. In other words, for species that are already listed as endangered or threatened, the analysis for a delisting due to recovery must include an evaluation of the threats that existed at the time of listing, the threats currently facing the species, and the threats that are reasonably likely to affect the species in the foreseeable future following the delisting or downlisting and the removal of the Act's protections.

*Status Throughout All of Its Range*

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we find that the Nashville crayfish is not in danger of extinction throughout all of its range. As discussed above, the Service has applied these listing factors to the Nashville crayfish. The Service finds that the present or threatened destruction, modification, or curtailment of its habitat (Factor A), which was the basis for listing the species when it was thought to have been extirpated from three of the four watersheds in which it historically occurred, is no longer a threat to the continued existence of the Nashville crayfish, and we do not expect it to be a threat in the future. The Nashville crayfish has faced and will face stressors from degraded water quality and potential catastrophic spills associated with increasing human populations and urbanization. However, the species has been found in large numbers at several locations that are already heavily developed. The Nashville crayfish population is stable or increasing throughout its range despite significant human population growth, consistent storm water drainage and frequent spills. Targeted conservation has ameliorated many threats associated with reductions in water quality, and under a best-case scenario will continue to do so, but even without these efforts, all population segments are predicted to at least persist within the foreseeable future.

Overutilization for commercial, sporting, scientific, or educational purposes is considered to be a potential threat to the Nashville crayfish (Factor B). Over the period from 2010 to 2015 we received reports that fish and aquatic invertebrates, including the Nashville crayfish, have been harvested from Mill Creek for food. We currently do not know the extent to which this is occurring; however, we conclude that harvesting presently is not a threat to the species because the species possesses multiple resilient populations across its range.

Disease and predation (Factor C) were not considered to be threats to the Nashville crayfish at the time of listing. We have no new information indicating that disease or predation has become a significant threat to the species.

The Nashville crayfish and its habitat have been and will continue to be protected under the CWA, Tennessee Water Quality Control Act, and the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act. These existing regulatory mechanisms (Factor D) are adequate to protect the Nashville crayfish now and in the future based on the crayfish populations continuing to

be stable throughout the Mill Creek watershed.

The Nashville crayfish has demonstrated the ability to adapt to changing environmental conditions over time (resiliency) from both anthropogenic and natural disturbances. Since the species was listed as an endangered species in 1986, it has demonstrated a high degree of viability even in stream segments that are impaired. Based on the biology of the species and the documented responses to the development in the Nashville metropolitan area since listing, we expect the species to respond the same way in the foreseeable future. In addition, although there is no genetic information available for the Nashville crayfish, there are no indications of a decreased fitness or that a lack of representation is adversely affecting species mortality or limiting its ability to adapt. Although the Nashville crayfish is an endemic species, residing only in the Mill Creek watershed, no immediate risk of extirpation has been identified. The fact that the species is found throughout Mill Creek watershed and persists even in stream segments of poor water quality indicates a large, well-represented population with demonstrated resiliency to threats.

Because the Nashville crayfish is considered self-sustaining, contains a relatively large number of individuals, and has demonstrated high resilience and viability, we expect this population to persist into the future. The species is considered abundant within its habitat, which consists of adequate area and quality to maintain survival and reproduction in spite of disturbances. It appears to have highly resilient population attributes (*e.g.,* ability to use storm water detention ponds). Nashville crayfish are represented across the entire watershed, and no extirpations have been recorded anywhere in the species' historical range; therefore, we conclude it has high redundancy across the historical and current range.

Even with continued risks from degraded water quality and catastrophic spills (Factor E), the best scientific and commercial information indicates that this species is viable and will remain viable in the foreseeable future. Therefore, this species is no longer in danger of extinction, nor is it likely to become in danger of extinction in the foreseeable future. Based on the analysis above and after considering the best available scientific and commercial information, we conclude that the Nashville crayfish does not currently meet the Act's definition of either an endangered or a threatened species throughout its range.

*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 (SPR). Where the best available information allows the Services to determine a status for the species rangewide, that determination should be given conclusive weight because a rangewide determination of status more accurately reflects the species' degree of imperilment and better promotes the purposes of the Act. Under this reading, we should first consider whether the species warrants listing ''throughout all'' of its range and proceed to conduct a ''significant portion of its range'' analysis if, and only if, a species does not qualify for listing as either an endangered or a threatened species according to the ''throughout all'' language.

Having determined that the Nashville crayfish is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in an SPR. The range of a species can theoretically be divided into portions in an infinite number of ways, so we first screen the potential portions of the species' range to determine if there are any portions that warrant further consideration. To do the ''screening'' analysis, we ask whether there are portions of the species' range for which there is substantial information indicating that: (1) The portion may be significant; and, (2) the species may be, in that portion, either in danger of extinction or likely to become so in the foreseeable future. For a particular portion, if we cannot answer both questions in the affirmative, then that portion does not warrant further consideration and the species does not warrant listing because of its status in that portion of its range. We emphasize that answering these questions in the affirmative is not a determination that the species is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range—rather, it is a step in determining whether a more detailed analysis of the issue is required.

If we answer these questions in the affirmative, we then conduct a more thorough analysis to determine whether the portion does indeed meet both of the SPR prongs: (1) The portion is significant and (2) the species is, in that portion, either in danger of extinction or likely to become so in the foreseeable future. Confirmation that a portion does indeed meet one of these prongs does not create a presumption, prejudgment, or other determination as to whether the species is an endangered species or threatened species. Rather, we must then undertake a more detailed analysis of the other prong to make that determination. Only if the portion does indeed meet both SPR prongs would the species warrant listing because of its status in a significant portion of its range.

At both stages in this process—the stage of screening potential portions to identify any portions that warrant further consideration and the stage of undertaking the more detailed analysis of any portions that do warrant further consideration—it might be more efficient for us to address the ''significance'' question or the ''status'' question first. Our selection of which question to address first for a particular portion depends on the biology of the species, its range, and the threats it faces. 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 second question for that portion of the species' range.

For Nashville crayfish we chose to evaluate the status question (*i.e.,* identifying portions where the Nashville crayfish may be in danger of extinction or likely to become so in the foreseeable future) first. To conduct this screening, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the following threats: Human population growth, urban development, impervious cover, and catastrophic spills including cumulative effects. We found no concentration of threats in any portion of the Nashville crayfish range at a biologically meaningful scale.

If both (1) a species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range and (2) the threats to the species are essentially uniform throughout its range, then the species could not be in danger of extinction or likely to become so in the foreseeable future in any biologically meaningful portion of its range. For the Nashville crayfish, we found both: The species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, and there is no geographical concentration of threats so the threats to the species are essentially uniform throughout its range. Therefore, no portions warrant further consideration through a more

detailed analysis, and the species is not in danger of extinction or likely to become so in the foreseeable future in any significant portion of its range. Our approach to analyzing SPR in this determination is consistent with the court's holding in *Desert Survivors* v. *Department of the Interior,* No. 16–cv–01165–JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018).

*Determination of Status*

Our review of the best available scientific and commercial information indicates that the Nashville crayfish is not in danger of extinction nor likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Therefore, we find that the Nashville crayfish does not meet the Act's definition of an endangered species or of a threatened species, and we propose to remove the Nashville crayfish from the List of Endangered and Threatened Wildlife.

**Effects of This Proposed Rule**

This proposal, if made final, would revise 50 CFR 17.11(h) to remove the Nashville crayfish from the Federal List of Endangered and Threatened Wildlife. The prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, would no longer apply to this species. Federal agencies would no longer be required to consult with the Service under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect Nashville crayfish. There is no critical habitat designated for this species.

**Post-Delisting Monitoring**

Section 4(g)(1) of the Act requires us to monitor for not less than 5 years the status of all species that are delisted due to recovery. Post-delisting monitoring (PDM) refers to activities undertaken to verify that a species delisted due to recovery remains secure from the risk of extinction after the protections of the Act no longer apply. The primary goal of PDM is to monitor the species to ensure that its status does not deteriorate, and if a decline is detected, to take measures to halt the decline so that proposing it as an endangered or a threatened species is not again needed. If at any time during the monitoring period, data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing. At the conclusion of the monitoring period, we will review all available information to determine if relisting, the continuation of monitoring, or the termination of monitoring is appropriate.

Section 4(g) of the Act explicitly requires that we cooperate with the States in development and implementation of PDM programs. However, we remain ultimately responsible for compliance with section 4(g) of the Act and, therefore, must remain actively engaged in all phases of PDM. We also seek active participation of other entities that are expected to assume responsibilities for the species' conservation after delisting.

Concurrent with this proposed delisting rule, we announce the draft plan's availability for public review at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0062. Copies can also be obtained from the U.S. Fish and Wildlife Service, Tennessee Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**). We seek information, data, and comments from the public regarding this proposed delisting of the Nashville crayfish and the PDM plan. We are also seeking peer review of the draft PDM plan concurrently with this comment period. We anticipate finalizing the PDM plan, considering all public and peer review comments, prior to making a final determination on the proposed delisting rule.

**Required Determinations**

*Clarity of the Proposed 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:

(a) Be logically organized;

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

(c) Use clear language rather than jargon;

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

(e) Use lists and tables wherever possible.

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

*National Environmental Policy Act*

We have determined that we do not need to prepare an environmental assessment or environmental impact statement, as defined in the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

*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, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal 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. There are no tribal interests associated with this proposed rule.

**References Cited**

A complete list of references cited is available on the internet at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0062 and upon request from the Field Supervisor, Tennessee Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**, above).

**Authors**

The primary authors of this proposed rule are staff members of the Service's Southeastern Region Recovery Team and the Tennessee Ecological Services Field Office.

**List of Subjects in 50 CFR Part 17**

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

**Proposed Regulation Promulgation**

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

## PART 17—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.

**§ 17.11 [Amended]**

■ 2. Amend § 17.11(h) by removing the entry for ''Crayfish, Nashville'' under CRUSTACEANS from the List of Endangered and Threatened Wildlife.

Dated: September 24, 2019.

**Margret E. Everson**

*Principal Deputy Director, U.S. Fish and Wildlife Service, Exercising the Authority of the Director, U.S. Fish and Wildlife Service.*

[FR Doc. 2019–25548 Filed 11–25–19; 8:45 am]

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