DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2019–0098; FF09E21000 FXES1111090FEDR 223]

RIN 1018–BE19

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Big Sandy Crayfish and Guyandotte River Crayfish

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), designate critical habitat for the Big Sandy crayfish (*Cambarus callainus*) and Guyandotte River crayfish (*C. veteranus*) under the Endangered Species Act (Act). In total, approximately 717 stream kilometers (446 stream miles) in Kentucky, Virginia, and West Virginia fall within the boundaries of the critical habitat designation. The effect of this final rule is to designate critical habitat for the Big Sandy crayfish, which is a threatened species under the Act, and Guyandotte River crayfish, which is an endangered species under the Act.

DATES: This rule is effective April 14, 2022.

ADDRESSES: This final rule is available on the internet at *https://www.regulations.gov* in Docket No. FWS–R5–ES–2019–0098 or at *https://www.fws.gov/northeast/* and at the West Virginia Ecological Services Field Office. Comments and materials we received, as well as some supporting documentation we used in preparing this rule, are available for public inspection in the docket at *https://www.regulations.gov*.

The coordinates or plot points or both from which the maps are generated are included in the administrative record for this critical habitat designation and are available at *https://www.regulations.gov* at Docket No. FWS–R5–ES–2019–0098, at *https://www.fws.gov/westvirginiafieldoffice/index.html*, and at the West Virginia Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**). Any additional tools or supporting information that we developed for this critical habitat designation will also be available at the U.S. Fish and Wildlife Service website and field office set out above, and may also be included in the preamble and at *https://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Jennifer L. Norris, Field Supervisor, U.S. Fish and Wildlife Service, West Virginia Ecological Services Field Office, 6263 Appalachian Highway, Davis, WV 26260; telephone 304–866–3858; email *FW5_WVFO@fws.gov*. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. This document is a final rule to designate critical habitat for the Big Sandy crayfish and Guyandotte River crayfish. Under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), any species that is determined to be an endangered or threatened species requires critical habitat to be designated, to the maximum extent prudent and determinable. Designations and revisions of critical habitat can be completed only by issuing a rule.

We listed the Big Sandy crayfish as a threatened species and the Guyandotte River crayfish as an endangered species on April 7, 2016 (81 FR 20450). On January 28, 2020, we published in the **Federal Register** a proposed critical habitat designation for the Big Sandy and Guyandotte River crayfishes (85 FR 5072).

What this document does. This document is a final rule that designates critical habitat for the Big Sandy crayfish and the Guyandotte River crayfish. The critical habitat areas we are designating in this rule constitute our current best assessment of the areas that meet the definition of critical habitat for Big Sandy and Guyandotte River crayfishes. We are designating a total of approximately 717 stream kilometers (skm) (446 stream miles (smi)) of rivers and streams in Kentucky, Virginia, and West Virginia for the Big Sandy and Guyandotte River crayfishes.

The basis for our action. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.

Peer review and public comment. Our designation is based on the best scientific data available in the proposed and final listing rules (80 FR 18710, April 7, 2015, and 81 FR 20450, April 7, 2016, respectively) and proposed and final critical habitat designations (85 FR 5072, January 28, 2020, and this rule, respectively). The proposed listing rule was peer-reviewed by four scientists with expertise in crayfish and their habitats, and we also considered all comments and information received from State and Federal resource agencies and the public in developing the final listing rule (81 FR 20450, April 7, 2016). We solicited peer review for the proposed designation of critical habitat; however, none of the three species experts responded to our request. We considered all comments and information received from State and Federal resource agencies and the public during the comment period for the proposed designation of critical habitat. Information we received from public comment is incorporated in this final designation of critical habitat, as appropriate, or addressed below in Summary of Comments and Recommendations.

Previous Federal Actions

We proposed the Big Sandy and Guyandotte River crayfishes for listing on April 7, 2015 (80 FR 18710), and finalized the listing on April 7, 2016 (81 FR 20450). As such, the Big Sandy crayfish is included as a threatened species and the Guyandotte River crayfish is included as an endangered species on the List of Endangered and Threatened Wildlife in title 50 of the Code of Federal Regulations at 50 CFR 17.11(h). We also proposed to designate critical habitat for the Big Sandy and Guyandotte River crayfishes on January 28, 2020 (85 FR 5072). For information on any actions prior to these rules, refer to the proposed listing rule (80 FR 18710, April 7, 2015).

Summary of Changes From the Proposed Rule

We have considered all comments and information received during the open comment period for the proposed designation of critical habitat for the Big Sandy and Guyandotte River crayfishes. In the Critical Habitat section of this document, we provide new or revised information and references on crayfish movement (*e.g.,* upstream) and our revised screening analysis. Based on further review and an effort to clarify our descriptions of the physical and biological features (PBFs), we modified the PBF 1 by adding additional descriptive information about habitat quality. Critical habitat boundaries remain unchanged from the proposed critical habitat designation (85 FR 5072, January 28, 2020).

Summary of Comments and Recommendations

We requested written comments from the public on the proposed designation of critical habitat for Big Sandy and Guyandotte River crayfishes (85 FR 5072) during a 60-day comment period that opened on January 28, 2020, and closed on March 30, 2020. A newspaper notice inviting general public comment was published in *USA Today* on February 5, 2020. We did not receive any requests for a public hearing. We also contacted appropriate Federal, State, and local agencies; scientific organizations; and other interested parties and invited them to comment on the proposed rule and draft economic analysis during the comment period.

We sought comments from three independent specialists to ensure that our designation was based on scientifically sound data, assumptions, and analyses. We received no comments from the peer reviewers. During the comment period, we received 45 comment submittals from organizations or individuals in response to the proposed critical habitat designation. Of these, 35 were nonsubstantive letters or form letters (submitted by 3 nongovernmental organizations [one organization packaged 3,401 subletters and another packaged 259 subletters]) in support of the proposed critical habitat designation. One of these letters, representing 23 nongovernmental organizations, summarized threats to the species and their habitats, consistent with the information provided in the proposed rule. Three letters provided detailed information regarding the species or its habitat in favor of additional critical habitat designation beyond what was proposed. One letter provided detailed water depth/elevation data for the proposed habitat. Five letters objected to the proposed designation of critical habitat for either or both of the species. All substantive information provided during the comment period has either been incorporated directly into this final determination or is addressed below.

In addition, several letters also contained suggestions applicable to general recovery issues for the Big Sandy and Guyandotte River crayfishes, but not directly related to the critical habitat designation (*i.e.,* meaning these comments are outside the scope of this critical habitat rule). These general comments included topics such as the role of crayfish in aquatic ecosystems and the importance of clean water, and the suggestion to seek information on crayfish restoration from commercial crayfish farmers. While these comments may not be directly incorporated into the critical habitat rule, we have noted the suggestions and look forward to working with our partners on these topics during recovery planning for the Big Sandy and Guyandotte River crayfishes.

Comments From Federal Agencies

(1) Comment: The U.S. Army Corps of Engineers (Corps) provided information on its operation of three multipurpose flood control dams and how those actions could potentially affect proposed critical habitat for the Big Sandy and Guyandotte River crayfishes. The Corps also provided a point of contact for more information on the operations of Corps reservoirs in the Guyandotte and Big Sandy basins.

Our response: We look forward to working with the Corps to coordinate dam maintenance and operation activities while also promoting the conservation of the Guyandotte and Big Sandy crayfishes in the identified subunits.

Comments From States

Section 4(i) of the Act states, ''the Secretary shall submit to the State agency a written justification for his failure to adopt regulations consistent with the agency's comments or petition.'' The Service received supportive comments from the West Virginia Division of Natural Resources (WVDNR). WVDNR stated that there is no benefit to exclusion of any of the proposed critical habitat areas. Further, WVDNR noted that current occupied areas do not provide sufficient resiliency, redundancy, or representation necessary to ensure persistence of the Guyandotte River crayfish and it supported the inclusion of Huff Creek, Indian Creek, and Guyandotte River as unoccupied critical habitat. Also, WVDNR recognized the importance of special management actions for Indian Creek as this stream is often dewatered (possibly due to anthropogenic causes).

Public Comments

(1) Comment: Two commenters who have researched the Big Sandy and Guyandotte River crayfishes expressed support for the proposed critical habitat for both species, but they also recommended that we designate additional unoccupied critical habitat to support the conservation of the Guyandotte River crayfish. The commenters referred to two studies completed after we published the proposed critical habitat rule (85 FR 5072, January 28, 2020). One study reported that individual Guyandotte River crayfish may have a tendency to move in an upstream direction and one study determined there is a high probability of detecting the species in certain headwater areas of the Guyandotte River (Sadecky 2020, pp. 118–119 and Tidmore 2020, pp. 29–40). Both commenters hypothesized that crayfish in the occupied Pinnacle Creek subunit may move upstream in the Guyandotte River to occupy or reoccupy currently unoccupied streams, and one commenter recommended the addition of four specific tributary streams located upstream in the Guyandotte River be designated as unoccupied critical habitat: Barkers Creek, Devil's Fork, Winding Gulf, and Tommy Creek.

One commenter stated that unoccupied reaches are needed to allow redistribution of the species, because Guyandotte River crayfish are present in only two streams of the proposed critical habitat (without this protection, delisting/recovery is improbable). The commenter also noted they had witnessed several spills in Guyandotte River crayfish habitat while conducting field research on the species.

Our response: These researchers have provided additional information on the life history, behavior, habitat requirements, and potential stressors (*e.g.,* climate change) affecting the Guyandotte River crayfish. Species' expansion into unoccupied streams would benefit their conservation. The new information confirms that individual crayfish move within stream reaches and that 59 percent of crayfish movements were in an upstream direction (Sadecky 2020, p. 119). This study reported one male crayfish moved 620 m (2,034 ft) upstream during a 44-day study period (Sadecky 2020, pp. 118–119). As discussed in the proposed critical habitat rule, and affirmed by this

new information, we considered the potential for crayfish movement by designating entire stream reaches between known occurrence locations as critical habitat unless available data indicated that these areas lacked PBFs. Additionally, the upstream terminus of most critical habitat units (typically a stream confluence) is located beyond the most upstream occurrence record of the species.

For the unoccupied Guyandotte River critical habitat subunit (1c), which we determined was essential for providing connectivity between the occupied Pinnacle Creek and Clear Fork subunits (1a and 1b, respectively), the upstream limit is the Guyandotte River–Pinnacle Creek confluence (which marks the downstream terminus of subunit 1a). Therefore, a continuous reach of critical habitat extends from the upstream terminus of the Pinnacle Creek subunit (1a), through the Guyandotte River subunit (1c), to the upstream terminus of the Clear Fork–Laurel Fork subunit (1b), a distance of approximately 90 skm (56 smi). Spatially arranging the critical habitat units in this manner facilitates crayfish movements consistent with PBF 6, which provides for ''an interconnected network of streams and rivers . . . that allow(s) for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers.''

We have reviewed information on the four specific streams recommended for additional unoccupied critical habitat. One of these streams, Barkers Creek, is located approximately 21 skm (13 smi) upstream of the Guyandotte River–Pinnacle Creek confluence, and the remaining three, Devil's Fork, Winding Gulf, and Tommy Creek (Stone Coal Creek), are located approximately 40 to 42 skm (25 to 26 smi) upstream of Pinnacle Creek. Of these, historical records of the Guyandotte River crayfish are available from only Barkers Creek (1947). In 2015, a total of 15 sites in these and other streams above Pinnacle Creek were surveyed, but the Guyandotte River crayfish was not detected (Loughman 2015b, pp. 4–5). Site assessment data from these surveys indicated the extent of suitable habitat in these headwater areas was limited and that habitat quality scores were generally lower than in streams where the species was present (Loughman 2015b, pp. 12–25). The commenter referenced a more recent habitat model (Tidmore 2020, pp. 29–40), which determined there was a high probability of suitable habitat in some portions of these streams; however, 31 validation surveys associated with this study failed to locate the species outside of the streams already proposed as occupied critical habitat (although the report does not indicate how many of these validation surveys occurred in the 4 streams recommended as unoccupied critical habitat).

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside of the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. We acknowledge that some segments of these streams contain areas of suitable habitat as described in Tidmore (2020, pp. 29–40) and contain one or more of the PBFs required by the species, and we conclude that the best available information (*e.g.,* aforementioned validation surveys) does not indicate that these areas are essential for the conservation of the species. While the most downstream stream (Barkers Creek) has a historical record of the species, we have no data indicating the species was historically present in the more distant upstream reaches or tributaries. Areas included in this final designation provides sufficient resiliency, redundancy, and representation to conserve the species.

As discussed in the proposed rule, we determined that the two occupied critical habitat subunits (1a and 1b) are not sufficient to ensure the conservation of the Guyandotte River crayfish; therefore, we proposed three subunits (1c, 1d, and 1e) as unoccupied critical habitat. Four of the proposed critical habitat subunits (two occupied, two unoccupied; totaling approximately 106.6 skm (66.2 smi)) are connected to each other, while the fifth unit, Huff Creek (subunit 1e totaling 28.0 skm (17.4 smi)), provides for increased representation by increasing the species' ability to disperse and colonize new areas downstream of R.D. Bailey Dam, which fragments the range of the species. As discussed in the proposed rule, four of these subunits have records of the species, while the remaining subunit (Guyandotte River subunit 1c) provides important connectivity between the currently occupied subunits. As described in the proposed rule, successful conservation of the Guyandotte River crayfish will require the establishment of additional populations within the species' historical range; the three unoccupied subunits advance this goal. Each unoccupied subunit will contribute to the conservation of the species by furthering the preliminary recovery goals identified in the recovery outline of increasing the Guyandotte River crayfish's resiliency, redundancy, and representation and are essential for its conservation.

The unoccupied critical habitat will provide increased redundancy in case of spills or other stochastic events. We also recognize the threat that spills and other stochastic and catastrophic events pose to the species and note special management may be needed to address these threats.

After considering all of the above factors, we conclude areas included in this final designation provide sufficient resiliency, redundancy, and representation to conserve the species, and the four additional streams recommended by the commenters are not essential to the conservation of the Guyandotte River crayfish and therefore do not meet the definition of critical habitat.

We recognize that habitat is dynamic, and species may move from one area to another over time. Therefore, critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for the recovery of the species. Areas that are important for the conservation of the listed species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act, (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species, and (3) the prohibitions found in section 9 of the Act. These protections and conservation tools will continue to contribute to recovery of this species. Similarly, critical habitat designations made on the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts indicates a different outcome. Therefore, if the species is found in the referenced areas during future surveys, they would be subject to the conservation measures described above. In addition, we may consider these areas during future recovery planning and/or conservation assessments.

(2) Comment: One commenter who has researched the Guyandotte River crayfish stated that alterations to

headwater streams could make them unsuitable for the species and affect the water quality of downstream critical habitat units. Therefore, the commenter recommended that these upper reaches be considered for (unoccupied) critical habitat designation.

Our response: We acknowledge that degradation to upstream reaches may affect downstream aquatic habitat. We will consider effects to downstream habitats during recovery planning and in section 7 consultation processes. We refer the reader to our response to comment 1 above, which provides a thorough discussion of our rationale for designating critical habitat for the Guyandotte River crayfish and the regulatory protections afforded by section 7 of the Act.

(3) Comment: One commenter stated that our proposed critical habitat designations were flawed because current survey data were insufficient to determine that certain areas were currently occupied; however, no specific examples were provided. The commenter concluded that the Service should more precisely refine critical habitat units to include only ''occupied stream segments.''

Our response: The regulations for designating critical habitat (50 CFR 424.02) define the geographical area occupied by the species as ''An area that may generally be delineated around species' occurrences, as determined by the Secretary (*i.e.,* range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (*e.g.,* migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).'' As we discussed in the final listing rule for the Big Sandy and Guyandotte River crayfishes (81 FR 20450, April 7, 2016) and the proposed critical habitat rule (85 FR 5072, January 28, 2020), occupied critical habitat units (and subunits) for these species are based on positive survey data collected between 2006 and 2016 (the time of listing), the best available information at that time. As we acknowledged then, continuous survey data do not exist, and many streams with known crayfish occurrences have not been surveyed completely. The best available information indicated both species occupy, transit through, or otherwise rely upon, stream reaches beyond that of any single occurrence location. This conclusion is supported by a study of Guyandotte River crayfish movements and habitat use, which was completed after we published the proposed critical habitat rule (see Sadecky 2020, entire). This study documented that individual crayfish routinely engage in substantial movements both upstream and downstream and that the species makes use of and moves through a variety of interconnected habitat types including riffles, runs, and pools (Sadecky 2020, pp. 150; 188–189). These data support our determination that stream segments between known capture locations are likely to be occupied by the crayfish and are essential to provide for the conservation of the species.

In the final listing rule (81 FR 20450, April 7, 2016), we identified habitat fragmentation as a stressor for both species, and in our proposed critical habitat rule we identified one of the PBFs essential to the conservation of the species as ''An interconnected network of streams and rivers . . . that allow(s) for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers. The scale of the interconnected stream network should be sufficient to allow for gene flow within and among watersheds.'' Therefore, we determined that critical habitat units should be defined in a way that promotes connectivity between documented occurrences and between populations, where possible. To this end, the upstream limits of occupied critical habitat units occur upstream of a known occurrence location. Downstream limits generally terminate at stream confluences with the next larger receiving stream or river (or in some cases at a reservoir). We designated the entire reach between the upstream and downstream termini as critical habitat unless available data indicated these areas lacked all of the PBFs required by the species.

(4) Comment: One commenter stated that the draft economic analysis underestimates the economic effects of the proposed designation on coal mining. The commenter stated that critical habitat designation will apply restrictive or protective measures to the entire watershed, and the Service failed to correctly identify the scope and reach of the potential economic, national security, and social impacts.

Our response: Our regulations at 50 CFR 424.19 require the Service to compare the impacts with and without the critical habitat designation when describing the probable economic impact of a designation (Industrial Economics, Incorporated (IEc) 2019, pp. 1–2). Although the commenter provided some economic information, it lacked detail to correlate with the designation of critical habitat. Determining the economic impacts of a critical habitat designation involves evaluating the ''without critical habitat'' baseline versus the ''with critical habitat'' scenario, to identify those effects expected to occur solely due to the designation of critical habitat and not from the protections that are in place due to the species being listed under the Act. Economic effects solely due to the critical habitat designation include both: (1) The costs of increased administrative efforts that result from the designation; and (2) the economic effects of changes in the action to avoid destruction or adverse modification of critical habitat. These changes can be thought of as ''changes in behavior'' or the ''incremental effect'' that would most likely result from the designation if finalized.

A primary goal of the screening analysis is to provide information about the likely incremental costs and benefits of the proposed critical habitat designation to determine whether the rule meets the threshold for an economically significant rule. As demonstrated, in occupied units for both the Big Sandy and Guyandotte River crayfishes, the incremental economic costs of the rule are likely to be limited to additional administrative effort to consider adverse modification during section 7 consultations. In the unoccupied subunits for the Guyandotte River crayfish, incremental economic costs may also include project modifications to activities with a Federal nexus. For the coal mining industry in particular, we have identified that many of the project recommendations the industry may provide already are required under other rules and regulations (*e.g.,* Clean Water Act, Surface Mining Control and Reclamation Act, West Virginia Surface Mining Reclamation Rule) (IEc 2020). Our analysis accounted for potential Federal actions within the watershed, both inside and outside the proposed critical habitat, that may affect the proposed critical habitat. We identified two project modifications above and beyond these existing baseline requirements that may result in costs to the mining industry as well as Federal and State agencies. The final economic impact screening analysis presents information on these costs, which are substantially below the threshold for an economically significant rule (IEc 2020).

National security and social impacts are not within the scope of the economic impact screening analysis. However, section 4(b)(2) of the Act allows for particular areas of proposed critical habitat to be excluded from the final designation based on considerations of economic impact, the impact on national security, and any other relevant impact if the benefits of

such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless the Secretary determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned. However, the commenters did not identify any particular areas that should be considered for exclusion, based on these factors, nor did the commenter provide any specific substantive information that would allow the Service to quantify or weigh the incremental effects of these factors in any particular area of proposed critical habitat to conduct an exclusion analysis. We did not receive any information from Federal agencies responsible for national security that the proposed designation would affect these interests, and therefore we have not identified any areas for exclusion analysis based on this factor.

(5) Comment: Two comments emphasized the historic importance of protection and enhancement plans (PEPs) and related adaptive management plans to protect the crayfish that the coal industry has developed with the West Virginia Department of Environmental Protection (WDEP). One commenter suggested maintaining and expanding the use of PEPs across the proposed unoccupied habitat and expressed fears that the PEPs and adaptative management plans may be undermined with the designation of critical habitat. The comment concludes by suggesting that the resources devoted to critical habitat regulations could have more benefit for the crayfish if they were used in a coordinated voluntary conservation and recovery effort instead.

Our response: We recognize the cooperative efforts of the WVDEP and the WV Coal Association in developing PEPs on projects that may affect these two crayfishes and looks forward to similar cooperative efforts in the future. We will continue to work with partners to address conservation and recovery of the species and its critical habitat through PEPs and other adaptive management measures, as appropriate and consistent with regulations. We note that current regulations and voluntary cooperative efforts have not resulted in the development of PEPs for any coal mining projects that would affect any streams that are designated for unoccupied critical habitat. Therefore, the designation of unoccupied critical habitat should not undermine any existing PEPs but rather should facilitate the development of additional PEPs and adaptive management efforts within these areas as recommended by the commenter.

(6) Comment: In regard to the draft economic analysis (DEA), one commenter stated the Service should not generalize potential economic impacts to only one coal mine but should look at effects to the watershed holistically, including associated development like railways that transport coal. For coal mines higher in the watershed, the commenter stated that site-specific conditions such as topography and property access might make some conservation measures infeasible.

Our response: We recognize that effects for these species should be considered on a watershed-level (see our response to comment 2 for information on how we consider effects to downstream resources), and also recognize that different conservation measures may be appropriate for different projects. For example, small-scale projects high in the watershed may not need the same scope or extent of conservation measures compared to a large-scale project occurring directly adjacent to a stream designated as critical habitat. In addition, construction techniques or conservation measures may not be feasible or applicable to all projects. As a result, when working with applicants, we consider issues such as topography and access when determining what conservation measures are appropriate. In addition, we have taken a watershed-level approach when evaluating effects from proposed projects including coal mines, as is reflected in the review of consultations and effects incorporated in our economics screening analysis. However, our analysis must be based on the best available information. For some project types, there may be a limited suite of previous project reviews available by which to estimate potential effects. We have updated our economic screening analysis to incorporate results from recent consultations.

Based on the public comments received on the proposed rule package, a final economic impact screening analysis updated the evaluation of potential costs associated with project modifications for consultations on mining activities that occur in watersheds with unoccupied critical habitat. In particular, the analysis relies on more detailed information from us regarding the likely project modifications recommended to avoid adverse modification of the critical habitat, and a more detailed assessment of the incremental costs of these modifications. Specifically, the final economic impact screening analysis quantifies costs associated with biological assessment stations and continuous turbidity loggers based on communication with State and Federal regulatory agencies. The analysis additionally provides information on the potential for additional costs to mine operators of recommendations for more stringent cleanout of sediment structures at the mines affecting unoccupied habitat. The final economic impact screening analysis describes that project modifications may not be requested of all mines given their unique characteristics; however, to provide a conservative estimate of costs that is more likely to overstate than understate costs, the analysis assumes all future mines in watersheds with unoccupied habitat would undertake these project modifications due to the critical habitat designation. We expect to work with individual mines to assess which project modifications are recommended for their site-specific conditions.

(7) Comment: One commenter believes that the proposed critical habitat for the two species is too large and that we included streams that ''do not contain these species and also do not contain the features and characteristics necessary to potentially support the species.''

Our response: Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available, which we discuss and reference in the final listing rule (81 FR 20450, April 7, 2016) and proposed critical habitat rule (85 FR 5072, January 28, 2020). All units contain the physical and biological features needed to support the species. Additionally, in our responses to comments 1 and 3 above, we provide a thorough discussion of our rationale for designating (or not designating) critical habitat.

(8) Comment: One commenter stated that, in our analysis of likely economic effects, we had incorrectly concluded that the Commonwealth of Kentucky ''owns'' the water and that this (presumed) error invalidated our entire economic analysis.

Our response: As we discussed in the proposed critical habitat rule, for the purposes of analyzing the potential economic effects of critical habitat designation, the critical habitat units/subunits were determined to be in either private, Federal, or State ownership based on the identification of the adjacent riparian landowner(s) (*i.e.,* private, Federal, State). This comports with our original citation (Energy & Mineral Law Institute 2011, pp. 414–415), which states that, in Kentucky, riparian landowners own the stream bed

''to the middle of the stream thread.'' It appears the commenter may have interpreted this to mean that adjacent landowners also own the water in the stream. However, this interpretation is contradicted by Kentucky Statute 151.120(1), which states, ''Water occurring in any stream, lake, ground water, subterranean water or other body of water in the Commonwealth which may be applied to any useful and beneficial purpose is hereby declared to be a natural resource and public water of the Commonwealth and subject to control or regulation for the public welfare. . . .'' Our economic analysis is based upon the best available information regarding critical habitat ownership.

(9) Comment: One coal company commented that costs associated with mining are underestimated and sample costs used were from small projects with minimal impacts. The commenter stated that costs of monitoring/testing could be over $100,000/year; plan modifications resulting in additional impacts to jurisdictional waters could increase costs by $1 million; and costs associated with relocating fills/co-locating valley fills could require new trucks at $2 million per truck or $300,000 per shift.

Our response: At the time of the proposed rule, there was a limited number of previous mining consultations that addressed these crayfish species that could be used to estimate potential costs. Additional consultations have been conducted since that time. We have updated the analysis based on a review of recommendations made on multiple mining consultations conducted throughout the range of these two species. The final economic impact screening analysis provides a more detailed assessment of the baseline requirements at mine sites within critical habitat due to State and Federal regulation of mining even absent critical habitat, as well as analysis of how the critical habitat rule may result in additional project modification recommendations above and beyond these baseline requirements. Specifically, Exhibit A–3 of appendix A of the final economic impact screening analysis provides information on our evaluation of the potential need for additional project modifications at mine sites in unoccupied critical habitat specifically to avoid adverse modification that would not already be recommended based on existing Federal and State rules and requirements in West Virginia. The identified incremental project modifications triggered by the critical habitat rule include (1) cleaning out sediment structures at 40-percent design capacity instead of the currently required 60-percent design capacity and (2) installing continuous turbidity loggers and biological assessment station sites to statistically monitor sediment and other water quality attributes of the streams that may affect the crayfish. The analysis also provides cost estimates associated with these project modifications in particular. The annualized cost of the turbidity loggers and biological assessment stations is expected to be approximately $120,000 at both 3- and 7-percent discount rates. These costs are expected to be incurred by both the coal mining industry as well as some State entities responsible for water quality monitoring. While data are not available to quantify the potential costs of the sediment structure cleaning recommendation, the screening analysis provides qualitative information on this unquantified cost for consideration.

(10) Comment: One commenter stated coal mining is the only consequential activity because high-quality coal is present and provides economic benefits to the coal and steel industry. The coal and steel industry support national security. Measures that would restrict coal production would affect the economy, and the DEA should be revised to include the costs of these lost economic resources.

Our response: No Federal agency responsible for national security has requested an exclusion from Big Sandy crayfish or Guyandotte River crayfish critical habitat designation.

We recognize that coal mining is prevalent in the range of these two species, and as a result have placed specific emphasis in review of coal mining projects in our screening analysis. The screening analysis does not identify any incremental impacts of the critical habitat designation that would likely restrict coal production in the region. In the occupied units for both crayfish, the economic impacts of the rule are expected to be limited to additional administrative effort to consider adverse modification during section 7 consultations. In the unoccupied subunits for the Guyandotte River crayfish, the economic costs additionally may include project modification recommendations. We have reviewed the best available information including existing rules and regulations and recent coal mining consultations. We then identified those project modifications that may be incremental and attributable to the critical habitat rule, and have updated the screening analysis to reflect these incremental effects to the coal industry. See our response to comment 9 for additional information.

(11) Comment: One commenter stated that silvicultural best management practices (BMPs) are implemented at high rates in the range of the Big Sandy and Guyandotte River crayfishes and that these BMPs are effective at protecting water quality, instream habitats, and aquatic biota. The commenter supported these assertions by briefly summarizing the results of 43 references that summarize the use and effectiveness of BMPs in protecting aquatic species. The commenter asked that the Service consider these references when making its final determination of critical habitat for the Big Sandy and Guyandotte River crayfishes. The commenter recommended the Service recognize BMPs as routine practices for protecting aquatic habitats and these practices should not be considered as ''special management.''

Our response: The best available information indicates BMP implementation rates are relatively high (80 to 90 percent) for commercial forestry operations across the ranges of the Big Sandy and Guyandotte River crayfishes, and properly implemented BMPs can be effective in protecting water quality and instream habitats (81 FR 20450, p. 20467, April 7, 2016). Commercial timber harvests occur throughout the ranges of both crayfishes, and often occur directly adjacent to, or on the steep slopes above, streams and rivers inhabited by these species. We estimate that across the ranges of both species, approximately 12,600 ha (30,745 ac) of forest are harvested annually, representing approximately 1.9 percent of the total cover within the region (Cooper et al. 2011a, p. 27; Cooper et al. 2011b, pp. 26–27; Piva and Cook 2011, p. 46).

As we discussed in Summary of Factors Affecting the Species in the final listing rule (81 FR 20450, April 7, 2016), the species and their habitats continue to be at risk due to sedimentation associated with improperly managed timber-harvesting activities. Even with high BMP implementation rates, which vary from State to State, a significant number of acres are logged each year with no BMP implementation (80 FR 18710, p. 18730, April 7, 2015). Monitoring and enforcement of BMPs in areas of timber harvests, as well as ensuring that BMPs are routinely updated to incorporate the best available information to reduce sedimentation and instream disturbance in crayfish watersheds are actions that are important to the conservation of

these species. Based on these factors, we conclude that features essential to the conservation of the Big Sandy and Guyandotte River crayfishes may require special management considerations or protections from threats associated with timber-harvesting activities. These threats may be ameliorated by implementation of BMPs that reduce erosion, sedimentation, and stream bank destruction.

(12) Comment: One coal company commented that the proposed designation overstates the stream miles and locations needed for species protection and recovery. More specifically, the commenter stated that conductivity is not a factor/relevant for designating critical habitat (citing the Service's Recovery Outline ''[m]ean values for conductivity and sulfates at sites supporting Big Sandy crayfish were similar to sites where the species was not detected, suggesting that these variables were not as influential in determining presence or absence of this species.'' (2018) (p. 3).

Our response: The best available information as cited in the final listing rule and the proposed critical habitat rule confirms that water quality is important to the conservation of these crayfishes, and that conductivity is one component of water quality that has been shown to be correlated with Guyandotte River crayfish absence, as well as negative effects to other benthic macroinvertebrates (see the summary of information provided in 81 FR 20450, p. 20471, April 7, 2016). Therefore, we have included reference to this water quality parameter in our PBFs. We acknowledge that additional information is needed to determine what thresholds or levels for each water quality parameter are sufficient for the normal behavior, growth, reproduction, and viability of all life stages of the species, and therefore have not cited a specific level within the PBFs for these species. We will continue to work with partners to evaluate the effects of various water quality parameters on these species.

(13) Comment: One coal company stated that connectedness is not a sufficient basis for ''over-designating'' a large part of the Tug Fork River as critical habitat.

Our response: We have reviewed data regarding the distribution of Big Sandy crayfish within the Tug Fork River. We proposed 65.9 smi of critical habitat within the Tug Fork extending from the confluence with Blackberry Creek upstream to the confluence with Dry Fork. The Big Sandy crayfish is documented to occur within both of these tributaries as well as throughout this reach of the Tug Fork River. Survey data collected after the listing of the species documented Big Sandy crayfish in the Tug Fork both upstream and downstream of the proposed critical habitat reach (confirming continued occupancy), including near the town of Hemphill, West Virginia, which is 28 smi upstream from the terminus of the unit (Mountain State Biosurveys, LLC, 2017, p. 8). The upper terminus of this unit has not been ''over-designated;'' instead, suitable habitat continues to occur farther upstream. Consistent with our previous listing determination and information received during the public comment period, the best available data indicate that interconnected stream segments are necessary to provide for movement of individuals and gene flow between populations. Telemetry studies conducted on Guyandotte River crayfish document that individuals engage in substantial movements, including 819.9 m by a female between July and August and 615.8 m by a male within the month of June. The species moves through a variety of interconnected habitat types, including riffles, runs, and pools (Sadecky 2020, pp. 150; 188–189). These data support our determination that stream segments between known capture locations are likely to be occupied by the crayfish and are essential to provide for the conservation of the species.

(14) Comment: One coal company stated that small headwater streams are not suitable habitat (cites 80 FR 18710, April 7, 2015).

Our response: We have reviewed the best available information including new information provided during the public comment period such as Tidmore (2020, pp. 36–37; 84), which found that stream accumulation (a measure of the size of the watershed draining into a stream reach) rather than stream order is a more accurate predictor of habitat quality for these species. Other public commenters (Sadecky; Loughman) noted that the Guyandotte River crayfish frequently moves upstream. This information confirms that the two species need moderate to large sized streams but that they are not restricted to occurring in only third-order or larger streams and may occur in smaller order streams when there is sufficient accumulation of water from upstream reaches. We have reviewed the areas proposed for critical habitat designation, and determined that no areas of proposed critical habitat should be deleted as a result of unsuitable stream size or elevation.

(15) Comment: One coal company stated that the Service significantly understates the economic impacts of its critical habitat rule on people living and operating in the affected watersheds.

Our response: The commenter did not provide information or specific examples of economic impacts on people living in the affected watershed. The screening analysis provides an assessment of the likely costs and benefits of the proposed critical habitat designation using the best available information.

(16) Comment: One commenter supports the designation of critical habitat for the two species but commented that the designation of unoccupied critical habitat for the Guyandotte River crayfish and reintroduction of the species would have adverse effects on the ecosystems present in those areas.

Our response: The commenter did not provide specific detail about these potential adverse effects. As we discussed in the proposed rule, all three of the unoccupied critical habitat units for the Guyandotte River crayfish are located within the species' historical range. Both Indian Creek and Huff Creek (subunits 1d and 1e, respectively) have historical records of the species, and the Guyandotte River (subunit 1c) connects (or connected) all known populations of the species. Therefore, the historical distribution of the species demonstrates that it is a naturally occurring component of the Upper Guyandotte River ecosystem, and reintroduction of the species should not cause ''adverse effects'' to the aquatic community in these areas.

(17) Comment: One commenter believes the proposed areas are too large, the proposal includes areas where the species do not occur, and the areas do not contain the features and characteristics necessary to support the species. The commenter felt that three unoccupied units (Indian Creek, Huff Creek, and Guyandotte River in Subunit 1c) should not be included because the analysis is insufficient to explain why these units were chosen and more information is needed to: (1) Evaluate feasibility of all historically occupied reaches, (2) evaluate the cost of restoring and maintaining stream health in these reaches, (3) evaluate the additive value of these reaches to the species' overall viability, and (4) determine the economic impact of designating each reach as potential critical habitat.

Our response: We refer the reader to our responses to comments 1 and 3, above, which provide a thorough discussion of our rationale for designating critical habitat for the Guyandotte River crayfish. The revised screening analysis provides more details

on the likely economic costs associated with designating unoccupied subunits for the Guyandotte River crayfish. In particular, it provides a more detailed assessment of the project modification recommendations that would be attributed to the proposed rule. In doing so, the final economic impact screening analysis provides more detail on the quantified costs associated with these incremental project modifications, which total approximately $350,000 on an annualized basis for the first 10 years. These costs are expected to be incurred by both the mining industry as well as State agencies that monitor water quality. Additionally, the final economic impact screening analysis identifies potential unquantified costs associated with recommendations for more stringent cleanout of sediment structures (*i.e.,* cleanout at 40 percent as opposed to 60 percent of design capacity) in the unoccupied critical habitat areas.

(18) Comment: One commenter commented that the economic analysis underestimates the economic costs of the proposed action because: (A) The Service underestimated costs by using one mining project as an example of conservation measures; (B) the baseline is incorrect, because all areas are not occupied; (C) full economic effects are missed (information is missing on compliance costs, construction costs, lost resource revenue, and socioeconomic benefits, including lost tax revenue, royalties to landowners, and wages/benefits to employees); (D) outdated data are used (relies on 2002 data); (E) there is an erroneous assumption that no project modification would be recommended; (F) there is no consideration of State/local requirements (surface water standards); (G) the analysis of property value impacts is flawed; and (H) the assumption that all proposed areas are occupied is incorrect.

Our response: The screening analysis provides information on the likely costs and benefits of the proposed critical habitat rule using the best available data. In general, the screening analysis provides conservative estimates where possible and is more likely to overstate costs than understate costs, to determine if the rule could meet the threshold for an economically significant rule. Following are responses to the specific points of this comment:

(A) The revised screening analysis provides updated cost estimates and more detail on the project modification recommendations likely to be requested of the surface coal mining industry in the unoccupied units for the Guyandotte River crayfish. In particular, it provides a more thorough assessment of the project modifications we may request that go above and beyond existing rules and requirements in West Virginia based on a review of recent consultations on the species. We identify two specific recommendations we may request that would be incremental to the proposed rule and provide an updated assessment of the costs associated with these recommendations.

(B) The screening analysis distinguishes between costs associated with occupied and unoccupied subunits for the crayfish. The costs of critical habitat designation for occupied habitat, as noted by the commenter, are generally lower because the listing status of the species provides baseline protection in these areas. That is, project modifications undertaken as part of section 7 consultations to avoid jeopardy to the species in these areas most likely also result in the projects avoiding adverse modification of critical habitat. Thus, we would not likely recommend more or different project modifications due to the designation of critical habitat in these areas. It is for this reason that the screening analysis separately considers the costs of the proposed critical habitat designation in occupied and unoccupied units. In particular, the incremental section 7 consultation costs (*i.e.,* above and beyond baseline costs) are separately assessed for occupied and unoccupied units (IEc 2020, pp. 13, 15, 16 (Exhibits 5, 6, and 7)). While the screening analysis identifies only limited administrative costs resulting from the designation of the occupied units, it estimates greater administrative costs, as well as the costs of project modifications from the designation of the unoccupied units. Specifically, the screening analysis identifies costs associated with the designation of three unoccupied habitat subunits for the Guyandotte River crayfish, where project modifications to future mining projects are likely and could range from $119,933 to $120,682 in a single year.

(C) The commenter did not provide specific cost detail (in United States dollars) on compliance costs, construction costs, lost resource revenue, socioeconomic benefits, lost tax revenue, royalties to landowners, or wages/benefits to employees. The screening analysis finds that the incremental costs of the rule are likely to include additional administrative costs to consider adverse modification during section 7 consultations in all units, as well as costs of project modification recommendations in the unoccupied subunits for the Guyandotte River crayfish. The revised screening analysis provides a more detailed assessment of costs that may arise from these project modification recommendations. Given the limited incremental costs associated with the proposed critical habitat designation, the screening analysis does not anticipate reductions in coal production, lost wages, or lost tax revenue resulting from the rule.

(D) The commenter is correct that the screening analysis relies on a range of incremental costs derived from an analysis effort performed in 2002. However, while the time required to complete the consultations remains fixed at the levels assumed in 2002, the screening analysis relies on updated salary and benefit information reflected in the 2019 Federal Government Schedule Rules. The administrative costs of consultation consider not only the level of effort required of us and other Federal agencies, but also of third parties to consultation, including private industry. Exhibit 6 of the screening analysis provides more details on the breakdown of costs by party.

(E) As described in (B) above, the screening analysis differentiates between occupied and unoccupied subunits. In occupied units, incremental costs due to project modifications are not anticipated. As described in section 3 of the screening analysis, this is because project modifications requested to avoid adverse modification of critical habitat are expected to be identical to project modifications requested to avoid jeopardy of the species where they currently reside. In other words, while project modifications may be requested in these occupied units, these same project modifications would be requested due to the listing of the species, and therefore critical habitat would not likely generate additional project modification recommendations. In unoccupied subunits, project modifications are not undertaken due to the presence of the crayfish and thus there is greater potential for incremental costs of project modifications. We identify that critical habitat designation may affect mine projects in unoccupied habitat in West Virginia due to two project modifications; the revised screening analysis provides more detail about these recommendations as well as the costs associated with implementing them.

(F) Section 4 of the screening analysis considers the potential for State or other local laws to be triggered by the critical habitat designation, resulting in an incremental impact of the rule. As described in the screening analysis as well as the Incremental Effects

Memorandum, a range of State and local laws have been triggered by the listing of the species under the Endangered Species Act (Act). However, we expect that no new State or local rules will apply as a result of the critical habitat. In other words, the cost of complying with State and local laws that were triggered by the listing of the species are baseline conditions and cannot be attributed to the critical habitat designation specifically.

(G) As a riverine species, the crayfish do not occur on land, and the literature has not evaluated effects of riverine critical habitat on property values. While the economics screening memorandum acknowledges the potential exists for the critical habitat designation to affect private property values, it does not conclude that these effects are ''likely,'' as implied in this comment. The economics literature evaluating the potential land value effects of critical habitat is limited and is specific to particular species and geographic areas. The memorandum therefore highlights this issue as an uncertainty associated with the screening analysis. Please also see comment and response 8, above, regarding land ownership in the Commonwealth of Kentucky.

(H) As described in (B) above, the screening analysis differentiates costs incurred in occupied and unoccupied subunits. The best available information supports our determination of which subunits are occupied and unoccupied.

(19) Comment: One commenter suggests that our economic analysis consider the economic benefits of critical habitat designation.

Our response: Section 6 of the screening analysis considers the potential benefits of the critical habitat designation. Incremental benefits of the critical habitat designation are most likely to occur in the unoccupied subunits for the Guyandotte River crayfish, where consultation to avoid adverse modification of critical habitat may alter the management of projects, resulting in incremental conservation efforts. Various economic benefits may result from these incremental conservation efforts, including improved water quality and improved ecosystem health for other coexisting species, which, in turn, may reduce the effort necessary for water treatment and ecosystem management.

Critical Habitat

Background

Refer to our January 28, 2020, proposed critical habitat rule (85 FR 5072) for a summary of species information available to the Service at the time that the proposed rule was published.

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

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

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

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

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

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

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

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

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features: (1) Which are essential to the conservation of the species, and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific features that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside of the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. When designating critical habitat, the Secretary will first evaluate areas occupied by the species. The Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied by the

species would be inadequate to ensure the conservation of the species. In addition, for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species.

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

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

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

Physical or Biological Features Essential to the Conservation of the Species

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the PBFs that are essential to the conservation of the species and which may require special management considerations or protection. The regulations at 50 CFR 424.02 define ''physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species.

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

Summary of Essential Physical or Biological Features

We derived the specific PBFs required for the Big Sandy crayfish and the Guyandotte River crayfish from studies and observations of these species' habitat, ecology, and life history, which are discussed in full in the proposed critical habitat designation (85 FR 5072, January 28, 2020), the species' proposed and final listing rules (80 FR 18710, April 7, 2015; 81 FR 20450, April 7, 2016, respectively), and information summarized here. While data are sparse with which to quantitatively define the optimal or range of suitable conditions for a specific biological or physical feature needed by these species (*e.g.,* degree of sedimentation, water quality thresholds, extent of habitat connectedness), the available species-specific information, in combination with information from other similar crayfish species, provides sufficient information to qualitatively discuss the physical and biological features needed to support these species. As discussed in the proposed (80 FR 18710, April 7, 2015) and final (81 FR 20450, April 7, 2016) listing rules, these species are classified as ''tertiary'' (stream) burrowing crayfish, meaning that they do not exhibit complex burrowing behavior; instead of digging holes, they shelter in shallow excavations under loose cobbles and boulders on the stream bottom (Loughman 2013, p. 1). These species feed on plant and/or animal material, depending on the season (Thoma 2009, p. 13; Loughman 2014, p. 21). The general life cycle pattern of these species is 2 to 3 years

of growth, maturation in the third year, and first mating in midsummer of the third or fourth year (Thoma 2009, entire; Thoma 2010, entire). Following midsummer mating, the annual cycle involves egg laying in late summer or fall, spring release of young, and late spring/early summer molting (Thoma 2009, entire; Thoma 2010, entire). The Big Sandy and Guyandotte River crayfishes' likely lifespan is 5 to 7 years, with the possibility of some individuals reaching 10 years of age (Thoma 2009, entire; Thoma 2010, entire; Loughman 2014, p. 20).

Suitable habitat for both the Big Sandy crayfish and the Guyandotte River crayfishes appears to be limited to higher elevation, clean, medium-sized streams and rivers in the upper reaches of the Big Sandy and Guyandotte river basins, respectively (Jezerinac et al.1995, p. 171; Channell 2004, pp. 21–23; Taylor and Shuster 2004, p. 124; Thoma 2009, p. 7; Thoma 2010, pp. 3–4, 6; Loughman 2013, p. 1; Loughman 2014, pp. 22–23). These streams are generally third-order streams or larger; however, the species may also occur in smaller order streams, as stream accumulation rather than stream order has been found to be a better predicter of habitat quality for these species (Tidmore 2020, pp. 36–37; 84). Both species are associated with the faster moving water of riffles and runs or pools with current (Jezerinac et al. 1995, p. 170). An important habitat feature for both species is large, unembedded slab boulders on a sand, cobble, or bedrock stream bottom (Loughman 2013, p. 2; Loughman 2014, pp. 9–11). Excessive sedimentation leading to substrate embeddedness can smother these habitats, creating unsuitable habitat conditions for these species (Jezerinac et al. 1995, p. 171; Channell 2004, pp. 22–23; Thoma 2009, p. 7; Thoma 2010, pp. 3–4; Loughman 2013, p. 6). As such, we have determined that the following PBFs are essential for the conservation of the Big Sandy and Guyandotte River crayfishes:

(1) Fast-flowing stream reaches with unembedded slab boulders, cobbles, or isolated boulder clusters within an unobstructed stream continuum (*i.e.,* riffle, run, pool complexes) of permanent, moderate- to large-sized (generally third order and larger) streams and rivers (up to the ordinary high-water mark as defined at 33 CFR 329.11).

(2) Streams and rivers with natural variations in flow and seasonal flooding sufficient to effectively transport sediment and prevent substrate embeddedness.

(3) Water quality characterized by seasonally moderated temperatures and physical and chemical parameters (*e.g.,* pH, conductivity, dissolved oxygen) sufficient for the normal behavior, growth, reproduction, and viability of all life stages of the species.

(4) An adequate food base, indicated by a healthy aquatic community structure including native benthic macroinvertebrates, fishes, and plant matter (*e.g.,* leaf litter, algae, detritus).

(5) Aquatic habitats protected from riparian and instream activities that degrade the PBFs described in (1) through (4), above, or cause physical (*e.g.,* crushing) injury or death to individual Big Sandy or Guyandotte River crayfish.

(6) An interconnected network of streams and rivers that have the PBFs described in (1) through (4), above, that allow for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers. The scale of the interconnected stream network should be sufficient to allow for gene flow within and among watersheds.

Special Management Considerations or Protections

When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of the Big Sandy and Guyandotte River crayfishes may require special management considerations or protections to reduce the following threats: (1) Resource extraction (coal mining, timber harvesting, and oil and gas development); (2) road construction and maintenance (including unpaved roads and trails); (3) instream dredging or construction projects; (4) off-road vehicle (ORV) use; (5) activities that may modify water quantity or quality; and (6) other sources of point and non-point source pollution, including spills. These activities are discussed in more detail under Summary of Factors Affecting the Species in the final listing rule (81 FR 20450; April 7, 2016). These threats are in addition to potential adverse effects of drought, floods, or other natural phenomena.

Management activities that could ameliorate these threats include, but are not limited to: Use of best management practices (BMPs) designed to reduce erosion, sedimentation, and stream bank destruction; development of alternatives that avoid and minimize stream bed disturbances; regulation of ORV use in or near streams; reduction of other watershed and floodplain disturbances that contribute excess sediments or pollutants into the water; and development and implementation of spill prevention and response plans.

Criteria Used To Identify Critical Habitat

As required by section 4(b)(2) of the Act, we use the best scientific data available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We are designating critical habitat in areas within the geographical area occupied by the Big Sandy crayfish and Guyandotte River crayfish at the time of listing in 2016. For the Guyandotte River crayfish, we also are designating areas in three specific streams outside the geographical area occupied by the species at the time of listing because we have determined that a designation limited to occupied areas would be inadequate to ensure the conservation of the species. These currently unoccupied streams are within the larger occupied watershed of the Guyandotte River crayfish's range and adjacent to currently occupied streams. The critical habitat designation includes the water and stream channel up to the ordinary high water mark as defined at 33 CFR 329.11. Refer to the Big Sandy and Guyandotte River crayfish proposed critical habitat designation for a full description of criteria used to identify critical habitat (85 FR 5072, January 28, 2020).

On December 16, 2020, we published a final rule in the **Federal Register** (85 FR 81411) adding a definition of ''habitat'' to our regulations for purposes of critical habitat designations under the Endangered Species Act of 1973, as amended (Act). This rule became effective on January 15, 2021 and only applies to critical habitat rules for which a proposed rule was published after January 15, 2021. Consequently, this new regulation does not apply to this final rule.

The current distribution of both the Big Sandy and the Guyandotte River crayfishes is fragmented and much reduced from its historical distribution. As specified in the Service's recovery outline for these species (Service 2018,

entire), we anticipate that recovery will require protection of existing populations and habitat for both species, and in the case of the Guyandotte River crayfish, reestablishing populations in some historically occupied streams where the species is presumed extirpated. These additional populations will increase the species' resiliency, representation, and redundancy, thereby increasing the likelihood that it will sustain populations over time.

Sources of data for this critical habitat designation include crayfish survey and habitat assessment reports (Jezerinac et al. 1995, entire; Channell 2004, entire; Taylor and Schuster 2004, entire; Thoma 2009a, entire; Thoma 2009b, entire; Thoma 2010, entire; Loughman 2013, entire; Loughman 2014, entire; Loughman 2015a, entire; Loughman 2015b, entire) and project-specific reports submitted to the Service (Appalachian Technical Services, Inc. (ATS) 2009, entire; ATS 2010, entire; Vanasse Hangen Brustlin, Inc. (VHB) 2011, entire; ATS 2012a, entire; ATS 2012b, entire; Virginia Department of Transportation (VDOT) 2014a, entire; VDOT 2014b, entire; VDOT 2015, entire; ATS 2017, entire; Red Wing 2017, entire; Third Rock 2017, entire; Red Wing 2018, entire).

Areas Occupied at the Time of Listing

As described in the final listing rule for the Big Sandy and Guyandotte River crayfishes (81 FR 20450, April 7, 2016), the best available data (stream surveys conducted between 2006 and 2016) indicate that at the time of listing, the Big Sandy crayfish occupied 26 streams and rivers (generally third order and larger) in the Russell Fork, Upper Levisa Fork, Lower Levisa Fork, and Tug Fork watersheds in the upper Big Sandy River basin of Kentucky, Virginia, and West Virginia. The Guyandotte River crayfish occupied two similarly sized streams in the Upper Guyandotte River basin of West Virginia.

We are designating a total of 4 occupied units, including a total of 19 occupied subunits, as critical habitat for the Big Sandy crayfish in the aforementioned watersheds. In addition, we are designating one unit, including two occupied subunits, as critical habitat for the Guyandotte River crayfish in the Upper Guyandotte River watershed in West Virginia. For the Guyandotte River crayfish, we have determined that a designation limited to the two occupied subunits would be inadequate to ensure the conservation of the species. The Guyandotte River crayfish is historically known from six connected stream systems within the Upper Guyandotte River basin (its geographical range); however, at the time of listing, the species was limited to two isolated subunits in Pinnacle Creek and Clear Fork. In our review, we determined that these two subunits would not provide sufficient redundancy or resiliency necessary for the conservation of the species. The Pinnacle Creek population is known from a 5.2-skm (3.3-smi) stream reach, but survey data collected between 2009 and 2015 indicate that this reach has low crayfish numbers. This small, isolated population is at risk of extirpation from demographic and environmental stochasticity, or a catastrophic event. The Clear Fork population occurs along a 33-km (22-mi) stream reach, and surveys from 2015 indicate Guyandotte River crayfish was the most prevalent crayfish species collected at sites maintaining the species (Loughman 2015b, pp. 9–11). The primary risk to this population is extirpation from a catastrophic event; however, because it is an isolated population, demographic or stochastic declines present some risk.

Areas Outside of the Geographic Range at the Time of Listing

Because we have determined occupied areas alone are not adequate for the conservation of the Guyandotte River crayfish, we have evaluated whether any unoccupied areas are essential for the conservation of the species. We considered the life-history, status, and conservation needs of both species. Our decision was further informed by observations of species-habitat relationship, habitat suitability models derived from these observations, and the locations of historical records to identify which features and specific areas are essential for the conservation of the species and, as a result, the development of the critical habitat designation.

We are designating as critical habitat three currently unoccupied subunits within the Upper Guyandotte basin unit. We have determined that each is essential for the conservation of the species. Two of the currently unoccupied subunits, Guyandotte River and Indian Creek, provide for an increase in the species' redundancy and, by providing connectivity between the subunits, increase the resiliency of the extant populations in Pinnacle Creek and Clear Fork. One of the unoccupied subunits, Huff Creek, is isolated from the other subunits by the R.D. Bailey dam, which fragments the range of the species and limits the species' ability to disperse and colonize new areas. Therefore, this unit will increase the species' overall redundancy and add representation in this area of its historical range. As discussed in the recovery outline for the species (Service 2018, entire), successful conservation of the Guyandotte River crayfish will require the establishment of additional populations within the species' historical range; the three unoccupied subunits advance this goal. All three subunits have at least one of the PBFs essential to the conservation of the species, as described below.

To reduce threats to the species and its habitat, the Service is working cooperatively with the West Virginia Department of Environmental Protection and the coal industry to develop protection and enhancement plans for coal mining permits that may affect crayfish streams. The Service and WVDEP are also working with the Hatfield McCoy Trail system and the Federal Highway Administration to avoid and minimize effects from ORV use in and around Pinnacle Creek and other trail systems adjacent to crayfish streams. Local watershed groups along with State and Federal partners have been conducting stream restoration and enhancement projects in Huff Creek. In addition, the Service, West Virginia Department of Natural Resources, Virginia Department of Wildlife Resources, and West Liberty University are working together to conduct additional research on both the Guyandotte River and Big Sandy crayfishes, including research on habitat use, activity patterns, and captive holding and propagation. We are reasonably certain that each unoccupied subunit will contribute to the conservation of the species by furthering preliminary recovery goals identified in the recovery outline. Establishing populations in the three unoccupied subunits will increase the Guyandotte River crayfish's resiliency, redundancy, and representation, thereby bolstering the species' viability and reducing the species' risk of extinction.

General Information on the Maps of the Critical Habitat Designation

The critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the discussion of individual units and subunits, provided below. We will make the coordinates or plot points or both on which each map is based available to the public on *https://www.regulations.gov* under Docket No.

FWS–R5–ES–2019–0098, and at the West Virginia Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**, above). When determining critical habitat boundaries, we made every effort to avoid including developed areas such as lands covered by pavement, buildings, and other structures because such lands lack PBFs necessary for the Big Sandy and Guyandotte River crayfishes. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this final rule have been excluded by text in the rule and are not designated as critical habitat. Therefore, a Federal action involving these lands would not trigger section 7 consultation under the Act with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the PBFs in the adjacent critical habitat.

In making its determination on the appropriate scale for designating critical habitat, the Service may consider, among other things, the life history of the species, the scales at which data are available, and biological or geophysical boundaries (such as watersheds). For the Big Sandy and the Guyandotte River crayfishes, streams or stream segments (as opposed to individual occurrence locations) are the appropriate units for designating critical habitat. We base this on the following factors:

(1) The regional geology and stream morphology in the upper Big Sandy and Upper Guyandotte River basins lead to a general abundance of slab boulders and/or cobble in most streams, although in some areas this habitat is sparse or occurs as isolated boulder clusters. Furthermore, while continuous crayfish survey data do not exist (*i.e.,* not every reach of every stream has been surveyed), more intensive crayfish surveys in portions of the Russell Fork watershed and in Clear Fork and Pinnacle Creek in the Upper Guyandotte basin indicate that the Big Sandy and Guyandotte River crayfishes may occur throughout stream reaches where the required PBFs (*e.g.,* riffles and runs with unembedded slab boulders or unembedded boulder clusters, adequate water quality, and connectivity) are present.

(2) Streams are dynamic, linear systems, and local water quality parameters (*e.g.,* dissolved oxygen, temperature, pH) can vary temporally and are largely reliant on upstream conditions (barring known point or non-point source discharges or other factors that affect water quality more locally). Likewise, the various stream microhabitats (*e.g.,* riffles, runs, pools) with attendant fauna do not generally occur in isolation, but form a continuous gradient along the stream continuum. Because the known occupied Big Sandy and Guyandotte River crayfish sites possess the required PBFs, at least to some minimal degree, for these species to survive, and because these PBFs are likely representative of stream conditions beyond any single survey location, we conclude that Big Sandy and Guyandotte River crayfish likely occupy, or otherwise rely upon, stream areas beyond any single occurrence location.

(3) Studies of other crayfish species suggest that adult and larger juvenile Big Sandy and Guyandotte River crayfish move both upstream and downstream in response to changes in environmental conditions or local crayfish demographics, or for other behavioral or physiological reasons (Momot 1966, pp. 158–159; Kerby et al. 2005, p. 407; Sadecky 2020, entire). The evidence also indicates that some individuals, especially newly independent juveniles, may be passively dispersed to downstream locations by swiftly flowing water (Loughman 2019, pers. comm.).

Therefore, within the greater geographical ranges of the Big Sandy crayfish and Guyandotte River crayfish (*i.e.,* the upper Big Sandy River basin and the Upper Guyandotte River basin, respectively), the general morphology and connectedness of the streams and the life history of these species lead us to reasonably conclude that both species likely occupy, transit through, or otherwise rely upon stream reaches beyond any known occurrence location. We acknowledge that some areas along a stream segment designated as critical habitat may not contain all of the PBFs required by either species, either naturally or as a result of habitat modification, but based on the considerations discussed above, we conclude that streams or stream segments are appropriate units of scale for describing critical habitat for these species.

In summary, we designate as critical habitat streams and stream segments up to the ordinary high water mark that were occupied at the time of listing and contain one or more of the PBFs that are essential to support the life-history processes of the Big Sandy crayfish and the Guyandotte River crayfish. Additionally, for the Guyandotte River crayfish, we designate three subunits outside the geographical range of that species occupied at the time of listing; however, these subunits are within the larger occupied watershed. Two of these subunits have historical records of the species, and one subunit, while not having a record of the species, is within its historical range and provides connectivity between occupied and unoccupied subunits. These unoccupied subunits provide for increased redundancy, resiliency, and representation of the Guyandotte River crayfish. We designate specific critical habitat unit/subunit boundaries based on the following general criteria:

(1) We delineated areas within the historical range of each species that had positive survey data between 2006 and 2016 (Big Sandy and Guyandotte River crayfishes were listed in 2016). For the Guyandotte River crayfish, we also delineated three stream segments as unoccupied critical habitat.

(2) Upstream termini of critical habitat units/subunits are located at the confluence of the primary stream and a smaller named tributary stream (usually a second-order stream). These termini are generally within about 5 skm (3.1 smi) upstream of a known crayfish occurrence record. The downstream termini are usually located at the confluence of the primary stream and the next larger receiving stream or river. In some instances, dams or reservoirs are used to demark critical habitat units/subunits.

(3) We included intervening stream segments between occurrence locations unless available occurrence data suggested the PBFs required by the species were absent from the intervening segment.

(4) We describe the designated critical habitat units/subunits by their upstream and downstream coordinates (*i.e.,* latitude and longitude) and geographic landmarks (*e.g.,* confluence of named streams and/or a town or population center).

Within these stream segments, designated critical habitat includes the stream channel within the ordinary high water mark. As defined at 33 CFR 329.11, the ''ordinary high water mark'' on nontidal rivers is the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving changes in the character of soil; destruction of terrestrial vegetation; the presence of the litter and debris; or other appropriate means that consider the characteristics of the surrounding areas.

For the purposes of analyzing the potential economic effects of critical habitat designation for the Big Sandy and Guyandotte River crayfishes, the critical habitat units/subunits are determined to be in either private, Federal, or State ownership. We describe ownership of designated critical habitat units/subunits based on the identification of the adjacent

riparian landowner(s) (*i.e.,* private, Federal, or State entity). In Kentucky, Virginia, and West Virginia, jurisdiction over the water itself is maintained by the State or Commonwealth; however, ownership of the stream bottom may vary depending on specific State law or legal interpretation (Energy & Mineral Law Institute 2011, pp. 409–427; Virginia Code at section 62.1–44.3; West Virginia Department of Environmental Protection 2013, section C). For example, the bed of a navigable stream in West Virginia may be owned by the state, whereas the bed of a non-navigable stream may be privately owned (Energy & Mineral Law Institute 2011, p. 427).

Final Critical Habitat Designation

For the Big Sandy crayfish, we designate approximately 582 skm (362 smi) in 4 units (including 19 subunits) in Kentucky, Virginia, and West Virginia as critical habitat (see table 1, below). These streams or stream segments were considered occupied at the time of listing and contain all known extant populations. Based on our review, we conclude that the units occupied by the Big Sandy crayfish at the time of listing (described below) are representative of the species' historical range and include core population areas in the Russell Fork watershed in Virginia and the upper Tug Fork watershed (*e.g.,* Dry Fork) in West Virginia, as well as other peripheral populations in Kentucky, Virginia, and West Virginia. We determined that there is sufficient area for the conservation of the Big Sandy crayfish within these occupied units, and we therefore do not designate any unoccupied critical habitat for the species. The designated units constitute our best assessment of areas that meet the definition of critical habitat for the Big Sandy crayfish.

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TABLE 1—DESIGNATED CRITICAL HABITAT UNITS AND SUBUNITS FOR THE BIG SANDY CRAYFISH

Unit/Watershed	Subunit	River/Stream	State	County(ies)	Occupied at Listing	Stream Length	
						skm	smi
Unit 1 Upper Levisa Fork		Dismal Creek	VA	Buchanan	Yes	29.2	18.1
Unit 2 Russell Fork	a	Russell Fork	KY/VA	Buchanan, Dickenson, Pike	Yes	83.8	52.1
	b	Hurricane Creek	VA	Buchanan	Yes	5.9	3.7
	c	Indian Creek	VA	Buchanan, Dickenson	Yes	7.4	4.6
	d	Fryingpan Creek	VA	Dickenson	Yes	4.6	2.9
	e	Lick Creek	VA	Dickenson	Yes	16.2	10.1
	f	Russell Prater Creek	VA	Dickenson	Yes	8.4	5.2
	g	McClure River, McClure Creek	VA	Dickenson	Yes	35.6	22.1
		Open Fork	VA	Dickenson	Yes	4.9	3.0
	h	Elkhorn Creek	KY	Pike	Yes	8.5	5.3
	i	Cranes Nest River	VA	Dickenson, Wise	Yes	24.6	15.3
		Birchfield Creek	VA	Wise	Yes	6.9	4.3
	j	Pound River	VA	Dickenson, Wise	Yes	28.5	17.7
Unit 3 Lower Levisa Fork	a	Levisa Fork (upstream)	KY	Pike	Yes	15.9	9.9
		Levisa Fork (downstream)	KY	Floyd, Johnson	Yes	17.5	10.9
	b	Shelby Creek	KY	Pike	Yes	32.2	20.0
		Long Fork	KY	Pike	Yes	12.9	8.0
Unit 4 Tug Fork	a	Tug Fork (upstream)	KY/VA/WV	Buchanan, McDowell, Mingo, Wayne, Pike	Yes	106.1	65.9
		Tug Fork (downstream)	KY/WV	Martin, Wayne	Yes	11.7	7.3
	b	Dry Fork	WV	McDowell	Yes	45.2	28.1
		Bradshaw Creek	WV	McDowell	Yes	4.6	2.9
	c	Panther Creek	WV	McDowell	Yes	10.7	6.6
	d	Knox Creek	KY/VA	Buchanan, Pike	Yes	16.6	10.3
	e	Peter Creek	KY	Pike	Yes	10.1	6.3
	f	Blackberry Creek	KY	Pike	Yes	9.1	5.7
	g	Pigeon Creek	WV	Mingo	Yes	14.0	8.7
		Laurel Fork	WV	Mingo	Yes	11.1	6.9
					Total:	582	362

Table 2 identifies the ownership of lands adjacent to the entirely aquatic Big Sandy crayfish designated critical habitat.

TABLE 2—LAND OWNERSHIP ADJACENT TO DESIGNATED CRITICAL HABITAT UNITS FOR THE BIG SANDY CRAYFISH (BSC)

Critical Habitat Unit		Federal		State/Local		Private		Total	
		skm	smi	skm	smi	skm	smi	skm	smi
Unit 1	Upper Levisa Fork	0	0	0	0	29	18	29	18
Unit 2	Russell Fork	23	14	11	7	201	125	235	146
Unit 3	Lower Levisa Fork	0	0	0	0	79	49	79	49
Unit 4	Tug Fork	0	0	11	7	228	142	239	149
Grand Total BSC		23	14	22	14	537	334	582	362

For the Guyandotte River crayfish, we designate approximately 135 skm (84 smi) in one unit, consisting of five subunits, in West Virginia as critical habitat. Approximately 67 skm (42 smi) in two subunits are considered occupied by the species at the time of listing and represent all known extant populations (see table 3, below). However, we determined that these two subunits do not provide sufficient resiliency, representation, or redundancy to ensure the conservation of the species. Therefore, we are designating approximately 68 skm (42 smi) in three subunits as unoccupied critical habitat (see table 3, below). The designated subunits constitute our best assessment of areas that meet the definition of critical habitat for the Guyandotte River crayfish.

TABLE 3—DESIGNATED CRITICAL HABITAT UNIT FOR THE GUYANDOTTE RIVER CRAYFISH

Unit/Watershed	Subunit	River/Stream	State	County(ies)	Occupied at Listing	Stream Length	
						skm	smi
Unit 1 Upper Guyandotte	a	Pinnacle Creek	WV	Wyoming	Yes	28.6	17.8
	b	Clear Fork	WV	Wyoming	Yes	24.9	15.5
		Laurel Fork	WV	Wyoming	Yes	13.1	8.1
	c	Guyandotte River	WV	Wyoming	No	35.8	22.2
	d	Indian Creek	WV	Wyoming	No	4.2	2.6
	e	Huff Creek	WV	Wyoming, Logan	No	28.0	17.4
					Total:	135	84

Table 4 identifies the ownership of lands adjacent to the entirely aquatic Guyandotte River crayfish designated critical habitat.

TABLE 4—LAND OWNERSHIP ADJACENT TO DESIGNATED CRITICAL HABITAT UNITS FOR THE GUYANDOTTE RIVER CRAYFISH

Critical Habitat Unit		Federal		State		Private		Total	
		skm	smi	skm	smi	skm	smi	skm	smi
Unit 1	Occupied	0	0	6	4	60	38	67	42
	Unoccupied	0	0	16	10	52	32	68	42
Grand Total GRC		0	0	23	14	112	70	135	84

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Below, we present brief descriptions of all units/subunits and reasons why they meet the definition of critical habitat for the Big Sandy and Guyandotte River crayfishes. Each unit/subunit of Big Sandy crayfish critical habitat contains all six PBFs identified above (see *Summary of Essential Physical or Biological Features)* that are essential to the conservation of the species. Each unit/subunit of Guyandotte River crayfish critical habitat contains one or more of the six PBFs.

Big Sandy Crayfish

Unit 1: Upper Levisa Fork—Dismal Creek, Buchanan County, Virginia

This occupied unit includes a single subunit of approximately 29.2 stream kilometers (skm) (18.1 smi) of Dismal Creek in the Upper Levisa Fork

watershed. The upstream boundary of this unit is the confluence of Dismal Creek and Laurel Fork, and the downstream limit is the confluence of Dismal Creek and Levisa Fork. This unit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Recent surveys of Dismal Creek indicated an abundance of unembedded slab boulders and boulder clusters, and live Big Sandy crayfish have been collected in relatively high numbers from several locations within this unit (Thoma 2009b, p. 10; Loughman 2015a, p. 26). The Dismal Creek watershed is mostly forested; however, U.S. Geological Survey (USGS) topographic maps and aerial imagery (ESRI) provide evidence of legacy and ongoing surface coal mining throughout the watershed. This unit may need special management considerations due to resource extraction (coal mining, timber harvesting, and oil and gas development), road construction and maintenance (including unpaved roads and trails), instream dredging or construction projects, and other sources of non-point source pollution. The narrow stream valley contains scattered residences and small communities, commercial facilities, occasional gas wells, and transportation infrastructure (*i.e.,* roads and rail lines). There is a large coal coke plant straddling Dismal Creek at the confluence of Dismal Creek and Levisa Fork. The Dismal Creek population of Big Sandy crayfish represents the species' only representation in the upper Levisa Fork watershed, which is physically isolated from the rest of the Big Sandy basin by Fishtrap Dam and Reservoir. The Dismal Creek population appears to be relatively robust and contributes to the representation and redundancy of the species.

Unit 2: Russell Fork

Unit 2 consists of the 10 subunits described below. The PBFs within this entire unit may need special management considerations from resource extraction (coal mining, timber harvesting, and oil and gas development), road construction and maintenance (including unpaved roads and trails), instream dredging or construction projects, and other sources of non-point source pollution.

Subunit 2a: Russell Fork, Buchanan and Dickenson Counties, Virginia, and Pike County, Kentucky

Subunit 2a includes approximately 83.8 skm (52.1 smi) of the Russell Fork mainstem from the confluence of Russell Fork and Ball Creek at Council, Virginia, downstream to the confluence of Russell Fork and Levisa Fork at Levisa Junction, Kentucky. Recent surveys of the Russell Fork indicated an abundance of unembedded slab boulders, boulder clusters, isolated boulders, and large cobbles, and live Big Sandy crayfish have been captured at numerous locations within this subunit (Thoma 2009b, p. 10; Loughman 2015a, p. 23). The Russell Fork watershed is mostly forested; however, USGS topographic maps and aerial imagery (ESRI) provide evidence of legacy and ongoing coal mining throughout the watershed. In the upper portion of the watershed, the narrow stream valley contains scattered residences and roads, but human development increases farther downstream in the form of small communities and towns, commercial facilities, and transportation infrastructure (*i.e.,* roads and rail lines). Approximately 12 skm (7.4 smi) of Subunit 2a is within the Jefferson National Forest and Breaks Interstate Park. The remainder of the subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. The Big Sandy crayfish population in Subunit 2a appears to be relatively robust and provides important connectivity between crayfish populations in several tributary streams and rivers, contributing to their resiliency. Additionally, some Big Sandy crayfish from Subunit 2a likely disperse to areas downstream in the Levisa Fork watershed, contributing to the species' representation and redundancy.

Subunit 2b: Hurricane Creek, Buchanan County, Virginia

Subunit 2b includes approximately 5.9 skm (3.7 smi) of Hurricane Creek, a tributary to Russell Fork. This occupied subunit extends from the confluence of Hurricane Creek and Gilbert Fork downstream to the confluence of Hurricane Creek and Russell Fork at Davenport, Virginia. Recent surveys of Hurricane Creek indicate an abundance of unembedded slab boulders, boulders, and cobbles, and live Big Sandy crayfish have been collected from two locations in lower Hurricane Creek (ATS 2009, entire; VDOT 2014, entire). Based on our review of USGS topographic maps and aerial imagery (ESRI) the Hurricane Creek watershed is composed of relatively intact forest, with the exception of ongoing oil or gas development on the ridges to the north and south of the creek and scattered residences, small agricultural fields, and roads in the narrow valley. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2c: Indian Creek, Buchanan and Dickenson Counties, Virginia

This occupied subunit includes approximately 7.4 skm (4.6 smi) of Indian Creek, a tributary to Russell Fork. Subunit 2c extends from the confluence of Indian Creek and Three Forks upstream of Duty, Virginia, to the confluence of Indian Creek and Russell Fork below Davenport, Virginia. Recent surveys of Indian Creek indicate an abundance of slab boulders and boulders with low to moderate embeddedness, and live Big Sandy crayfish have been collected from several locations (ATS 2009, entire; ATS 2010, entire; Loughman 2015a, pp. 24–25). The USGS topographic maps and aerial imagery (ESRI) indicate the lower portion of the Indian Creek watershed is mostly forested, with the exception of oil or gas development on a ridgeline to the west of the creek. The upper portion of the watershed is dominated by a large surface coal mine. The narrow creek valley contains scattered residences, small agricultural fields, and roads. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2d: Fryingpan Creek, Dickenson County, Virginia

Subunit 2d includes approximately 4.6 skm (2.9 smi) of Fryingpan Creek, a tributary to Russell Fork. This occupied subunit extends from the confluence of Fryingpan Creek and Priest Fork downstream to the confluence of Fryingpan Creek and Russell Fork. Recent surveys of Fryingpan Creek indicate an abundance of isolated slab boulders and boulder clusters with low embeddedness, and live Big Sandy crayfish have been collected from the lower reach of Fryingpan Creek (Loughman 2015a, pp. 24–25). The USGS topographic maps and aerial imagery (ESRI) indicate the watershed is mostly intact forest, with the exception of oil or gas development on some adjacent ridgelines and legacy coal mining in the upper portion of the watershed. The narrow creek valley contains scattered residences, small agricultural fields, and roads. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the

form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2e: Lick Creek, Dickenson County, Virginia

Subunit 2e includes approximately 16.2 skm (10.1 smi) of Lick Creek, a tributary of Russell Fork. This occupied subunit extends from the confluence of Lick Creek and Cabin Fork near Aily, Virginia, downstream to the confluence of Lick Creek and Russell Fork at Birchfield, Virginia. Recent surveys of Lick Creek indicate an abundance of unembedded slab boulders and cobbles, with live Big Sandy crayfish collected at several locations (ATS 2012a, entire; ATS 2012b, entire). The USGS topographic maps and aerial imagery (ESRI) indicate the watershed is mostly forested, with the exception of oil or gas development on some adjacent ridgelines and legacy coal mining and timber harvesting sites at various locations within the watershed. The narrow creek valley contains scattered residences, small agricultural fields, and roads. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2f: Russell Prater Creek, Dickenson County, Virginia

This occupied subunit includes approximately 8.4 skm (5.2 smi) of Russell Prater Creek, a tributary to Russell Fork. This subunit extends from the confluence of Russell Prater Creek and Greenbrier Creek downstream to the confluence of Russell Prater Creek and Russell Fork at Haysi, Virginia. Recent surveys of Russell Prater Creek indicate abundant unembedded slab boulders, boulders, and cobbles, with live Big Sandy crayfish collected from two sites in the lower portion of the creek (Thoma 2009b, p. 10; Loughman 2015a, pp. 22–23). The USGS topographic maps and aerial imagery (ESRI) indicate the Russell Prater watershed is mostly forested; however, legacy coal mines and valley fills occur throughout the watershed. The narrow creek valley contains scattered residences, commercial facilities, small agricultural fields, and roads. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2g: McClure River and McClure Creek and Open Fork, Dickenson County, Virginia

Subunit 2g includes approximately 35.6 skm (22.1 smi) of the McClure River and Creek, a major tributary to Russell Fork, and its tributary stream, Open Fork (4.9 skm (3.0 smi)); this subunit is occupied. The McClure River and McClure Creek section extends from the confluence of McClure Creek and Honey Branch downstream to the confluence of McClure River and Russell Fork. Recent surveys of the McClure River indicated a generally sandy bottom with unembedded, isolated slab boulders and boulder clusters, with live Big Sandy crayfish collected at several locations (Thoma 2009b, p. 18; Loughman 2015a, p. 22). The McClure River valley contains scattered residences, small communities, commercial mining-related facilities, small agricultural fields, roads, railroads, and other infrastructure. The riparian zone along much of the river is relatively intact.

The Open Fork section of Subunit 2g extends from the confluence of Middle Fork Open Fork and Coon Branch downstream to the confluence of Open Fork and McClure Creek at Nora, Virginia. Recent surveys of Open Fork indicated unembedded, isolated slab boulders and boulder clusters, with live Big Sandy crayfish collected at one location (Loughman 2015a, p. 22). The narrow valley contains scattered residences, some small agricultural fields, roads, and railroads.

The USGS topographic maps and aerial imagery (ESRI) indicate the McClure River watershed is mostly forested; however, legacy and active coal mining occurs in the middle and upper portions of the watershed. Natural gas development is also apparent on many of the adjacent ridges, and recent or ongoing logging operations continue at several locations in the watershed. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2h: Elkhorn Creek, Pike County, Kentucky

Subunit 2h includes approximately 8.5 skm (5.3 smi) of Elkhorn Creek, a tributary to Russell Fork. This occupied subunit extends from the confluence of Elkhorn Creek and Mountain Branch downstream to the confluence of Elkhorn Creek and Russell Fork at Elkhorn City, Kentucky. Recent surveys indicated unembedded slab boulders and boulders in Elkhorn Creek with ''extensive bedrock glides'' in the lower reaches of the creek. Live Big Sandy crayfish have been collected from under slab boulders in lower Elkhorn Creek (Loughman 2015a, pp. 18–19). The USGS topographic maps and aerial imagery (ESRI) indicate the watershed is mostly forested; however, significant legacy and active coal mining and other mining and quarrying occurs in the watershed. Human development, in the form of small communities, residences, small agricultural fields, and commercial and industrial facilities, as well as roads, railroads, and other infrastructure, occurs almost continually in the riparian zone along Elkhorn Creek. The watershed to the south of Elkhorn Creek is a unit of the Jefferson National Forest; however, Subunit 2h is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 2i: Cranes Nest River and Birchfield Creek, Dickenson and Wise Counties, Virginia

This occupied subunit includes approximately 24.6 skm (15.3 smi) of Cranes Nest River, a major tributary to Russell Fork, and approximately 6.9 skm (4.3 smi) of Birchfield Creek, a tributary to Cranes Nest River. The Cranes Nest River section of Subunit 2i extends from the confluence of Cranes Nest River and Birchfield Creek downstream to the confluence of Cranes Nest River and Lick Branch. Recent surveys of the Cranes Nest River indicated abundant, unembedded slab boulders, boulder clusters, isolated boulders, and coarse woody debris, and live Big Sandy crayfish have been collected at multiple sites (Thoma 2009b, p. 10; VDOT 2014b, entire; VDOT 2015, entire; Loughman 2015a, pp. 21–22). The riparian zone of this section is largely intact; however, human development, in the form of residences, small communities, small agricultural fields, roads, railroads, and other infrastructure, occurs along some segments of Cranes Nest River.

The Birchfield Creek section of this subunit extends from the confluence of Birchfield Creek and Dotson Creek downstream to the confluence of Birchfield Creek and Cranes Nest River. Recent surveys resulted in observations of live Big Sandy crayfish from a site in the lower portion of Birchfield Creek. Human development, in the form of residences, roads, and other

infrastructure, occurs in the riparian zone along Birchfield Creek.

The USGS topographic maps and aerial imagery (ESRI) indicate the Cranes Nest River watershed is mostly forested; however, significant legacy and active coal mining is evident throughout the watershed. Natural gas development is ongoing on some of the ridges adjacent to the Cranes Nest River. Approximately 10.3 skm (6.4 smi) of Subunit 2i is within the John W. Flannagan Recreation Area. The remainder of the subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. Since 1964, this subunit has been physically isolated from the Russell Fork by the John W. Flannagan Dam and Reservoir. The Big Sandy crayfish population in Subunit 2i appears to be relatively robust and contributes to the redundancy of the species.

Subunit 2j: Pound River, Dickenson and Wise Counties, Virginia

Subunit 2j includes approximately 28.5 skm (17.7 smi) of the Pound River, a major tributary to Russell Fork that has been physically isolated from that river since 1964 by the John W. Flannagan Dam and Reservoir. This occupied subunit extends from the confluence of Pound River and Bad Creek downstream to the confluence of Pound River and Jerry Branch. Recent surveys indicate abundant, unembedded slab boulders, boulders, and boulder clusters in the riffle and run sections, and live Big Sandy crayfish have been collected from multiple locations (Thoma 2009b, entire; VHB, Inc. 2011, entire; Loughman 2015a, p. 21). The USGS topographic maps and aerial imagery (ESRI) indicate the Pound River watershed is mostly forested; however, significant legacy and recent coal mining is evident, especially to the south of the river. Aerial imagery also indicates recent or ongoing logging operations at several locations in the watershed. Much of the immediate riparian zone is intact forest, with occasional human development in the form of small communities, residences, small agricultural fields, commercial development, and roads and other infrastructure adjacent to the river. Approximately 11.4 skm (7.1 smi) of Subunit 2j is within the John W. Flannagan Recreation Area. The remainder of the subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. The Big Sandy crayfish population in Subunit 2j appears to be relatively robust and contributes to the redundancy of the species.

Unit 3: Lower Levisa Fork

Unit 3 consists of the two subunits described below. The unit may need special management consideration due to resource extraction (coal mining, timber harvesting, and oil and gas development); road construction and maintenance (including unpaved roads and trails); instream dredging or construction projects; and other sources of non-point source pollution.

Subunit 3a: Levisa Fork, Pike, Floyd, and Johnson Counties, Kentucky

Subunit 3a includes approximately 33.4 skm (20.8 smi) of the mainstem Levisa Fork in two disjunct segments. The occupied upstream segment includes approximately 15.9 skm (9.9 smi) of the Levisa Fork from its confluence with the Russell Fork at Levisa Junction, Kentucky, downstream to the confluence of Levisa Fork and Island Creek at Pikeville, Kentucky. Surveys indicate that suitable, unembedded, boulder habitat is present in the Levisa Fork, and live Big Sandy crayfish have been recently collected both upstream of Subunit 3a in the Russell Fork and at one location near Pikeville, Kentucky (Thoma 2010, pp. 5–6; Loughman 2015a, pp. 5–10).

The occupied downstream segment of Subunit 3a includes approximately 17.5 skm (10.9 smi) of the Levisa Fork near Auxier, Kentucky, from the confluence of Levisa Fork and Abbott Creek downstream to the confluence of Levisa Fork and Miller Creek. Recent surveys indicate isolated boulder clusters in this segment, with live Big Sandy crayfish collected from two locations (Thoma 2009b, entire; Loughman 2014, pp. 12–13).

The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 3a watershed is mostly forested; however, legacy and ongoing coal mining is evident in several locations. Human development, in the form of towns, small communities, residences, small agricultural fields, commercial and industrial development, roads, railroads, and other infrastructure, occurs nearly continuously in the riparian zone of these segments of the Levisa Fork. Subunit 3a is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. The upper segment of the subunit provides connectivity between the Russell Fork and Shelby Creek populations (discussed below), and the lower segment supports the most downstream population of Big Sandy crayfish in the Levisa Fork watershed. Because the natural habitat characteristics (*e.g.,* size, gradient, bottom substrate) in the Levisa Fork differ from those in the upper tributaries, this subunit increases Big Sandy crayfish representation as well as the species' redundancy.

Subunit 3b: Shelby Creek and Long Fork, Pike County, Kentucky

This occupied subunit includes approximately 32.2 skm (20.0 smi) of Shelby Creek, a tributary to Levisa Fork, and approximately 12.9 skm (8.0 smi) of Long Fork, a tributary to Shelby Creek. The Shelby Creek portion of this subunit extends from the confluence of Shelby Creek and Burk Branch downstream to the confluence of Shelby Creek and Levisa Fork at Shelbiana, Kentucky. The Long Fork portion of Subunit 3b extends from the confluence of Right Fork Long Fork and Left Fork Long Fork downstream to the confluence of Long Fork and Shelby Creek at Virgie, Kentucky. Recent surveys of this subunit indicated an abundance of unembedded slab boulders, boulder clusters, and anthropogenic structures such as concrete slabs and blocks in Shelby Creek and Long Fork. Live Big Sandy crayfish have been collected at multiple locations within this subunit (Thoma 2010, pp. 5–6; Loughman 2015a, p. 18). The USGS topographic maps and aerial imagery (ESRI) indicate the Shelby Creek watershed is mostly forested; however, several large surface coal mines are evident west of the stream. The Long Fork watershed is also mostly forested; however, legacy and active coal mining is evident in the upper portion of this watershed. Human development, in the form of towns, small communities, residences, small agricultural fields, commercial and industrial development, roads, railroads, and other infrastructure, occurs nearly continuously in the riparian zone of Shelby Creek. In the riparian zone of Long Fork, residences, small agricultural fields, roads, and other infrastructure occur nearly continuously. Subunit 3b is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit maintains the most robust population of Big Sandy crayfish in the lower Levisa Fork (as indicated by recent survey capture rates) and increases the representation and redundancy of the species.

Unit 4: Tug Fork

Unit 4 consists of the seven subunits described below. The threats within this

entire unit that may need special management consideration include resource extraction (coal mining, timber harvesting, and oil and gas development); road construction and maintenance (including unpaved roads and trails); instream dredging or construction projects; and other sources of nonpoint source pollution.

Subunit 4a: Tug Fork, McDowell, Mingo, and Wayne Counties, West Virginia; Buchanan County, Virginia; and Pike and Martin Counties, Kentucky

Subunit 4a includes approximately 117.8 skm (73.2 smi) of the Tug Fork mainstem in two disjunct, occupied segments. The upstream segment includes approximately 106.1 skm (65.9 smi) of the Tug Fork from the confluence of Tug Fork and Elkhorn Creek at Welch, West Virginia, downstream to the confluence of Tug Fork and Blackberry Creek in Pike County, Kentucky. Surveys indicate that suitable unembedded boulder habitat is sparse and discontinuous in this segment of the Tug Fork; however, live Big Sandy crayfish have been collected at four locations within this subunit (Loughman 2015a, p. 16). The downstream segment includes approximately 11.7 skm (7.3 smi) of the Tug Fork near Crum, West Virginia, from the confluence of Tug Fork and Little Elk Creek downstream to the confluence of Tug Fork and Bull Creek.

The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 4a watershed is mostly forested; however, there is evidence of legacy and ongoing coal mining throughout the subunit. The riparian zone in the upper segment of Subunit 4a is relatively intact, with human development consisting primarily of road and railroad corridors. In the lower segment of the subunit, towns, small communities, residences, small agricultural fields, commercial and industrial development, roads, railroads, and other infrastructure become prevalent. Subunit 4a is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. Because of the diversity of natural habitat characteristics (*e.g.,* size, gradient, bottom substrate) in this subunit, it contributes to Big Sandy crayfish representation and redundancy. This subunit provides habitat for the Big Sandy crayfish, as well as providing potential connectivity between the Dry Fork, Panther Creek, Knox Creek, Peter Creek, Blackberry Creek, and Pigeon Creek populations (discussed below).

Subunit 4b: Dry Fork and Bradshaw Creek, McDowell County, West Virginia

This occupied subunit includes approximately 45.2 skm (28.1 smi) of Dry Fork, a large tributary to the Tug Fork, and approximately 4.6 skm (2.9 smi) of Bradshaw Creek, a tributary to Dry Fork. The Dry Fork portion of Subunit 4b extends from the confluence of Dry Fork and Jacobs Fork downstream to the confluence of Dry Fork and Tug Fork at Iaeger, West Virginia. The Bradshaw Creek portion extends from the confluence of Bradshaw Creek and Hite Fork at Jolo, West Virginia, downstream to the confluence of Bradshaw Creek and Dry Fork at Bradshaw, West Virginia. Recent surveys indicate abundant unembedded slab boulders, boulders, boulder clusters, and large cobbles, with live Big Sandy crayfish collected at numerous locations within this subunit (Loughman 2013, pp. 7–8; Loughman 2014, pp. 10–11; Loughman 2015a, pp. 14–15). The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 4b watershed is mostly forested; however, legacy coal mining is evident throughout, and natural gas development is apparent in the upper portions of the watershed. The riparian zone in the upper portion of Dry Fork is relatively intact, with human development consisting primarily of road and railroad corridors. In the middle and lower portions of Dry Fork, small communities, residences, small agricultural fields, commercial and industrial development, roads, railroads, and other infrastructure become prevalent. The Bradshaw Creek riparian zone is dominated by residences, small agricultural fields, roads, and other infrastructure. The middle portion of Dry Fork passes through the Berwind Lake State Wildlife Management Area; otherwise, Subunit 4b is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit appears to maintain a relatively robust population of the Big Sandy crayfish and likely serves as a source population for areas downstream in the Tug Fork basin. This subunit contributes to the redundancy of the species.

Subunit 4c: Panther Creek, McDowell County, West Virginia

This occupied subunit includes approximately 10.7 skm (6.6 smi) of Panther Creek, a tributary to Tug Fork. Subunit 4c extends from the confluence of Panther Creek and George Branch downstream to the confluence of Panther Creek and Tug Fork at Panther, West Virginia. Big Sandy crayfish have been collected at one site in the lower portion of this subunit. The USGS topographic maps and aerial imagery (ESRI) indicate the majority of the Panther Creek watershed is intact forest with evidence of only limited legacy coal mining. The riparian zone of this narrow valley is largely intact, containing a road and occasional residences (mostly in the lower portion of the subunit). Approximately 6.1 skm (3.8 smi) of Subunit 4c is located within the Panther State Forest, and the remainder is located on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 4d: Knox Creek, Buchanan County, Virginia, and Pike County, Kentucky

Subunit 4d includes approximately 16.6 skm (10.3 smi) of Knox Creek, a tributary to Tug Fork. This occupied subunit extends from the confluence of Knox Creek and Cedar Branch downstream to the confluence of Knox Creek and Tug Fork in Pike County, Kentucky. Recent surveys indicated abundant unembedded slab boulders, boulders, and boulder clusters, with live Big Sandy crayfish collected at four sites in the Kentucky portion of the creek (Thoma 2010, p. 5; Loughman 2015a, p. 12). The USGS topographic maps and aerial imagery (ESRI) indicate the Knox Creek watershed is mostly forested, with evidence of significant legacy, recent, and ongoing coal mining in the watershed. In the upper portion of this subunit, human development in the form of small communities, residences, roads, railroads, and other infrastructure is common. In the middle and lower sections, the riparian zone is relatively intact, except for scattered residences and a road and railroad line. Subunit 4d is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. This subunit contributes to the redundancy of the species.

Subunit 4e: Peter Creek, Pike County, Kentucky

Subunit 4e includes approximately 10.1 skm (6.3 smi) of Peter Creek, a tributary to Tug Fork. This occupied subunit extends from the confluence of Left Fork Peter Creek and Right Fork Peter Creek at Phelps, Kentucky, downstream to the confluence of Peter Creek and Tug Fork at Freeburn, Kentucky. Recent surveys indicate

moderate sedimentation in Peter Creek, but some unembedded bottom substrates continue to be present (Loughman 2015a, p. 12). Big Sandy crayfish have been collected at two sites in the lower portion of this subunit. The USGS topographic maps and aerial imagery (ESRI) indicate the Peter Creek watershed is mostly forested, with evidence of significant legacy, recent, and ongoing coal mining throughout the watershed. The riparian zone in Subunit 4e is dominated by human development in the form of small communities, residences, roads, railroads, and other infrastructure. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. Subunit 4e contributes to the redundancy of the species.

Subunit 4f: Blackberry Creek, Pike County, Kentucky

Subunit 4f includes approximately 9.1 skm (5.7 smi) of Blackberry Creek, a tributary to Tug Fork. This occupied subunit extends from the confluence of Blackberry Creek and Bluespring Branch downstream to the confluence of Blackberry Creek and Tug Fork. Recent surveys indicate moderate sedimentation in Blackberry Creek, but some unembedded bottom substrates continue to be present (Loughman 2015a, p. 12). Big Sandy crayfish have been collected at two sites in the lower portion of this subunit. The USGS topographic maps and aerial imagery (ESRI) indicate the Blackberry Creek watershed is mostly forested, with evidence of significant legacy, recent, and ongoing coal mining throughout the watershed. The narrow riparian zone in Subunit 4f is dominated by human development in the form of small communities, residences, roads, and other infrastructure. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. Subunit 4f contributes to the redundancy of the species.

Subunit 4g: Pigeon Creek and Laurel Creek, Mingo County, West Virginia

Subunit 4g includes approximately 14.0 skm (8.7 smi) of Pigeon Creek, a tributary to Tug Fork, and approximately 11.1 skm (6.9 smi) of Laurel Fork, a tributary to Pigeon Creek; this subunit is occupied. The Pigeon Creek portion of this subunit extends from the confluence of Pigeon Creek and Trace Fork downstream to the confluence of Pigeon Creek and Tug Fork. The Laurel Creek portion extends from the confluence of Laurel Fork and Lick Branch 0.6 skm (0.4 smi) downstream of the Laurel Lake dam to the confluence of Laurel Fork and Pigeon Creek at Lenore, West Virginia.

Recent surveys indicate the bottom substrates in Pigeon Creek consist of fine sediments, sand, and occasional boulders, with Big Sandy crayfish collected at a single site (Loughman 2015a, p. 11). Laurel Fork maintains a bottom substrate of sand, gravel, cobble, and occasional slab boulders, with Big Sandy crayfish collected at two sites (Loughman 2015a, pp. 10–11). The USGS topographic maps and aerial imagery (ESRI) indicate the Pigeon Creek watershed is mostly forested, with evidence of significant legacy, recent, and ongoing coal mining and valley fills in the upper portion of the watershed. The Pigeon Creek riparian zone is dominated by human development in the form of small communities, residences, roads, railroads, and other infrastructure. The majority of the Laurel Creek watershed is located within the Laurel Creek State Wildlife Management Area and is mostly intact forest; however, the narrow riparian zone is dominated by human development in the form of residences, roads, and other infrastructure. Subunit 4g is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements. With the exception of the Big Sandy crayfish occurrence in the Tug Fork mainstem near Crum, West Virginia, Subunit 4g supports the most downstream Big Sandy crayfish population in the Tug Fork watershed. Therefore, this subunit contributes to the representation and redundancy of the species.

Guyandotte River Crayfish

Below we present brief descriptions of all units/subunits and reasons why they meet the definition of critical habitat for the Guyandotte River crayfish. Each unit/subunit contains one or more of the PBFs identified above (see *Summary of Essential Physical or Biological Features)* that are essential to the conservation of the species.

Unit 1: Upper Guyandotte

We propose to designate a single critical habitat unit (Unit 1), consisting of five subunits, for the Guyandotte River crayfish. This unit may require special management considerations or protection to address threats from resource extraction (coal mining, timber harvesting, and oil and gas development), road construction and maintenance (including unpaved roads and trails), instream dredging or construction projects, and other sources of point and non-point source pollution including spills. In addition, subunits 1a and 1e may need special management considerations to address threats from ORV use. The subunits are described below.

Subunit 1a: Pinnacle Creek, Wyoming County, West Virginia

This occupied subunit includes approximately 28.6 skm (17.8 smi) of Pinnacle Creek, a tributary to the Guyandotte River. Subunit 1a extends from the confluence of Pinnacle Creek and Beartown Fork downstream to the confluence of Pinnacle Creek and the Guyandotte River at Pineville, West Virginia. The USGS topographic maps and aerial imagery (ESRI) indicate the Pinnacle Creek watershed is mostly forested; however, legacy, recent, and ongoing coal mining is evident in the watershed. The riparian zone in this subunit is mostly intact, with human development consisting of unimproved roads or trails. In the lower portion of the subunit, some commercial and coal-related facilities are adjacent to the stream. This subunit is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Recent surveys of Pinnacle Creek confirmed the presence of the Guyandotte River crayfish in at least five sites in the upper portion of the stream. The subunit contains bottom substrate consisting of gravel with unembedded cobbles, small boulders, and isolated slab boulders (PBF 1). Substrate embeddedness was reported to increase markedly in downstream reaches (Loughman 2015b, p. 11). As one of only two known Guyandotte River crayfish populations, this subunit provides critical representation and redundancy for the species.

Subunit 1b: Clear Fork and Laurel Fork, Wyoming County, West Virginia

Subunit 1b includes approximately 38.0 skm (23.6 smi) of Clear Fork and its primary tributary Laurel Fork. This occupied subunit extends from the confluence of Laurel Creek and Acord Branch downstream to the confluence of Clear Fork and the Guyandotte River. The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 1b watershed is mostly forested; however, coal mining activity occurs throughout the subunit. Human development is prevalent in the riparian zone in this subunit and consists of communities, residences, commercial facilities, agricultural fields, roads, railroads, and other infrastructure. Approximately 6.2 skm (3.9 smi) of Subunit 1b is within

the R.D. Bailey Lake State Wildlife Management Area, and the remainder is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Surveys confirmed the Guyandotte River crayfish at six sites within this subunit, with the stream bottom substrate generally characterized as sand with abundant unembedded slab boulders, boulders, or boulder clusters (Loughman 2015b, pp. 9–10). Of the two remaining Guyandotte River crayfish populations, Subunit 1b contains the most robust population and provides critical representation and redundancy for the species.

Subunit 1c: Guyandotte River, Wyoming County, West Virginia

Subunit 1c includes approximately 35.8 skm (22.2 smi) of the Guyandotte River from its confluence with Pinnacle Creek at Pineville, West Virginia, downstream to its confluence with Clear Fork. The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 1c watershed is mostly forested; however, some legacy and ongoing coal mining is evident along with natural gas development on adjacent ridges. In the lower portion of the subunit, the riparian zone is largely intact, with the exception of road and railroad rights-of-way. In the middle and upper portions of this subunit, human development in the riparian zone increases and consists of communities, residences, commercial facilities, agricultural fields, roads, railroads, and other infrastructure. Approximately 15.0 skm (9.3 smi) of Subunit 1c is located within the R.D. Bailey Lake State Wildlife Management Area, and the remainder is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Although it is considered unoccupied, this subunit contains at least two of the PBFs essential to the conservation of the Guyandotte River crayfish, and we are reasonably certain that it will contribute to the conservation of the species. This subunit maintains ''optimal'' Guyandotte River crayfish habitat, including abundant unembedded slab boulders, boulders, boulder clusters, and cobble (PBF 1) (Loughman 2015b, pp. 22–24). Along with providing suitable habitat for the Guyandotte River crayfish and thereby providing the potential to increase its redundancy, this subunit provides connectivity (PBF 6) between the extant Pinnacle Creek and Clear Fork populations and provides connectivity between these two populations and the unoccupied critical habitat subunit at Indian Creek (Subunit 1d, described below).

Subunit 1d: Indian Creek, Wyoming County, West Virginia

Subunit 1d includes approximately 4.2 skm (2.6 smi) of Indian Creek, a tributary to the Guyandotte River. This subunit extends from the confluence of Indian Creek and Brier Creek at Fanrock, West Virginia, downstream to the confluence of Indian Creek and the Guyandotte River. The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 1d watershed is mostly intact forest, with evidence of legacy coal mining and natural gas drilling on the adjacent slopes. Residences, roads, and other infrastructure occur in the narrow riparian zone. Approximately 1.3 skm (0.8 smi) of Subunit 1d is located within the R.D. Bailey Lake State Wildlife Management Area, and the remainder is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Although it is considered unoccupied, this subunit contains at least two of the PBFs essential to the conservation of the Guyandotte River crayfish, and we are reasonably certain that it will contribute to the conservation of the species. This subunit represents the type location for the Guyandotte River crayfish, with specimens last collected in 1947. The best available survey data (Loughman 2015b, p. 14) indicate this subunit maintains unembedded slab boulders and boulders in the faster moving stream sections, with some sedimentation observed in slow or slack water sections (PBF 1). This subunit is located approximately midway between the extant Pinnacle Creek and Clear Fork populations and, if recolonized, would increase the redundancy of the Guyandotte River crayfish and contribute to population connectedness within the species' range (PBF 6).

Subunit 1e: Huff Creek, Wyoming and Logan Counties, West Virginia

Subunit 1e includes approximately 28.0 skm (17.4 smi) of Huff Creek, a tributary of the Guyandotte River. This subunit extends from the confluence of Huff Creek and Straight Fork downstream to the confluence of Huff Creek and the Guyandotte River at Huff, West Virginia. The USGS topographic maps and aerial imagery (ESRI) indicate the Subunit 1e watershed is mostly intact forest, with evidence of legacy and ongoing coal mining and legacy natural gas drilling on the adjacent slopes. Human development, in the form of residences, roads, and other infrastructure, occurs in the narrow riparian zone throughout this subunit. Subunit 1e is located almost entirely on private land, except for any small amount that is publicly owned in the form of bridge crossings or road easements.

Although it is considered unoccupied, this subunit contains at least one of the PBFs essential to the conservation of the Guyandotte River crayfish, and we are reasonably certain that it will contribute to the conservation of the species. The best available survey data (Loughman 2015b, pp. 14–15) indicate this subunit maintains unembedded slab boulders and boulder clusters with only minimal sedimentation (PBF 1). Guyandotte River crayfish were last collected from this subunit in 1989. The R.D. Bailey Dam, constructed in 1980, prevents connectivity between this subunit and the extant Guyandotte River crayfish populations upstream. Successful reintroduction of the species to this subunit would contribute to the species' redundancy and increase the ability of the species to disperse and colonize areas of its historical range that are isolated from existing populations by R.D. Bailey Dam.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species.

We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33

U.S.C. 1251 *et seq.*) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded or authorized, or carried out by a Federal agency—do not require section 7 consultation.

As a result of section 7 consultation, we document compliance with the requirements of section 7(a)(2) through our issuance of:

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

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

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

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

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

(3) Are economically and technologically feasible, and

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

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

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law), and, subsequent to the previous consultation, we have listed a new species or designated critical habitat that may be affected by the Federal action, or the action has been modified in a manner that affects the species or critical habitat in a way not considered in the previous consultation. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.

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

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

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

Activities that the Service may, during a consultation under section 7(a)(2) of the Act, find are likely to destroy or adversely modify critical habitat include, but are not limited to:

(1) Actions that would significantly increase sediment deposition within the stream channel. Such activities could include, but are not limited to, excessive erosion and sedimentation from coal mining or abandoned mine lands, oil or natural gas development, timber harvests, unpaved forest roads, road construction, channel alteration, off-road vehicle use, and other land-disturbing activities in the watershed and floodplain. Sedimentation from these activities could lead to stream bottom embeddedness that eliminates or reduces the sheltering habitat necessary for the conservation of these crayfish species.

(2) Actions that would significantly alter channel morphology or geometry. Such activities could include, but are not limited to, channelization, dredging, impoundment, road and bridge construction, pipeline construction, and destruction of riparian vegetation. These activities may cause changes in water flows or channel stability and lead to increased sedimentation and stream bottom embeddedness that eliminates or reduces the sheltering habitat necessary for the conservation of these crayfish species.

(3) Actions that would significantly alter water chemistry or temperature. Such activities could include, but are not limited to, the release of chemicals, fill, biological pollutants, or heated effluents into the surface water or connected groundwater at a point source or by dispersed release (non-point source). These activities could alter water conditions to levels that are beyond the tolerances of the Big Sandy or Guyandotte River crayfish and result in direct or cumulative adverse effects to individual crayfish.

Exemptions

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

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

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

Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if she determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless she determines, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making that determination, the statute on its face, as well as the legislative history are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. On December 18, 2020, we published a final rule in the **Federal Register** (85 FR 82376) revising portions of our regulations pertaining to exclusions of critical habitat. These final regulations

became effective on January 19, 2021, and apply to critical habitat rules for which a proposed rule was published after January 19, 2021. Consequently, these new regulations do not apply to this final rule.

We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.

Consideration of Economic Impacts

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

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

For this particular designation, we developed an incremental effects memorandum (IEM) considering the probable incremental economic impacts that may result from this designation of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the Big Sandy and Guyandotte River crayfishes (IEc 2019, entire). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts.

The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (*i.e.,* absent critical habitat designation) and includes probable economic impacts where land and water use may be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If there are any unoccupied units in the proposed critical habitat designation, the screening analysis assesses whether any additional management or conservation efforts may incur incremental economic impacts.

This screening analysis combined with the information contained in our IEM are what we consider our draft economic analysis (DEA) of the proposed critical habitat designation for the Big Sandy and Guyandotte River crayfishes and are summarized in the narrative below. The IEM dated August 14, 2019, and the draft screening analysis, dated October 7, 2019, was made available for public review from January 28, 2020, through March 30, 2020 (85 FR 5072). We received public comments on the DEA. A copy of the DEA may be obtained by contacting the West Virginia Field Office (see **ADDRESSES**) or by downloading from the internet at *https://www.regulations.gov*.

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

As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts that may result from the designation of critical habitat for the Big Sandy and Guyandotte River crayfishes, first we identified, in the IEM dated August 14, 2019 (Service 2019, entire), probable incremental economic impacts associated with the following categories of activities: (1) Watershed and stream restoration activities; (2) construction of recreation improvements and management of recreation activities; (3) energy extraction (coal, oil, and gas) and maintenance/management of facilities (*e.g.,* abandoned mine lands, active mines, pipelines); (4) road and bridge maintenance; (5) pesticide use; (6) timber harvest; (7) agriculture; and (8) instream emergency response activities.

We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. In areas where the Big Sandy and Guyandotte River crayfishes are present, Federal agencies already are required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. When this final critical habitat designation rule becomes effective, consultations to avoid the destruction or adverse modification of critical habitat would be incorporated into the existing consultation process.

In our IEM, we attempted to clarify the distinction between the effects that will result from the species being listed and those attributable to the critical habitat designation (*i.e.,* difference between the jeopardy and adverse modification standards) for the Big Sandy or Guyandotte River crayfishes' critical habitat. Because all of the units/subunits we are designating as critical habitat for the Big Sandy crayfish are occupied, we do not expect that the critical habitat designation will result in any additional consultations. The

conservation recommendations provided to address impacts to the occupied critical habitat will be the same as those recommended to address impacts to the species because the habitat tolerances of the Big Sandy crayfish are inextricably linked to the health, growth, and reproduction of the crayfish, which are present year-round in their occupied streams. Furthermore, because the critical habitat and the Big Sandy crayfish's known range are identical, the results of consultation under adverse modification are not likely to differ from the results of consultation under jeopardy. In the event of an adverse modification determination, we expect that reasonable and prudent alternatives to avoid jeopardy to the species would also avoid adverse modification of the critical habitat. The only incremental costs of critical habitat designation that we anticipate are the small administrative costs required during section 7 consultation to document effects on the physical and biological features of the critical habitat and whether the action appreciably diminishes the value of critical habitat as a whole for the conservation of the listed species.

The above conclusion is also accurate for the occupied Guyandotte River crayfish subunits (1a and 1b). For the unoccupied Guyandotte River crayfish subunits (1c, 1d, and 1e), we anticipate project modifications may result in the future from consultations on one planned surface mining project as well as one existing surface mining project. Examples of project modifications may include, but are not limited to, sediment monitoring, chemical testing, macroinvertebrate monitoring, installing box culverts at all stream crossings, collocating valley fills or constructing regarded backstacks, and maintaining a spill response plan (IEc 2019, p. 15). Informed by discussions with a mining company operating in Guyandotte River crayfish occupied habitat, the cost estimates associated with such project modifications were projected to be relatively minor, ranging from $30,000 to $60,000 in the year of implementation.

We received several comments during the public comment period stating that we underestimated the economic impact of the proposed designation, so we revised the screening analysis (IEc 2020, p. 2). We worked with IEc and Federal and State agencies to better understand the likely effects of critical habitat designation. The final screening analysis examines potential project modifications for consultations in unoccupied critical habitat in more detail (*i.e.,* cleaning out sediment structures [*e.g.,* ponds] at 40% of design capacity instead of the 60% of design capacity that is required under existing regulations and installing continuous turbidity loggers, isolating mine discharge with upstream and downstream Biological Assessment Station [BAS] sites, statistically monitoring sediment within crayfish streams and receiving streams, sediment transport modeling) (IEc 2020, p. 16). Insufficient information is available to quantify the costs of sediment cleanout; therefore, annualized project modification costs were qualitatively discussed and total costs were estimated to be on the order of $350,000 (IEc 2020, p. 21). The administrative costs are discussed below. The final screening analysis states that critical habitat designation for the Big Sandy and Guyandotte River crayfish is unlikely to generate costs exceeding $100 million in a single year and, therefore, would not be significant as defined by Executive Order 13211 (below).

The critical habitat designation for the Big Sandy crayfish totals approximately 582 skm (362 smi), all of which is currently occupied by the species. The critical habitat designation for the Guyandotte River crayfish totals approximately 135 skm (84 smi), of which approximately 49% is currently occupied by the species.

As stated in the final screening analysis (IEc 2020, p. 24), critical habitat designation for the Big Sandy and Guyandotte River crayfish would be unlikely to generate costs exceeding $100 million in a single year, and therefore would not be significant. The direct section 7 costs would most likely be limited to additional administrative effort to consider adverse modification, as well as the project modifications discussed above, in unoccupied habitat for the Guyandotte River crayfish. All of the critical habitat units/subunits for the Big Sandy crayfish and two subunits of critical habitat for the Guyandotte River crayfish are occupied year-round by these species. Within occupied habitat, regardless of whether critical habitat is designated, all projects with a Federal nexus are already subject to section 7 requirements due to the listing of the species. The administrative time required to address critical habitat in these consultations is minor. The results of consultation for adverse modification are not likely to differ from the results of consultation for jeopardy. Three subunits of critical habitat for the Guyandotte River crayfish are currently unoccupied by the species. Section 7 consultations for all projects with a Federal nexus in this unoccupied habitat would be fully attributable to the critical habitat designation. We anticipate incremental project modifications resulting from these consultations, including for existing and planned surface mines.

Based on the rate of historical consultations in occupied units/subunits, these two species are likely to generate a total of approximately 285 consultations and technical assistances in a given year; this includes multiple project types including roads and transportation projects, pipeline and utility crossings, and other project types as described in the IEM. The total additional administrative cost of addressing adverse modification in these new and existing consultations is not expected to exceed $870,000, depending on the range of cost estimates for unoccupied critical habitat (see below), in a given year. This value likely overestimates the cost because technical assistance consultations, which cost substantially less, cannot be separated from informal consultations in the consultation information provided to the economists. The cost of project modifications resulting from currently identified existing and future activities in unoccupied habitat for the Guyandotte River crayfish is expected to be about $350,000 in a given year.

Further, the designation of critical habitat is not expected to trigger additional requirements under State or local regulations. Additionally, because the critical habitat is located in stretches of river, rather than on land, impacts on property values resulting from the perception of additional regulation are unlikely. Project modifications in unoccupied habitat for the Guyandotte River crayfish have the potential to increase conservation in these areas, resulting in an incremental benefit. Data limitations preclude IEc's ability to monetize these benefits; however, these benefits are unlikely to exceed $100 million in a given year.

The units with the highest potential costs resulting from the designation of critical habitat are Unit 2 for the Big Sandy crayfish and the unoccupied subunits of Unit 1 for the Guyandotte River crayfish. Because Unit 1 for the Guyandotte River crayfish (in West Virginia) includes unoccupied stream miles, requests for project modifications would be likely for existing and planned projects in this area. Unit 2 for the Big Sandy crayfish (Russell Fork, spanning both Kentucky and Virginia) contains the most stream miles with adjacent Federal land ownership and, therefore, a higher probability of intersecting with projects or activities with a Federal nexus that require consultation.

We have considered additional economic impact information we received during the public comment period, and determined that no areas may be excluded from the final critical habitat designation under section 4(b)(2) of the Act and our implementing regulations at 50 CFR 424.19.

Exclusions

Exclusions Based on Economic Impacts

The first sentence of section 4(b)(2) of the Act requires the Service to consider the economic impacts (as well as the impacts on national security and any other relevant impacts) of designating critical habitat. In addition, economic impacts may, for some particular areas, play an important role in the discretionary section 4(b)(2) exclusion analysis under the second sentence of section 4(b)(2). In both contexts, the Service has considered the probable incremental economic impacts of the designation. When the Service undertakes a discretionary section 4(b)(2) exclusion analysis with respect to a particular area, we weigh the economic benefits of exclusion (and any other benefits of exclusion) against any benefits of inclusion (primarily the conservation value of designating the area). The conservation value may be influenced by the level of effort needed to manage degraded habitat to the point where it could support the listed species.

The Service uses its discretion in determining how to weigh probable incremental economic impacts against conservation value. The nature of the probable incremental economic impacts, and not necessarily a particular threshold level, triggers considerations of exclusions based on probable incremental economic impacts. For example, if an economic analysis indicates high probable incremental impacts of designating a particular critical habitat unit of lower conservation value (relative to the remainder of the designation), the Service may consider exclusion of that particular unit.

As discussed above, the Service considered the economic impacts of the critical habitat designation and the Secretary is not exercising her discretion to exclude any areas from this designation of critical habitat for the Big Sandy and Guyandotte River crayfishes based on economic impacts.

Exclusions Based on Impacts on National Security and Homeland Security

Under section 4(b)(2) of the Act, we consider whether there are lands owned or managed by the Department of Defense where a national security impact might exist. We have determined that the lands within the final designation of critical habitat for the Big Sandy and Guyandotte River crayfishes are not owned or managed by the Department of Defense or Department of Homeland Security, and, therefore, we anticipate no impact on national security. We did not receive any requests from Federal agencies responsible for national security or homeland security requesting exclusions from Big Sandy crayfish or Guyandotte River crayfish critical habitat designation. Consequently, the Secretary is not exercising her discretion to exclude any areas from the final designation based on impacts on national security.

Exclusions Based on Other Relevant Impacts

Under section 4(b)(2) of the Act, the Service considers any other relevant impacts of the critical habitat designation, in addition to economic impacts and impacts on national security as discussed above. The Service considers a number of factors including whether there are permitted conservation plans covering the species in the area such as HCPs, safe harbor agreements, or candidate conservation agreements with assurances, or whether there are nonpermitted conservation agreements and partnerships that would be encouraged by designation of, or exclusion from, critical habitat. In addition, we look at the existence of Tribal conservation plans and partnerships and consider the government-to-government relationship of the United States with Tribal entities. We also consider any social impacts that might occur because of the designation.

In preparing this designation, we have determined that there are currently no HCPs or other management plans for the Big Sandy or Guyandotte River crayfishes, and the designation does not include any Tribal lands or trust resources. We anticipate no impact on Tribal lands, partnerships, or HCPs from this critical habitat designation.

As explained above, there are no Department of Defense or national security impacts or Tribal trust impacts associated with the designation. Therefore, the Secretary is not exercising her discretion to exclude any areas from this final designation based on other relevant impacts.

Required Determinations

Regulatory Planning and Review (Executive Orders 12866 and 13563)

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

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The Executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this rule in a manner consistent with these requirements.

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

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

According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses

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

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

During the development of this final rule we reviewed and evaluated all information submitted during the comment period that may pertain to our consideration of the probable incremental economic impacts of this critical habitat designation. Based on this information, we affirm our certification that this final critical habitat designation will not have a significant economic impact on a substantial number of small entities, and a regulatory flexibility analysis is not required.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Coal mining, pipeline and utility crossings, and oil and gas exploration activities regularly occur within the range of the Big Sandy and Guyandotte River crayfishes and their critical habitat units/subunits (Service 2019, pp. 7–8). These are routine activities that the Service consults on with the Office of Surface Mining, the Federal Energy Regulatory Commission, and the U.S. Army Corps of Engineers under section 7 of the Act. In our screening analysis, we do not find that the designation of this critical habitat would significantly affect energy supplies, distribution, or use. As discussed in the revised screening analysis, the costs associated with consultations related to occupied critical habitat would be largely administrative in nature and the costs associated with projects in unoccupied critical habitat are estimated not to exceed $350,000 per year (IEc 2020, p. 21). The full cost of the entire designation is not expected to exceed $1,000,000 per year, which does not reach the significant threshold of $100 million per year. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

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

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

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

The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments.

(2) We do not believe that this rule would significantly or uniquely affect small governments because the waters being designated for critical habitat are owned by the States of Kentucky, Virginia, and West Virginia. These government entities do not fit the definition of ''small government jurisdiction.'' Therefore, a Small Government Agency Plan is not required.

Takings—Executive Order 12630

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

Federalism—Executive Order 13132

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

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

Civil Justice Reform—Executive Order 12988

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

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

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

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

It is our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) in connection with designating critical habitat under the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with 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. We determined that there are no Tribal lands that were occupied by the Big Sandy or Guyandotte River crayfishes at the time of listing that contain the features essential for conservation of the species, and no Tribal lands unoccupied by the Big Sandy or Guyandotte River crayfishes that are essential for the conservation of the species. Therefore, we are not designating critical habitat for the Big Sandy or Guyandotte River crayfishes on Tribal lands.

References Cited

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

Authors

The primary authors of this rulemaking are the staff members of the North Atlantic—Appalachian Regional Office, Kentucky Ecological Services Field Office, Southwestern Virginia Field Office, and the West Virginia Field Office.

List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

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

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

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

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

■ 2. Amend § 17.11(h) by revising the entries for ''Crayfish, Big Sandy'' and ''Crayfish, Guyandotte River'' under ''Crustaceans'' in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
*	*	*	*	*
CRUSTACEANS				
*	*	*	*	*
Crayfish, Big Sandy	*Cambarus callainus*	Wherever found	T	81 FR 20450, 4/7/2016; 50 CFR 17.95(h).[CH]
*	*	*	*	*
Crayfish, Guyandotte River	*Cambarus veteranus*	Wherever found	E	81 FR 20450, 4/7/2016; 50 CFR 17.95(h).[CH]
*	*	*	*	*

■ 3. Amend § 17.95(h) by adding entries for ''Big Sandy Crayfish (*Cambarus callainus*)'' and '' Guyandotte River Crayfish (*Cambarus veteranus*)'' after the entry for '' Pecos amphipod (*Gammarus pecos*)'' to read as follows:

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(h) *Crustaceans.*

* * * * *

Big Sandy Crayfish (Cambarus callainus)

(1) Critical habitat units are depicted for Martin, Pike, Johnson, and Floyd Counties, Kentucky; Buchanan, Dickenson, and Wise Counties, Virginia; and McDowell, Mingo, and Wayne Counties, West Virginia, on the maps in this entry.

(2) Within these areas, the physical or biological features essential to the conservation of the Big Sandy crayfish consist of the following components:

(i) Fast-flowing stream reaches with unembedded slab boulders, cobbles, or isolated boulder clusters within an unobstructed stream continuum (*i.e.,* riffle, run, pool complexes) of permanent, moderate- to large-sized (generally third order and larger) streams and rivers (up to the ordinary high water mark as defined at 33 CFR 329.11).

(ii) Streams and rivers with natural variations in flow and seasonal flooding sufficient to effectively transport sediment and prevent substrate embeddedness.

(iii) Water quality characterized by seasonally moderated temperatures and physical and chemical parameters (*e.g.,* pH, conductivity, dissolved oxygen) sufficient for the normal behavior, growth, reproduction, and viability of all life stages of the species.

(iv) An adequate food base, indicated by a healthy aquatic community structure including native benthic macroinvertebrates and fishes, and plant matter (*e.g.,* leaf litter, algae, detritus).

(v) Aquatic habitats protected from riparian and instream activities that degrade the physical and biological features described in paragraphs (2)(i) through (iv) of this entry or cause physical (*e.g.,* crushing) injury or death to individual Big Sandy crayfish.

(vi) An interconnected network of streams and rivers that have the physical and biological features described in paragraphs (2)(i) through (iv) of this entry and that allow for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers. The scale of the interconnected stream network should be sufficient to allow for gene flow within and among watersheds.

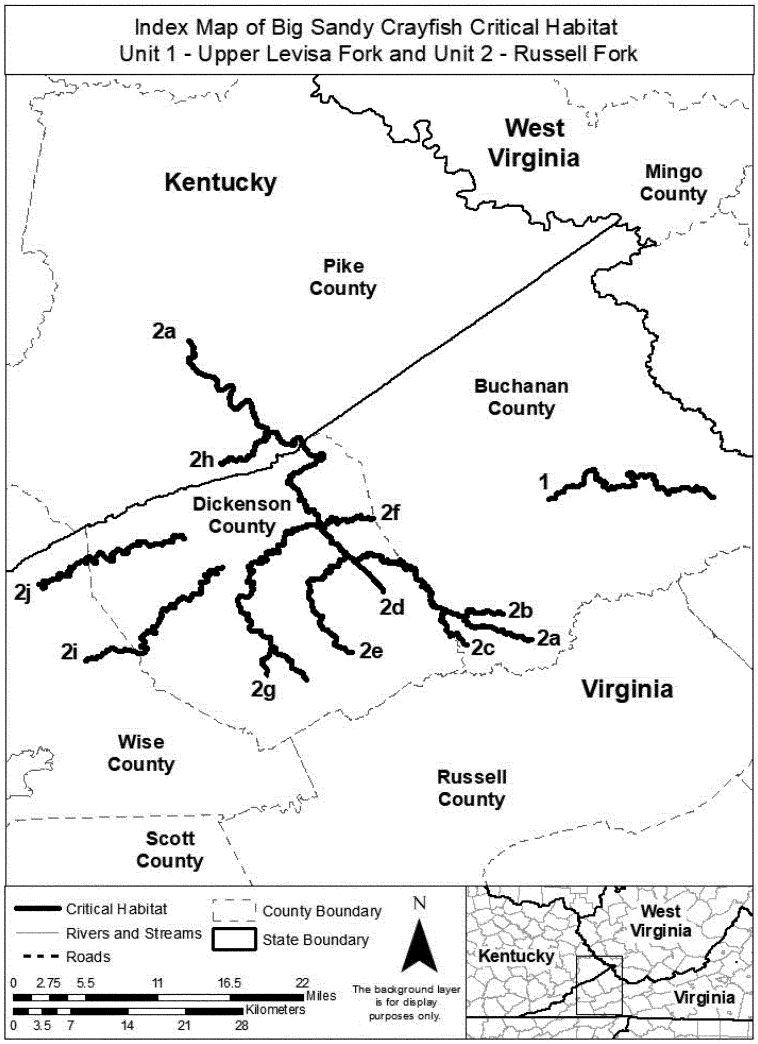
(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on April 14, 2022.

(4) Data layers defining map units were created on a base of U.S. Geological Survey digital ortho-photo quarter-quadrangles, and critical habitat units were then mapped using Universal Transverse Mercator (UTM) Zone 15N coordinates. ESRI's ArcGIS 10.0 software was used to determine latitude and longitude coordinates using decimal degrees. The USA Topo ESRI online basemap service was referenced to identify features (like roads and streams) used to delineate the upstream and downstream extents of critical habitat units. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at *https://www.fws.gov/westvirginiafieldoffice/*, at *https://www.regulations.gov* at Docket No. FWS–R5–ES–2019–0098, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Index map of critical habitat Units 1 and 2 for the Big Sandy crayfish follows:

BILLING CODE 4333–15–P

Figure 1 to Big Sandy Crayfish paragraph (5)

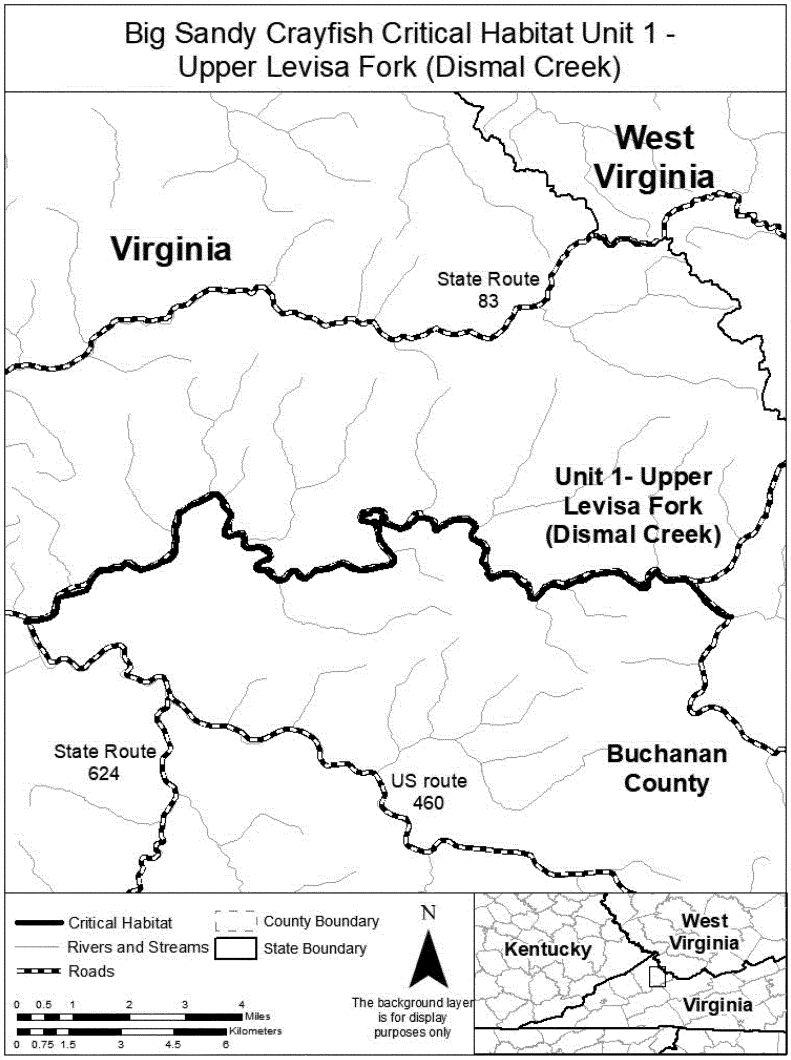


(6) Unit 1: Upper Levisa Fork—Dismal Creek, Buchanan County, Virginia.

(i) Unit 1 includes approximately 29.2 stream kilometers (skm) (18.1 smi) of Dismal Creek from its confluence with Laurel Fork downstream to its confluence with Levisa Fork in Buchanan County, Virginia.

(ii) Map of Unit 1 follows:

Figure 2 to Big Sandy Crayfish paragraph (6)(ii)



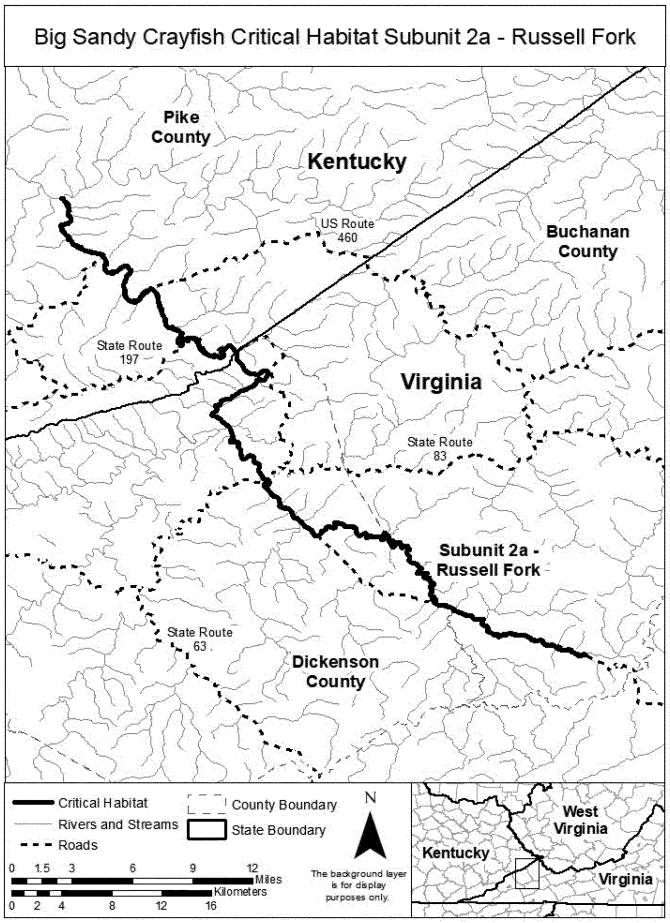
(7) Unit 2: Russell Fork—Buchanan, Dickenson, and Wise Counties, Virginia, and Pike County, Kentucky.

(i) Subunit 2a: Russell Fork, Buchanan and Dickenson Counties, Virginia, and Pike County, Kentucky.

(A) Subunit 2a consists of approximately 83.8 skm (52.1 smi) of Russell Fork from its confluence with Ball Creek at Council, Virginia, downstream to its confluence with Levisa Fork at Levisa Junction, Kentucky.

(B) Map of Subunit 2a follows:

Figure 3 to Big Sandy Crayfish paragraph (7)(i)(B)

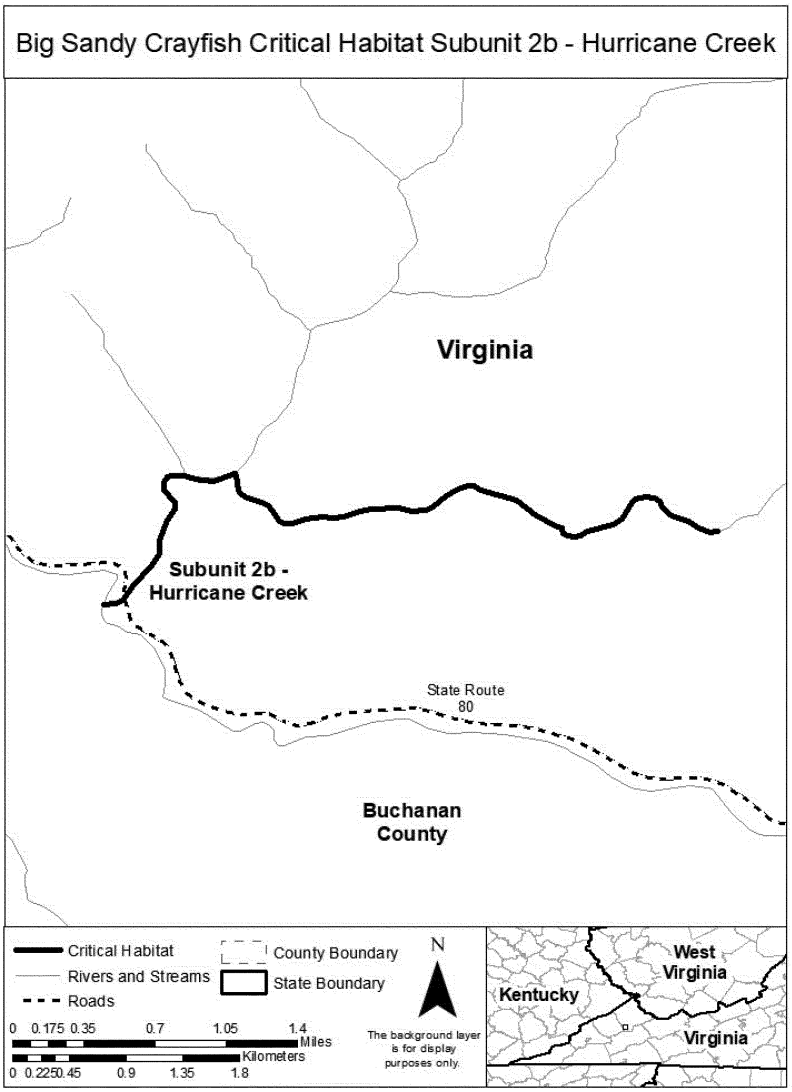


(ii) Subunit 2b: Hurricane Creek, Buchanan County, Virginia.

(A) Subunit 2b consists of approximately 5.9 skm (3.7 smi) of Hurricane Creek from its confluence with Gilbert Fork downstream to its confluence with Russell Fork at Davenport, Virginia.

(B) Map of Subunit 2b follows:

Figure 4 to Big Sandy Crayfish paragraph (7)(ii)(B)

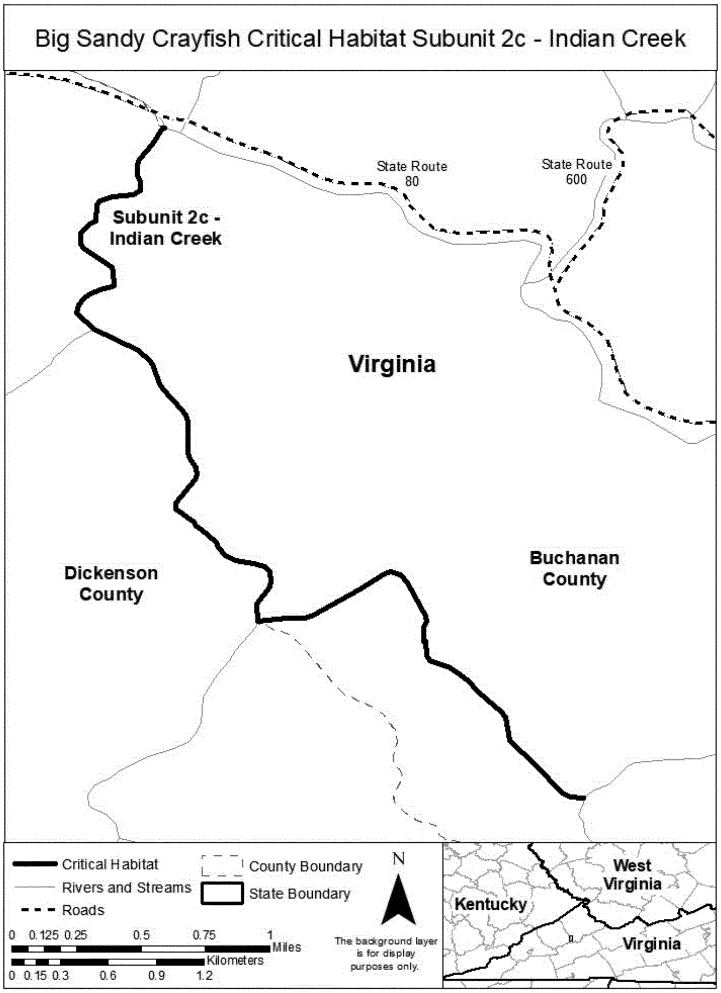


(iii) Subunit 2c: Indian Creek, Buchanan and Dickenson Counties, Virginia.

(A) Subunit 2c consists of approximately 7.4 skm (4.6 smi) of Indian Creek from its confluence with Three Forks in Buchanan County, Virginia, downstream to its confluence with Russell Fork in Buchanan and Dickenson Counties, Virginia.

(B) Map of Subunit 2c follows:

Figure 5 to Big Sandy Crayfish paragraph (7)(iii)(B)

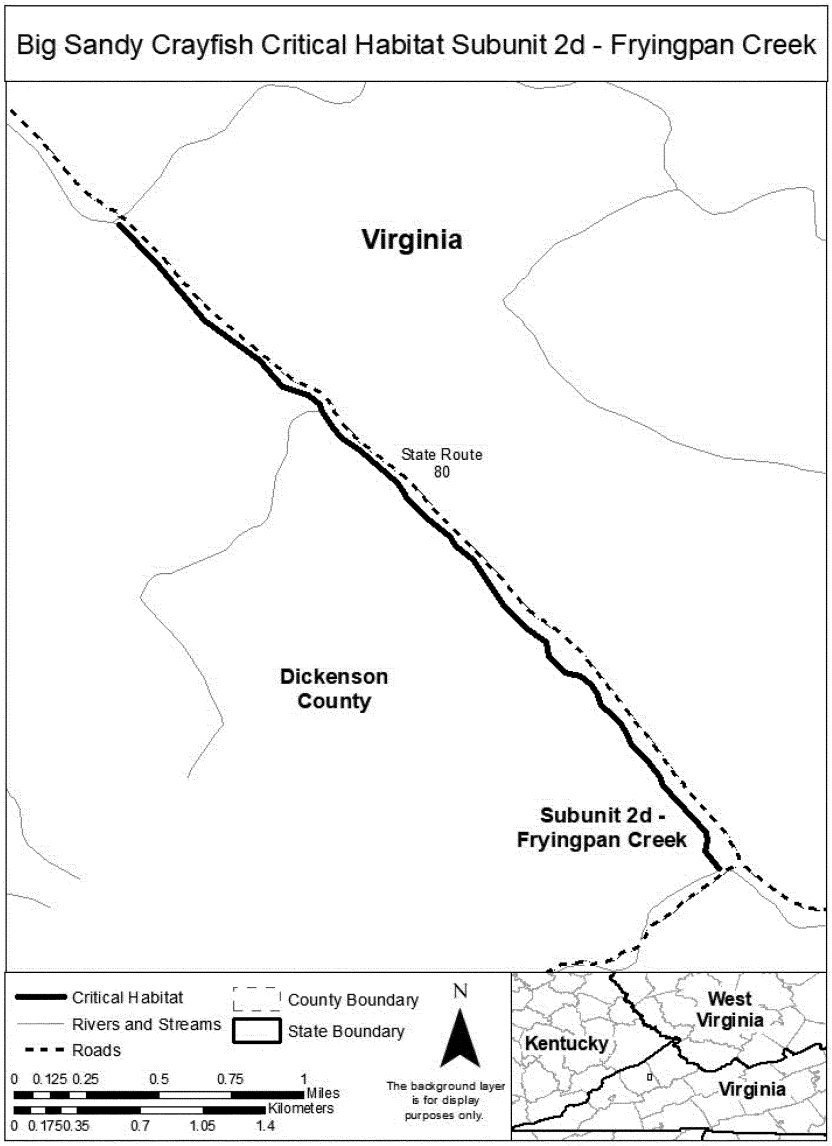


(iv) Subunit 2d: Fryingpan Creek, Dickenson County, Virginia.

(A) Subunit 2d consists of approximately 4.6 skm (2.9 smi) of Fryingpan Creek from its confluence with Priest Fork downstream to its confluence with Russell Fork.

(B) Map of Subunit 2d follows:

Figure 6 to Big Sandy Crayfish paragraph (7)(iv)(B)

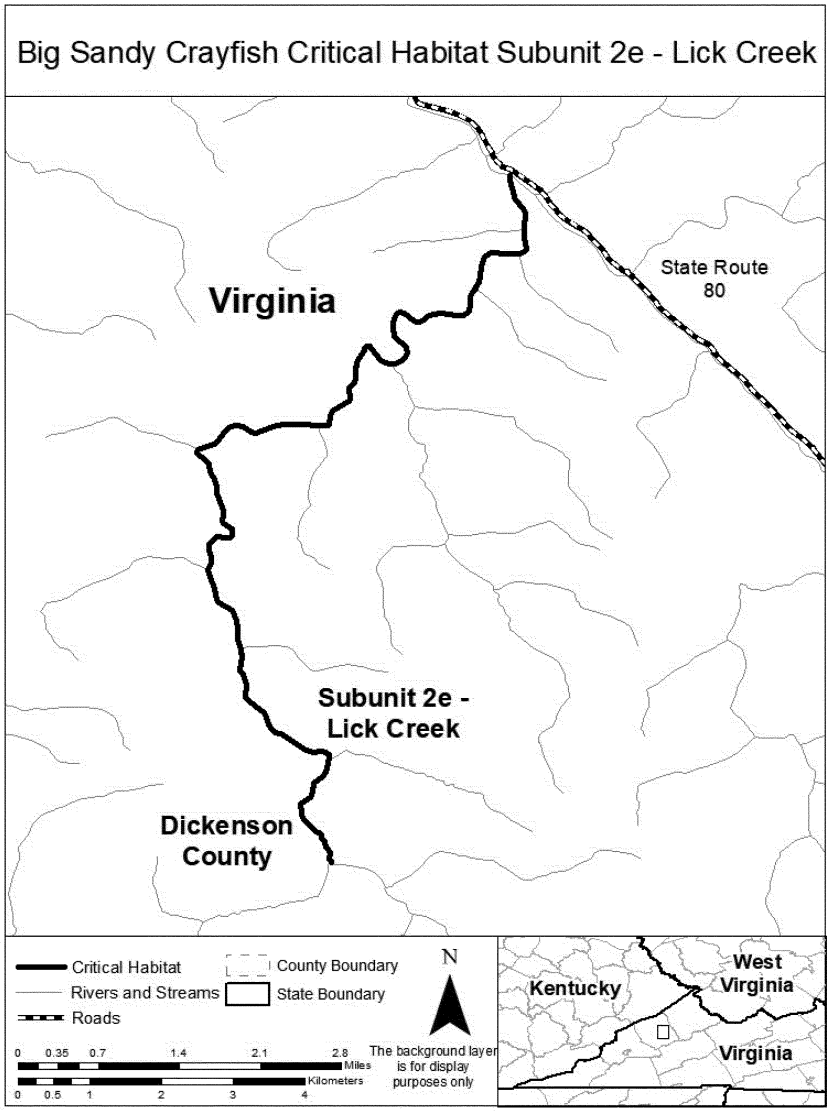


(v) Subunit 2e: Lick Creek, Dickenson County, Virginia.

(A) Subunit 2e consists of approximately 16.2 skm (10.1 smi) of Lick Creek from its confluence with Cabin Fork near Aily, Virginia, downstream to its confluence with Russell Fork at Birchfield, Virginia.

(B) Map of Subunit 2e follows:

Figure 7 to Big Sandy Crayfish paragraph (7)(v)(B)

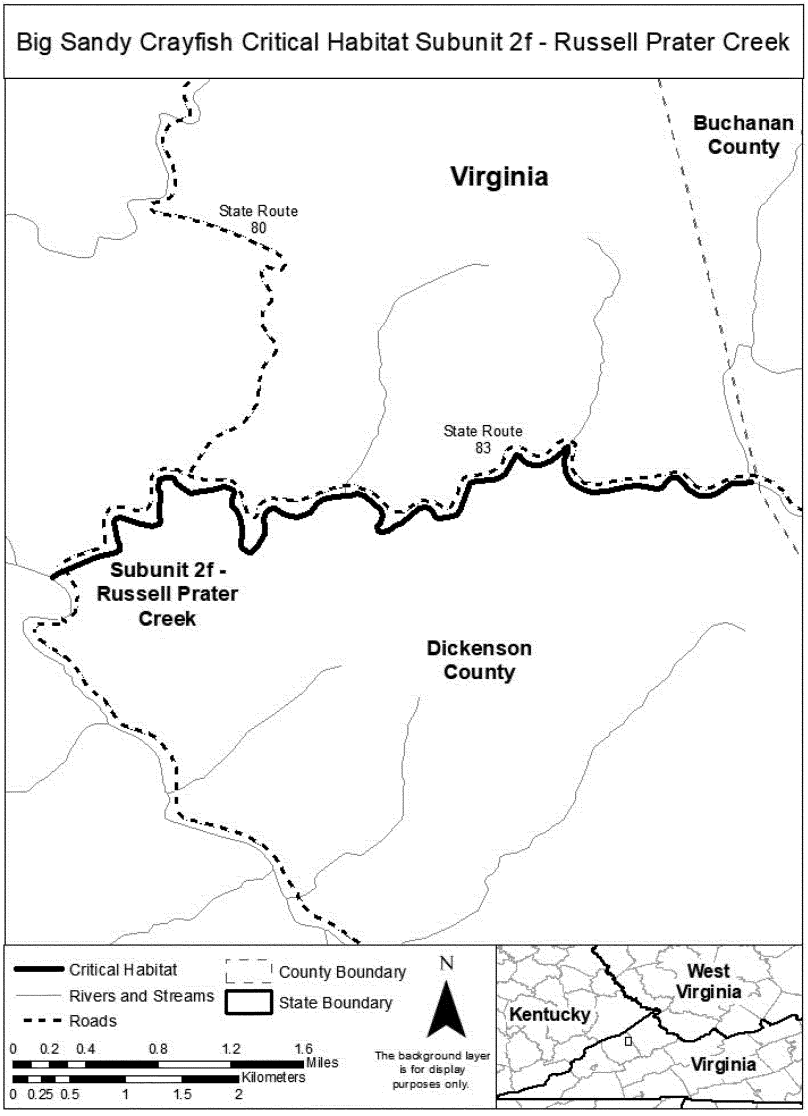


(vi) Subunit 2f: Russell Prater Creek, Dickenson County, Virginia.

(A) Subunit 2f consists of approximately 8.4 skm (5.2 smi) of Russell Prater Creek from its confluence with Greenbrier Creek downstream to its confluence with Russell Fork at Haysi, Virginia.

(B) Map of Subunit 2f follows:

Figure 8 to Big Sandy Crayfish paragraph (7)(vi)(B)

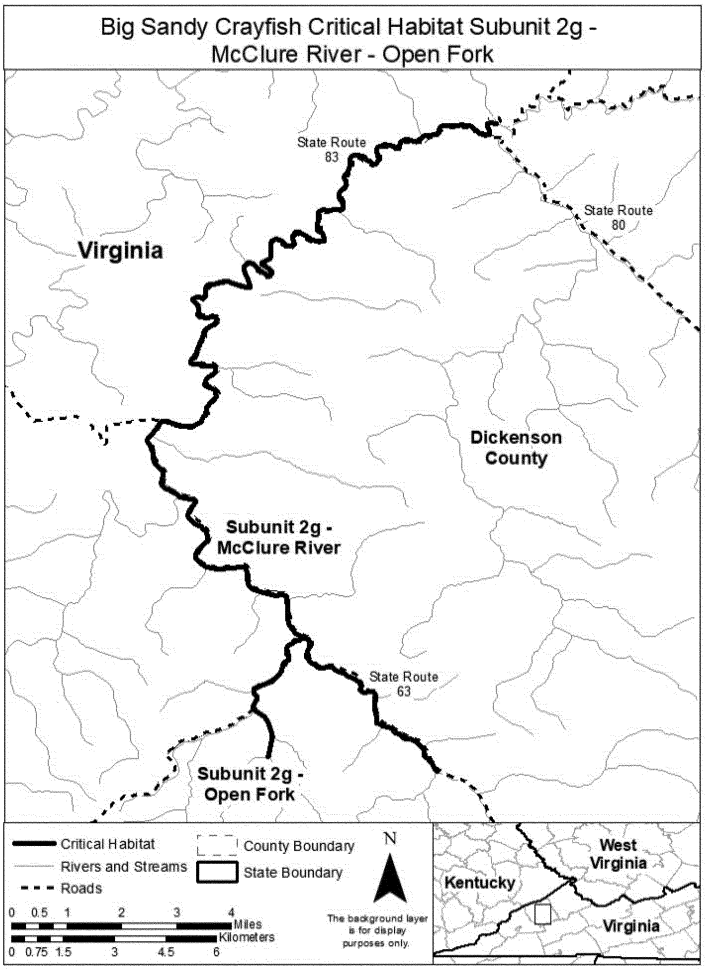


(vii) Subunit 2g: McClure River, Open Fork and McClure Creek, Dickenson County, Virginia.

(A) Subunit 2g consists of approximately 35.6 skm (22.1 smi) of the McClure River and McClure Creek from the confluence of McClure Creek and Honey Branch downstream to the confluence of McClure River and Russell Fork; and approximately 4.9 km (3.0 mi) of Open Fork from the confluence of Middle Fork Open Fork and Coon Branch downstream to the confluence of Open Fork and McClure Creek at Nora, Virginia.

(B) Map of Subunit 2g follows:

Figure 9 to Big Sandy Crayfish paragraph (7)(vii)(B)

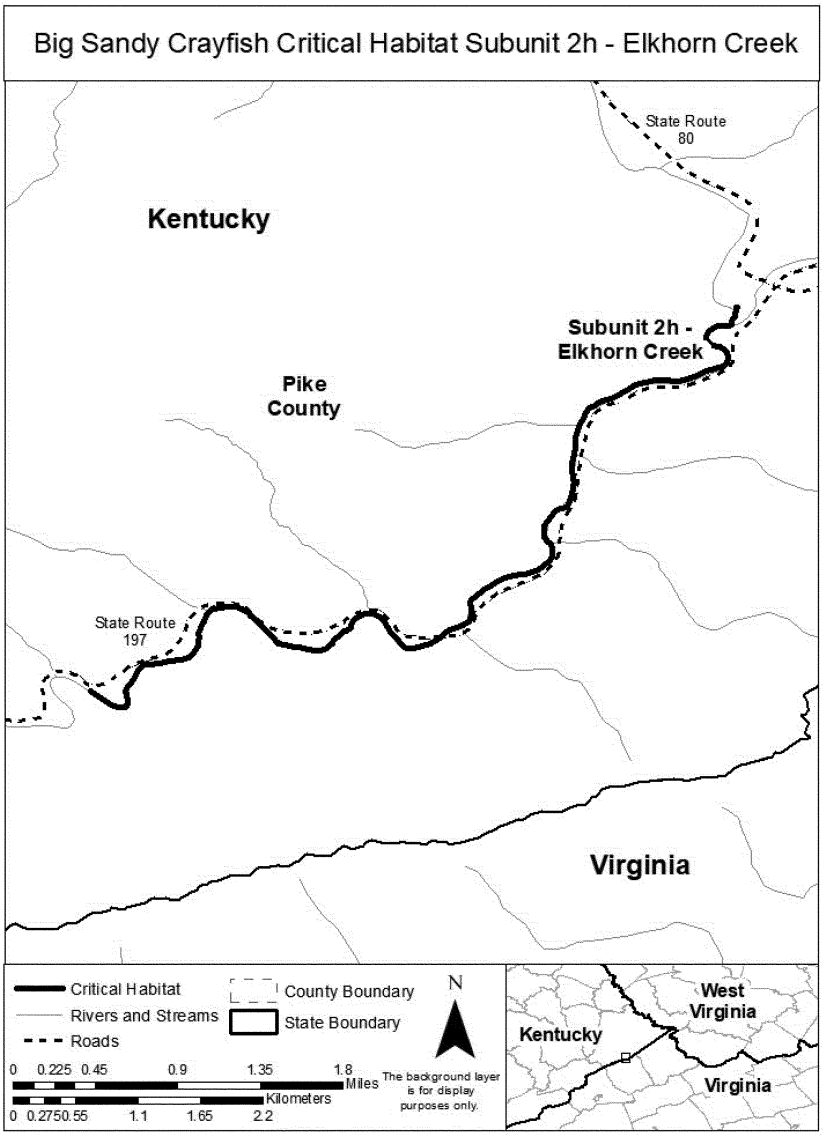


(viii) Subunit 2h: Elkhorn Creek, Pike County, Kentucky.

(A) Subunit 2h consists of approximately 8.5 skm (5.3 smi) of Elkhorn Creek from its confluence with Mountain Branch downstream to its confluence with Russell Fork at Elkhorn City, Kentucky.

(B) Map of Subunit 2h follows:

Figure 10 to Big Sandy Crayfish paragraph (7)(viii)(B)

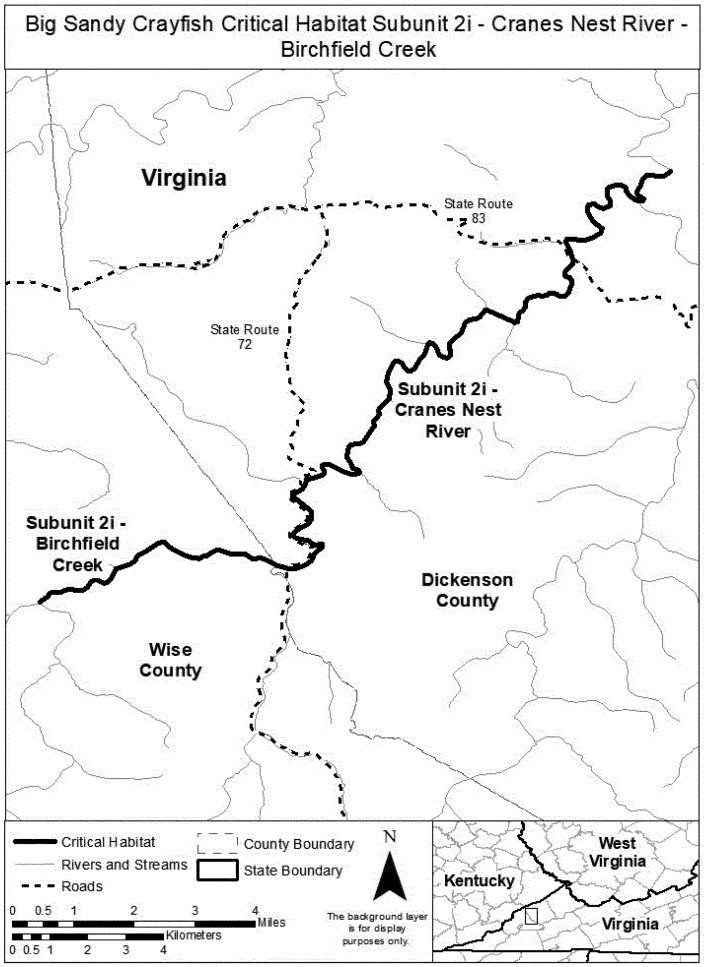


(ix) Subunit 2i: Cranes Nest River and Birchfield Creek, Dickenson and Wise Counties, Virginia.

(A) Subunit 2i consists of approximately 24.6 skm (19.0 smi) of the Cranes Nest River from its confluence with Birchfield Creek downstream to its confluence with Lick Branch and approximately 6.9 skm (4.3 smi) of Birchfield Creek from its confluence with Dotson Creek downstream to its confluence with Cranes Nest River.

(B) Map of Subunit 2i follows:

Figure 11 to Big Sandy Crayfish paragraph (7)(ix)(B)

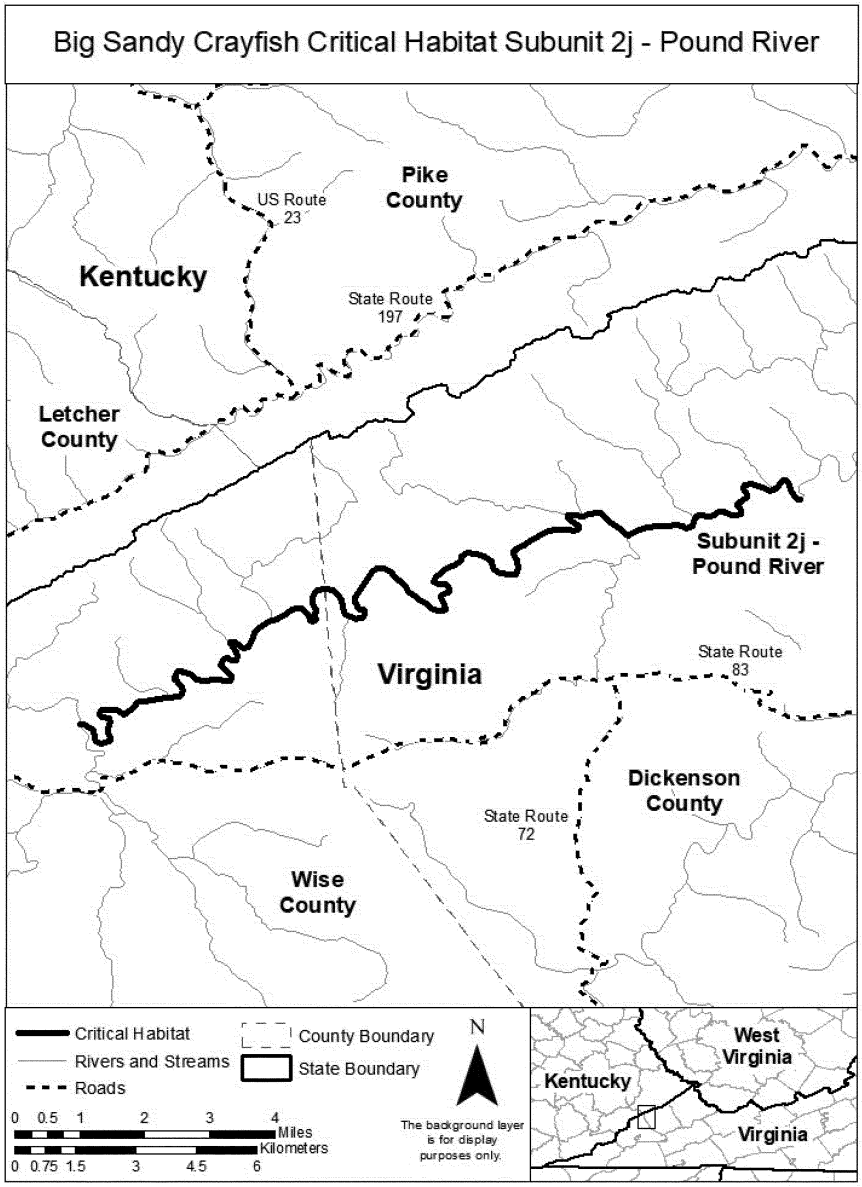


(x) Subunit 2j: Pound River, Dickenson and Wise Counties, Virginia.

(A) Subunit 2j consists of approximately 28.5 skm (17.7 smi) of the Pound River from its confluence with Bad Creek downstream to the confluence of the Pound River and Jerry Branch.

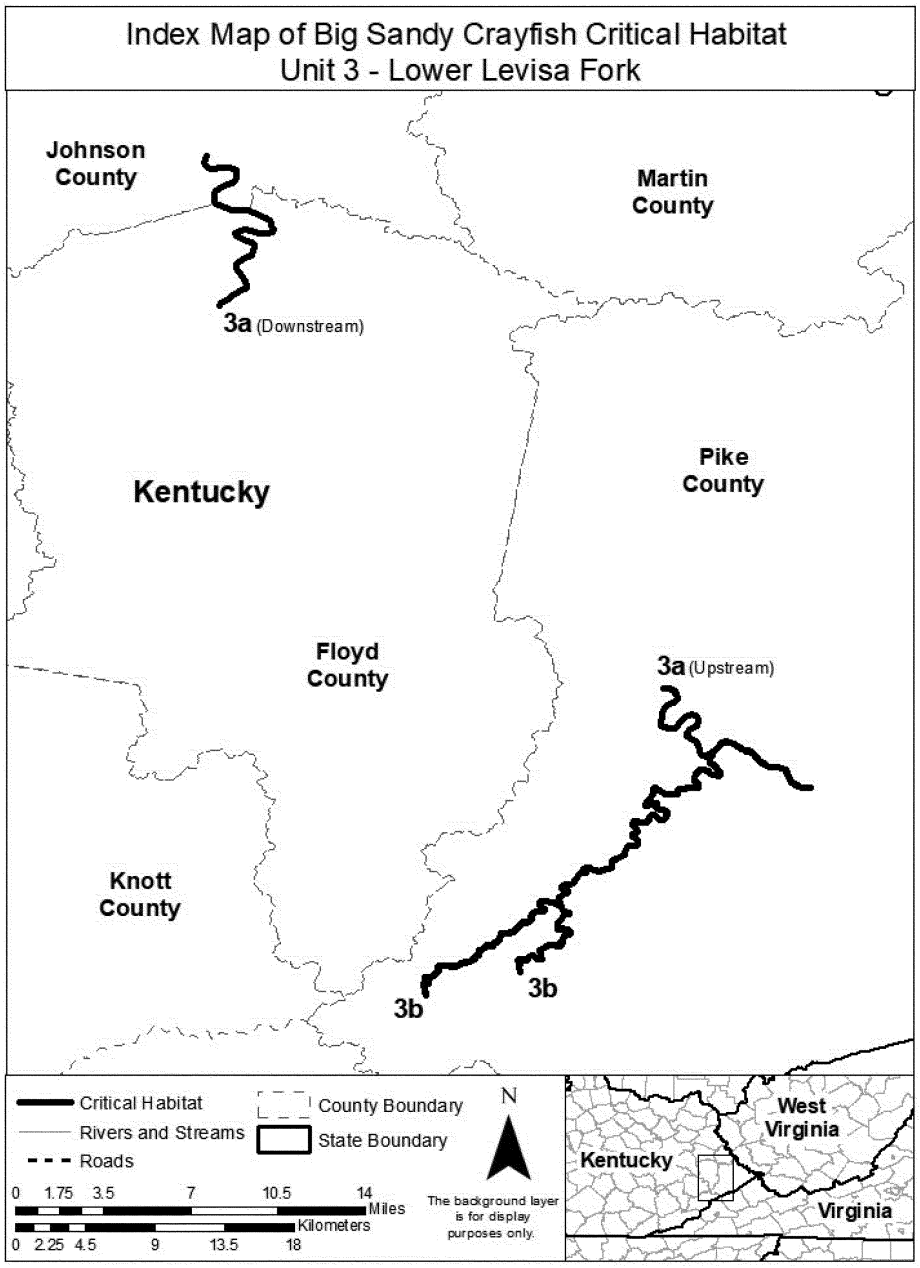
(B) Map of Subunit 2j follows:

Figure 12 to Big Sandy Crayfish paragraph (7)(x)(B)



(8) Index map of critical habitat Unit 3 for the Big Sandy crayfish follows:

Figure 13 to Big Sandy Crayfish paragraph (8)



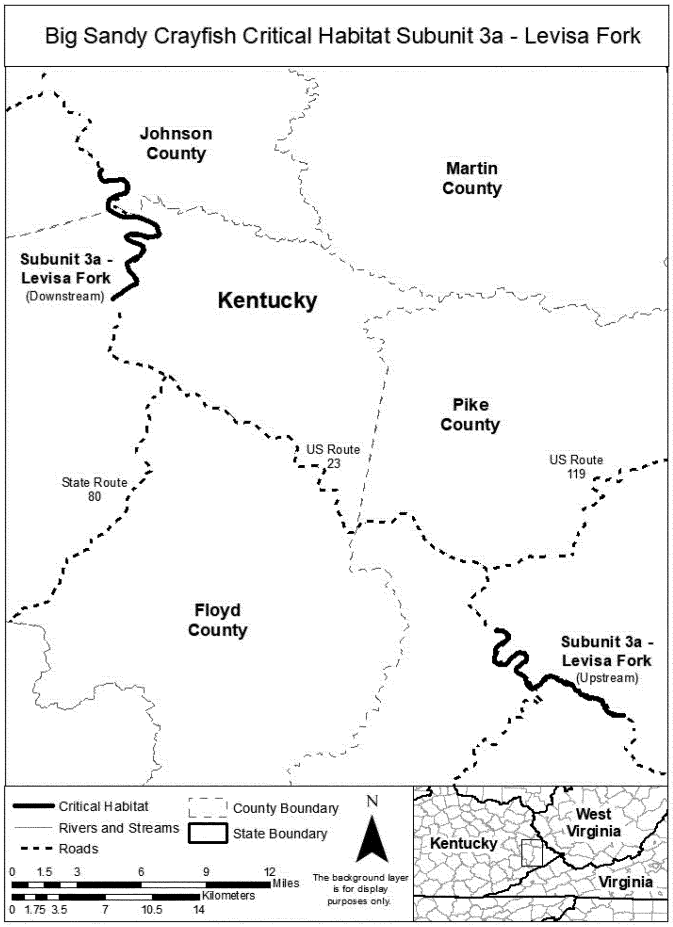
(9) Unit 3: Lower Levisa Fork—Floyd, Johnson, and Pike Counties, Kentucky.

(i) Subunit 3a: Levisa Fork, Floyd, Johnson, and Pike Counties, Kentucky.

(A) Subunit 3a consists of approximately 15.9 km (9.9 mi) of Levisa Fork from its confluence with Russell Fork at Levisa Junction, Kentucky, downstream to its confluence with Island Creek at Pikeville, Kentucky; and 17.5 skm (10.9 smi) of Levisa Fork from its confluence with Abbott Creek downstream to its confluence with Miller Creek at Auxier, Kentucky.

(B) Map of Subunit 3a follows:

Figure 14 to Big Sandy Crayfish paragraph (9)(i)(B)

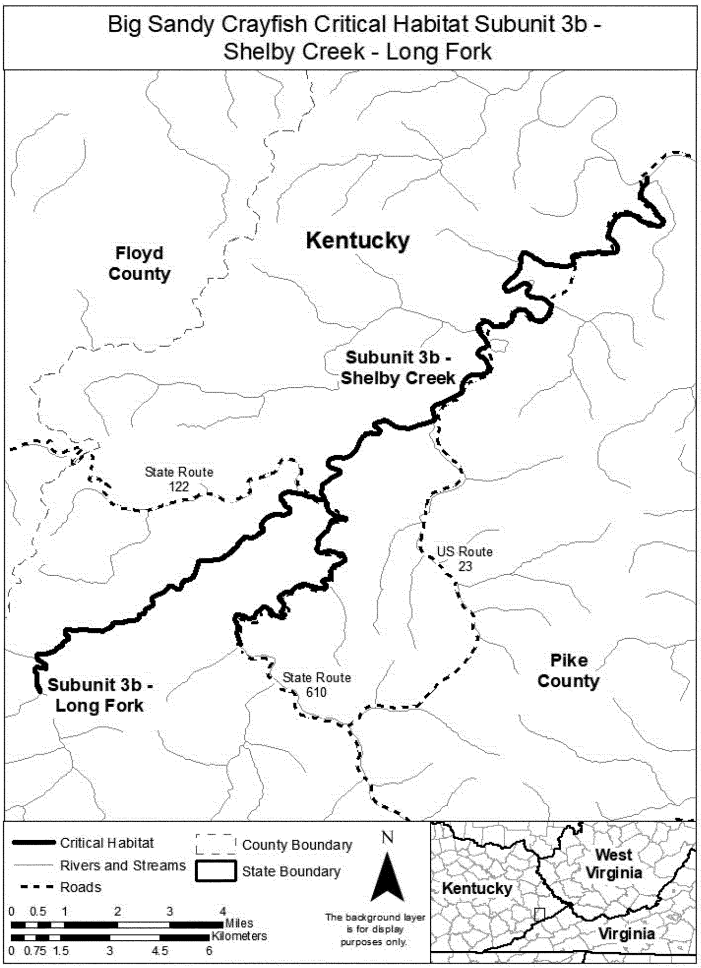


(ii) Subunit 3b: Shelby Creek and Long Fork, Pike County, Kentucky.

(A) Subunit 3b consists of approximately 32.2 skm (20.0 smi) of Shelby Creek from its confluence with Burk Branch downstream to its confluence with Levisa Fork at Shelbiana, Kentucky; and approximately 12.9 skm (8.0 smi) of Long Fork from the confluence of Right Fork Long Fork and Left Fork Long Fork downstream to the confluence of Long Fork and Shelby Creek at Virgie, Kentucky.

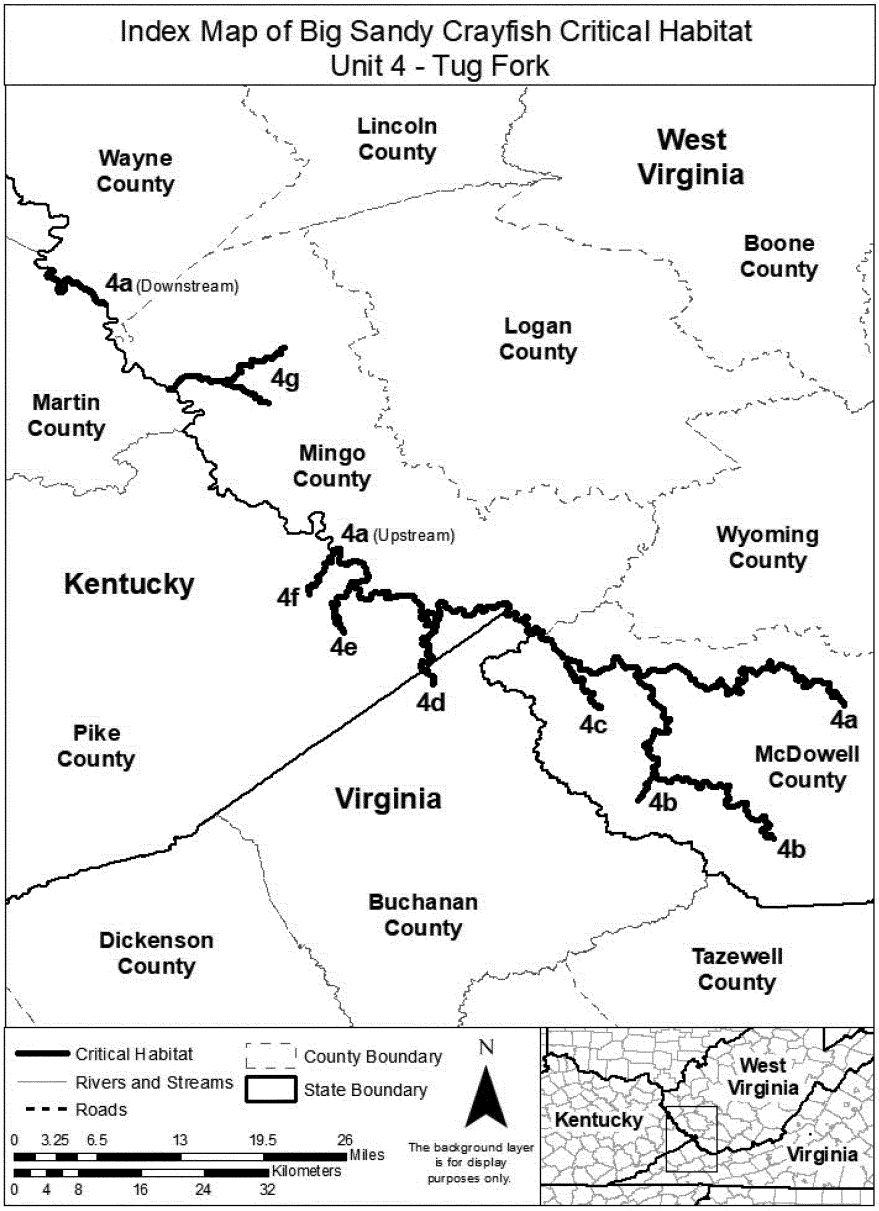
(B) Map of Subunit 3b follows:

Figure 15 to Big Sandy Crayfish paragraph (9)(ii)(B)



(10) Index map of critical habitat Unit 4 for the Big Sandy crayfish follows:

Figure 16 to Big Sandy Crayfish paragraph (10)



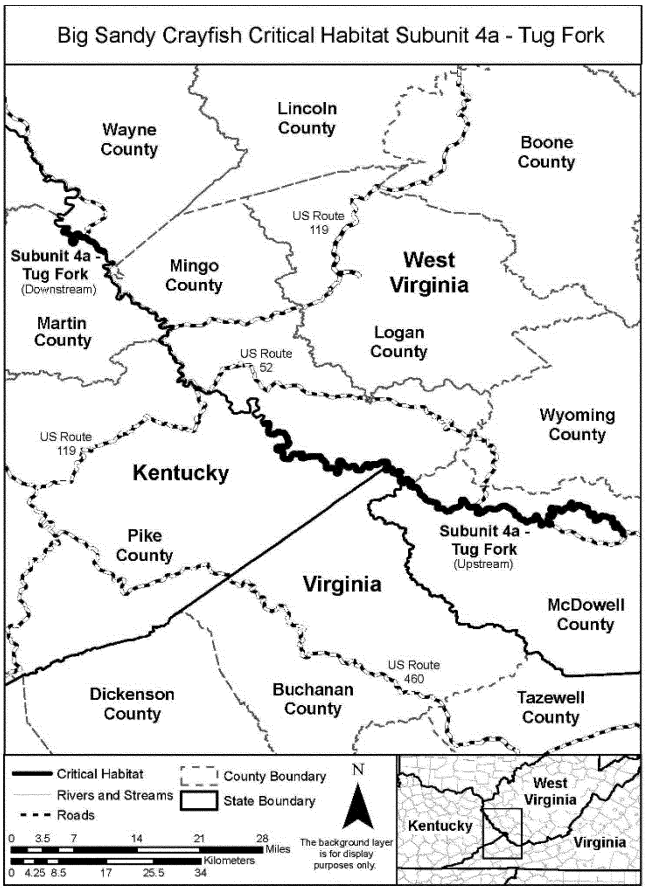
(11) Unit 4: Tug Fork—McDowell, Mingo, and Wayne Counties, West Virginia; Buchanan County, Virginia; and Pike and Martin Counties, Kentucky.

(i) Subunit 4a: Tug Fork, McDowell, Mingo, and Wayne Counties, West Virginia; Buchanan County, Virginia; and Pike and Martin Counties, Kentucky.

(A) Subunit 4a consists of approximately 106.1 skm (65.9 smi) of the Tug Fork from its confluence with Elkhorn Creek at Welch, West Virginia, downstream to its confluence with Blackberry Creek in Pike County, Kentucky; and 11.7 skm (7.3 smi) of the Tug Fork from its confluence with Little Elk Creek downstream to its confluence with Bull Creek at Crum, West Virginia.

(B) Map of Subunit 4a follows:

Figure 17 to Big Sandy Crayfish paragraph (11)(i)(B)

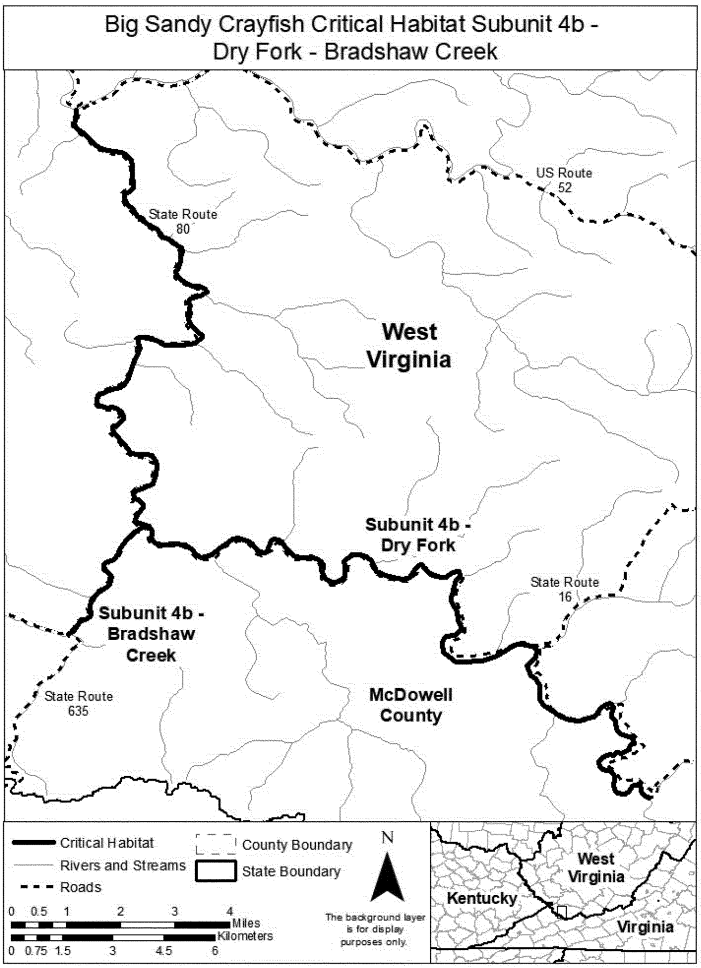


(ii) Subunit 4b: Dry Fork and Bradshaw Creek, McDowell County, West Virginia.

(A) Subunit 4b consists of approximately 45.2 skm (28.1 smi) of Dry Fork from its confluence with Jacobs Fork downstream to its confluence with Tug Fork at Iaeger, West Virginia; and approximately 4.6 skm (2.9 smi) of Bradshaw Creek from its confluence with Hite Fork at Jolo, West Virginia, downstream to its confluence with Dry Fork at Bradshaw, West Virginia.

(B) Map of Subunit 4b follows:

Figure 18 to Big Sandy Crayfish paragraph (11)(ii)(B)

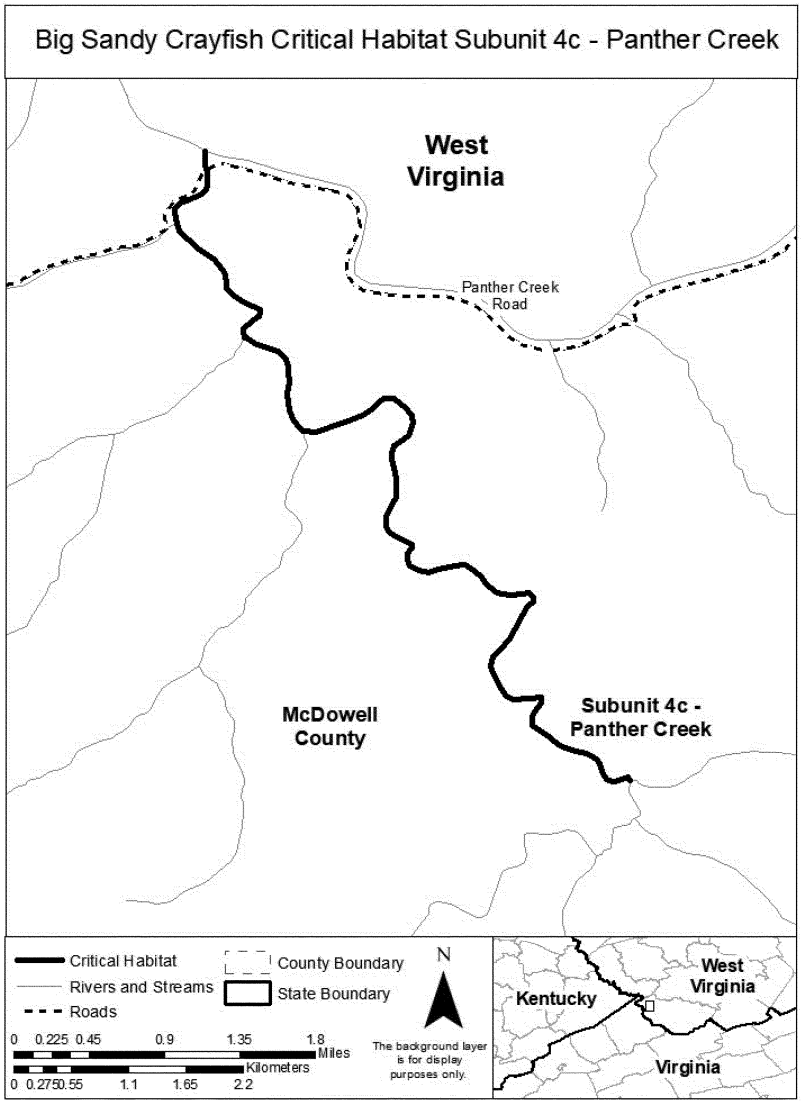


(iii) Subunit 4c: Panther Creek, McDowell County, West Virginia.

(A) Subunit 4c consists of approximately 10.7 skm (6.6 smi) of Panther Creek from its confluence with George Branch downstream to its confluence with Tug Fork at Panther, West Virginia.

(B) Map of Subunit 4c follows:

Figure 19 to Big Sandy Crayfish paragraph (11)(iii)(B)

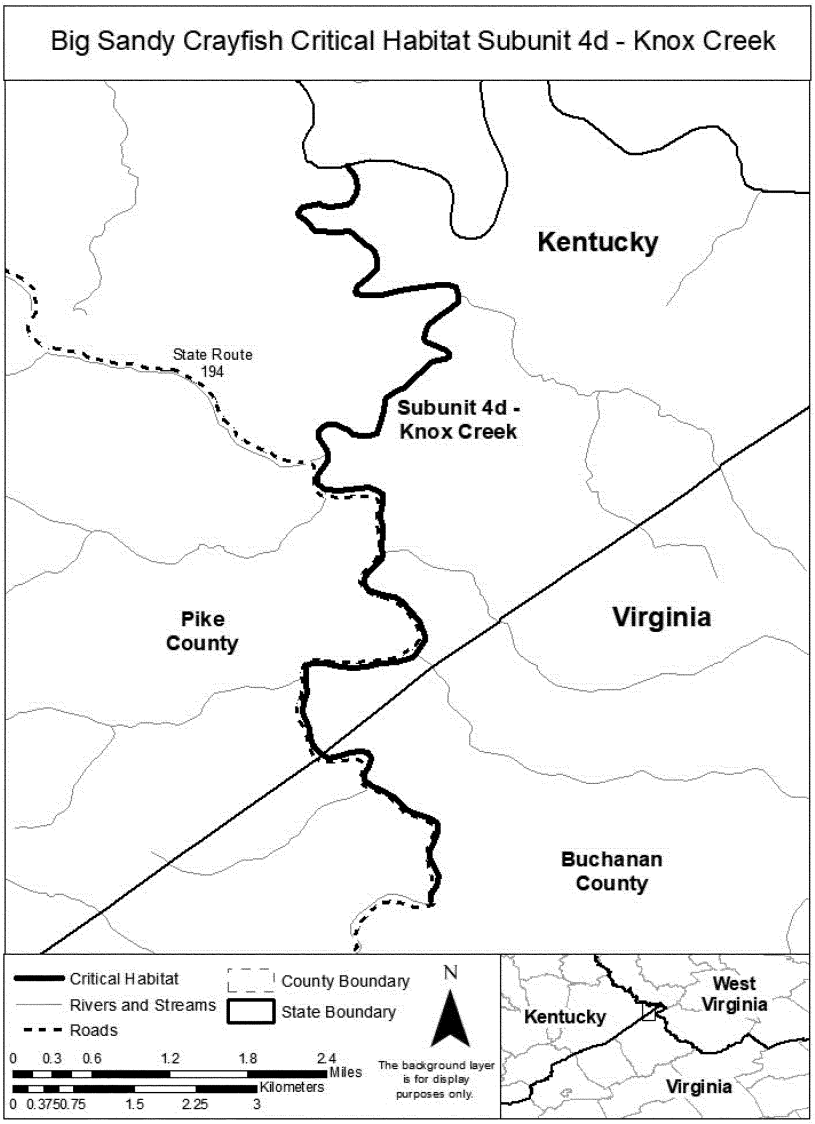


(iv) Subunit 4d: Knox Creek, Buchanan County, Virginia, and Pike County, Kentucky.

(A) Subunit 4d consists of approximately 16.6 skm (10.3 smi) of Knox Creek from its confluence with Cedar Branch downstream to its confluence with Tug Fork in Pike County, Kentucky.

(B) Map of Subunit 4d follows:

Figure 20 to Big Sandy Crayfish paragraph (11)(iv)(B)

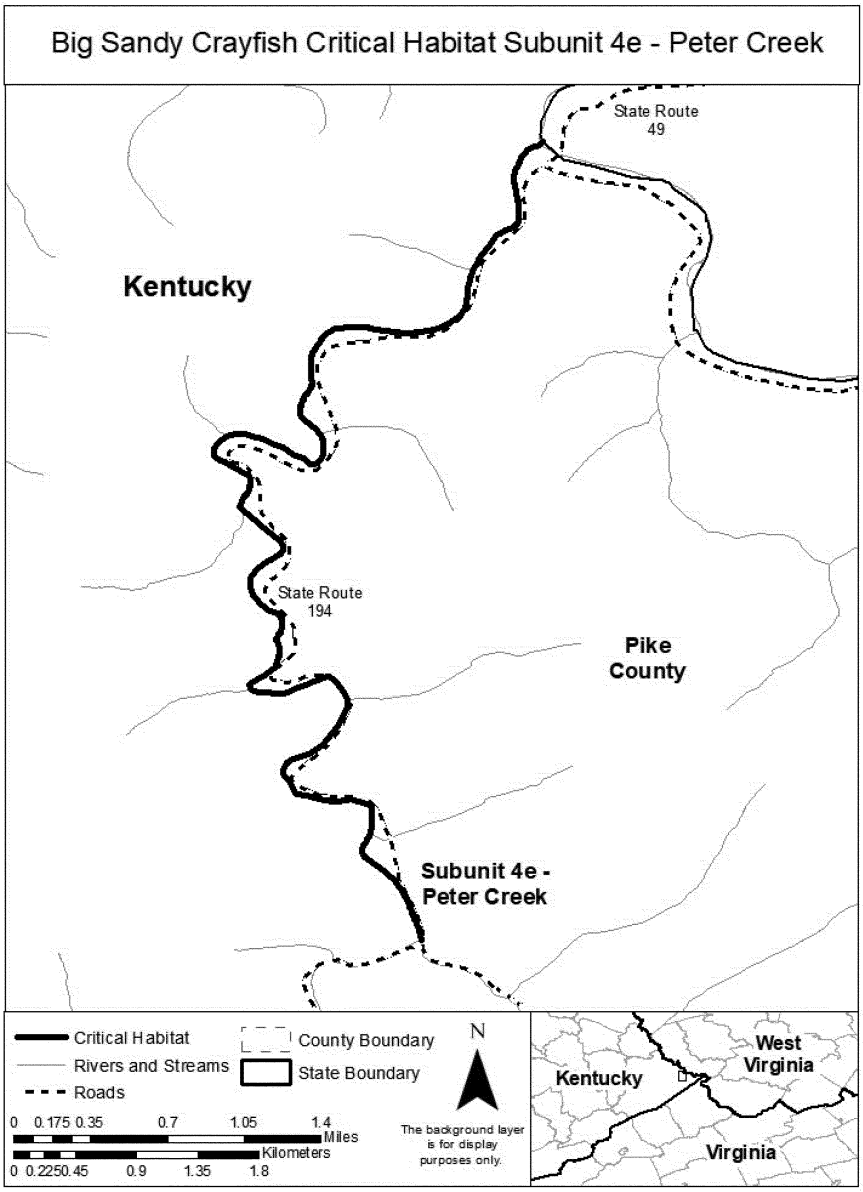


(v) Subunit 4e: Peter Creek, Pike County, Kentucky.

(A) Subunit 4e consists of approximately 10.1 skm (6.3 smi) of Peter Creek from the confluence of Left Fork Peter Creek and Right Fork Peter Creek at Phelps, Kentucky, downstream to the confluence of Peter Creek and Tug Fork at Freeburn, Kentucky.

(B) Map of Subunit 4e follows:

Figure 21 to Big Sandy Crayfish paragraph (11)(v)(B)

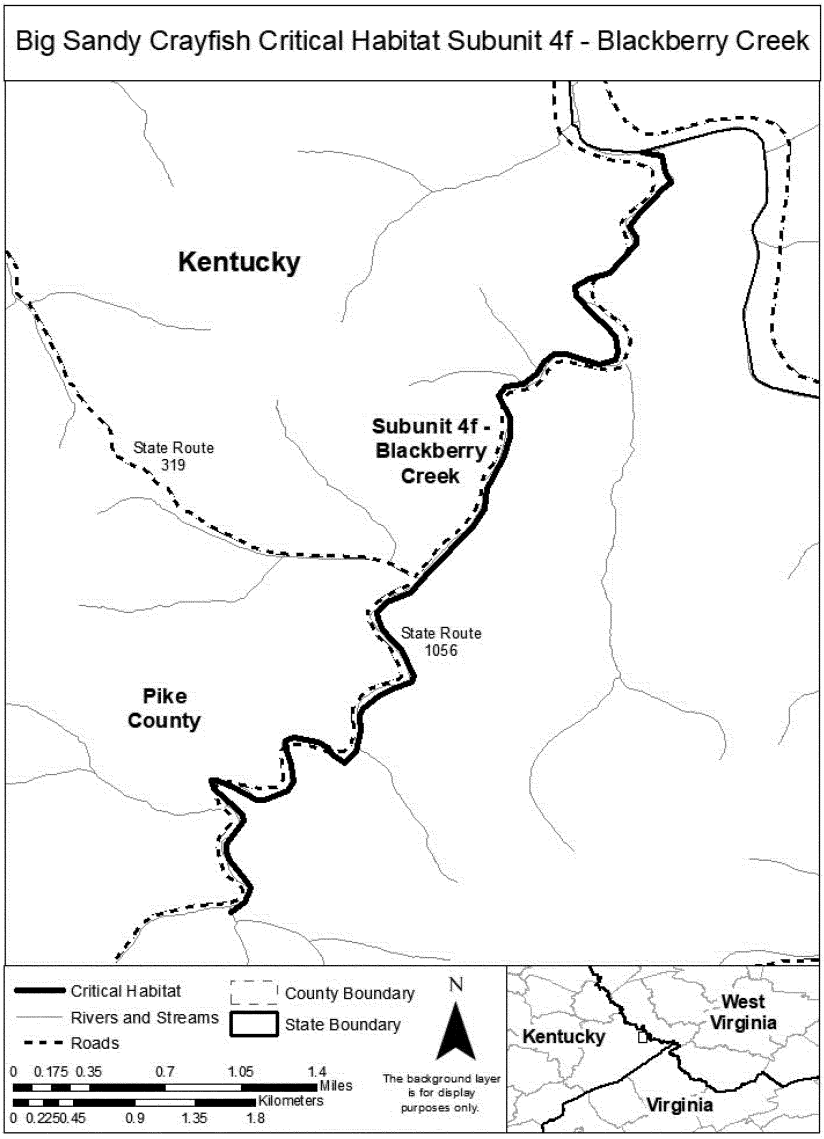


(vi) Subunit 4f: Blackberry Creek, Pike County, Kentucky.

(A) Subunit 4f consists of approximately 9.1 skm (5.7 smi) of Blackberry Creek its confluence with Bluespring Branch downstream to the confluence of Blackberry Creek and Tug Fork.

(B) Map of Subunit 4f follows:

Figure 22 to Big Sandy Crayfish paragraph (11)(vi)(B)

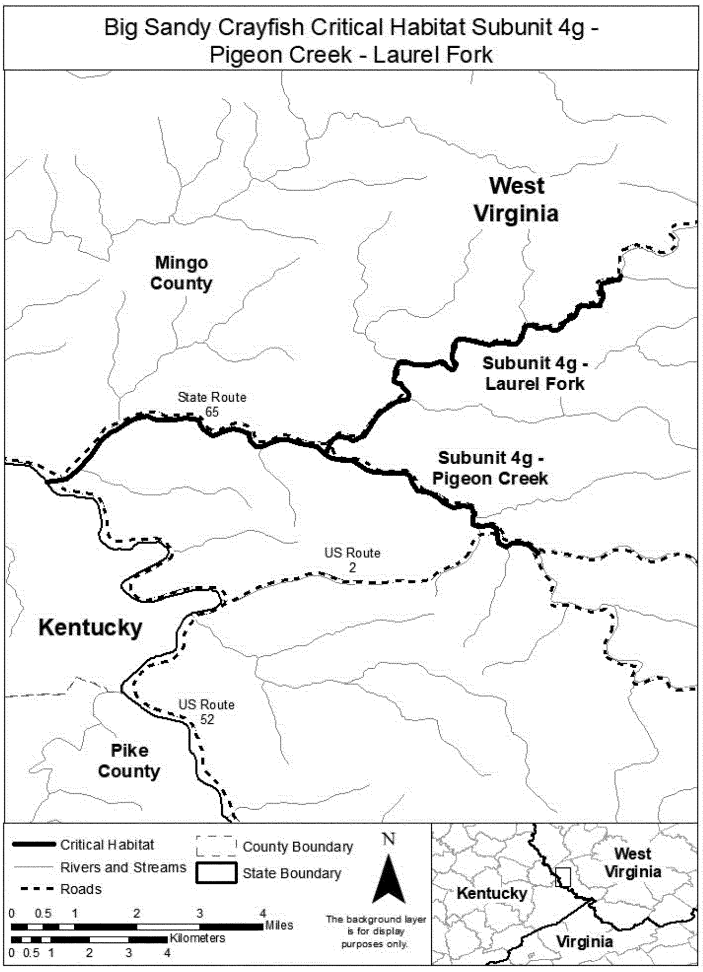


(vii) Subunit 4g: Pigeon Creek and Laurel Fork, Mingo County, West Virginia.

(A) Subunit 4g consists of approximately 14.0 skm (8.7 smi) of Pigeon Creek from its confluence with Trace Fork downstream to its confluence with Tug Fork; and approximately 11.1 skm (6.9 smi) of Laurel Fork from its confluence with Lick Branch downstream to its confluence with Pigeon Creek at Lenore, West Virginia.

(B) Map of Subunit 4g follows:

Figure 23 to Big Sandy Crayfish paragraph (11)(vii)(B)



Guyandotte River Crayfish (Cambarus veteranus)

(1) Critical habitat units are depicted for Logan and Wyoming Counties, West Virginia, on the maps in this entry.

(2) Within these areas, the physical or biological features essential to the conservation of the Guyandotte River crayfish consist of the following components:

(i) Fast-flowing stream reaches with unembedded slab boulders, cobbles, or isolated boulder clusters within an unobstructed stream continuum (*i.e.*. riffle, run, pool complexes) of permanent, moderate- to large-sized (generally third order and larger) streams and rivers (up to the ordinary high water mark as defined at 33 CFR 329.11).

(ii) Streams and rivers with natural variations in flow and seasonal flooding sufficient to effectively transport sediment and prevent substrate embeddedness.

(iii) Water quality characterized by seasonally moderated temperatures and physical and chemical parameters (*e.g.,* pH, conductivity, dissolved oxygen) sufficient for the normal behavior, growth, reproduction, and viability of all life stages of the species.

(iv) An adequate food base, indicated by a healthy aquatic community structure including native benthic macroinvertebrates, fishes, and plant matter (*e.g.,* leaf litter, algae, detritus).

(v) Aquatic habitats protected from riparian and instream activities that degrade the physical and biological features described in paragraphs (2)(i) through (iv) of this entry or cause physical (*e.g.,* crushing) injury or death to individual Guyandotte River crayfish.

(vi) An interconnected network of streams and rivers that have the physical and biological features described in paragraphs (2)(i) through (iv) of this entry and that allow for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers. The scale of the interconnected stream network should be sufficient to allow for gene flow within and among watersheds.

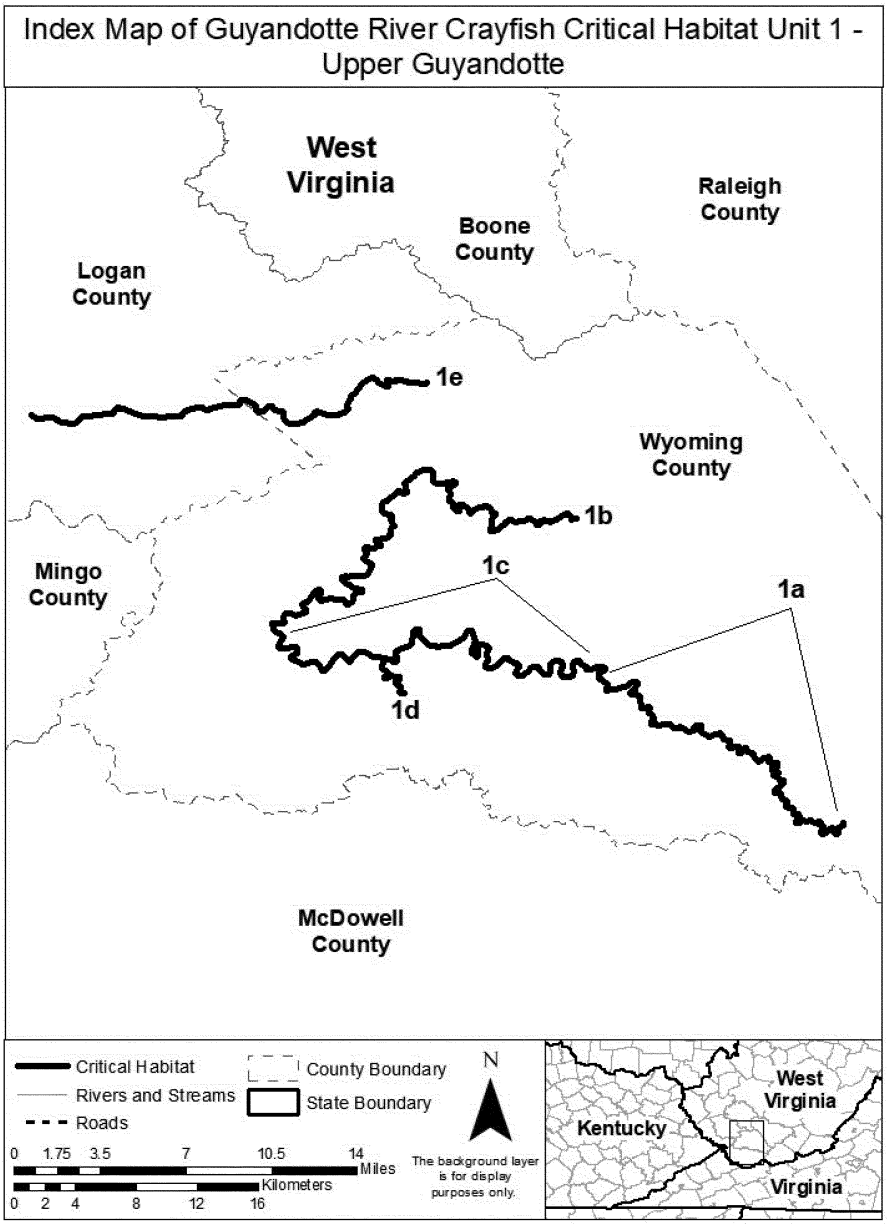
(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on April 14, 2022.

(4) Data layers defining map units were created on a base of U.S. Geological Survey digital ortho-photo quarter-quadrangles, and critical habitat units were then mapped using Universal Transverse Mercator (UTM) Zone 15N coordinates. ESRI's ArcGIS 10.0 software was used to determine latitude and longitude coordinates using decimal degrees. The USA Topo ESRI online basemap service was referenced to identify features (like roads and streams) used to delineate the upstream and downstream extents of critical habitat units. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries

of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at *https://www.fws.gov/westvirginiafieldoffice/*, at *https://www.regulations.gov* at Docket No. FWS–R5–ES–2019–0098, and at the North Atlantic–Appalachian Regional Office. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Index map of critical habitat for the Guyandotte River crayfish follows:

Figure 1 to Guyandotte River Crayfish paragraph (5)



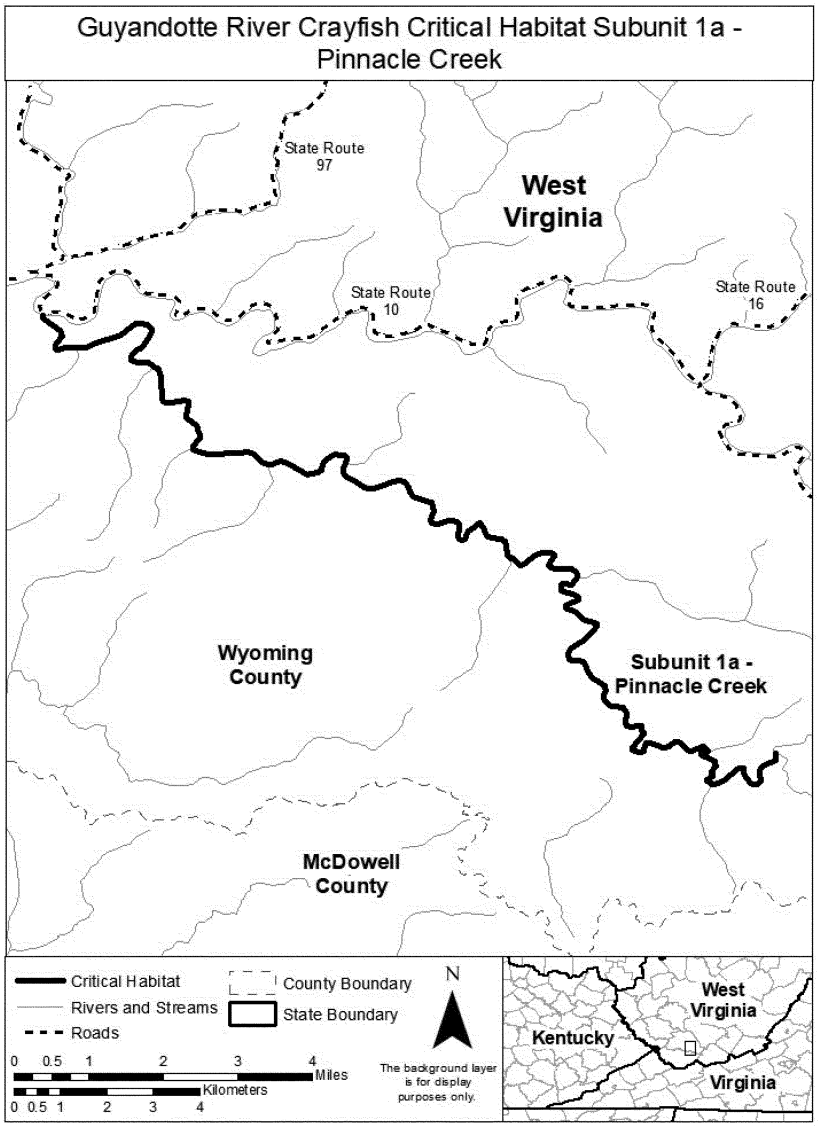
(6) Unit 1: Upper Guyandotte—Logan and Wyoming Counties, West Virginia.

(i) Subunit 1a: Pinnacle Creek, Wyoming County, West Virginia.

(A) Subunit 1a consists of approximately 28.6 skm (17.8 smi) of Pinnacle Creek from its confluence with Beartown Fork downstream to its confluence with the Guyandotte River at Pineville, West Virginia.

(B) Map of Subunit 1a follows:

Figure 2 to Guyandotte River Crayfish paragraph (6)(i)(B)

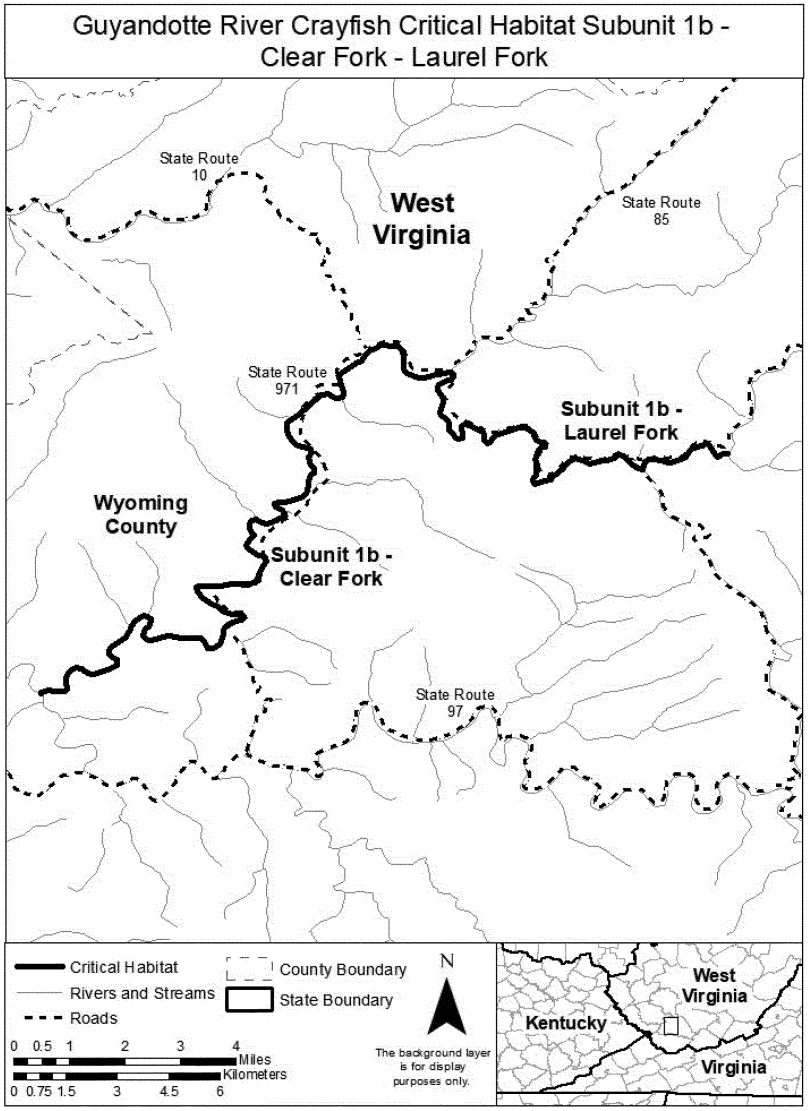


(ii) Subunit 1b: Clear Fork and Laurel Fork, Wyoming County, West Virginia.

(A) Subunit 1b consists of approximately 38.0 skm (23.6 smi) of Clear Fork and its primary tributary Laurel Fork from the confluence of Laurel Creek and Acord Branch downstream to the confluence of Clear Fork and the Guyandotte River.

(B) Map of Subunit 1b follows:

Figure 3 to Guyandotte River Crayfish paragraph (6)(ii)(B)

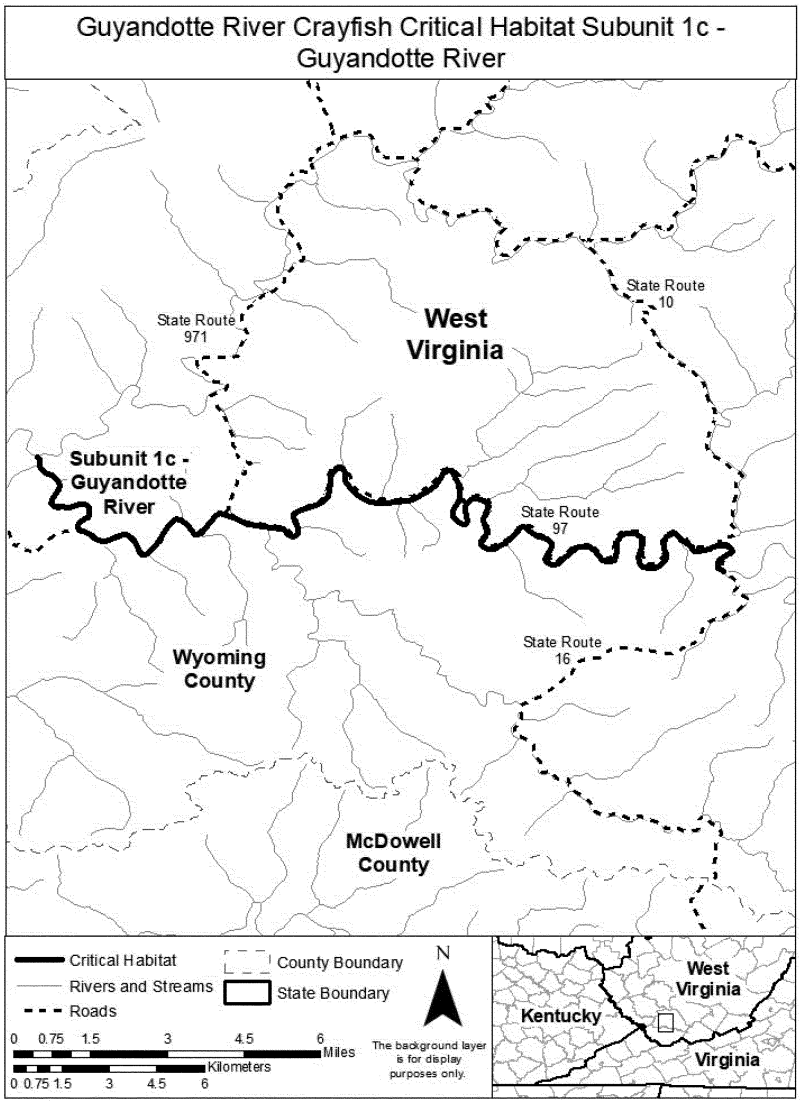


(iii) Subunit 1c: Guyandotte River, Wyoming County, West Virginia.

(A) Subunit 1c consists of approximately 35.8 skm (22.2 smi) of the Guyandotte River from its confluence with Pinnacle Creek at Pineville, West Virginia, downstream to its confluence with Clear Fork.

(B) Map of Subunit 1c follows:

Figure 4 to Guyandotte River Crayfish paragraph (6)(iii)(B)

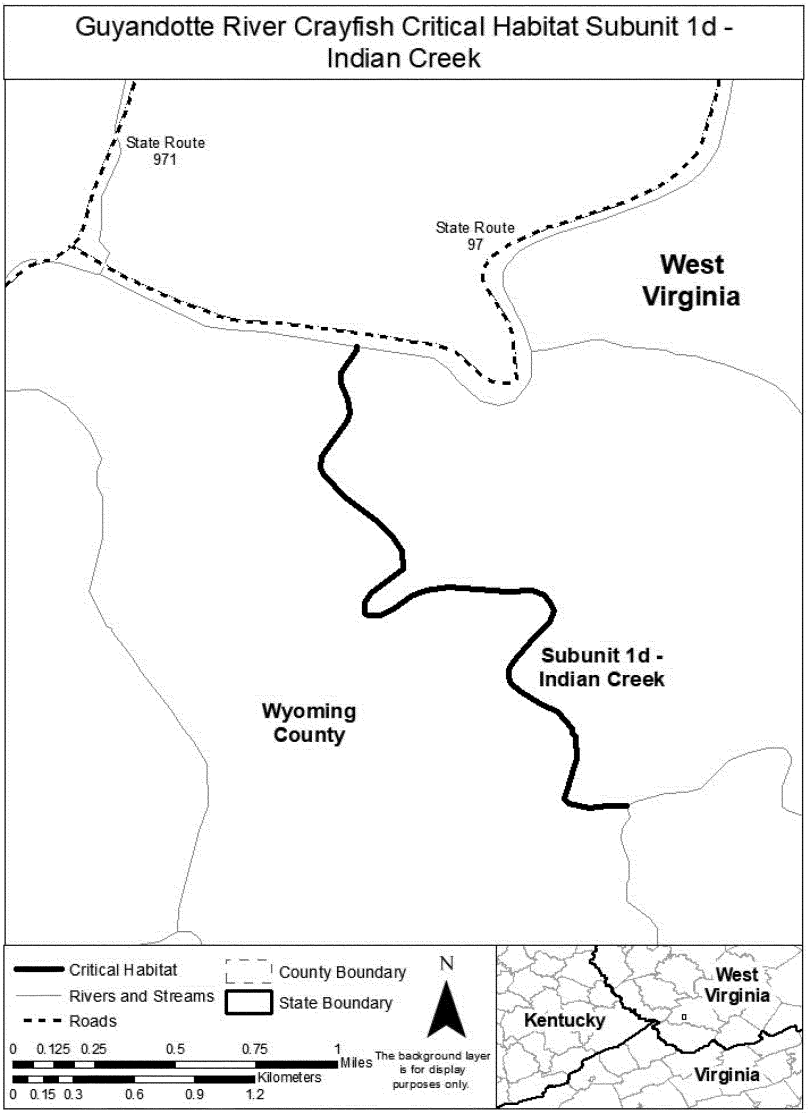


(iv) Subunit 1d: Indian Creek, Wyoming County, West Virginia.

(A) Subunit 1d consists of approximately 4.2 skm (2.6 smi) of Indian Creek from the confluence of Indian Creek and Brier Creek at Fanrock, West Virginia, to the confluence of Indian Creek and the Guyandotte River.

(B) Map of Subunit 1d follows:

Figure 5 to Guyandotte River Crayfish paragraph (6)(iv)(B)

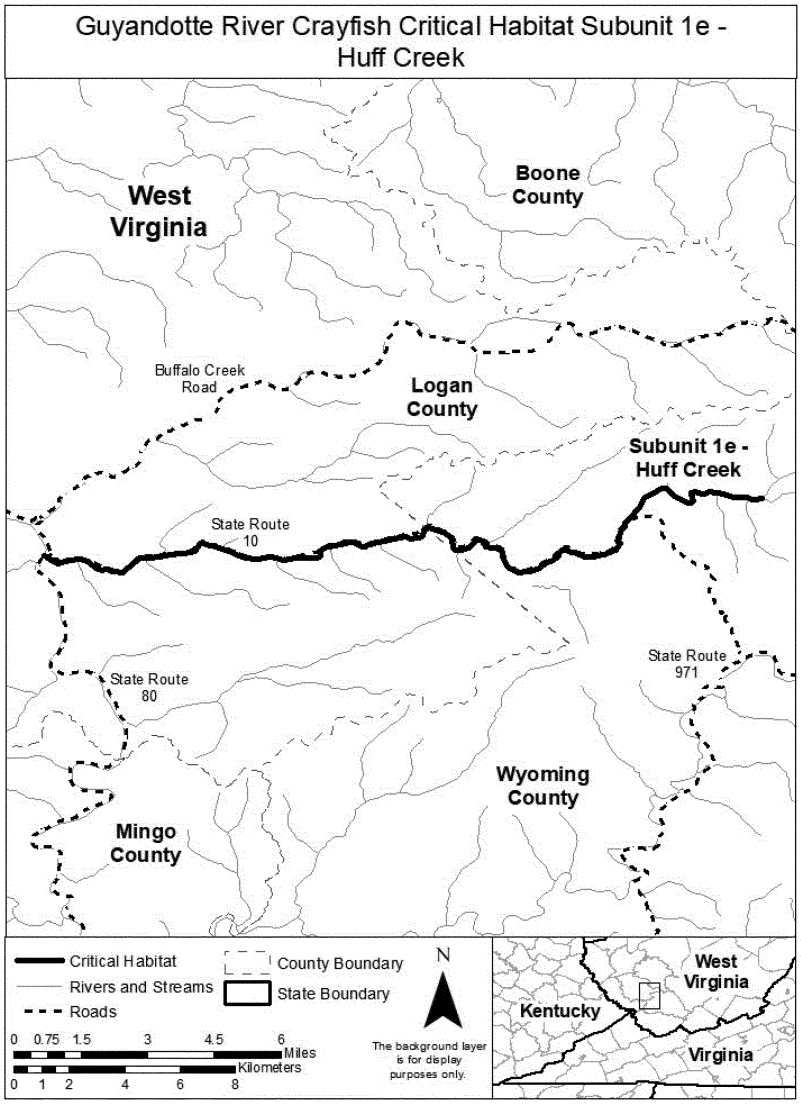


(v) Subunit 1e: Huff Creek, Wyoming and Logan Counties, West Virginia.

(A) Subunit 1e consists of approximately 28.0 skm (17.4 smi) of Huff Creek from its confluence with Straight Fork downstream to its confluence with the Guyandotte River at Huff, West Virginia.

(B) Map of Subunit 1e follows:

Figure 6 to Guyandotte River Crayfish paragraph (6)(v)(B)



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Martha Williams,

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

[FR Doc. 2022–04598 Filed 3–14–22; 8:45 am]

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