DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2019–0098; 4500090023]

RIN 1018–BE19

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

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to designate critical habitat for the Big Sandy crayfish (*Cambarus callainus*) and the Guyandotte River crayfish (*C. veteranus*) under the Endangered Species Act of 1973, as amended (Act). In total, approximately 582 stream kilometers (skm) (362 stream miles (smi)) in Martin and Pike Counties, Kentucky; Buchanan, Dickenson, and Wise Counties, Virginia; and McDowell, Mingo, and Wayne Counties, West Virginia, are proposed as critical habitat for the Big Sandy crayfish. Approximately 135 skm (84 smi) in Logan and Wyoming Counties, West Virginia, are proposed as critical habitat for the Guyandotte River crayfish. If we finalize this rule as proposed, it would extend the Act's protections to these species' critical habitat. We also announce the availability of a draft economic analysis of the proposed designation of critical habitat for these species.

DATES: We will accept comments on the proposed rule or draft economic analysis (DEA) that are received or postmarked on or before March 30, 2020. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by March 13, 2020.

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

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter FWS–R5–ES–2019–0098, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on ''Comment Now!''

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R5–ES–2019–0098, U.S. Fish and Wildlife Service, MS: JAO/1N, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

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

Document availability: This proposed rule and the DEA are available on the internet at *http://www.regulations.gov* at Docket No. FWS–R5–ES–2019–0098, and at the North Atlantic-Appalachian Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

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 *http://www.regulations.gov* at Docket No. FWS–R5–ES–2019–0098, and at the North Atlantic-Appalachian Regional Office (see **FOR FURTHER INFORMATION CONTACT**). Any additional tools or supporting information that we may develop for this critical habitat designation will also be available at the Regional Office set out above, and may also be included in the preamble and/or at *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Martin Miller, Chief, Endangered Species, U.S. Fish and Wildlife Service, North Atlantic-Appalachian Regional Office, 300 Westgate Center Drive, Hadley, MA 01035; telephone 413–253–8615. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the 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 only be completed by issuing a rule.

This rule proposes to designate critical habitat for two species of crayfish, the Big Sandy crayfish and the Guyandotte River crayfish. 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).

The basis for our action. Under the Act, any species that is determined to be an endangered or threatened species shall, to the maximum extent prudent and determinable, have habitat designated that is considered to be critical habitat. 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, the impact on national security, and any other relevant impact of specifying any particular area as critical habitat. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or 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. The Secretary may exclude an area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he 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.

The critical habitat areas we are proposing to designate in this rule constitute our current best assessment of the areas that meet the definition of critical habitat for the Big Sandy and Guyandotte River crayfishes. We propose to designate:

- Approximately 582 stream kilometers (skm) (362 stream miles (smi)) of streams for the Big Sandy crayfish.
- Approximately 135 skm (84 smi) of streams for the Guyandotte River crayfish.

We prepared an economic analysis of the proposed designation of critical habitat. In order to consider economic impacts, we prepared an analysis of the economic impacts of the proposed critical habitat designation. We hereby announce the availability of the draft economic analysis and seek public review and comment.

Peer review. In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), we are seeking comments

from independent specialists to ensure that this critical habitat proposal is based on scientifically sound data and analyses. We have invited these peer reviewers to comment on our specific assumptions and conclusions in this proposal to designate critical habitat. Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal.

Information Requested

Public Comments

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

(1) The reasons why we should or should not designate habitat as ''critical habitat'' under section 4 of the Act (16 U.S.C. 1531 *et seq.*), including information to answer the following questions:

(a) Are the species threatened by taking or other human activity, and would identification of critical habitat be expected to increase the degree of such threat to the species?

(b) Is the present or threatened destruction, modification, or curtailment of a species' habitat or range a threat to the species, or do the threats to the species' habitats stem solely from causes that cannot be addressed through management actions resulting from consultation under section 7(a)(2) of the Act?

(c) Do any areas meet the definition of critical habitat?

(2) Specific information on:

(a) The amount and distribution of Big Sandy crayfish or Guyandotte River crayfish habitat;

(b) What areas, that were occupied at the time of listing (*i.e.,* are currently occupied) and that contain features essential to the conservation of the species, should be included in the designation and why;

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

(d) What areas not occupied at the time of listing are essential for the conservation of the species and why.

We particularly seek comments regarding:

(i) Whether occupied areas are inadequate for the conservation of the species; and

(ii) Specific information that supports the determination that unoccupied areas will, with reasonable certainty, contribute to the conservation of the species and contain at least one physical or biological feature essential to the conservation of the species.

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

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

(5) Information on the extent to which the description of probable economic effects in the draft economic analysis (DEA) is a reasonable estimate of the likely economic effects.

(6) Information on land ownership within proposed critical habitat areas, particularly tribal land ownership (allotments, trust, and/or fee) so that the Service may best implement Secretarial Order 3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act).

(7) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act. Specific information we seek includes information on any conservation plans within the proposed critical habitat areas that provide conservation for the Big Sandy or Guyandotte River crayfishes and their habitats.

(8) The likelihood of adverse social reactions to the designation of critical habitat, as discussed in the associated documents of the DEA, and how the consequences of such reactions, if likely to occur, would relate to the conservation and regulatory benefits of the proposed critical habitat designation.

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

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

Please note also that comments merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that we must make determinations ''solely on the basis of the best scientific and commercial data available.''

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

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

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

Public Hearing

Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified above in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the **Federal Register** and local newspapers at least 15 days before the hearing.

Previous Federal Actions

Federal actions prior to April 7, 2015, are described in the proposed rule to list the Big Sandy crayfish and the Guyandotte River crayfish under the Act (80 FR 18710; April 7, 2015).

On April 7, 2016 (81 FR 20450), we listed the Big Sandy crayfish as a threatened species and the Guyandotte River crayfish as an endangered species. In the April 7, 2015, proposed listing rule (80 FR 18710), we stated that designating critical habitat at that time

was prudent but not determinable. On March 28, 2018, the Service received a notice of intent (NOI) to sue letter from the Center for Biological Diversity (CBD) alleging that the Service failed to designate critical habitat for the Big Sandy crayfish and the Guyandotte River crayfish within the timeframe set forth in the Act. On May 23, 2018, the Service responded to CBD's NOI, explaining that the proposed critical habitat designations for these two species were not currently among the highest priority actions outlined in our 7-year National Listing Workplan and more specific fiscal year 2018 Workplan. On June 20, 2018, CBD filed suit alleging that the Service failed to designate critical habitat within the Act's required timeline (*CBD* v. *Zinke,* No. 2:18–cv–11111 (S.D.W.Va.)). On September 21, 2018, we filed an unopposed motion to stay litigation (No. 2:18–cv–01058 (S.D.W.Va.)) until December 31, 2019. On October 18, 2018, the court granted our motion to stay (No. 2:18–cv–01058 (S.D.W.Va.)).

Background

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

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

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

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

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

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

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

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public to access private lands or 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 consultation requirements of section 7(a)(2) of the Act would apply, but even in the event of a destruction or adverse modification finding, the obligation of the Federal action agency and the landowner is not to restore or recover the species, but to 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 within an area, we focus on the specific features that 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 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 from the species status assessment (SSA) report, if available, and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by states and counties; scientific surveys

and studies; biological assessments; other published 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 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) section 9 of the Act's prohibitions on taking any individual of the species, including taking caused by actions that affect habitat. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of this species. Similarly, critical habitat designations made on the 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.

Prudency Determination

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that the Secretary shall designate critical habitat at the time a species is determined to be an endangered or threatened species, to the maximum extent prudent and determinable. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances:

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

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

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

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

(v) After analyzing the best scientific data available, the Secretary otherwise determines that designation of critical habitat would not be prudent.

We did not identify any of the factors above to apply to the Big Sandy crayfish or the Guyandotte River crayfish. Therefore, we find that designation of critical habitat is prudent for both the Big Sandy crayfish and the Guyandotte River crayfish.

Critical Habitat Determinability

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

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

(ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ''critical habitat.''

As we discussed in the proposed rule (80 FR 18710; April 7, 2015) and in accordance with 16 U.S.C. 1533(b)(6)(C)(ii)), we concluded that critical habitat was not determinable at that time because we were seeking additional information on the Big Sandy and Guyandotte River crayfishes, but that we would make a critical habitat determination no later than 1 year following publication of the final listing rule. We have since received and reviewed additional data on the biological needs of these species and the habitat characteristics where they are located. This and other information represent the best scientific data available and lead us to conclude that the designation of critical habitat is determinable for the Big Sandy and the Guyandotte River crayfishes.

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 within the geographical area occupied by the species at the time of listing to designate as critical habitat, we consider the physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. These include, but are not limited to:

(1) Space for individual and population growth and for normal behavior;

(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;

(3) Cover or shelter;

(4) Sites for breeding, reproduction, or rearing (or development) of offspring; and

(5) Habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a 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. We derived the specific physical or biological features 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 species' proposed and final listing rules (80 FR 18710, April 7, 2015; 81 FR 20450, April 7, 2016, respectively). The primary habitat elements that influence resiliency of these species include, but are not limited to, the degree of sedimentation, water quality thresholds, and extent of habitat connectedness.

Summary of Essential Physical or Biological Features

We derived the specific physical or biological features 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 species' proposed and final listing rules (80 FR 18710, April 7, 2015; 81 FR 20450, April 7, 2016, respectively), and 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 are opportunistic omnivores, with seasonal-mediated tendencies for animal or plant material (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 crayfish 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). 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 an abundance of 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 creates unsuitable 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 physical and biological features (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 physical and biological features 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 physical and biological features 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; and (5) other sources of non-point source pollution. 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; and reduction of other watershed and floodplain disturbances that contribute excess sediments or pollutants into the water.

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 proposing to designate 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 proposing to designate 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. Proposed critical habitat includes the water and stream channel up to the ordinary high water mark as defined at 33 CFR 329.11.

The current distribution of both the Big Sandy and the Guyandotte River crayfishes is fragmented and much reduced from their historical distributions. 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 proposed critical habitat designation include crayfish survey and habitat assessment reports (Jezerinac *et al.* 1995, entire; Channell 2004, entire; Taylor and Shuster 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 propose to designate 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 propose to designate 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 do 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, and survey data collected between 2009 and 2015 indicate that this area has low crayfish numbers. This small, isolated population is at risk of extirpation from demographic and environmental stochasticity, and a catastrophic event. The Clear Fork population occurs along a 33-skm (22-smi) stream reach, and surveys from 2015 indicate several sites with ''robust'' crayfish numbers. 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 are proposing 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 proposed unoccupied subunits, Huff Creek, is isolated from the other units by the R.D. Bailey dam, but provides for increased overall redundancy of the species and adds 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 proposed unoccupied subunits advance this goal. All three subunits have at least one of the physical or biological features essential to the conservation of the species. 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 and 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. In addition, the Service, West Virginia Department of Natural Resources, Virginia Department of Game and Inland Fisheries, 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 and 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 the preliminary recovery goals identified in the recovery outline of increasing the Guyandotte River crayfish's resiliency, redundancy and representation. Bolstering the species' viability will reduce the species' risk of extinction.

General Information on the Maps of the Proposed Critical Habitat Designation

The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the proposed critical habitat designation in the discussion of individual units and subunits, below. We will make the coordinates or plot points or both on which each map is based available to the public on *http://www.regulations.gov* under Docket No. FWS–R5–ES–2019–0098, and at the North Atlantic-Appalachian Regional Office (see **FOR FURTHER INFORMATION CONTACT**, above). When determining proposed 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 physical or biological features 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 proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation under the Act with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or

biological features in the adjacent critical habitat.

Under §§ 424.12(b)(1) and (2) of the implementing regulations, the Service determines the appropriate scale for designating critical habitat. This is further clarified in the final rule titled, ''Implementing Changes to the Regulations for Designating Critical Habitat'' (81 FR 7414; February 11, 2016; see Discussion of Changes to Part 424 in that rule): The Service ''cannot and need not make determinations at an infinitely fine scale.'' Thus, the Service need not determine that each square inch, square yard, acre, or even square mile independently meets the definition of ''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, we propose that 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 physical and biological features (*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 physical and biological features, at least to some minimal degree, for these species to survive, and because these physical and biological features 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 likely 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). The evidence also indicates that some individuals, especially newly independent juveniles, may be passively dispersed to downstream locations by swiftly flowing water (Loughman 2019).

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 proposed as critical habitat may not contain all of the physical and biological features 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 propose to 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 physical and biological features to support the life-history processes essential to the conservation of the Big Sandy crayfish and the Guyandotte River crayfish. Additionally, for the Guyandotte River crayfish, we propose to 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 propose 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 (the time of listing). For the Guyandotte River crayfish, we also delineated three stream segments as unoccupied critical habitat.

(2) Upstream termini of proposed 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 there are data suggesting the physical and biological features required by the species are absent in the intervening segment.

(4) We describe the proposed 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, proposed 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 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 proposed 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. 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 the purposes of our economic analysis, we describe ownership of proposed critical habitat units/subunits based on the identification of the adjacent riparian landowner(s) (*i.e.,* private, Federal, or State entity).

Proposed Critical Habitat Designation

For the Big Sandy crayfish, we propose to 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 are considered occupied at the time of listing and represent the entire known range of the species and all 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 propose to designate any unoccupied critical habitat for the species. The proposed units constitute our best assessment of areas that meet the definition of critical habitat for the Big Sandy crayfish.

TABLE 1—PROPOSED 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	Buchanan, Dickenson	Yes	8.4	5.2
	g	McClure River	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 proposed critical habitat.

TABLE 2—LAND OWNERSHIP ADJACENT TO PROPOSED CRITICAL HABITAT UNITS FOR THE BIG SANDY CRAYFISH

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 propose to designate approximately 135 skm (84 smi) in one unit, consisting of five subunits, in West Virginia as critical habitat. Approximately 67 skm (41 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 propose to designate approximately 68 skm (42 smi) in three subunits as unoccupied critical habitat (see table 3, below). The proposed subunits constitute our best assessment of areas that meet the definition of critical habitat for the Guyandotte River crayfish.

TABLE 3—PROPOSED 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 proposed critical habitat.

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

Critical habitat unit	Federal		State/local		Private		Total	
	skm	smi	skm	smi	skm	smi	skm	smi
Unit 1:								
Occupied	0	0	6	4	60	38	67	41
Unoccupied	0	0	16	10	52	32	68	42
Grand Total GRC	0	0	23	14	112	70	135	84

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.

Big Sandy Crayfish

Unit 1: Dismal Creek, Buchanan County, Virginia

This unit includes approximately 29.2 stream kilometers (skm) (18.1 stream miles (smi)) of Dismal Creek in the Upper Levisa Fork watershed. The threats within this 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 non-point source pollution. The upper limit 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. 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. 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. 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. 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 the 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 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 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 basin, 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 subunit extends from the confluence of Hurricane Creek and Gilbert Branch 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). The USGS topographic maps and aerial imagery (ESRI) indicate the Hurricane Creek watershed is 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 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 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 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, Buchanan and Dickenson Counties, Virginia

This 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 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)). The McClure River and Creek section extends from the confluence of McClure Creek and Wakenva Branch downstream to the confluence of McClure River and Russell Fork. Recent surveys of the McClure River indicated an often 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 appears to be 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 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 were 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 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 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 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 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 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 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 basin. 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 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, and 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 creek. 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 non-point source pollution.

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

Subunit 4a includes approximately 117.8 skm (73.2 smi) of the Tug Fork mainstem in two disjunct 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 Bull Creek downstream to the confluence of Tug Fork and Little Elk 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 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 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 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 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 issues 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 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. 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 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

Unit 1: Upper Guyandotte

We propose to designate a single critical habitat unit (Unit 1), consisting of five subunits, for the Guyandotte River crayfish. 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 non-point source pollution. In addition, subunits 1a and 1e may need special management consideration from the threat of ORV use. The subunits are described below.

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

This 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 creek. 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 at five sites in the upper portion of the creek, with the bottom substrate being characterized as gravel, with unembedded cobbles, small boulders, and isolated slab boulders. 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 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

Because we have determined occupied areas 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 and identified this area as essential for the conservation of the species. 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 physical or biological features (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 potential habitat for the Guyandotte River crayfish and thereby increasing 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 proposed unoccupied critical habitat subunit at Indian Creek (Subunit 1d, described below).

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

Because we have determined occupied areas 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 and identified this area as essential for the conservation of the species. 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 physical or biological features 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

Because we have determined occupied areas 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 and identified this area as essential for the conservation of the species. 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 physical or biological features 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. While 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.

Effects of Critical Habitat Designation

Section 7 Consultation

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

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

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

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

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

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

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

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

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

(3) Are economically and technologically feasible, and

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

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

Regulations at 50 CFR 402.16 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 ''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 destroy or adversely modify 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 geographical 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 (DoD) lands with a completed INRMP within the proposed 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 he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he 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.

The first sentence in section 4(b)(2) of the Act requires that we take into consideration the economic, national security, or other relevant impacts of designating any particular area as critical habitat. 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 proposed 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 (Industrial Economics, Incorporated (IEc) 2019, entire). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out the geographic areas in which the critical habitat designation is unlikely to result

in probable 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. The screening analysis filters out particular areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. 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. The screening analysis also assesses whether units/subunits are unoccupied by the species and may require additional management or conservation efforts as a result of the critical habitat designation for the species which may incur incremental economic impacts. This screening analysis combined with the information contained in our IEM are what we consider our draft economic analysis of the proposed critical habitat designation for the Big Sandy and Guyandotte River crayfishes and is summarized in the narrative below.

Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O. regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient data are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts that may result from the proposed 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. If we finalize this proposed critical habitat designation, 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 proposing to designate 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 proposed 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 impact of critical habitat designation that we anticipate is the small administrative effort 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 are projected to be relatively minor, ranging from $30,000 to $60,000 in the year of implementation.

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

As stated in the DEA (IEc 2019, p. 1), 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 proposed 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. 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. The total additional administrative cost of addressing adverse modification in these new and existing consultations is not expected to exceed $860,000 to $920,000, 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 range from $30,000 to $60,000 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 proposed 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 proposed 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. Proposed 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. Because proposed 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 surface mines.

As we stated earlier, we are soliciting data and comments from the public on the DEA, as well as all aspects of this proposed rule and our required determinations. We may revise the proposed rule or supporting documents to incorporate or address information we receive during the public comment period. In particular, we may exclude an area from critical habitat if we determine that the benefits of excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.

During the development of a final designation, we will consider any additional economic impact information we receive during the public comment period (see **DATES**, above), and 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.

Consideration of National Security Impacts

Section 4(a)(3)(B)(i) of the Act may not cover all DoD lands or areas that pose potential national-security concerns (*e.g.,* a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i) of the Act, national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ''critical habitat.'' Nevertheless, when designating critical habitat under section 4(b)(2) of the Act, the Service must consider impacts on national security, including homeland security, on lands or areas not covered by section 4(a)(3)(B)(i) of the Act. Accordingly, we will always consider for exclusion from the designation areas for which DoD, Department of Homeland Security (DHS), or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns.

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

In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for the Big Sandy and the Guyandotte River crayfishes are not owned or managed by DoD or DHS, and, therefore, we anticipate no impact on national security. Consequently, the Secretary is not intending to exercise his discretion to exclude any areas from the final designation based on impacts on national security unless we receive new information on such impacts during the public comment period.

Consideration of Other Relevant Impacts

We have not considered any areas for exclusion from critical habitat. As explained above, there are no DoD or national security impacts, and as described below, there are no Tribal trust impacts associated with the proposed designation. However, the final decision on whether to exclude any areas will be based on the best scientific data available at the time of the final designation, including information obtained during the comment period and information about the economic impact of designation. Accordingly, we have prepared a draft economic analysis (DEA) concerning the proposed critical habitat designation, which is available for review and comment (see **ADDRESSES**, above).

Exclusions

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and

impacts on national security. We consider a number of factors including whether there are permitted conservation plans covering the species in the area, such as habitat conservation plans (HCPs), safe harbor agreements, or candidate conservation agreements with assurances, or whether there are non-permitted 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 proposal, we have determined that there are currently no HCPs or other management plans for the Big Sandy or Guyandotte River crayfishes, and the proposed designation does not include any tribal lands or trust resources. We anticipate no impact on tribal lands, partnerships, or HCPs from this proposed critical habitat designation.

During the development of a final designation, we will consider any information currently available or received during the public comment period regarding the economic, national security, or other relevant impacts of the proposed designation and will determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 424.19.

Required Determinations

Clarity of the Rule

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

(1) Be logically organized;

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

(3) Use clear language rather than jargon;

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

(5) Use lists and tables wherever possible.

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

Regulatory Planning and Review (Executive Orders 12866 and 13563)

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

Executive Order (E.O.) 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. To determine if 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.

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

In summary, we have considered whether the proposed designation would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if adopted, the proposed critical habitat designation

would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.

Executive Order 13771

This proposed rule is not an E.O. 13771 (''Reducing Regulation and Controlling Regulatory Costs'') (82 FR 9339, February 3, 2017) regulatory action because this rule is not significant under E.O. 12866.

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 proposed 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 draft economic analysis (DEA), we do not find that the designation of this proposed critical habitat would significantly affect energy supplies, distribution, or use. As discussed in the DEA, the costs associated with consultations related to occupied critical habitat would be largely administrative in nature and the costs associated with the two mining projects in unoccupied critical habitat are estimated not to exceed $60,000 per year (IEc 2019, pp. 1, 14–15). The full cost of the entire proposed designation is not expected to exceed $920,000 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. However, we will further evaluate this issue as we conduct our economic analysis, and review and revise this assessment as warranted.

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

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

(2) We do not believe that this rule would significantly or uniquely affect small governments. The waters we are proposing to designate as critical habitat are owned by the States of Kentucky, Virginia, and West Virginia. None of these government entities fits the definition of ''small governmental 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 proposed rule does not have significant federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this proposed critical habitat designation with, appropriate State resource agencies in Kentucky, Virginia, and West Virginia. 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 would 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 or 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 propose designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the elements of physical or biological features essential to the conservation of the species. The designated areas of critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.

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

This rule does not contain any new collections of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). An agency may not conduct or sponsor, and a person is 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 proposing to designate critical habitat for the Big Sandy or Guyandotte River crayfishes on tribal lands.

References Cited

A complete list of references cited in this proposed rule is available on the internet at *http://www.regulations.gov* and upon request from the North Atlantic–Appalachian Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed 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.

Proposed Regulation Promulgation

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

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

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

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

■ 2. Amend § 17.11(h) by 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				

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
*	*	*	*	*
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*)'' in the same order that these species appear in the table at § 17.11(h) 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, fishes, and plant matter (*e.g.,* leaf litter, algae, detritus).

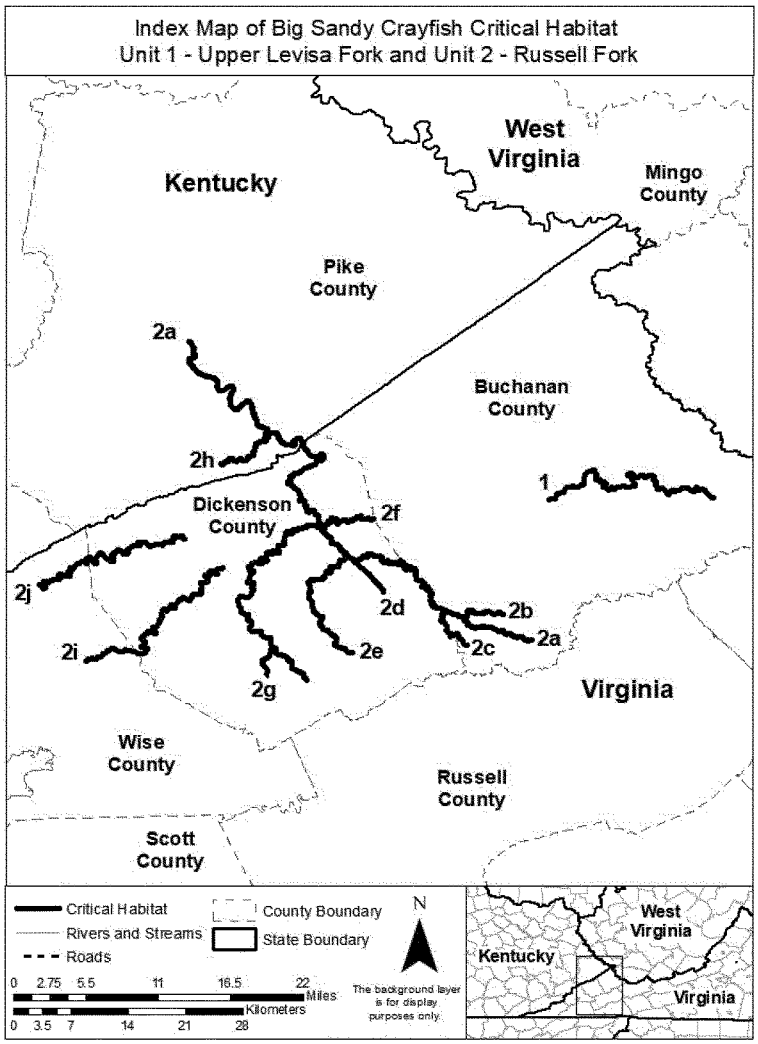
(v) Aquatic habitats protected from riparian and instream activities that degrade the physical and biological features described in paragraphs (2)(i) through (iv) of this entry or cause physical (*e.g.,* crushing) injury or death to individual Big Sandy crayfish.

(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 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 the effective date of this rule.

(4) *Critical habitat map units.* 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 *http://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.

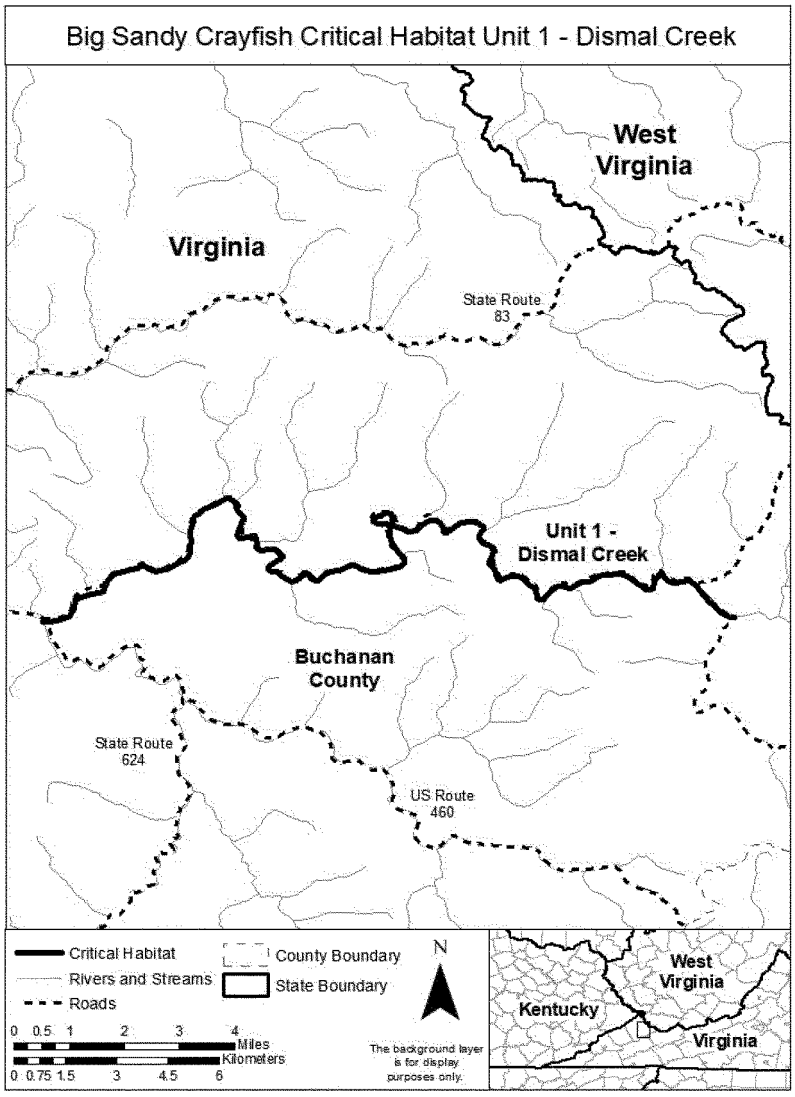
(5) **Note:** Index map of Units 1 and 2 follows:



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

(i) *General description:* Unit 1 includes approximately 29.2 stream kilometers (skm) (18.1 stream miles (smi)) of Dismal Creek from its confluence with Laurel Fork (37.234458, −81.862347) downstream to its confluence with Levisa Fork (37.233465, −82.043663) in Buchanan County, Virginia.

(ii) Map of Unit 1 follows:

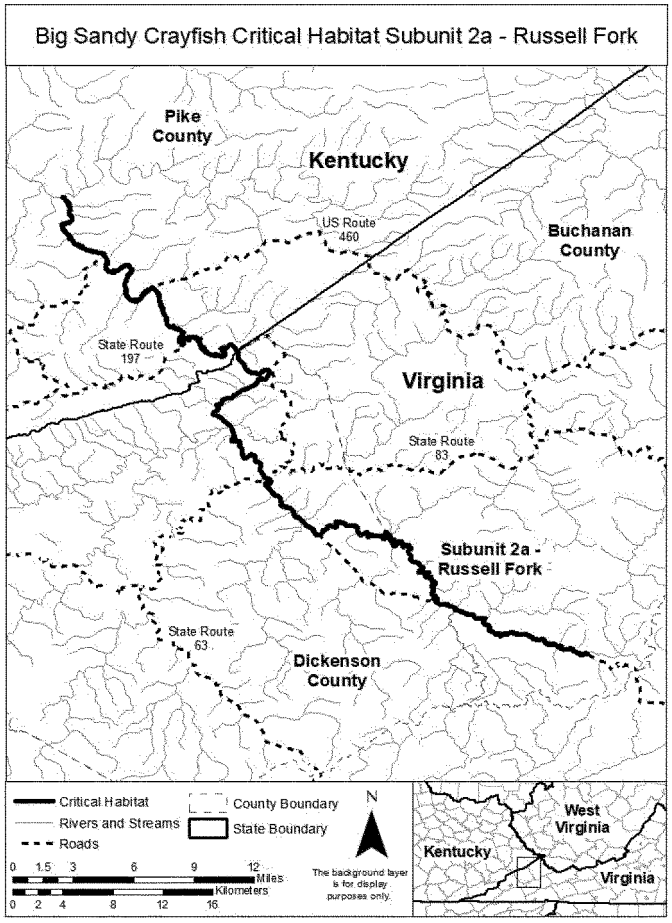

Big Sandy Crayfish Critical Habitat Unit 1 - Dismal Creek
West Virginia
Virginia
State Route 83
Unit 1 - Dismal Creek
Buchanan County
State Route 624
US Route 460
Critical Habitat
Rivers and Streams
Roads
County Boundary
State Boundary
N
0 0.5 1 2 3 4
Miles
Kilometers
0 0.75 1.5 3 4.5 6
The background layer is for display purposes only.
West Virginia
Kentucky
Virginia

(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) *General description:* Subunit 2a consists of approximately 83.8 skm (52.1 smi) of Russell Fork from its confluence with Ball Creek at Council, Virginia (37.077889, −82.062759), downstream to its confluence with Levisa Fork at Levisa Junction, Kentucky (37.407259, −82.439904).

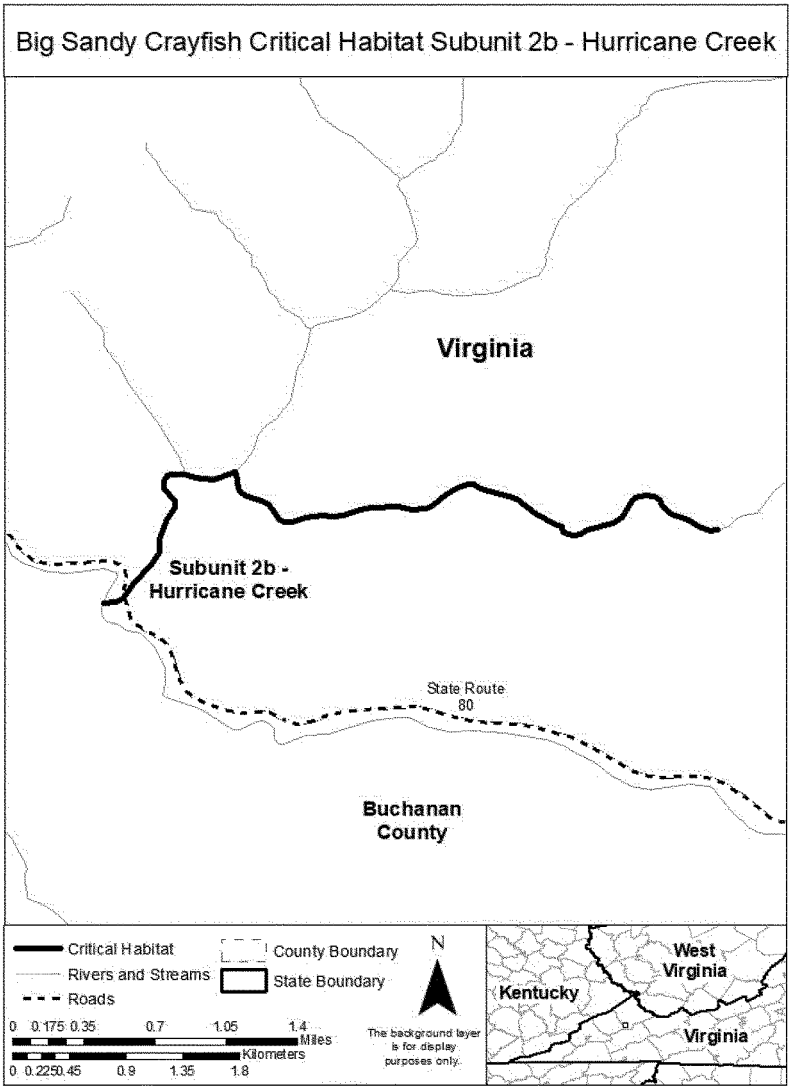
(B) Map of Subunit 2a follows:



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

(A) *General description:* Subunit 2b consists of approximately 5.9 skm (3.7 smi) of Hurricane Creek from its confluence with Gilbert Branch (37.106350, −82.0939999) downstream to its confluence with Russell Fork at Davenport, Virginia (37.101311, −82.137719).

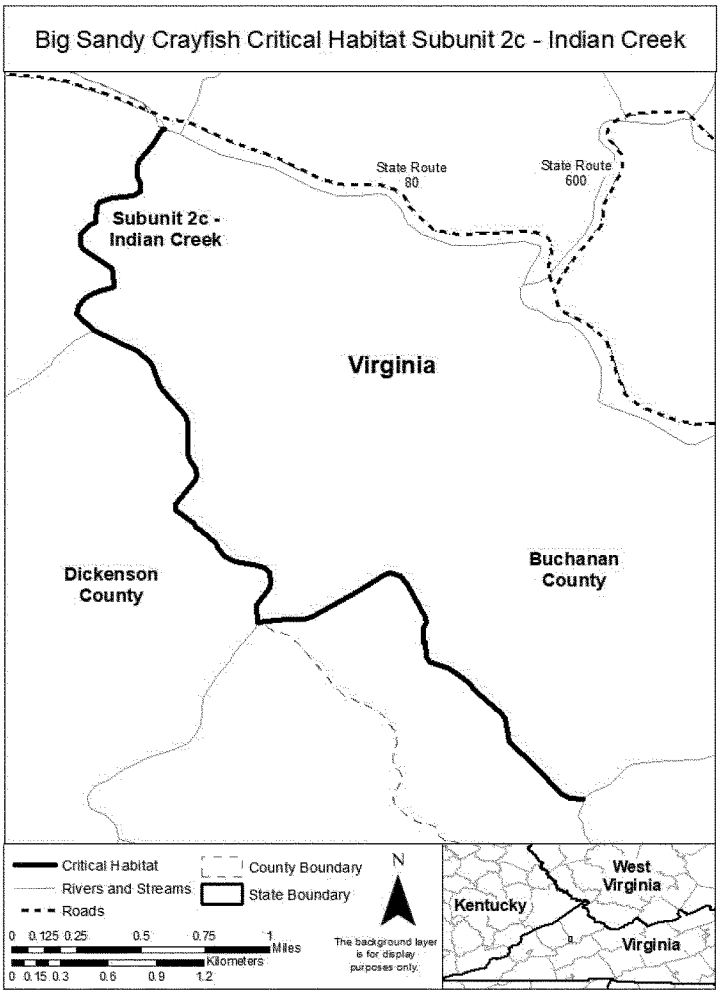
(B) Map of Subunit 2b follows:



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

(A) *General description:* Subunit 2c consists of approximately 7.4 skm (4.6 smi) of Indian Creek from its confluence with Three Forks in Buchanan County, Virginia (37.072393, −82.134788), downstream to its confluence with Russell Fork in Buchanan and Dickenson Counties, Virginia (37.109915, −82.157881).

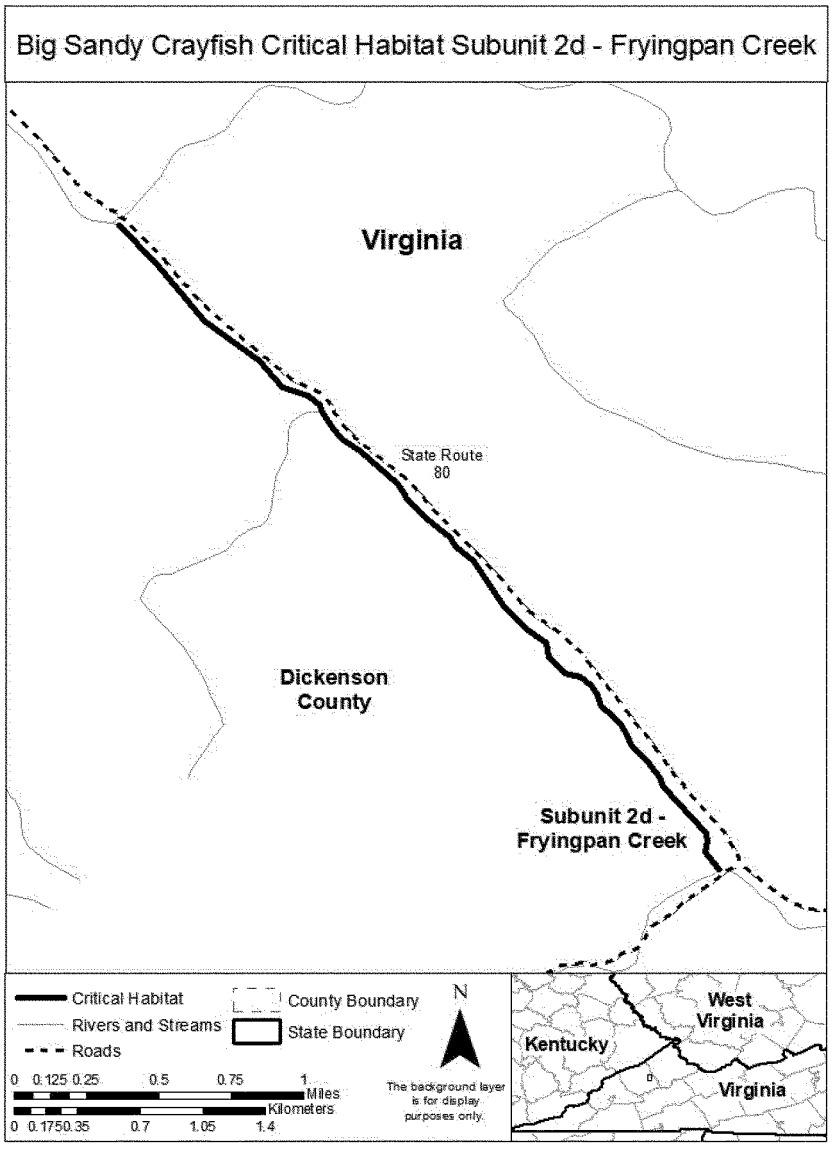
(B) Map of Subunit 2c follows:



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

(A) *General description:* Subunit 2d consists of approximately 4.6 skm (2.9 smi) of Fryingpan Creek from its confluence with Priest Fork (37.068649, −82.214330) downstream to its confluence with Russell Fork (37.163426, −82.255683).

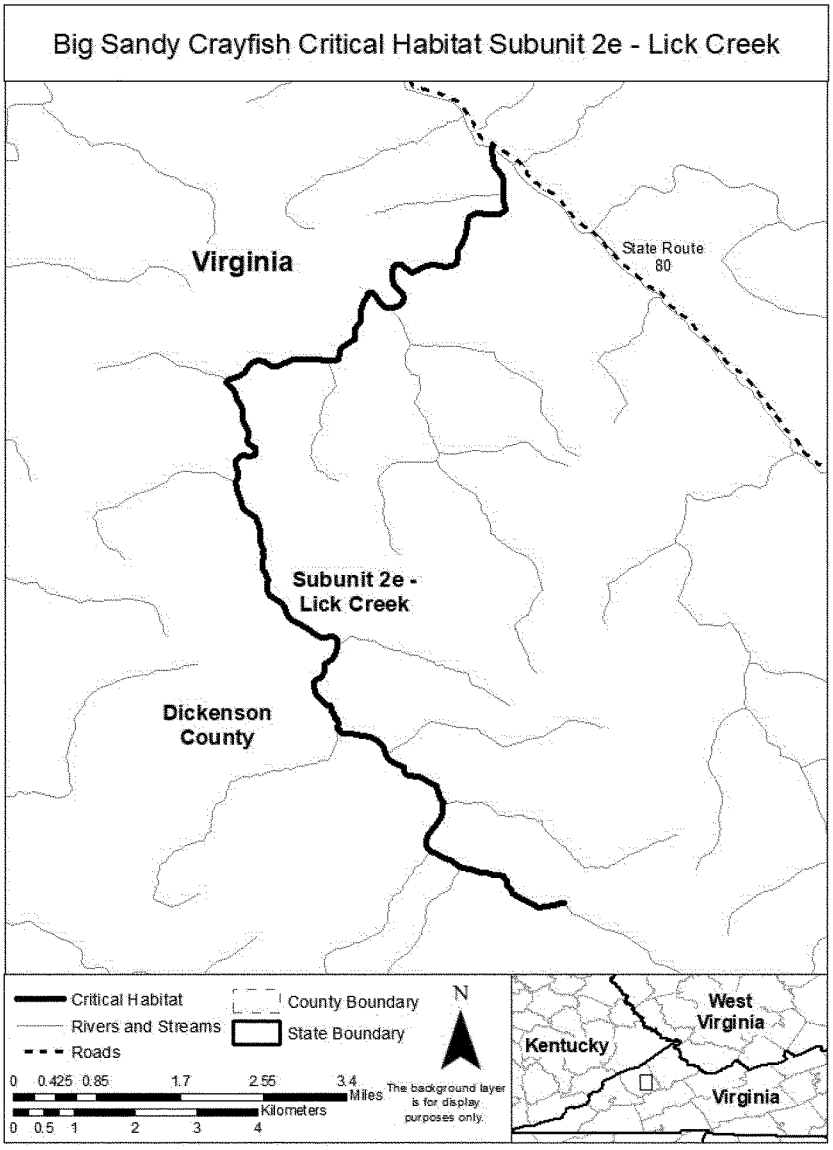
(B) Map of Subunit 2d follows:



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

(A) *General description:* Subunit 2e consists of approximately 16.2 skm (10.1 smi) of Lick Creek from its confluence with Cabin Fork near Aily, Virginia (37.89885, −82.293036), downstream to its confluence with Russell Fork at Birchfield, Virginia (37.176104, −82.270633).

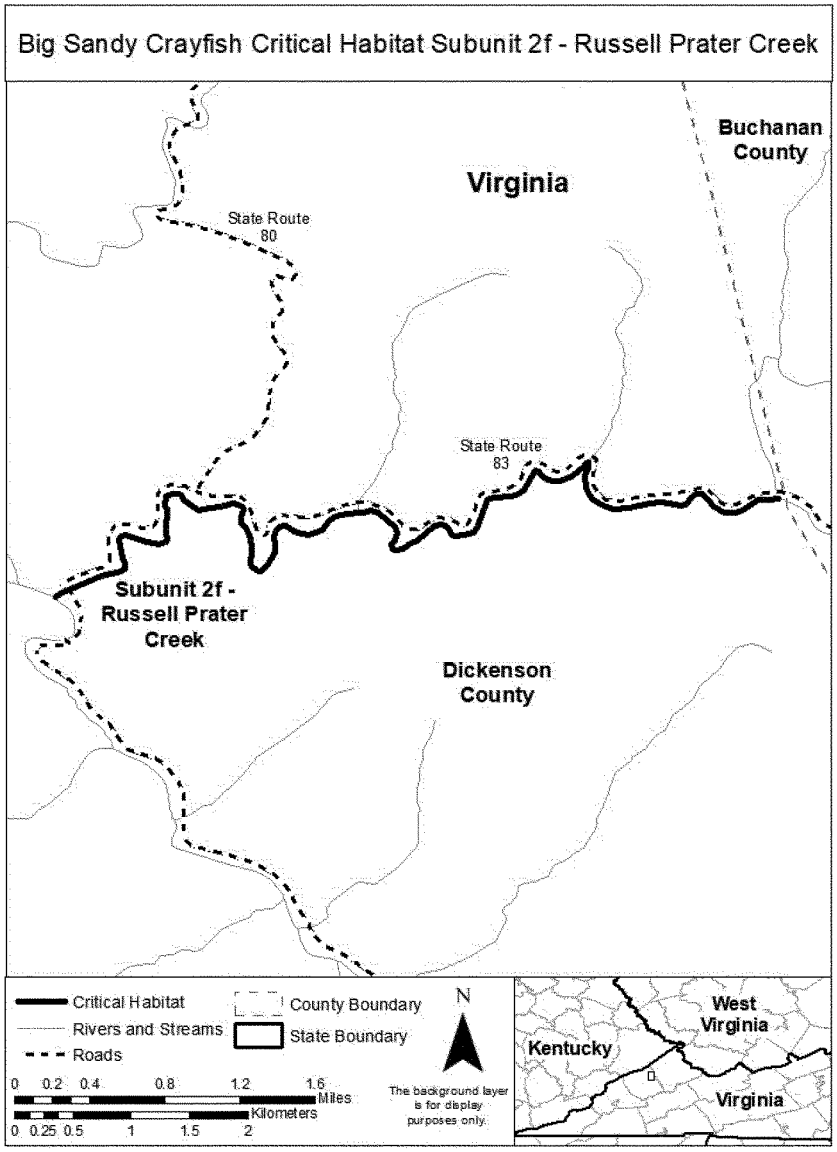
(B) Map of Subunit 2e follows:



(vi) Subunit 2f: Russell Prater Creek, Buchanan and Dickenson Counties, Virginia.

(A) *General description:* Subunit 2f consists of approximately 8.4 skm (5.2 smi) of Russell Prater Creek from its confluence with Greenbrier Creek (37.211915, −82.236479) downstream to its confluence with Russell Fork at Haysi, Virginia (37.204347, −82.291918).

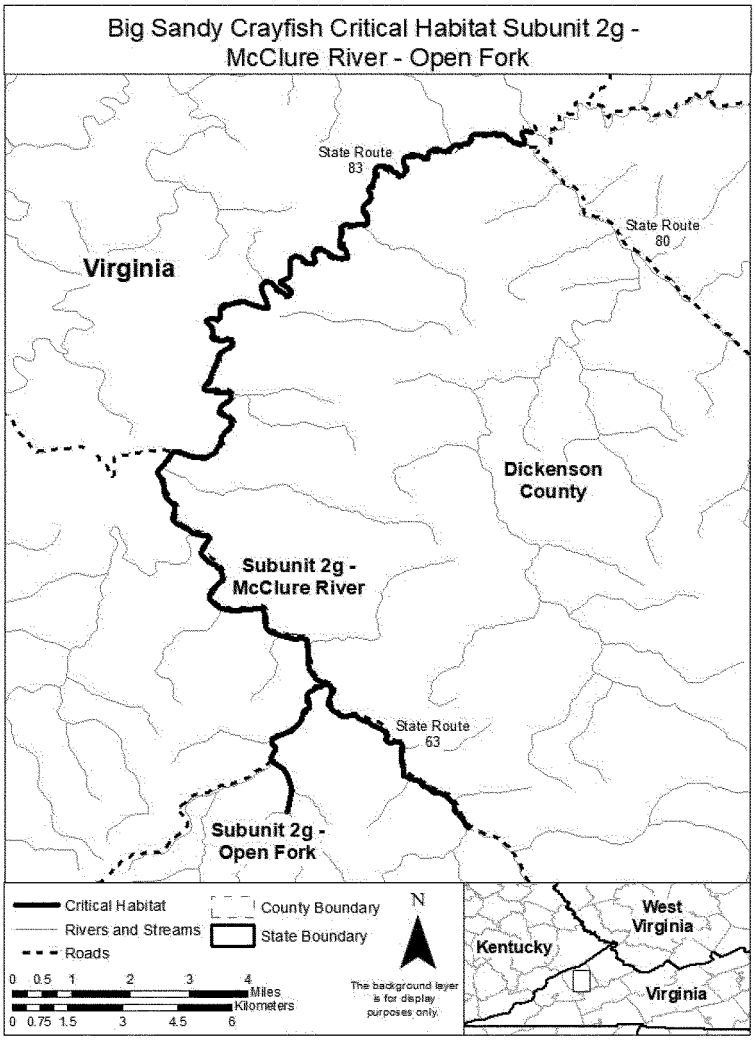
(B) Map of Subunit 2f follows:



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

(A) *General description:* 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 Wakenva Branch (37.034201, −82.311081) downstream to the confluence of McClure River and Russell Fork (37.205175, −82.295412); and approximately 4.9 km (3.0 mi) of Open Fork from the confluence of Middle Fork Open Fork and Coon Branch (37.038336, −82.355402) downstream to the confluence of Open Fork and McClure Creek at Nora, Virginia (37.069451, −82.346317).

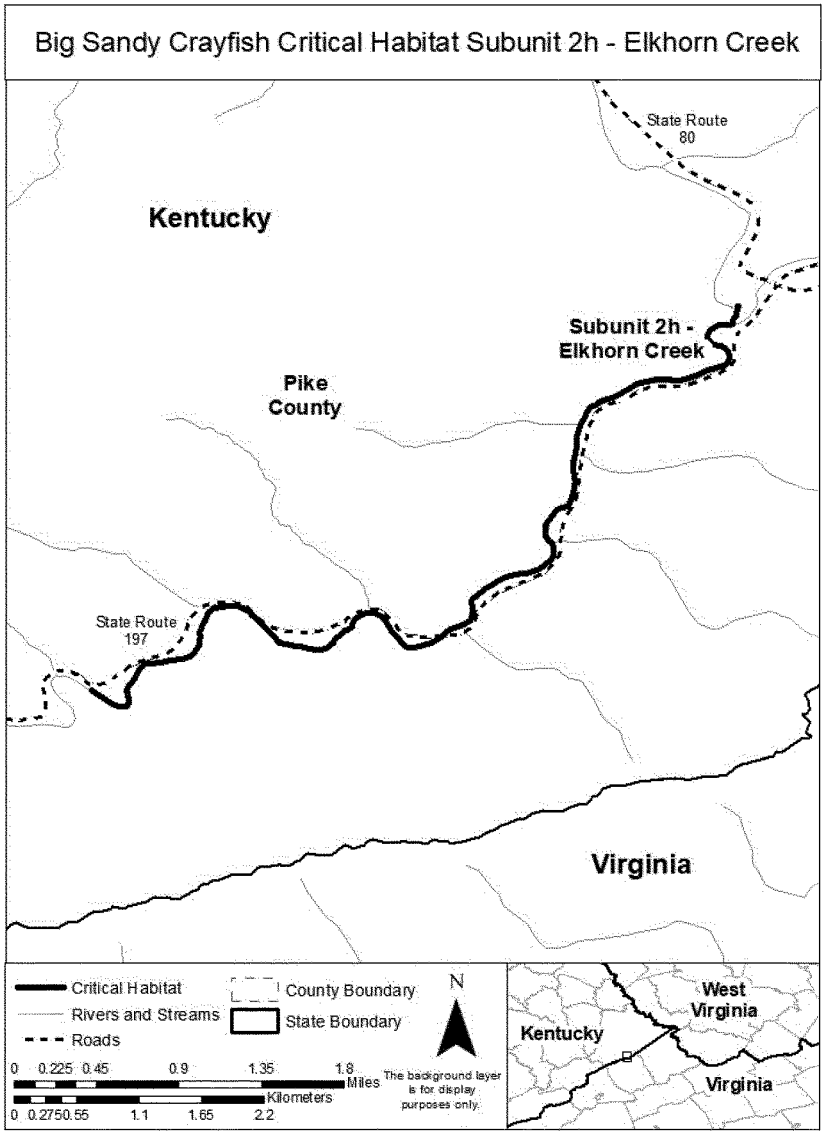
(B) Map of Subunit 2g follows:



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

(A) *General description:* Subunit 2h consists of approximately 8.5 skm (5.3 smi) of Elkhorn Creek from its confluence with Mountain Branch (37.271984, −82.405623) downstream to its confluence with Russell Fork at Elkhorn City, Kentucky (37.302386, −82.354708).

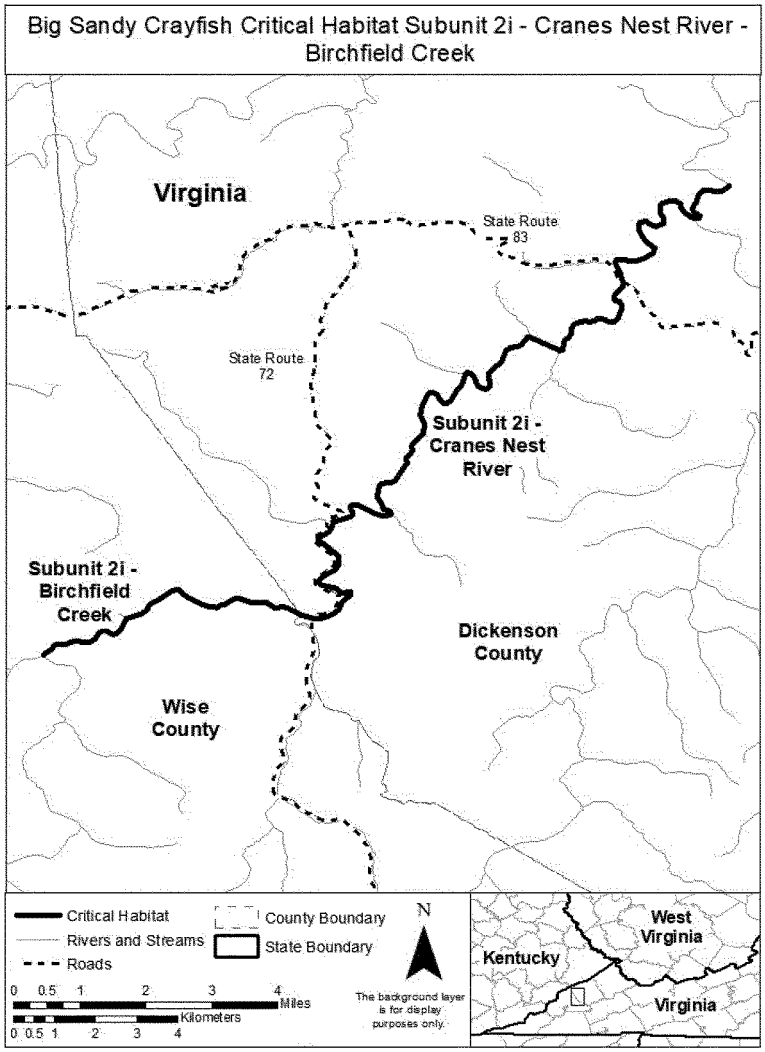
(B) Map of Subunit 2h follows:



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

(A) *General description:* Subunit 2i consists of approximately 24.6 skm (19.0 smi) of the Cranes Nest River from its confluence with Birchfield Creek (37.065100, −82.496553) downstream to its confluence with Lick Branch (37.158007, −82.402839) and approximately 6.9 skm (4.3 smi) of Birchfield Creek from its confluence with Dotson Creek (37.055320, −82.552734) downstream to its confluence with Cranes Nest River (37.063510, −82.496553).

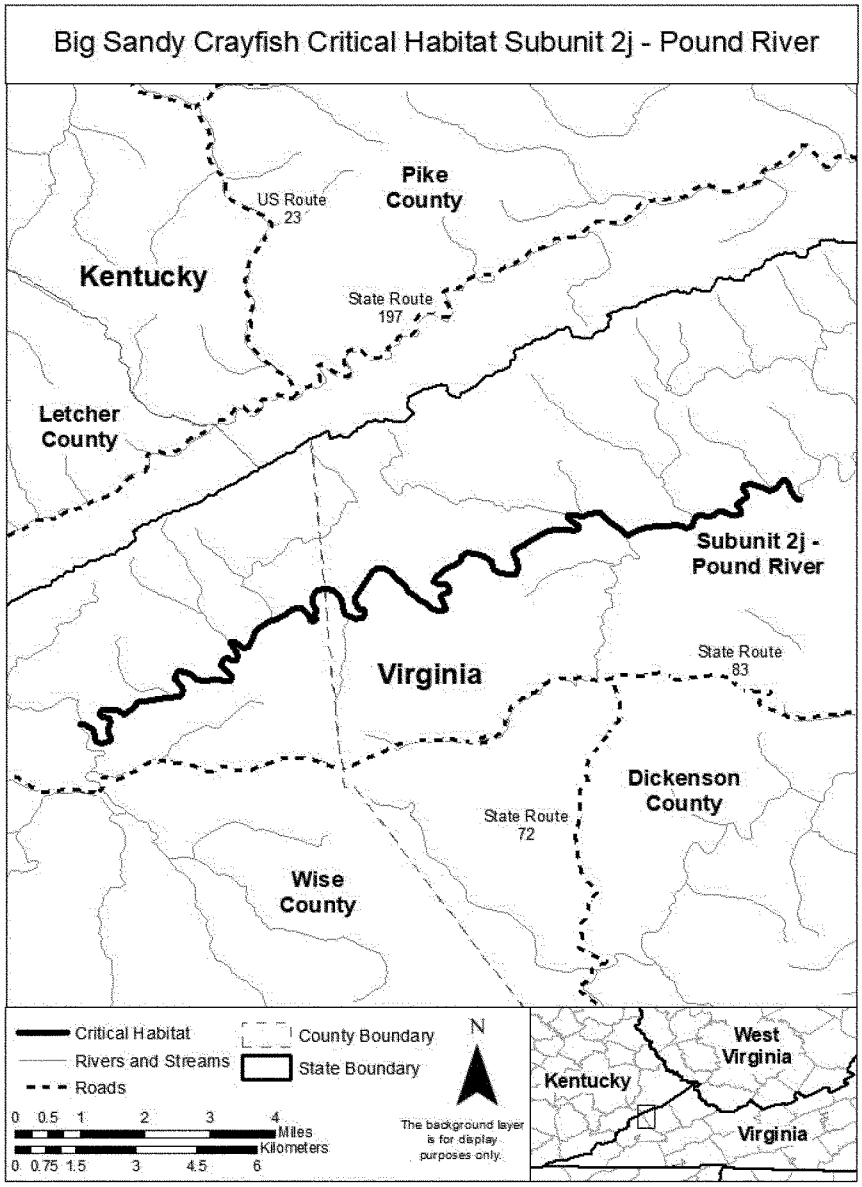
(B) Map of Subunit 2i follows:



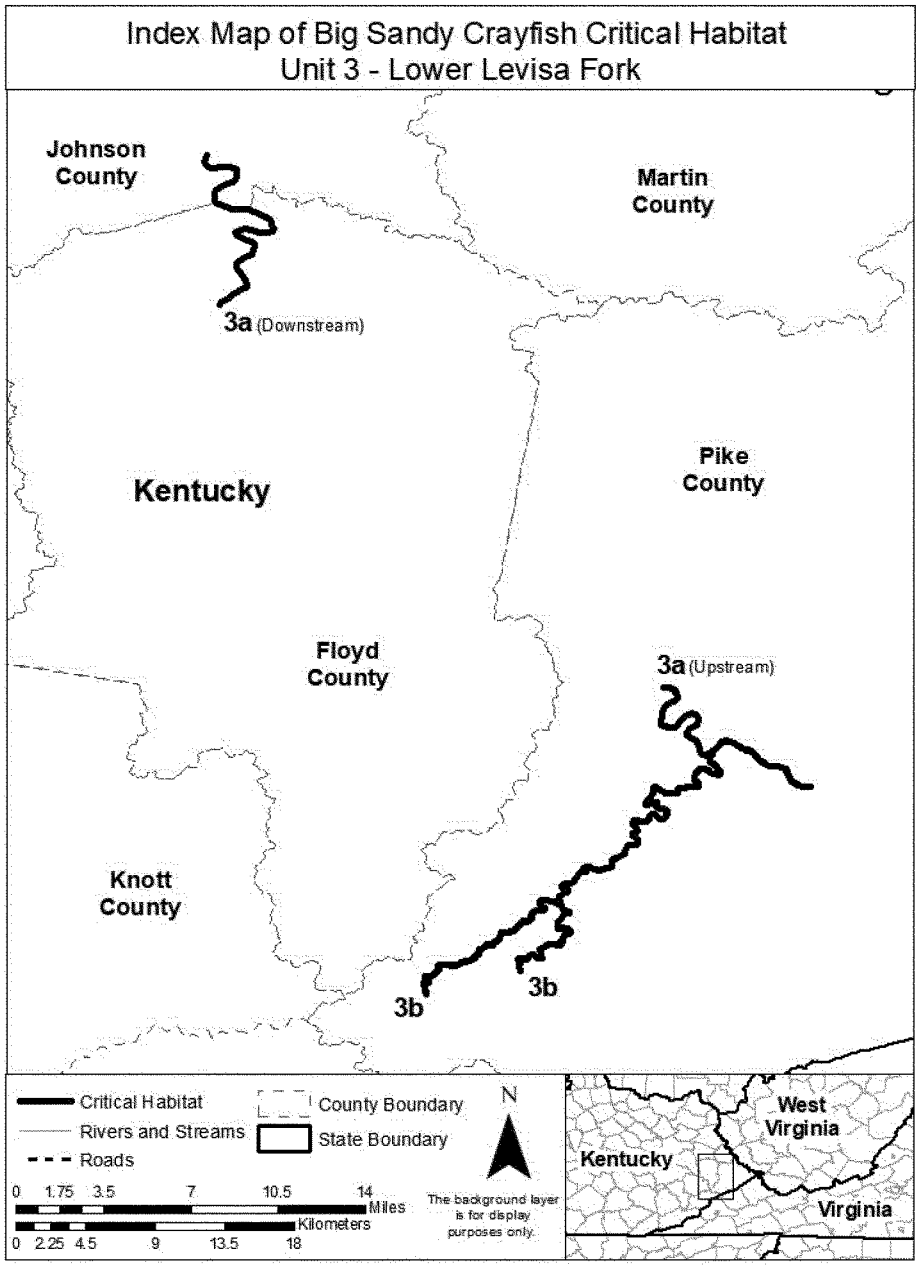
(x) Subunit 2j: Pound River, Dickenson and Wise Counties, Virginia.

(A) *General description:* Subunit 2j consists of approximately 28.5 skm (17.7 smi) of the Pound River from its confluence with Bad Creek (37.391300, −82.605201) downstream to the confluence of the Pound River and Jerry Branch (37.189207, −82.444613).

(B) Map of Subunit 2j follows:



(8) **Note:** Index map of Unit 3 follows:

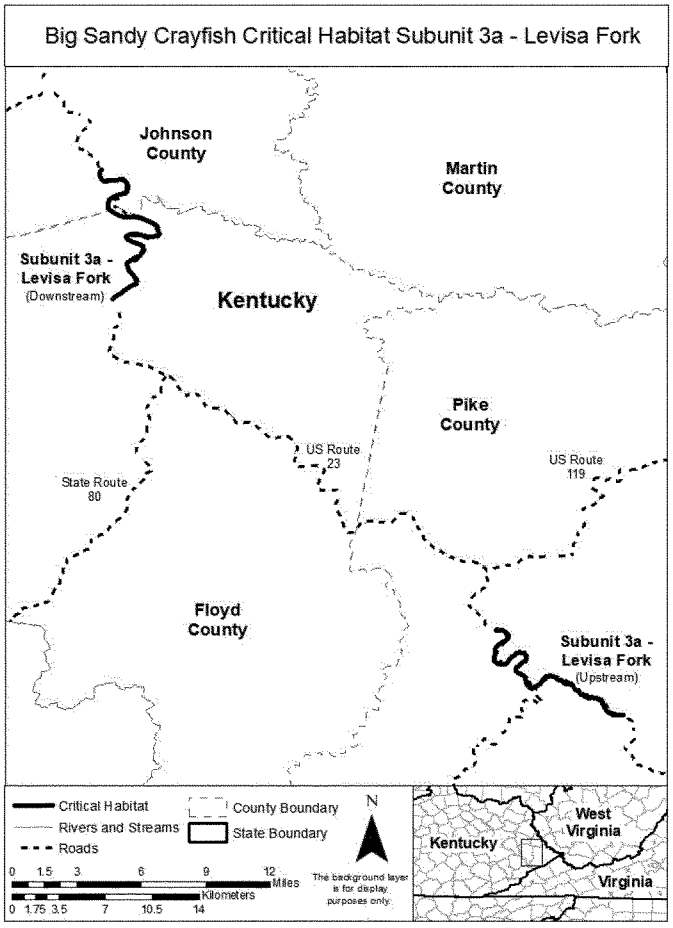


(9) Unit 3: Lower Levisa Fork—Floyd, Johnson, and Pike Counties, Kentucky.

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

(A) *General description:* Subunit 3a consists of approximately 15.9 km (9.9 mi) of Levisa Fork from its confluence with Russell Fork at Levisa Junction, Kentucky (37.407259, −82.439904), downstream to its confluence with Island Creek at Pikeville, Kentucky (37.464506, −82.525588); and 17.5 skm (10.9 smi) of Levisa Fork from its confluence with Abbott Creek (37.687149, −82.783021) downstream to its confluence with Miller Creek at Auxier, Kentucky.

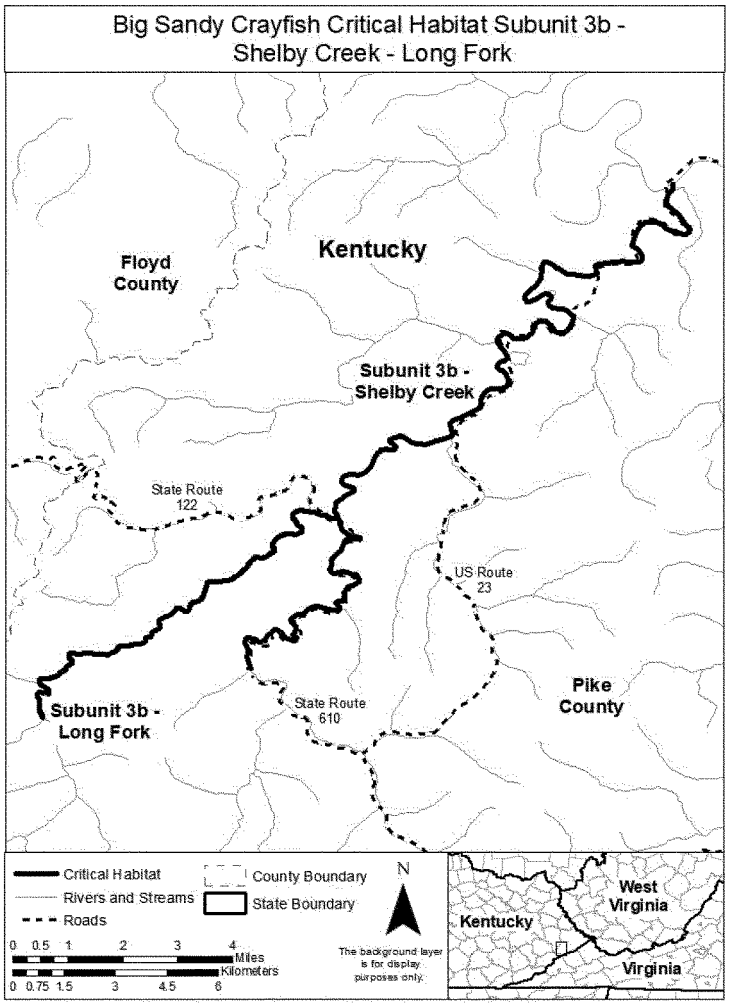
(B) Map of Subunit 3a follows:



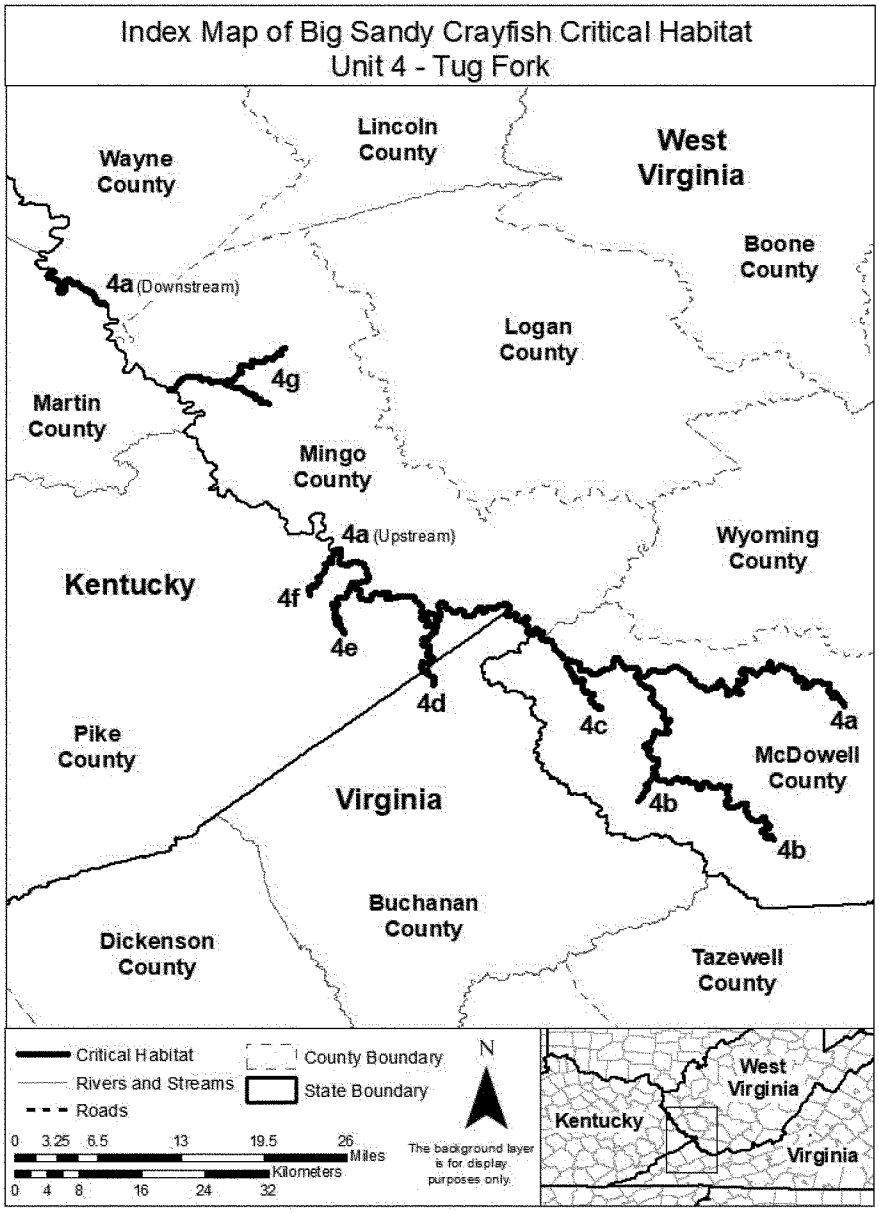
(ii) Subunit 3b: Shelby Creek and Long Fork, Pike County, Kentucky.

(A) *General description:* Subunit 3b consists of approximately 32.2 skm (20.0 smi) of Shelby Creek from its confluence with Burk Branch (37.299511, −82.608677) downstream to its confluence with Levisa Fork at Shelbiana, Kentucky (37.426986, −82.497604); and approximately 12.9 skm (8.0 smi) of Long Fork from the confluence of Right Fork Long Fork and Left Fork Long Fork (37.286508, −82.663639) downstream to the confluence of Long Fork and Shelby Creek at Virgie, Kentucky (37.338841, −82.585800).

(B) Map of Subunit 3b follows:



(10) **Note:** Index map of Unit 4 follows:

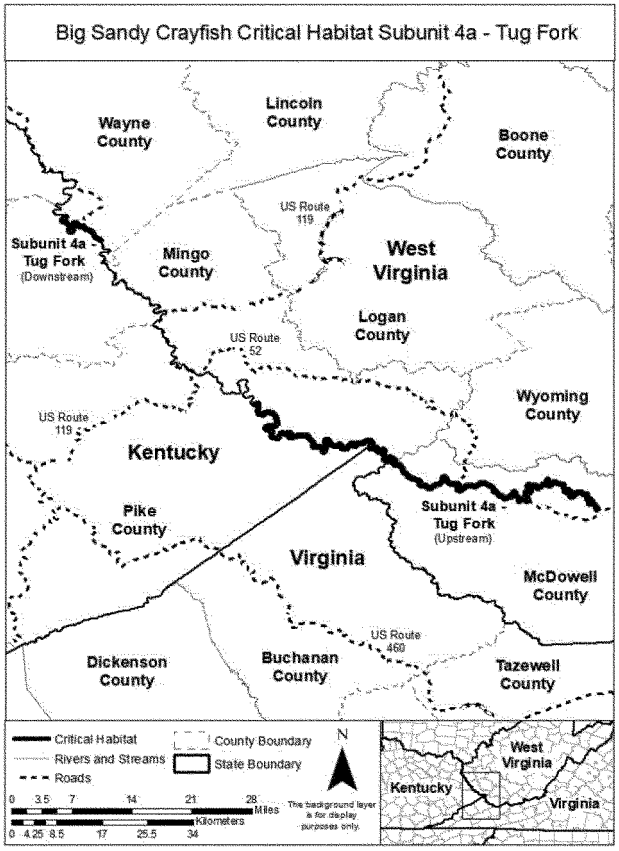


(11) Unit 4: Tug Fork—McDowell, Mingo, and Wayne Counties, West Virginia; Buchanan County, Virginia; and Pike and Martin Counties, Kentucky.

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

(A) *General description:* 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 (37.430721, −81.586455), downstream to its confluence with Blackberry Creek in Pike County, Kentucky (37.607876, −82.162722); and 11.7 skm (7.3 smi) of the Tug Fork from its confluence with Little Elk Creek (37.885876, −82.421245) downstream to its confluence with Bull Creek at Crum, West Virginia (37.924275, −82.480983).

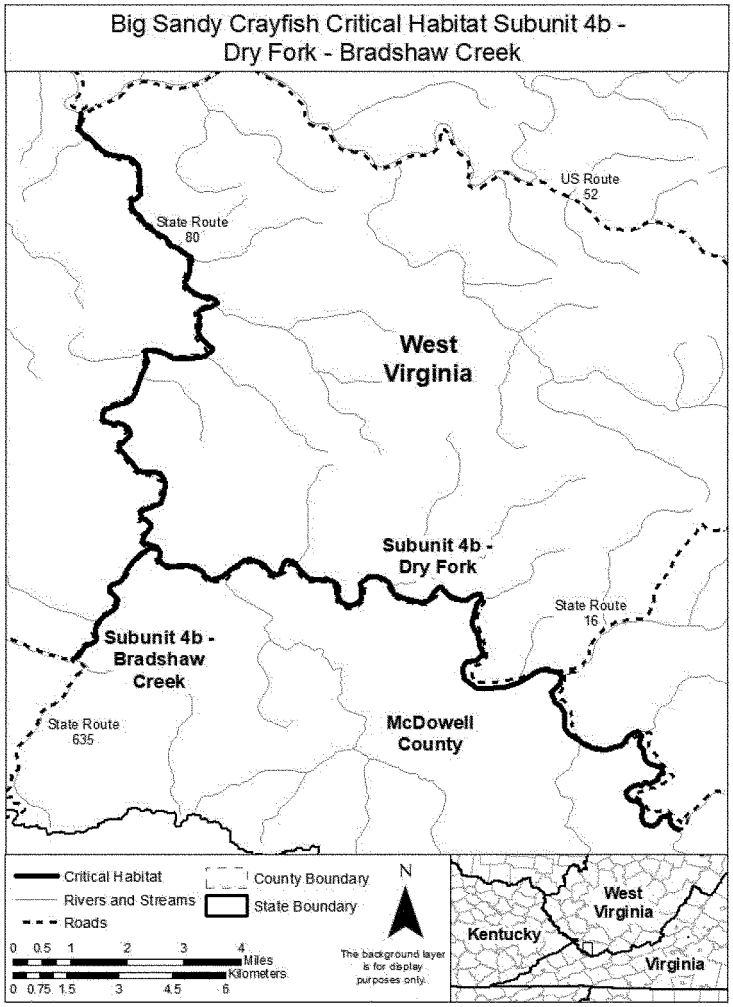
(B) Map of Subunit 4a follows:



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

(A) *General description:* Subunit 4b consists of approximately 45.2 skm (28.1 smi) of Dry Fork from its confluence with Jacobs Fork (37.280873, −81.665897) downstream to its confluence with Tug Fork at Iaeger, West Virginia (37.462387, −81.817595); and approximately 4.6 skm (2.9 smi) of Bradshaw Creek from its confluence with Hite Fork at Jolo, West Virginia (37.323526, −81.819835), downstream to its confluence with Dry Fork at Bradshaw, West Virginia (37.352839, −81.799246).

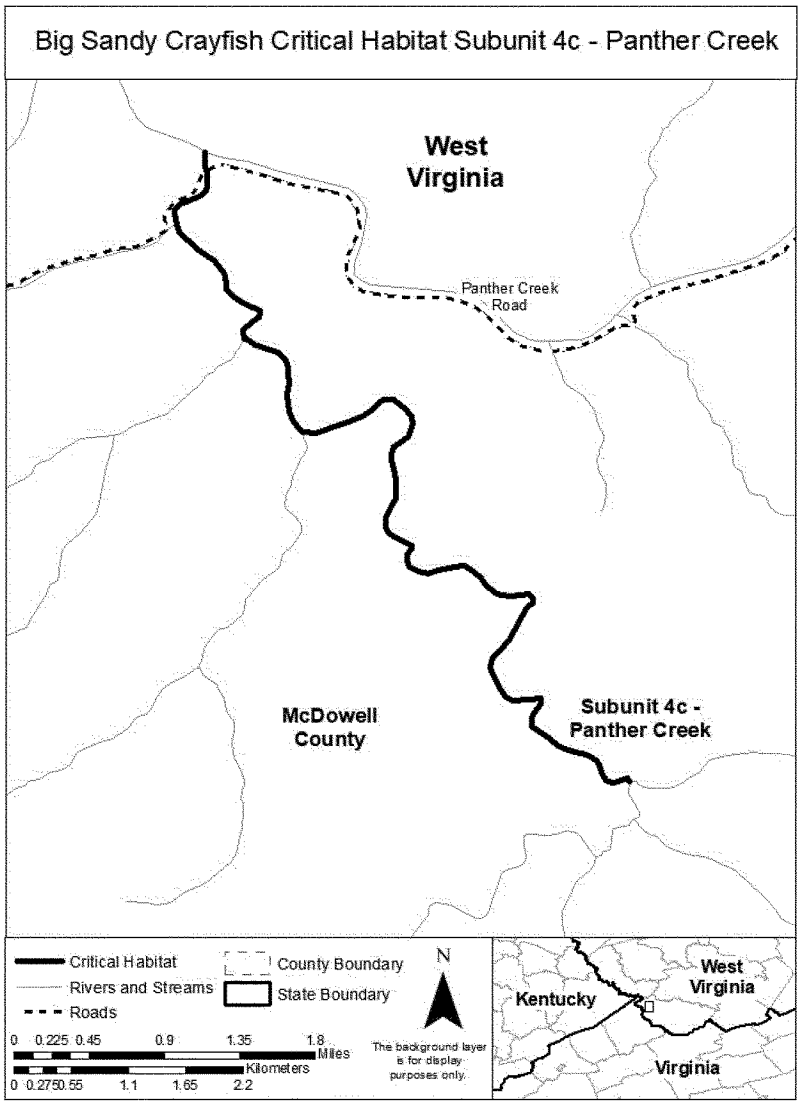
(B) Map of Subunit 4b follows:



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

(A) *General description:* Subunit 4c consists of approximately 10.7 skm (6.6 smi) of Panther Creek from its confluence with George Branch (37.428924, −81.861612) downstream to its confluence with Tug Fork at Panther, West Virginia (37.482947, −81.898348).

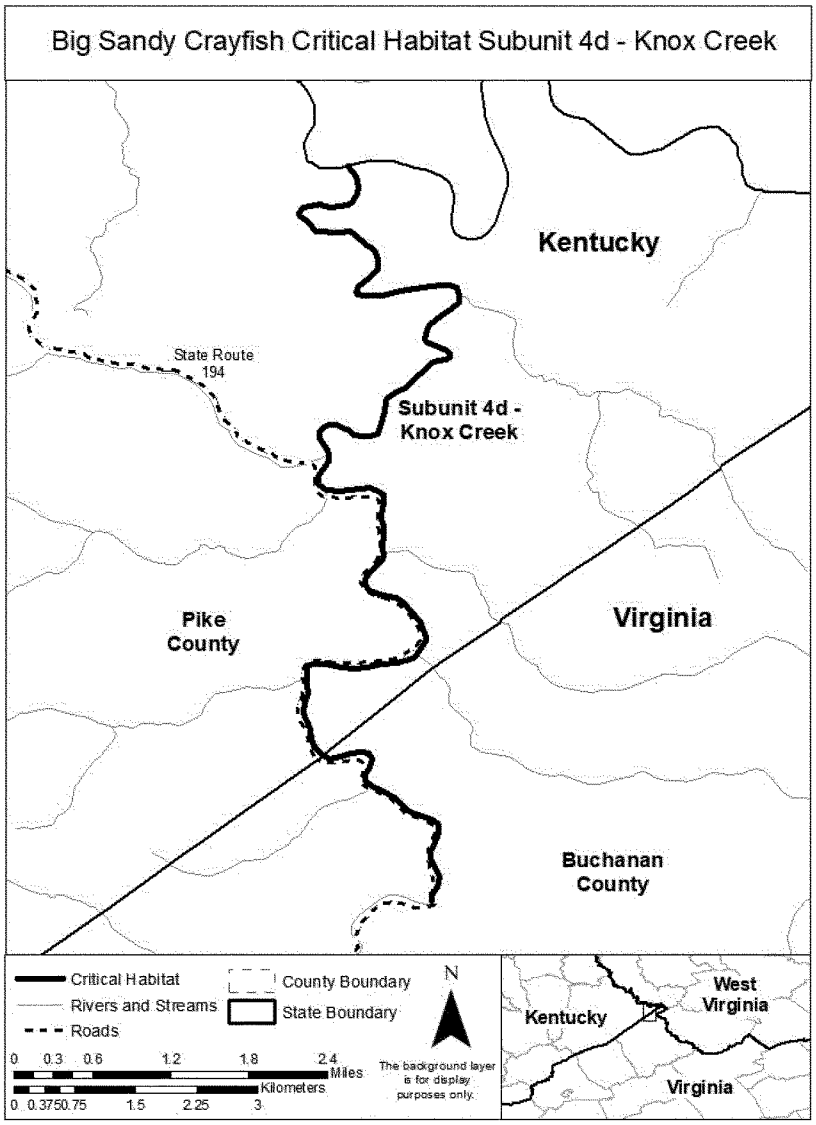
(B) Map of Subunit 4c follows:



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

(A) *General description:* Subunit 4d consists of approximately 16.6 skm (10.3 smi) of Knox Creek from its confluence with Cedar Branch (37.454923, −82.050515) downstream to its confluence with Tug Fork in Pike County, Kentucky (37.536035, −82.059658).

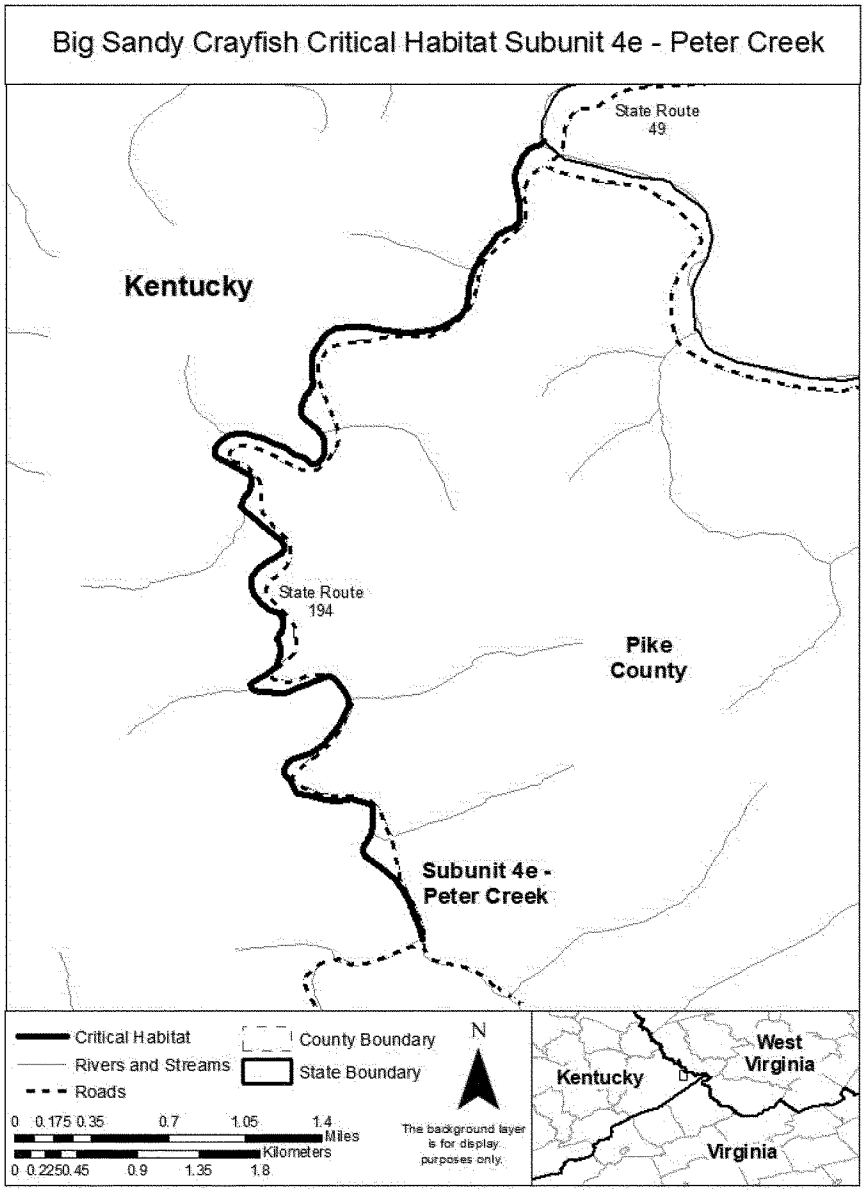
(B) Map of Subunit 4d follows:



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

(A) *General description:* 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 (37.514158, −82.152615), downstream to the confluence of Peter Creek and Tug Fork at Freeburn, Kentucky (37.566644, −82.144842).

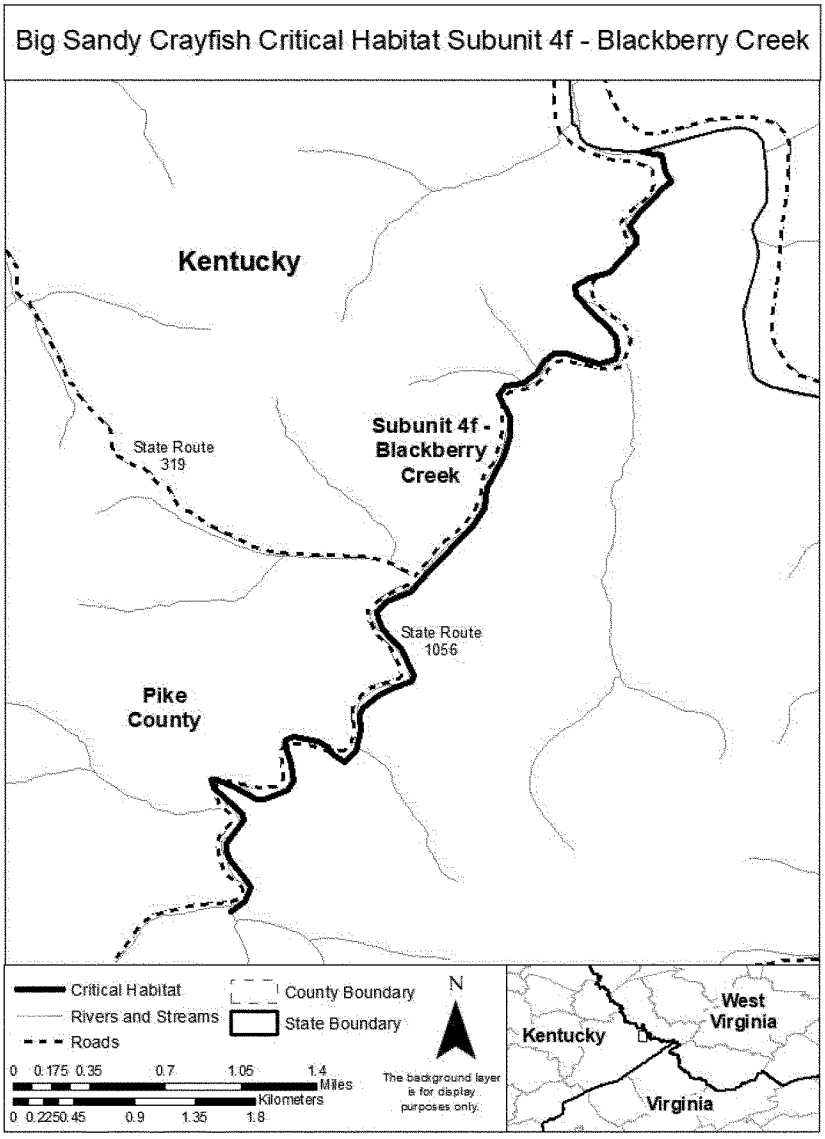
(B) Map of Subunit 4e follows:



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

(A) *General description:* Subunit 4f consists of approximately 9.1 skm (5.7 smi) of Blackberry Creek its confluence with Bluespring Branch (37.549770, −82.188713) downstream to the confluence of Blackberry Creek and Tug Fork (37.607876, −82.162722).

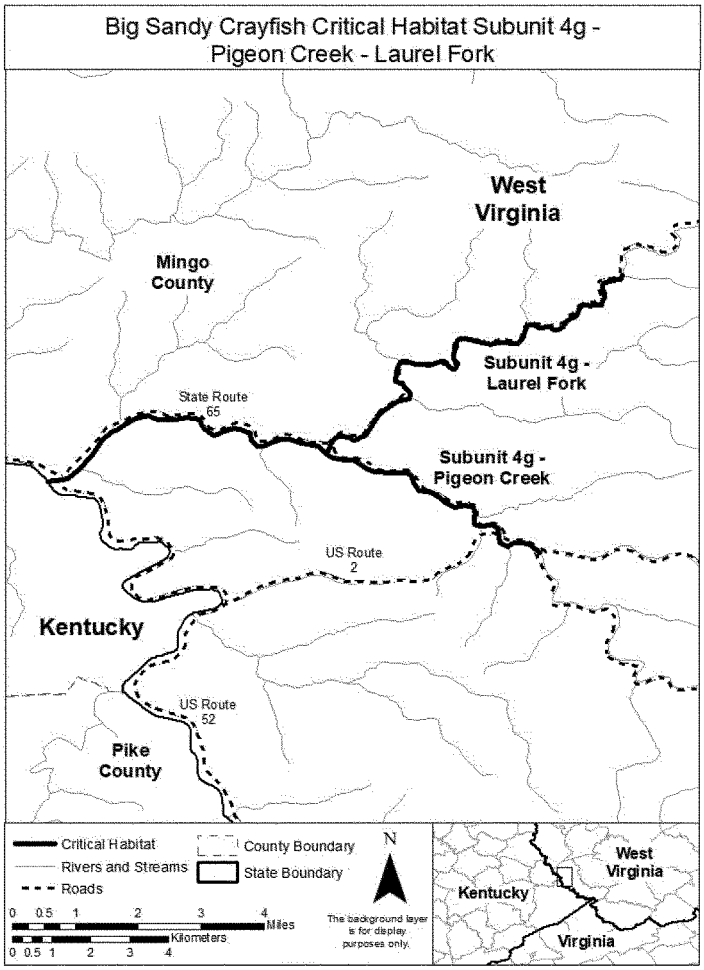
(B) Map of Subunit 4f follows:



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

(A) *General description:* Subunit 4g consists of approximately 14.0 skm (8.7 smi) of Pigeon Creek from its confluence with Trace Fork (37.773483, −82.237696) downstream to its confluence with Tug Fork (37.789979, −82.351194); and approximately 11.1 skm (6.9 smi) of Laurel Fork from its confluence with Lick Branch (37.837657, −82.219076) downstream to its confluence with Pigeon Creek at Lenore, West Virginia (37.796029, −82.287111).

(B) Map of Subunit 4g follows:



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.

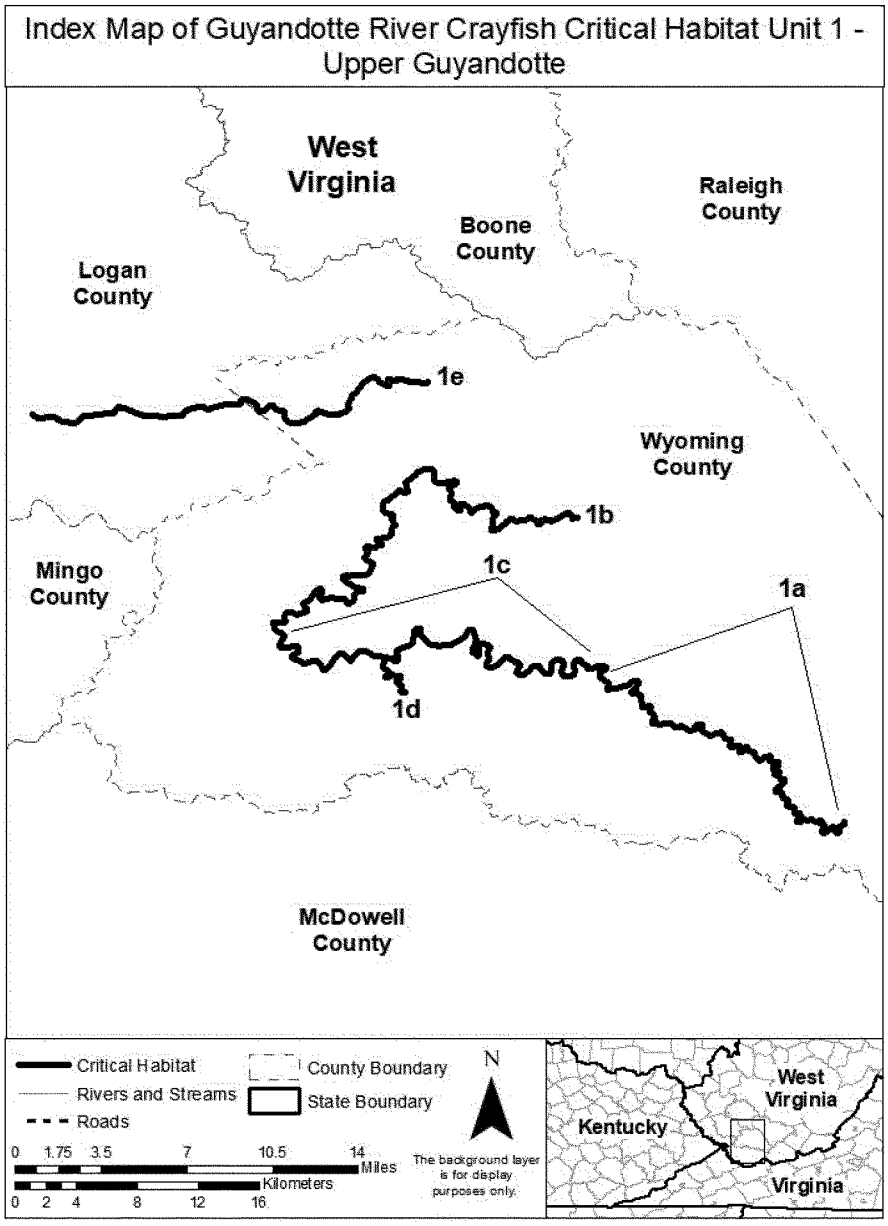
(vi) An interconnected network of streams and rivers that have the physical and biological features described in paragraphs (2)(i) through (iv) of this entry and that allow for the movement of crayfish in response to environmental, physiological, or behavioral drivers. The scale of the interconnected 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 the effective date of this rule.

(4) *Critical habitat map units.* 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 *http://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) **Note:** Index map of critical habitat for the Guyandotte River crayfish follows:

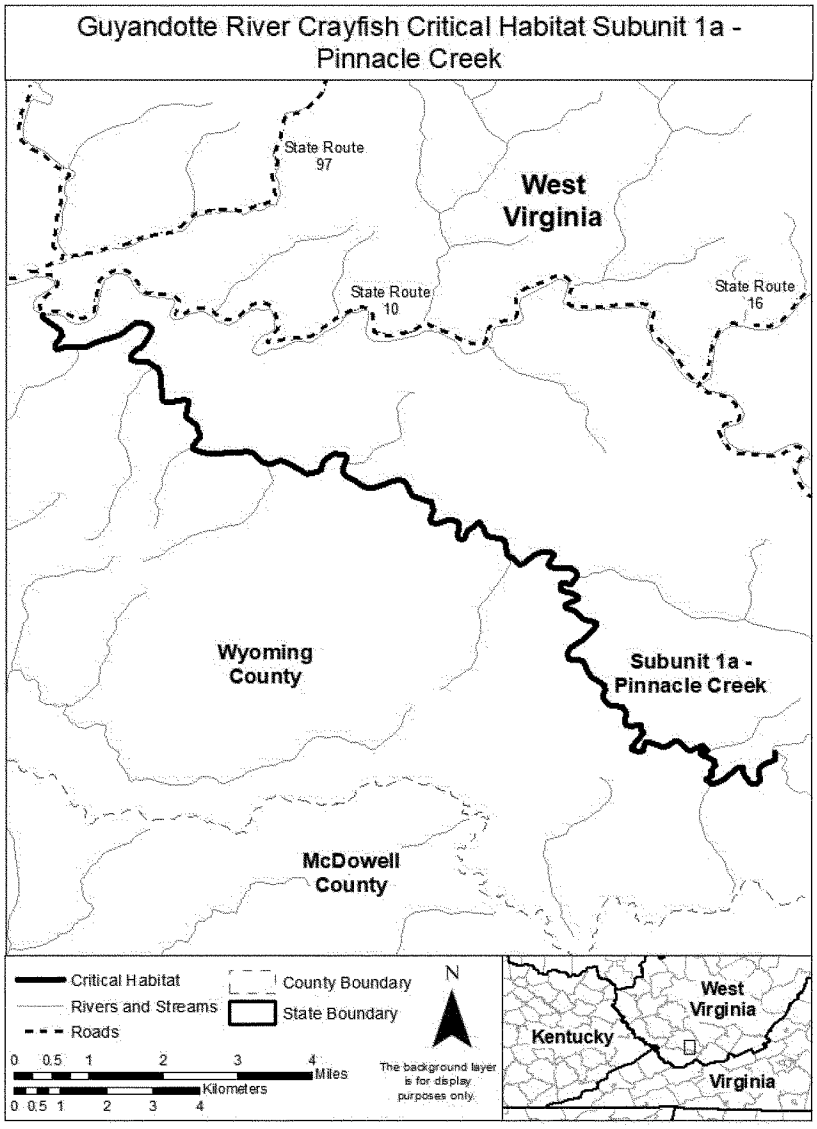


(6) Unit 1: Upper Guyandotte—Logan and Wyoming Counties, West Virginia.

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

(A) *General description:* Subunit 1a consists of approximately 28.6 skm (17.8 smi) of Pinnacle Creek from its confluence with Beartown Fork (37.489547, −81.394295) downstream to its confluence with the Guyandotte River at Pineville, West Virginia (37.574700, −81.536473).

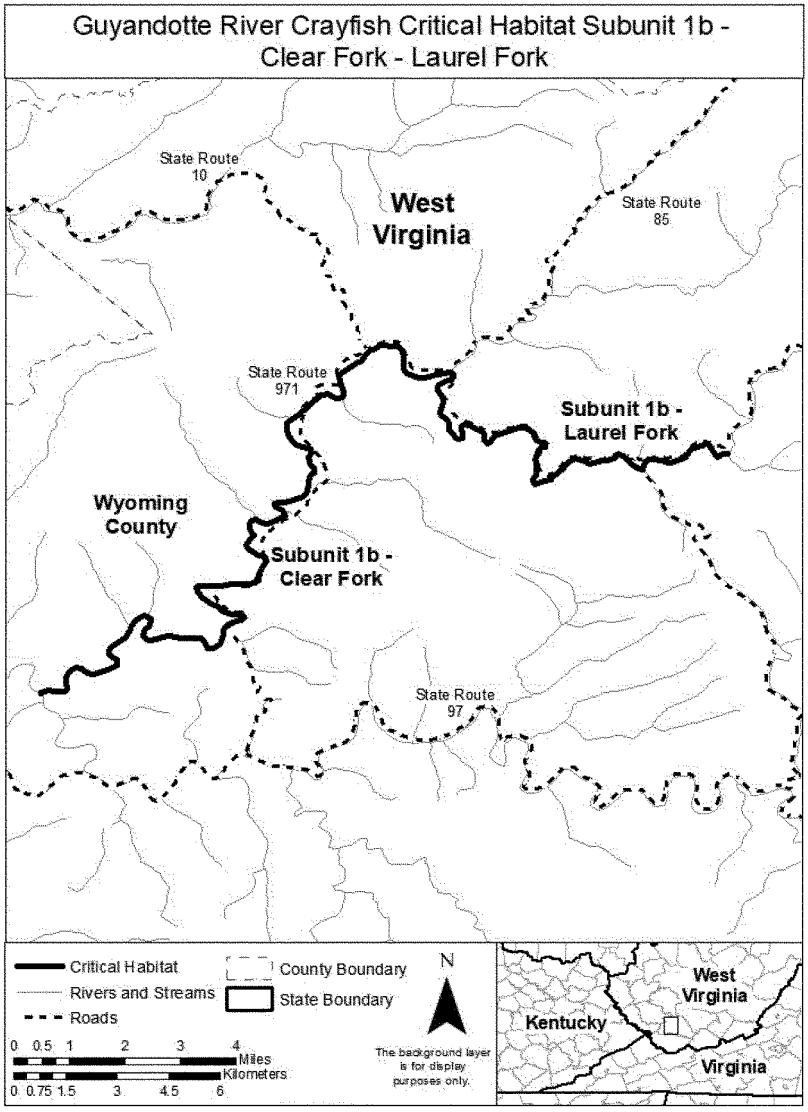
(B) Map of Subunit 1a follows:



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

(A) *General description:* 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 (37.669908, −81.551222) downstream to the confluence of Clear Fork and the Guyandotte River (37.607552, −81.730974).

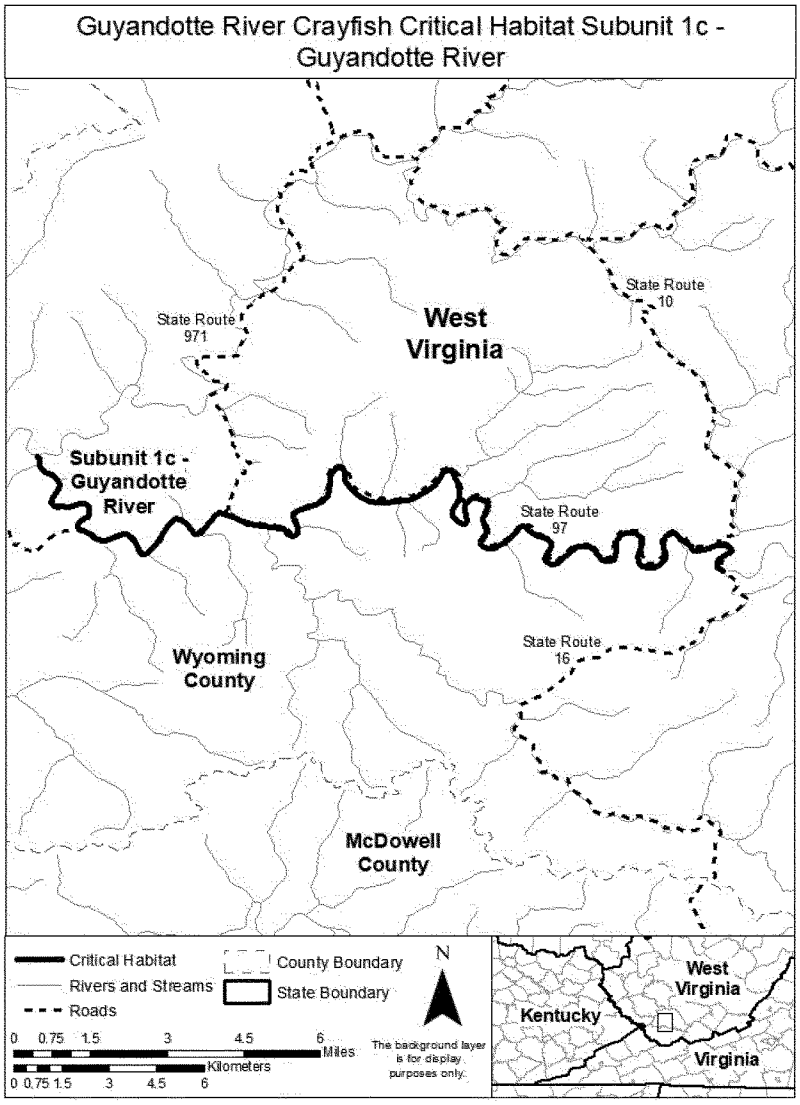
(B) Map of Subunit 1b follows:



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

(A) *General description:* 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 (37.574700, −81.536473), downstream to its confluence with Clear Fork (37.607552, −81.730974).

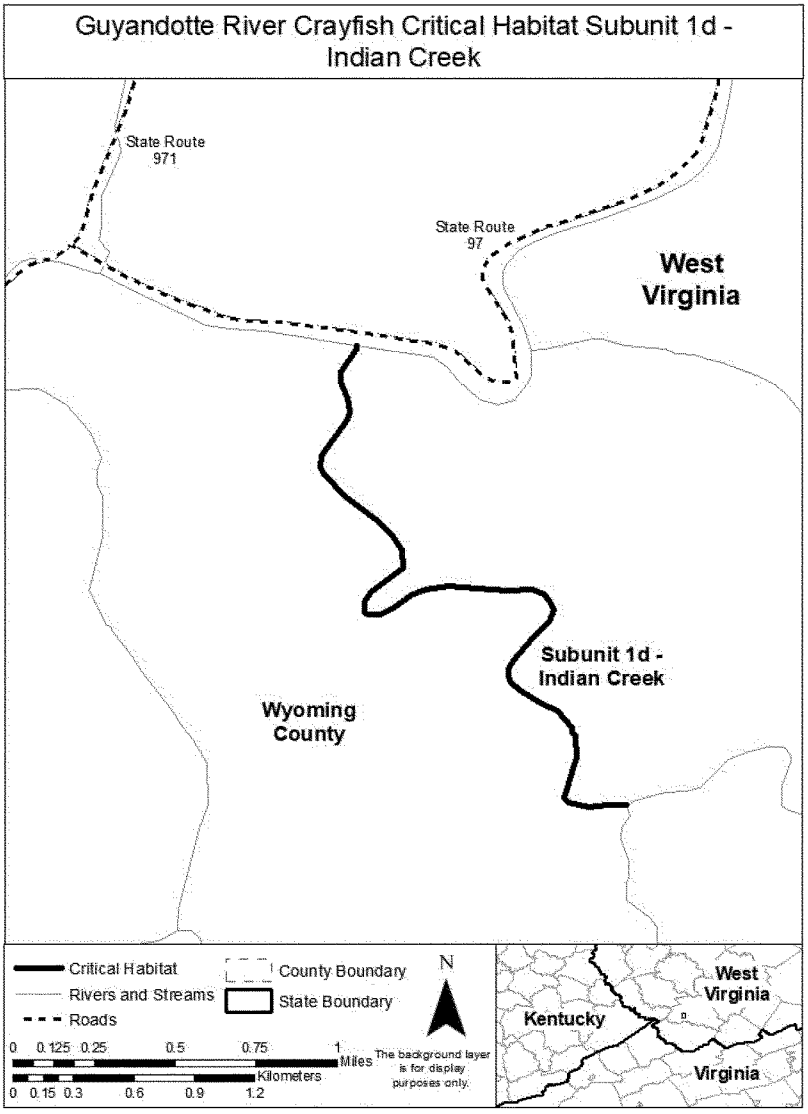
(B) Map of Subunit 1c follows:



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

(A) *General description:* 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 (37.566268, −81.650848), to the confluence of Indian Creek and the Guyandotte River (37.587149, −81.664680).

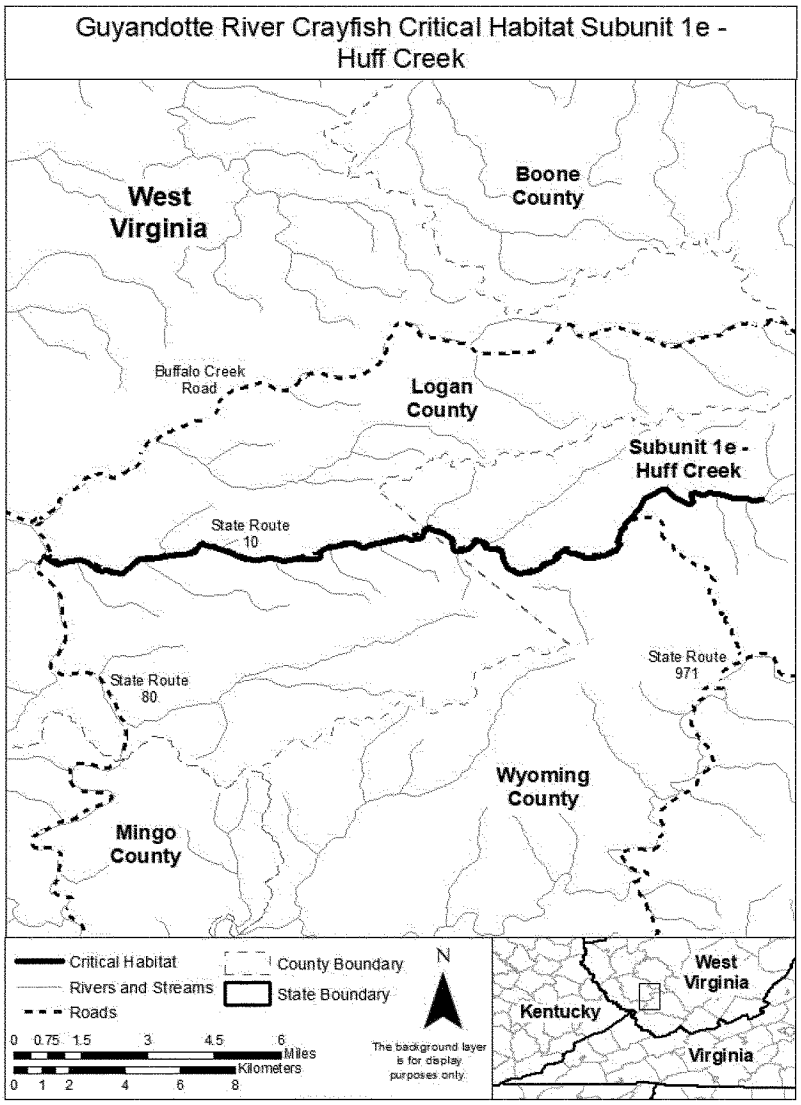
(B) Map of Subunit 1d follows:



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

(A) *General description:* Subunit 1e consists of approximately 28.0 skm (17.4 smi) of Huff Creek from its confluence with Straight Fork (37.748834, −81.640132) downstream to its confluence with the Guyandotte River at Huff, West Virginia (37.730736, −81.873387).

(B) Map of Subunit 1e follows:



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Dated: January 15, 2020.

Aurelia Skipwith,

Director, U.S. Fish and Wildlife Service.

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BILLING CODE 4333–15–P