**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**50 CFR Part 17**

**[FWS–R5–ES–2012–0045; 4500030113]**

**RIN 1018–AY12**

## Endangered and Threatened Wildlife and Plants; Endangered Status for the Diamond Darter and Designation of Critical Habitat

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

**ACTION:** Proposed rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service, propose to list the diamond darter (*Crystallaria cincotta*) as endangered under the Endangered Species Act of 1973, as amended (Act); and propose to designate critical habitat for the species. In total, approximately 197.1 river kilometers (122.5 river miles) are being proposed for designation as critical habitat. The proposed critical habitat is located in Kanawha and Clay Counties, West Virginia, and Edmonson, Hart, and Green Counties, Kentucky.

**DATES:** We will consider comments received or postmarked on or before September 24, 2012. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES** section, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in the **ADDRESSES** section by September 10, 2012.

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

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Keyword box, enter Docket No. FWS–R5–ES–2012–0045, which is the docket number for this rulemaking. Then, in the Search panel on the left side of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on ''Send a Comment or Submission.''

(2) *By hard copy:* Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R5–ES–2012–0045; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

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 the Public Comments section below for more information).

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.fws.gov/westvirginiafieldoffice/index.html*), *www.regulations.gov* at Docket No. FWS–R5–ES–2012–0045, and at the West Virginia Field Office (see **FOR FURTHER INFROMATION CONTACT**). Any additional tools or supporting information that we may develop for this critical habitat designation will also be available at the above locations.

**FOR FURTHER INFORMATION CONTACT:** Deborah Carter, Field Supervisor, U.S. Fish and Wildlife Service, West Virginia Field Office, 694 Beverly Pike, Elkins, WV 26241, by telephone (304) 636–6586 or by facsimile (304) 636–7824. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800–877–8339.

**SUPPLEMENTARY INFORMATION:**

### Executive Summary

*Why we need to publish a rule.* Under the Endangered Species Act (Act), a species may warrant protection through listing if it is endangered throughout all or a significant portion of its range. We are proposing to list the diamond darter as endangered under the Act because of continued threats, and listing can only be done by issuing a rule. The diamond darter occurs as a single population in the Elk River in West Virginia. We are also proposing to designate critical habitat under the Act for the species. Critical habitat represents geographical areas that are essential to a species' conservation, and is designated on the basis of the best scientific information available after taking into consideration the economic impact, impact on national security, and any other relevant impact of specifying any particular area as critical habitat. A forthcoming draft economic analysis will evaluate the potential economic impacts that may be attributable to the proposed designation of critical habitat for the species.

*The basis for our action.* Under the Act, a species may be determined to be endangered or threatened based on any of five factors: (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulations; or (5) other natural or manmade factors affecting its continued existence. The Act also requires that we designate critical habitat concurrently with listing determinations, if designation is prudent and determinable.

We have made the following finding related to these criteria:

- Diamond darter is endangered by water quality degradation; habitat loss; inadequate existing regulatory mechanisms; a small population size that makes the species vulnerable to the effects of the spread of an invasive alga (*Didymosphenia geminate);* loss of genetic fitness; and catastrophic events, such as oil and other toxic spills.

*This rule proposes to designate critical habitat for the diamond darter.*

- Critical habitat designation would not be expected to increase threats to the species, and we have sufficient scientific information on the diamond darter to determine the areas essential to, and essential for, its conservation. Accordingly, we have determined the designation of critical habitat is both prudent and determinable.
- In total, we propose to designate approximately 197.1 river kilometers (122.5 miles) as critical habitat. The proposed critical habitat is located in Kanawha and Clay Counties, West Virginia, and Edmonson, Hart, and Green Counties, Kentucky.
- Based on our interpretation of directly regulated entities under the Regulatory Flexibility Act and relevant case law, this designation of critical habitat will only directly regulate Federal agencies, which are not by definition small business entities. However, though not necessarily required by the Regulatory Flexibility Act, in our draft economic analysis for this proposal, we will consider and evaluate the potential effects to third parties that may be involved with consultations with Federal action agencies related to this action.

*Peer Review.* We will seek the expert opinions of at least three appropriate and independent specialists with scientific expertise to ensure our determinations are based on scientifically sound data, assumptions, and analyses.

### Information Requested

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

(1) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to this species and regulations that may be addressing those threats.

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

(3) The factors that are the basis for making a listing determination for a species under section 4(a) of the Act, which are:

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

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

(c) Disease or predation;

(d) The inadequacy of existing regulatory mechanisms; or

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

(4) Any information on the biological or ecological requirements of the species and ongoing conservation measures for the species and its habitat.

(5) Current or planned activities in the areas occupied by the species and possible impacts of these activities on this species.

(6) 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 whether there are threats to the species from human activity, the degree of which can be expected to increase due to the designation, and whether that increase in threat outweighs the benefit of designation such that the designation of critical habitat may not be prudent.

(7) Specific information on:

(a) The amount and distribution of diamond darter habitat;

(b) What areas, that were occupied at the time of listing (or 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.

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

(9) Information on the projected and reasonably likely impacts of climate change on the diamond darter and proposed critical habitat.

(10) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation; in particular, any impacts on small entities or families, and the benefits of including or excluding areas that exhibit these impacts.

(11) 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.

(12) 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 note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is a threatened or endangered species must be made solely on the basis of the best scientific and commercial data available, and section 4(b)(2) directs that critical habitat designations be made based on the best scientific data available and after consideration of economic, national security, and other relevant impacts.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. 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 Web site. 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.* Please include sufficient information with your comments to allow us to verify any scientific or commercial information you include.

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, West Virginia Field Office (see **FOR FURTHER INFORMATION CONTACT**).

## Previous Federal Actions

The diamond darter was first identified as a candidate for protection under the Act in the November 9, 2009, **Federal Register** (74 FR 57804). As a candidate, it was assigned a listing priority number (LPN) of 2. Candidate species are assigned LPNs based on the magnitude and immediacy of threats, as well as their taxonomic status. The lower the LPN, the higher priority that species is for us to determine appropriate action using our available resources. An LPN of 2 reflects threats that are both imminent and high in magnitude, as well as the taxonomic classification of the diamond darter as a full species. We retained the LPN of 2 in our subsequent Notices of Review dated November 10, 2010 (75 FR 69222) and October 26, 2011 (76 FR 66370).

## Status Assessment for Diamond Darter

## Background

It is our intent to discuss below only those topics directly relevant to the proposed listing of the diamond darter as endangered in this section of the proposed rule. A summary of topics relevant to this proposed rule is provided below. Additional information on this species may be found in the Candidate Notice of Review, which was published October 26, 2011 (76 FR 66370).

### *Species Description*

The diamond darter (*Crystallaria cincotta*) is a member of the perch family (Percidae), a group characterized by the presence of a dorsal (top) fin separated into two parts, one spiny and the other soft (Kuehne and Barbour 1983, p. 1). The darters differ from other percids in being much smaller in overall size and having a more slender shape. Some darters, including those in the genus *Crystallaria,* lack a swim bladder. This characteristic increases the density of the fish and facilitates their ability to remain near the bottom of their riverine habitats with little effort (Evans and Page 2003, p. 64).

The diamond darter is overall translucent and is a silvery white on the under side of the body and head and has four wide, olive-brown saddles on the back and upper side (Welsh *et al.* 2008, p. 1). Between the saddles, olive-brown colored pigments on the scale margins produce a fragmented cross-hatch pattern. A blotch under and in front of the eyes is dark and distinctly separated from the front margin of the orbital rim around the eye. The side coloration includes 12 to 14 oblong, olive-brown blotches overlain by an iridescent, olive-green stripe. Fins are clear with the exception of sparse pigmentation on the tail fin.

Documented standard lengths measured from the tip of the snout to the beginning of the tail fin range from 73 to 77.3 millimeters (mm) (2.9 to 3.0 inches [in]) (Welsh and Wood 2008, pp. 64–66).

Characteristics that distinguish the diamond darter from the related crystal darter (*C. asprella*) that occurs in freshwater rivers in the Gulf Coast States of Alabama, Florida, Louisiana, and Mississippi, and in the Mississippi and Wabash rivers, include: the width of the mouth when opened is larger and is approximately equal to or exceeding the width between the pelvic fins; a blotch under and in front of the eyes that is distinctly separate from the front of the orbital rim; a pair of fins located on the underside of the fish near the pelvis girdle (pelvic fins) that are distinctly curved like a sickle in both sexes; a reduced number of cheek scale rows (most frequently 2); a reduced number of scale rows (most frequently 2) on the opercle, which is a bone near the gills; a high count of mid-lateral blotches (most frequently 13); a low count of rays (most frequently 13) on the anal fin (a single fin located on the underside of the fish behind the anus); a low count of dorsal-fin spines (most frequently 12), and a high count of scales (most frequently 11) below the lateral line, which is a sense organ fish use to detect movement and vibration in the surrounding water (Welsh and Wood 2008, p. 66).

*Taxonomy*

Previously, *Crystallaria* was regarded as a subgenus within *Ammocrypta* (Cincotta and Hoeft, 1987, p. 133; Simons 1991, p. 934). However, in an evaluation of the species' evolutionary development based on morphology, Simons (1991) elevated *Crystallaria* to a separate genus. This taxonomic treatment has been adopted in other subsequent works (Page and Burr 1991, Simons 1992, and Wiley 1992 in NatureServe 2008, p. 1). Allozyme data (variant forms of enzymes that are coded by different forms of a gene at the same gene locus) also seem consistent with this taxonomy (Wood and Mayden 1997, pp. 267–268).

When the diamond darter was first collected from the Elk River, West Virginia, in 1980, the specimen was identified and reported as the crystal darter (*Crystallaria* ne: *Ammocrypta asprella*) (Cincotta and Hoeft 1987, pp. 133–136). This was the first collection of this species from the Ohio River Basin in 41 years and the first time it was ever collected in West Virginia (Cincotta and Hoeft 1987, p. 133). Although the diagnostic characteristics of the specimen were within those described for the crystal darter by Page (1983), even at the time of collection some researchers believed that the species, as then recognized, actually constituted more than one subspecies or species (Cincotta and Hoeft 1987, p. 134), particularly given the disjunct nature of existing crystal darter populations.

In order to explore this possibility, Wood and Raley (2000) evaluated the genetic variation of five crystal darter populations by sequencing a specific gene referred to as the cytochrome b gene. Individuals were evaluated from populations in the Pearl River in Louisiana, the Cahaba River in Alabama, the Saline River in Arkansas, the Zumbro River in Minnesota, and the Elk River in West Virginia. This analysis was conducted on these crystal darter specimens, as well as individuals from eight other darter species (Wood and Raley 2000, p. 20). This study found that there was an 11.2 to 11.8 percent difference between the cytochrome b sequence of the Elk River crystal darter population and all other crystal darter populations evaluated (Wood and Raley 2000, p. 24). This was one of the highest differences in cytochrome b ever reported for a fish species (Wood and Raley 2000, p. 24), and was more typical of differences between species or genera rather than subspecies (Wood and Raley 2000, p. 24).

Because differentiation observed at a single gene region is generally not considered sufficient evidence to establish taxonomic status, additional genetic and physical analyses were initiated by Morrison *et al.* (2006, p. 129). In that study, the authors sampled individuals from the same five disjunct crystal darter populations previously surveyed and compared genetic variation between these populations using additional genetic markers referred to as the mitochondrial control region (mtDNA CR) and nuclear S7 ribosomal gene (Morrison *et al.* 2006, p. 129). In addition, morphometric (a technique of taxonomic analysis using measurements of the form of organisms) measurements and meristic (divided into segments) counts between individuals from these populations were compared (Morrison *et al.* 2006, p. 130). Meristics are systematic counts of fish characteristics such as the number of scales along the lateral line or the number of rays in the anal fin. The results of this study confirmed the conclusions of Wood and Raley (2000, pp. 20–26) in regard to the Elk River population. The magnitude of divergence between the Elk River population and the other populations sampled, as estimated from mtDNA CR data, was similar in magnitude to mtDNA divergences measured between recognized species of darters and was an order of magnitude greater than some mtDNA CR divergence estimates for recognized subspecies (Morrison *et al.* 2006, p. 139). Morphometric data were also consistent with molecular data regarding the distinctiveness of the Elk River population (Morrison *et al.* 2006, p. 129). The study concluded that the Elk River group likely constituted a distinct species (Morrison *et al.* 2006, p. 143).

Welsh and Wood (2008) conducted additional morphological comparisons between *Crystallaria* populations from 18 rivers within the Ohio River Drainage; the upper, middle, and lower Mississippi River drainages; and the Gulf Coast (Welsh and Wood 2008, p. 63). This evaluation included specimens from extant populations, as well as museum specimens from currently extirpated populations that were gathered during the late 1800s to early 1900s. Nine specific morphological characteristics were identified that distinguish the Elk River population from other populations of the crystal darter (see Species Description section). Based on the results of this analysis, and the previous genetic studies, Welsh and Wood (2008, pp. 62–68) formally named and described the Elk River population of the crystal darter as a separate and distinct species, the diamond darter (*Crystallaria cincotta*) (Welsh and Wood 2008, pp. 62–68). Welsh and Wood (2008, pp. 62–68) further identified that specimens from extirpated populations within the Cumberland, Green, and Muskingum Rivers within the Ohio River Basin were consistent with the characteristics defined for the diamond darter, thus establishing the extent of the species' historical range. The crystal darter's current range, as described above, does not appear to overlap with the diamond darter's current or historical range (Grandmaison *et al.* 2003, p. 6; Welsh and Wood 2008, pp. 62–68).

We carefully reviewed the available taxonomic information summarized above and conclude that the species is a valid taxon based upon considerations of genetic and morphological characteristics.

*Life History and Habitat*

Due to its rarity, little research exists on the natural history of this species (Osier 2005, p. 10). However, in some cases, potential characteristics can be inferred from the information available on the closely related crystal darter, as noted below.

The diamond darter is a species that inhabits medium to large, warmwater streams with moderate current and clean sand and gravel substrates (Simon and Wallus 2006, p. 52). In the Elk River, the diamond darter has been collected from riffles and pools where swift currents result in clean swept, predominately sand and gravel substrates that lack silty depositions (Osier 2005, p. 11).

Diamond darters are more often collected at dusk or during the night and are likely crepuscular (more active at dusk and dawn) (Welsh 2008, p. 10). They may stay partially buried in the sand during the day and then come out to feed during the night (Welsh 2009c, p. 1). Adult diamond darters are benthic invertivores, feeding primarily on stream bottom-dwelling invertebrates (NatureServe 2008, p. 8). They may use an ambush foraging tactic by burying in the sand and darting out at prey (Robinson 1992 and Hatch 1997 in Osier 2005, pp. 12–13; NatureServe 2008, p. 1). The large teeth seen in juvenile diamond darters hatched in captivity suggest that young diamond darters may feed on other smaller fish larvae (Ruble *et al.* 2010, p. 15). However, because no juveniles have been successfully reared to adulthood, this has not been confirmed. The juveniles may also eat zooplankton prey, which is a more typical behavior for pelagic (drifting in open water) larval percids (Rakes 2011, p. 1).

Very little information is available on the reproductive biology and early life history of the diamond darter (Welsh *et al.* 2008, p. 1; Ruble and Welsh 2010, p. 1). When maintained in captivity, females began to show signs of being gravid from late March to May. Spawning likely occurs mid-April to May, and larvae hatch within 7 to 9 days afterward (Ruble *et al.* 2010, pp. 11–12). Males appear to guard spawning territories, but no guarding of eggs has been observed in captivity (Ruble 2012, p. 1)

If the diamond darter's reproductive behavior is similar to crystal darters in the wild, then females may be capable of multiple spawning events and producing multiple clutches of eggs in one season (George *et al.* 1996, p. 75). Crystal darters lay their eggs in side channel riffle habitats over sand and gravel substrates in moderate current. Adult crystal darters do not guard their eggs (Simon and Wallus 2006, p. 56). Embryos develop in the clean interstitial spaces of the coarse substrate (Simon and Wallus 2006, p. 56). After hatching, the larvae are pelagic and drift within the water column (Osier 2005, p. 12; Simon and Wallus 2006, p. 56; NatureServe 2008, p. 1). See the discussion under Critical Habitat Designation—Physical and Biological Features below under ''Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring'' for additional information.

Life expectancy of diamond darters is unknown in the wild. Diamond darters have been maintained in captivity for 2 years. During that time, it is suspected that one adult female died due to senescence (old age). Because she was brought into captivity as an adult (approximately 2 years old) it is suspected that she was 4 years or older at death (Ruble 2011b, p. 1). Life expectancy for the crystal darter has been reported to range from 2 to 4 years (Osier 2005, pp. 10–11), although some authors have suggested the potential to live up to 7 years (Simon and Wallus 2006, p. 52). In Arkansas, sexual maturity for the crystal darter may occur during the first year, with the first spawning event occurring the season after hatching. However, in the Ohio River Basin this may not occur until age 3 (George *et al.* 1996, p. 75; Simon and Wallus 2006, p. 52). Reported differences in age and size at maturity between northern and southern populations of crystal darters have been attributed to environmental differences, such as flow regimes, photoperiod, and temperature, with southern populations maturing and reproducing at an earlier age and thus having shorter lifespans (George *et al.* 1996, pp. 75–76).

*Species Distribution and Status*

Historical Range/Distribution

As shown in Table 1 below, historical records of the species indicate that the diamond darter was distributed throughout the Ohio River Basin and that the range included the Muskingum River in Ohio; the Ohio River in Ohio, Kentucky and Indiana; the Green River in Kentucky; and the Cumberland River Drainage in Kentucky and Tennessee. There is some difference of opinion as to how common the species was during the early portions of the 1900s. Trautman (1981, p. 645) suggests that it is quite probable that before 1900 the species was well distributed in the lower reaches of the southern Ohio tributaries and the Ohio River. However in 1892, Woolman (in Cicerello 2003, p. 6) noted that the species was likely neither widely distributed, nor common anywhere in Kentucky.

TABLE 1—Historical diamond darter collections.

| Date | State | River | General Location | Citation | Notes |
|---|---|---|---|---|---|
| 1888 | OH | Muskingum | near Beverly, Washington Co. | Trautman 1981, p. 645; Kibbey 2008, p. 1 | * |
| 1899 | OH/KY | Ohio | near Ironton, Lawrence Co., OH/Greenup Co., KY | Trautman 1981, p. 645; Kibbey 2008, p. 1; Clay 1975 p. 315; KSNPC 1991, p. 1 | * |
| pre-1899 | KY/IN | Ohio | near Rising Sun, IN; Boone Co., KY | Jordan 1899 in KSNPC 1991, p. 3 | |
| 1890 | KY | Green River | near Greensburg, Green Co. | Clay 1975, p. 314; KSNPC 1991, pp. 4 & 5 | 2 collected* |
| 1929 | KY | Green River | Mammoth Cave, Edmonson Co. | Clay 1975, p. 315; KSNPC 1991, p. 6 | 2 collected* |
| 1890s | KY | Cumberland | near Kuttawa, Lyon Co. | KSNPC 1991, p. 2; Burr and Warren 1986, p. 285 | * |
| 1939 | TN | Cumberland | Clay Co. | Shoup *et al.* 1941 in Etnier and Starnes 1993, p. 443 | |
| 1939 | TN | Roaring River (tributary to Cumberland River) | Jackson Co. | Shoup *et al.* 1941 in Etnier and Starnes 1993, p. 443 | |
| 1870 | TN/KY | Big South Fork of the Cumberland | Scotts Co., TN near KY State border | Comiskey and Entier 1972 in Entier and Starnes 1993, p. 443 | |

** These specimens are currently available in museums and were confirmed as C. cincotta in the analysis that described and differentiated between that species and C. asprella (Welch and Wood, 2008). The other specimens are no longer available and/or could not be located. It is assumed that these occurrences are also C. cincotta because they occur within the watershed upstream of and/or in close proximity to other confirmed specimens of the species.*

Current Range/Distribution

The species is currently known to exist only within the lower Elk River in Kanawha and Clay Counties, West Virginia, and is considered extirpated from the remainder of the Ohio River Basin (Cicerello 2003, p. 3; Welsh and Wood 2008, pp. 62, 68). The species was first collected from the Elk River in November 1980, when one individual was collected during boat electroshocking surveys conducted near Mink Shoals in Kanawha County (Cincotta and Hoeft 1987, p. 133). This collection marked the rediscovery of the species in the Ohio River Basin, where it formerly had been considered extirpated from all states in which it had previously been recorded (Cincotta and Hoeft 1987, pp. 133–134). The species has not been collected since 1899 in Ohio, 1929 in Kentucky, and 1939 in Tennessee (Grandmaison *et al.* 2003, p. 6).

Trautman (1981, p. 645) suggests that increased silt load and subsequent smothering of suitable habitats likely caused the extirpation of the species from the State of Ohio by 1925 and that ‘‘the habitat of few other Ohio fishes seemed so vulnerable to annihilation’’ (Trautman 1981, p. 646). In addition, researchers at the Ohio State University have conducted extensive sampling in the Ohio River and its tributaries, starting with Ed Wickliff in the 1920s and continuing through the present (Kibbey 2008, p. 1; Ohio State University 2008, p. 1). Despite semiannual survey efforts in likely diamond darter habitats, such as the riffles below Devola Dam on the Muskingum River, no additional diamond darters have been located

(Kibbey 2008, p. 1). The Midwest Biodiversity Institute has also conducted recent surveys in the Muskingum River using both trawls and electroshocking. These surveys also failed to locate any *Crystallaria* species (Kibbey 2008, p. 1). Furthermore, despite conducting over 20,000 individual sampling events at over 10,000 locations throughout the State of Ohio, including sampling in both large rivers and small creeks, the Ohio Environmental Protection Agency has never collected any *Crystallaria* species (Mishne 2008, p. 1). As a result of these efforts, the species is considered extirpated from both the State of Ohio and the Ohio River (Mishne 2008, p. 1; Trautman 1981, p. 646). Pearson and Krumholtz (1984, p. 252) state that the chances of the diamond darter currently being present in the entire mainstem Ohio River are ''remote at best.''

The species is also considered extirpated from Kentucky (Burr and Warren 1986, p. 285; Evans 2008b, p. 1). Kentucky has been fairly well surveyed by numerous researchers without resulting in any recent collections of the species (Evans 2008, p. 1). All historical Green River sites have been repeatedly but unsuccessfully sampled for the diamond darter (Cicerello 2003, p. 6). Both the Kentucky State Nature Preserves Commission (KSNPC) and Southern Illinois University have conducted surveys targeting the species throughout the upper portion of the Green River Basin (Cicerello 2003, p. 6). Most recently in 2007, the Kentucky Department of Fish and Wildlife Resources, the Missouri Department of Conservation, and KSNPC sampled below Lock and Dam 5 and 6 on the Green River, as well as in river reaches downstream of the dams using a Hertzog trawl (Evans 2008a, p. 1). The Kentucky Department of Fish and Wildlife Resources has also done some site monitoring in the Green River at three sites below Green River dam and has not collected the species.

The diamond darter has not been documented to occur in Tennessee since 1939, and all previous records of the species within the State were from the Cumberland River Drainage (Etnier and Starnes 1993, p. 443). Starting in the 1950s, dams were installed on the mainstem Cumberland River that impounded much of its entire length from Barkley Dam in Kentucky to Cumberland Falls near the headwaters (Tennessee Wildlife Resources Agency (TWRA) 2005, p. 14). This dramatically altered most of the riverine habitat qualities that made the river suitable for the diamond darter and likely resulted in the extirpation of the species (Etnier and Starnes, 1993, p. 443; TWRA 2005, p. 14; Saylor, 2009, p. 1). Cold water discharges from many of these dams have changed the natural temperature regimes so that the river no longer functions as a warmwater fishery (TWRA 2005, p. 14; Fiss 2009, p. 1).

In addition, when the Cumberland River impoundments were being constructed, a fish barrier was installed near the mouth of the Roaring River in order to keep species that might frequent the impoundments, such as carp, from moving into the Roaring River, thus impeding any connectivity between the two systems (Fiss 2009, p. 1). Surveys in the Roaring River between 1972 and 1986 noted a loss of silt-intolerant fish species and increased disturbance from activities such as gravel dredging, highway construction, and poor agricultural practices that were degrading habitat quality in the stream. Although these surveys included the reach of river where *Crystallaria* had previously been documented, no diamond darters were captured during this effort (Crumby *et al.* 1990, pp. 885–891).

Surveys conducted in 1939 in the Big South Fork Cumberland River near where *Crystallaria* was previously documented noted that chemical conditions of the drainage were so adverse to biological productivity that the waters of the region are comparatively barren in contrast to surrounding regions (Shoup and Peyton 1940, p. 106). Comprehensive fisheries surveys were conducted in the Big South Fork Cumberland River from 2003 to 2006. Collection methods included backpack electroshocking, seines, dip nets, snorkeling, boat shocking, gill nets, and minnow traps (Scott 2007, p. 2). No *Crystallaria* were documented during this effort and the report concludes that the species is one of six that will likely never be encountered in the area due to extinction, extirpation, and being isolated from downstream populations by Wolf Creek Dam (Scott 2007, p. 21). Those surveys document that water quality within the Big South Fork Cumberland River has improved since the 1970's and that fish-diversity in the system is in the process of recovery (Scott 2007, pp. 14–19).

Currently, the Cumberland River watershed is subject to threats to water quality from inadequate pasture and grazing management practices, forest clearing, heavy navigation and recreational use, active mining, historical mining and acid mine drainage issues, oil and gas drilling, lack of riparian buffers, and poor stormwater and wastewater management (TWRA 2005, pp. 135–136). Despite these threats, the Cumberland aquatic region still contains some of the most diverse populations of fish, mussel, and crayfish species in North America (TWRA 2005, p. 14), and some ichthyologists have suggested that there is a ''remote possibility'' that the diamond darter may still exist in the cleaner large tributaries of the Cumberland or the lower Tennessee rivers (Etnier and Starnes 1993, p. 444). Therefore, some targeted sampling may be warranted (Fiss 2009, p. 1). The TWRA has conducted 111 fish survey samples from 1996 to 2007 throughout the Cumberland River system, although the gear used during some of these surveys was not targeted towards capturing the diamond darter (Fiss 2009, p. 1),, and has no recent records of recent diamond darter captures (Kirk 2009, p. 1). Despite extensive sampling in the Duck River, as well as the Blood and Big Sandy Rivers, there are no current or historical records of the diamond darter in those rivers either (Saylor 2009, p. 1).

Population Estimates/Status

Although there is currently not sufficient information available to develop an overall population estimate for the species, the results of numerous survey efforts confirm that the species is extremely rare. Fish surveys have been conducted in the Elk River in 1936, 1971, 1973, 1978 to 1983, 1986, 1991, 1993, 1995, 1996, and every year since 1999 (Welsh *et al.* 2004, pp. 17–18; Welsh 2008, p. 2; Welsh 2009a, p. 1). Survey methods included backpack and boat electrofishing, underwater observation, kick seines, and bag seines (Welsh *et al.* 2004, p. 4). Starting in early 1990s, the timing of sampling and specific methods used were targeted towards those shown to be effective at capturing similar darter species during previous efforts (Welsh *et al.* 2004, pp. 4–5; Hatch 1997, Shepard *et al.* 1999, and Katula 2000 in Welsh *et al.* 2004, p. 9; Ruble 2011a, p. 1). Despite these extensive and targeted survey efforts within the species' known range and preferred habitat in the Elk River, fewer than 50 individuals have been collected over the last 30 years since the species was first collected in the Elk River (SEFC 2008 p. 10; Cincotta 2009a, p. 1; Cincotta 2009b, p. 1; Welsh 2009b, p. 1, Ruble and Welsh 2010, p. 2). More than half of these collections (n = 26) have occurred in the last 5 years as a result of focused conservation efforts and sampling that targeted known or suspected diamond darter locations based on habitat mapping (Cincotta 2009b, p. 1; Cincotta 2009c, p. 1; Ruble 2011a, pp. 1–2).

Welsh *et al.* (2004, p. 8) concludes that the number of individuals in the Elk River is likely small given the low catch per unit effort totals recorded in both previous and recent surveys. Independent publications that have evaluated the status of the species further corroborate the rarity of the species. For example, the diamond darter was recently highlighted as a Threatened Fish of the World (Welsh *et al.* 2008, pp. 1–2) and was listed by the Southeastern Fishes Council as one of the 12 most imperiled fishes (i.e., the ''desperate dozen'') of the southeastern United States (SEFC 2008, pp. 2–3).

**Summary of Factors Affecting the Species**

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below.

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

As indicated by the continued persistence of the diamond darter, the Elk River in West Virginia currently provides overall high-quality aquatic habitat. The Elk River is one of the most ecologically diverse rivers in the State (Green 1999, p. 2) supporting over 100 species of fish and 30 species of mussels, including 5 federally listed mussel species (Welsh 2009a, p. 1). The river, including those portions that are within the range of the diamond darter, is listed as a ''high quality stream'' by the West Virginia Division of Natural Resources (WVDNR 2001, pp. 1, 2, 5). Streams in this category are defined as having ''significant or irreplaceable fish, wildlife, and recreational resources'' (WVDNR 2001, p. iii). In an evaluation of the watershed, the West Virginia Department of Environmental Protection (WVDEP) noted that all four sampling sites within the mainstem of the Elk River scored well for benthic macroinvertebrates on the West Virginia Stream Condition Index, with results of 77 or higher out of a potential 100 points (WVDEP 1997, p. 41).

Criteria for placement on the high-quality streams list are based solely on the quality of fisheries populations and the utilization of those populations by the public and do not include water quality or threats to the watershed (WVDNR 2001, p. 36; Brown 2009, p. 1). Despite the high quality of the fishery populations, there are continuing and pervasive threats within the watershed. In fact, the WVDEP evaluation also noted that because larger rivers offer a wider variety of microhabitats, the high benthic macroinvertebrate scores may mask some degradation in water quality (WVDEP 1997, p. 41). Noted threats to the watershed include coal mining, oil and gas development, sedimentation and erosion, timber harvesting, water quality degradation, and poor wastewater treatment (WVDEP 1997, p. 15; Strager 2008, pp. 1–39; WVDEP 2008b, pp. 1–2).

Many sources have recognized that *Crystallaria* species appear to be particularly susceptible to habitat alterations and changes in water quality. Threats similar to those experienced in the Elk River watershed have likely contributed to the extirpation of *Crystallaria* within other watersheds (Clay 1975, p. 315; Trautman 1981, pp. 24–29, 646; Grandmaison 2003, pp. 16–19). In addition, the current range of the diamond darter is restricted and isolated from other potential and historical habitats by impoundments.

Coal Mining

Coal mining occurs throughout the entire Elk River watershed. Most of the active mining occurs in the half of the watershed south of the Elk River (see Unit 1 Map below), which flows east to west (Strager 2008, p. 17). The most recent summarized data, as of January 2008, indicates more than 5,260 hectares (ha) (13,000 acres [ac]) of actively mined areas including 91 surface mine permits, 79 underground mine permits, 1,351 ha (3,339 ac) of valley fills, 582 km (362 mi) of haul roads, 385 km (239 mi) of mine drainage structures, 473 National Pollutant Discharge Elimination System (NPDES) discharge points associated with mines, and 3 mining related dams (Strager 2008, pp. 19–21). There are also 615 ha (1,519 ac) of abandoned mine lands and 155 mine permit sites that have forfeited their bonds and have not adequately remediated the sites (Strager 2008, p. 18). Approximately 47 percent of the entire Elk River watershed is within the area that the U.S. Environmental Protection Agency has identified as potentially being subject to mountain top removal mining activities (Strager 2008, p. 17).

Coal mining can contribute significant amounts of sediment to streams and degrade their water quality. Impacts to instream water quality (chemistry) occur through inputs of dissolved metals and other solids that elevate stream conductivity, increase sulfate levels, alter stream pH, or a combination of these (Curtis 1973, pp. 153–155; Pond 2004, pp. 6–7, 38–41; Hartman *et al.* 2005, p. 95; Mattingly *et al.* 2005, p. 59; Palmer *et al.* 2010, pp. 148–149). As rock strata and overburden (excess material) are exposed to the atmosphere, precipitation leaches metals and other solids (e.g., calcium, magnesium, sulfates, iron, and manganese) from these materials and carries them in solution to receiving streams (Pond 2004, p. 7). If valley fills are used as part of the mining activity, precipitation and groundwater percolate through the fill and dissolve minerals until they discharge at the toe of the fill as surface water (Pond *et al.* 2008, p. 718). Both of these scenarios result in elevated conductivity, sulfates, and hardness (increased pH) in the receiving stream. Increased levels of these metals and other dissolved solids have been shown to exclude other sensitive fish species and darters from streams, including the federally threatened blackside dace (*Chrosomus cumberlandensis*) in the upper Cumberland River Basin (Mattingly *et al.* 2005, pp. 59–62). The Kentucky arrow darter (*Etheostoma sagitta spilotum*) was found to be excluded from mined watersheds when conductivity exceeded 250 micro Siemens per cm (µ*S*/cm) (Thomas 2008, pp. 3–6; U.S. Fish and Wildlife Service (Service) 2009, pp. 1–4).

Mining-associated water quality impacts have been noted in the Elk River. For example, in the Jacks Run watershed, a tributary to the Elk River, one third of the entire watershed had been subject to mining-related land use changes that cleared previously existing vegetation. In a sampling site downstream of mining, the WVDEP documented embedded substrates with dark silt, most likely from manganese precipitate or coal fines, and benthic scores that indicated severe impairment (WVDEP 1997, p. 60). Another Elk River tributary, Blue Creek, had low pH levels associated with contour mining and acid drainage and three sample sites had pH values of 4.2 or less (WVDEP 1997, p. 47; WVDEP 2008b, p. 6). At pH levels of 5.0 or less, most fish eggs cannot hatch (USEPA 2009, p. 2).

Sampling sites below a large mining reclamation site in the Buffalo Creek drainage of the Elk River watershed had violations of the West Virginia water quality criteria for acute aluminum and manganese water quality criteria, poor habitat quality, and substrates that were heavily embedded with coal fines and clay (WVDEP 1997, pp. 4, 56–57). Other sites in the watershed, where topographic maps showed extensive surface mining, had pH readings of 4.7, elevated aluminum levels, and benthic communities that were dominated by acid-tolerant species (WVDEP 1997, pp. 4, 56–57).

A U.S. Geological Survey (USGS) study of the Kanawha River Basin, which includes the Elk River, found that streams draining basins that have been mined since 1980 showed increased dissolved sulfate, decreased median bed-sediment particle size, and impaired benthic invertebrate communities when compared to streams not mined since 1980. Stream-bottom sedimentation in mined basins was also greater than in undisturbed basins (USGS 2000, p. 1). In streams that drained areas where large quantities of coal had been mined, the benthic invertebrate community was impaired in comparison to rural parts of the study area where little or no coal had been mined since 1980 (USGS 2000, p. 7). That report notes that benthic invertebrates are good indicators of overall stream water quality and that an impaired invertebrate community indicates that stream chemistry or physical habitat, or both, are impaired, causing a disruption in the aquatic food web (USGS 2000, p. 8).

In another study that specifically evaluated fish data, the Index of Biotic Integrity (IBI) scores at sites downstream of valley fills were significantly reduced by an average of 10 points when compared to unmined sites, indicating that fish communities were degraded below mined areas (Fulk *et al.* 2003, p. iv). In addition, that study noted a significant correlation between the number of fishes that were benthic invertivores and the amount of mining in the study watershed: the number of those types of fish species decreased with increased mining (Fulk *et al.* 2003, pp. 41–44). As described above in the Life History section, the diamond darter is a benthic invertivore. The effects described above are often more pronounced in smaller watersheds that do not have the capacity to buffer or dilute degraded water quality (WVDEP 1997, p. 42; Fulk *et al.* 2003, pp. ii–iv). Because the mainstem Elk River drains a relatively large watershed, these types of adverse effects are more likely to be noticed near the confluences of tributaries that are most severely altered by mining activities such as Blue Creek, which occurs within the known range of the diamond darter, and Buffalo Creek, which is upstream of the known diamond darter locations.

In addition to chronic sediment releases and water quality effects from coal mine areas, the potential exists for failure of large-scale mine waste (coal slurry) impoundment structures contained by dams constructed of earth, mining refuse, and various other materials, which could release massive quantities of mine wastes that could cover the stream bottoms. There are currently two coal slurry impoundments within the Elk River watershed. These impoundments have a capacity of 6,258,023 and 1,415,842 cubic meters ($m^3$) (221,000,000 and 50,000,000 cubic feet [cf]). The larger structure covers 19 ha (48 ac) and is considered a ''class C'' dam which could result in the loss of human life and serious damage to homes, and industrial and commercial facilities in the event of failure (Strager 2008, pp. 21–22). A third coal refuse disposal impoundment is permitted and planned for construction with an additional 54,821 $m^3$ (1,936,000 cf) of capacity (Fala 2009, p. 1; WVDEP 2012, p. 1). These three impoundments are on tributaries of the Elk River upstream of the reach of river known to support the diamond darter. In October 2000, a coal slurry impoundment near Inez, Kentucky breached, releasing almost 991,090 $m^3$ (35,000,000 cf) of slurry into the Big Sandy Creek Watershed. ''The slurry left fish, turtles, snakes and other aquatic species smothered as the slurry covered the bottoms of the streams and rivers and extended out into the adjacent floodplain'' (USEPA 2001a, p. 2). Over 161 km (100 mi) of stream were impacted by the spill (USEPA 2001a, p. 2). If a similar dam failure were to occur in the Elk River watershed, it could have detrimental consequences for the diamond darter population.

There is also a potential for abandoned underground mines to fill with water and ''blow out'' causing large discharges of sediment and contaminated water. Similar events have happened in nearby areas, including one in Kanawha County, West Virginia, in April 2009 that discharged ''hundreds of thousands of gallons of water'' onto a nearby highway, and caused a ''massive earth and rock slide'' (Marks 2009, p. 1). A second situation occurred in March 2009 in Kentucky where water from the mine portal was discharged into a nearby creek at an estimated rate of 37,854 liters (l) (10,000 gallons [gal]) a minute (Associated Press 2009, p. 1). In addition to the increased levels of sediment and potential smothering of stream habitats, discharges from abandoned mine sites often have elevated levels of metals and low pH (Stoertz *et al.* 2001, p. 1). In 2010, a fish kill occurred in Blue Creek, a tributary of the Elk River in Kanawha County, when a contractor working for WVDEP attempted to cleanup an abandoned mine site. When they breached an impoundment, the mine discharged highly acidic water that then flowed into the stream. Approximately 14.5 km (9 mi) of Blue Creek was affected by the fish kill (McCoy 2010, p. 1). The effects of the fish kill were stopped by response crews 9.5 km (5.9 mi) upstream from where Blue Creek enters the Elk River within the known range of the diamond darter.

Oil and Gas Development

The Elk River watershed is also one of the more densely drilled areas of the State, with over 5,800 oil or gas wells in the watershed as of the most recent data in January 2011 (WVDEP 2011a, p. 1). The lower section of the Elk River, which currently contains the diamond darter, has the highest concentration of both active and total wells in the watershed, with over 2,320 active wells and 285 abandoned wells (WVDEP 2011a, p. 1).

Although limited data are available to quantify potential impacts, development of oil and gas resources can increase sedimentation rates in the stream and degrade habitat and water quality in a manner similar to that described for coal mining. Oil and gas wells can specifically cause elevated chloride levels through discharge of brine and runoff from materials used at the site, and the erosion of roads associated with these wells can contribute large amounts of sediment to the streams (WVDEP 1997, p. 54). For example, WVDEP sampling sites within Summers Fork, a tributary to the Elk River with a ''high density of oil and gas wells,'' had elevated chloride and conductivity levels as well as impaired benthic invertebrate scores despite ''good benthic substrate'' (WVDEP 1997, p. 52). Within the Buffalo Creek watershed, another Elk River tributary, the impaired benthic invertebrate scores at sample sites were attributed to oil compressor stations next to the creek, pipes running along the bank parallel to the stream, and associated evidence of past stream channelization (WVDEP 1997, p. 55).

High levels of siltation have been noted in the impaired sections of the Elk River (USEPA 2001b, pp. 3–6). Oil and gas access roads have been identified as a source that contributes ''high'' levels of sediment to the Elk River (USEPA

2001b, pp. 3–7). The WVDEP estimates the size of the average access road associated with an oil or gas well to be 396 meters (m) (1,300 feet [ft]) long by 7.6 m (25 ft) wide or approximately .30 ha (0.75 ac) per well site (WVDEP 2008b, p. 10). If each of the wells in the watershed has this level of disturbance, there would be over 1,821 ha (4,500 ac) of access roads contributing to increased sedimentation and erosion in the basin. Lack of road maintenance, improper construction, and subsequent use by the timber industry and all-terrain vehicles can increase the amount of erosion associated with these roads (WVDEP 2008b, pp. 5–6).

Shale gas development is an emerging issue in the area. Although this is currently not the most productive area of the State, the entire current range of the diamond darter is underlain by the Marcellus and Utica Shale formation and potentially could be affected by well drilling and development (National Energy Technology Laboratory (NETL) 2010 pp. 6–10). The pace of drilling for Marcellus Shale gas wells is expected to increase substantially in the future, growing to about 700 additional wells per year in West Virginia starting in 2012 (NETL 2010, p. 27). This is consistent with what has been reported in the area around the Elk River. In March 2011, there were 15 Marcellus Shale gas wells reported within Kanawha County (West Virginia Geological and Economic Survey (WVGES) 2011, p. 1). As of January 2012, there were 188 completed Marcellus Shale gas wells within Kanawha County and an additional 27 wells that had been permitted (WVGES 2012, p. 1). Data specific to the Elk River watershed are not available for previous years, but there are currently at least 100 completed and 21 additional permitted Marcellus Shale gas wells within the watershed (WVGES 2012, p 1).

Marcellus Shale gas wells require the use of different techniques than previously used for most gas well development in the area. When compared to more traditional methods, Marcellus Shale wells usually require more land disturbance, and more water and chemicals for operations. In addition to the size and length of any required access roads, between 0.8 and 2.0 ha (2 and 5 ac) are generally disturbed per well (Hazen and Sawyer 2009, p. 7). Each well also requires about 500 to 800 truck trips to the site (Hazen and Sawyer 2009, p. 7). Construction of these wells in close proximity to the Elk River and its tributaries could increase the amount of siltation in the area due to erosion from the disturbed area, road usage, and construction.

Shale gas wells typically employ a technique called hydrofracking which involves pumping a specially blended liquid mix of water and chemicals down a well, into a geologic formation. The pumping occurs under high pressure, causing the formation to crack open and form passages through which gas can flow into the well. During the drilling process, each well may utilize between 7 and 15 million liters (2 and 4 million ga) of water (Higginbotham *et al.* 2010, p. 40). This water is typically withdrawn from streams and waterbodies in close proximity to the location where the well is drilled. Excessive water withdrawals can reduce the quality and quantity of habitat available to fish within the streams, increase water temperatures, reduce dissolved oxygen concentrations, and increase the concentration of any pollutants in the remaining waters (Freeman and Marcinek 2006, p. 445; PSU 2010, p. 9). Increasing water withdrawals has been shown to be associated with a loss of native fish species that are dependent on flowing-water habitats. Darters were one group of species that were noted to be particularly vulnerable to this threat (Freeman and Marcinek 2006, p. 444).

In addition to water withdrawals, there is a potential for spills and discharges from oil and gas wells, particularly Marcellus Shale drilling operations. Pipelines and ponds being used to handle brine and wastewaters from fracking operations can rupture, fail, or overflow and discharge into nearby streams and waterways. In Pennsylvania, accidental discharges of brine water from a well site have killed fish, invertebrates, and amphibians up to 0.4 mi (0.64 km) downstream of the discharge, even though the company immediately took measures to control and respond to the spill (PADEP 2009, pp. 4–22). In 2011, the WVDEP cited a company for a spill at a well site in Elkview, West Virginia. Up to 50 barrels of oil leaked from a faulty line on the oil well site. The spill entered a tributary of Indian Creek, traveled into Indian Creek and then flowed into the Elk River (Charleston Gazette 2011, p. 1). This spill occurred within the reach of the Elk River known to be occupied by the diamond darter, and therefore could have affected the species and its habitat.

Siltation (Sedimentation)

Excess siltation has been specifically noted as a threat to the Elk River system. Portions of the lower Elk River were previously listed as impaired due to elevated levels of iron and aluminum (USEPA 2001b, p. 1–1; Strager 2008, p. 36; WVDEP 2008a, p. 18; WVDEP 2008b, p. 1). The WVDEP has since revised those water quality criteria in order to address bioavailability of those metals, and established maximum amounts of these pollutants allowed to enter the waterbody (known as Total Maximum Daily Loads [TMDL]) (WVDEP 2010, p. 26; WVDEP 2008a, p. A–2). The WVDEP identified that impairment due to metals usually indicates excess sediment conditions (WVDEP 2008b, p. 5), and identified coal mining, oil and gas development, timber harvesting, all-terrain vehicle usage, and stream bank erosion as sources of increased sedimentation within the Elk River watershed (USEPA 2001b, pp. 1–1, 3–4 and 6; WVDEP 2008b, p. 1). Within two subwatersheds that make up approximately 11 percent of the total Elk River watershed area, the WVDEP identified 433 km (269 miles) of unimproved dirt roads and 76 km (47 mi) of severely eroding stream banks (WVDEP 2008b, p. 5). There was also an estimated 1,328 ha (3,283 ac) of lands being actively timbered in those two watersheds in 2004 (WVDEP 2008b, p. 6). Although data on timber harvesting for the entire Elk River watershed are not available, it is likely that these types of activities are common because there are 11 known sawmills within the watershed, and forested land is the predominant land-use category in the area (Strager 2008, pp. 13, 29).

Siltation has long been recognized as a pollutant that alters aquatic habitats by reducing light penetration, changing heat radiation, increasing turbidity, and covering the stream bottom (Ellis 1936 in Grandmaison *et al.* 2003, p. 17). Increased siltation has also been shown to abrade and suffocate bottom-dwelling organisms, reduce aquatic insect diversity and abundance, and, ultimately, negatively impact fish growth, survival, and reproduction (Berkman and Rabeni 1987, p. 285). Siltation directly affects the availability of food for the diamond darter by reducing the diversity and abundance of aquatic invertebrates on which the diamond darter feeds (Powell 1999, pp. 34–35), and by increasing turbidity, which reduces foraging efficiency (Berkman and Rabeni 1987, pp. 285–294). Research has found that when the percentage of fine substrates increases in a stream, the abundance of benthic insectivorous fishes decreases (Berkamn and Rabeni 1987, p. 285). Siltation also affects the ability of diamond darters to successfully breed by filling the small interstitial spaces between sand and gravel substrates with silt. Diamond darters lay their eggs within these interstitial spaces. The complexity and abundance of interstitial spaces is reduced dramatically with increasing sediment inputs and the resulting increase in substrate embeddedness. Consequently, the amount of suitable breeding microhabitat for species such as the diamond darter is reduced (Bhowmik and Adams 1989, Kessler and Thorp 1993, Waters 1995, and Osier and Welsh 2007 all in Service 2008, pp. 15–16).

Many researchers have noted that *Crystallaria* species are particularly susceptible to the effects of siltation, and Grandmaison *et al.* (2003, pp. 17–18) summarize the information as follows: ''Bhowmik and Adams (1989) provide an example of how sediment deposition has altered aquatic habitat in the Upper Mississippi River system, where the construction of locks and dams has resulted in siltation leading to a successional shift from open water to habitats dominated by submergent and emergent vegetation. This successional process is not likely to favor species such as the crystal darter which rely on extensive clean sand and gravel raceways for population persistence (Page 1983). For example, the crystal darter was broadly distributed in tributaries of the Ohio River until high silt loading and the subsequent smothering of sandy substrates occurred (Trautman 1981). In the Upper Mississippi River, the relative rarity of crystal darters has been hypothesized as a response to silt deposition over sand and gravel substrates (Hatch 1998)''. Although the Trautman (1981) citation within the above quote mentions the crystal darter, we now know that he was referring to individuals that have since been identified as diamond darters. In summary, *Crystallaria* species, including both the diamond darter and the crystal darter, are known to be particularly susceptible to the effects of sedimentation, and populations of these species have likely become extirpated or severely reduced in size as a result of this threat.

Water Quality/Sewage Treatment

One common source of chemical water quality impairments is untreated or poorly treated wastewater (sewage). Municipal wastewater treatment has improved dramatically since passage of the 1972 amendments to the Federal Water Pollution Control Act (which was amended to become the Clean Water Act in 1977), but some wastewater treatment plants, especially smaller plants, continue to experience maintenance and operation problems that lead to discharge of poorly treated sewage into streams and rivers (OEPA 2004 in Service 2008, p. 23). According to the data available in 2008, there were a total of 30 sewage treatment plants within the Elk River watershed (Strager 2008, p. 30).

Untreated domestic sewage (straight piping) and poorly operating septic systems are still problems within the Elk River watershed (WVDEP 1997, p. 54; WVDEP 2008b, p. 3). Untreated or poorly treated sewage contributes a variety of chemical contaminants to a stream including ammonia, pathogenic bacteria, nutrients (e.g., phosphorous and nitrogen), and organic matter that can increase biochemical oxygen demand (BOD) (Chu-Fa Tsai 1973, pp. 282–292; Cooper 1993, p. 405). The BOD is a measure of the oxygen consumed through aerobic respiration of micro-organisms that break down organic matter in the sewage waste. Excessive BOD and nutrients in streams can lead to low dissolved oxygen (DO) levels in interstitial areas of the substrate where a high level of decomposition and, consequently, oxygen depletion takes place (Whitman and Clark 1982, p. 653). Low interstitial DO has the potential to be particularly detrimental to fish such as the diamond darter which live on and under the bottom substrates of streams and lay eggs in interstitial areas (Whitman and Clark 1982, p. 653). Adequate oxygen is an important aspect of egg development, and reduced oxygen levels can lead to increased egg mortality, reduced hatching success, and delayed hatching (Keckeis *et al.* 1996, p. 436).

Elevated nutrients in substrates can also make these habitats unsuitable for fish spawning, breeding, or foraging and reduce aquatic insect diversity which may impact availability of prey and ultimately fish growth (Chu-Fa Tsai 1973, pp. 282–292; Wynes and Wissing 1981, pp. 259–267). Darters are noted to be ''highly sensitive'' to nutrient increases associated with sewage discharges, and studies have demonstrated that the abundance and distribution of darter species decreases downstream of these effluents (Katz and Gaufin 1953, p. 156; Wynes and Wissing 1981, p. 259). Elevated levels of fecal coliform signal the presence of improperly treated wastes (WVDEP 2008a, p. 7) that can cause the types of spawning, breeding, and foraging problems discussed above.

The reach of the Elk River from the mouth to River Mile 102.5, which includes the area supporting the diamond darter, is currently on the State's CWA section 303(d) list of impaired waters due to violations of fecal coliform levels (WVDEP 2008a, p. 18; WVDEP 2010, p. 26). There have been noticeable increases in fecal coliform near population centers adjacent to the Elk River, including the cities of Charleston, Elkview, Frametown, Gassaway, Sutton, and Clay (WVDEP 2008b, p. 8). Elk River tributaries near Clendenin also show evidence of organic enrichment and elevated levels of fecal coliform (WVDEP 1997, p. 48). The WVDEP notes that failing or nonexistent septic systems are prevalent throughout the lower Elk River watershed (WVDEP 2008b, p. 1). In order to address water quality problems, the WVDEP conducted a more detailed analysis of two major tributary watersheds to the lower Elk River. They found that all residences in these watersheds were ''unsewered'' (WVDEP 2008b, p. 7). The Kanawha County Health Department Sanitarians estimate that the probable failure rate for these types of systems is between 25 and 30 percent, and monitoring suggests it may be as high as 70 percent (WVDEP 2008b, p. 7).

In another study, it was noted that straight pipe and grey water discharges are often found in residences within the Elk River watershed because the extra grey water would overburden septic systems. These untreated wastes are discharged directly into streams. This grey water can contain many household cleaning and disinfectant products that can harm stream biota (WVDEP 1997, p. 54). Finally, there is the potential for inadvertent spills and discharges of sewage waste. In 2010, a section of stream bank along the Elk River near Clendenin failed and fell into the river, damaging a sewerline when it fell. The line then discharged raw sewage into the river (Marks 2010, p. 1). The diamond darter is known to occur in the Elk River near Clendenin; therefore, this discharge could have likely affected the species.

Impoundment

One of the reasons the diamond darter may have been able to persist in the Elk River is because the river remains largely unimpounded. Although there is one dam on the Elk River near Sutton, approximately 161 km (100 mi) of the river downstream of the dam retains natural, free-flowing riffle and pool characteristics, including the portion that supports the diamond darter (Strager 2008, p. 5; Service 2008). All the other rivers with documented historical diamond darter occurrences are now either partially or completely impounded. There are 4 dams on the Green River, 8 dams on the Cumberland River, and 11 locks and dams on the

Muskingum River. A series of 20 locks and dams have impounded the entire Ohio River for navigation. Construction of most of these structures was completed between 1880 and 1950; however, the most recent dam constructed on the Cumberland River was completed in 1973 (Clay 1975, p. 3; Trautman 1981, p. 25; Tennessee Historical Society 2002, p. 4; American Canal Society 2009, p. 1; Ohio Division of Natural Resources 2009, p. 1).

These impoundments have permanently altered habitat suitability in the affected reaches and fragmented stream habitats, blocking fish immigration and emigration between the river systems, and preventing recolonization (Grandmaison *et al.* 2003, p. 18). Trautman (1981, p. 25) notes that the impoundment of the Muskingum and Ohio Rivers for navigation purposes almost entirely eliminated riffle habitat in these rivers, increased the amount of silt settling on the bottom which covered former sand and gravel substrates, and affected the ability of the diamond darter to survive in these systems. In addition, almost the entire length of the Kanawha River, including the 53 km (33 mi) upstream of the confluence with the Elk River and an additional 93 km (58 mi) downstream to Kanawha's confluence with the Ohio River, has been impounded for navigation (U.S. Army Corps of Engineers (ACOE) 1994, pp. 1, 13, 19). The series of dams and impoundments on this system likely impede movement between the only remaining population of the diamond darter in the Elk River and the larger Ohio River watershed, including the other known river systems with historical populations. Range fragmentation and isolation (see Factor E below) is noted to be a significant threat to the persistence of the diamond darter (Warren *et al.* 2000 in Grandmaison *et al.* 2003, p. 18).

Direct Habitat Disturbance

There is the potential for direct disturbance, alteration, and fill of diamond darter habitat in the Elk River. Since 2009, there have been at least three proposed projects that had the potential to directly disturb habitat in the Elk River in reaches that are known to support the species. Plans for these projects have not yet been finalized. Project types have included bridges and waterline crossings. Direct disturbances to the habitat containing the diamond darter could kill or injure adult individuals, young, or eggs. Waterline construction that involves direct trenching through the diamond darter's habitat could destabilize the substrates, leading to increased sedimentation or erosion. Placement of fill in the river could result in the overall reduction of habitat that could support the species, and could alter flows and substrate conditions, making the area less suitable for the species (Welsh 2009d, p. 1).

In addition, the expansion of gas development in the basin will likely lead to additional requests for new or upgraded gas transmission lines across the river. Pipeline stream crossings can affect fish habitat; food availability; and fish behavior, health, reproduction, and survival. The most immediate effect of instream construction is the creation of short-term pulses of highly turbid water and total suspended solids (TSS) downstream of construction (Levesque and Dube 2007, pp. 399–400). Although these pulses are usually of relatively short duration and there is typically a rapid return to background conditions after activities cease, instream construction has been shown to have considerable effects on stream substrates and benthic invertebrate communities that persist after construction has been completed (Levesque and Dube 2007, p. 396–397). Commonly documented effects include substrate compaction, as well as silt deposition within the direct impact area and downstream that fills interstitial spaces and reduces water flow through the substrate, increasing substrate embeddedness and reducing habitat quality (Reid and Anderson 1999, p. 243; Levesque and Dube 2007, pp. 396–397; Penkal and Phillips 2011, pp. 6–7). Construction also directly alters stream channels, beds, and banks resulting in changes in cover, channel morphology, and sediment transport dynamics. Stream bank alterations can lead to increased water velocities, stream degradation, and stream channel migrations. Removal of vegetation from the banks can change temperature regimes, and increase sediment and nutrient loads (Penkal and Phillips 2011, pp. 6–7).

These instream changes not only directly affect the suitability of fish habitat, they also affect the availability and quality of fish forage by altering the composition and reducing the density of benthic invertebrate communities within and downstream of the construction area (Reid and Anderson 1999, pp. 235, 244; Levesque and Dube 2007, pp. 396–399; Penkal and Phillips 2011, pp. 6–7). Various studies have documented adverse effects to the benthic community that have been apparent for between 6 months and 4 years post-construction (Reid and Anderson 1999, pp. 235, 244; Levesque and Dube 2007, pp. 399–400). Stream crossings have also been shown to affect fish physiology, survival, growth, and reproductive success (Levesque and Dube 2007, p. 399). Studies have found decreased abundance of fish downstream of crossings, as well as signs of physiological stress such as increased oxygen consumption and loss of equilibrium in remaining fish downstream of crossings (Reid and Anderson 1999, pp. 244–245; Levesque and Dube 2007, pp. 399–401). Increased sediment deposition and substrate compaction from pipeline crossing construction can degrade spawning habitat, result in the production of fewer and smaller fish eggs, impair egg and larvae development, limit food availability for young-of-the-year fish, and increase stress and reduce disease resistance of fish (Reid and Anderson 1999, pp. 244–245; Levesque and Dube 2007, pp. 401–402).

The duration and severity of these effects depends on factors such as the duration of disturbance, the length of stream segment directly impacted by construction, and whether there are repeated disturbances (Yount and Niemi 1990, p. 557). Most studies documented recovery of the affected stream reach within 1 to 3 years after construction (Yount and Niemi 1990, pp. 557–558, 562; Reid and Anderson 1999, p. 247). However, caution should be used when interpreting results of short-term studies. Yount and Niemi (1990, p. 558) cite an example of one study that made a preliminary determination of stream recovery within 1 year, but when the site was reexamined 6 years later, fish biomass, fish populations, macroinvertebrate densities, and species composition were still changing. It was suspected that shifts in sediment and nutrient inputs to the site as a result of construction in and around the stream contributed to the long-term lack of recovery. In another study, alterations in channel morphology, such as increased channel width and reduced water depth, were evident 2 to 4 years post-construction at sites that lacked an intact forest canopy (Reid and Anderson 1999, p. 243).

There is also the potential for cumulative effects. While a single crossing may have only short-term or minor effects, multiple crossings or multiple sources of disturbance and sedimentation in a watershed can have cumulative effects on fish survival and reproduction that exceed the recovery capacity of the river, resulting in permanent detrimental effects (Levesque and Dube 2007, pp. 406–407). Whether or how quickly a stream population recovers depends on factors such as the life-history characteristics of the species, and the availability of unaffected populations upstream and downstream as a source of organisms for recolonization (Yount and Niemi 1990, p. 547). Species such as the diamond darter that are particularly susceptible to the effects of sedimentation and substrate embeddedness, and that have limited distribution and population numbers, are likely to be more severely affected by instream disturbances than other more common and resilient species.

Summary of Factor A

In summary, there are significant threats to the diamond darter from the present and threatened destruction, modification, or curtailment of its habitat. Threats include discharges from activities such as coal mining and oil and gas development, sedimentation from a variety of sources, pollutants originating from inadequate wastewater treatment, habitat changes caused by impoundments, and direct habitat disturbance. These threats are ongoing, severe, and occur throughout the species' entire range. We have no information indicating that these threats are likely to be appreciably reduced in the future, and in the case of gas development, we expect this threat to increase over the next several years as shale gas development continues to intensify.

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

Due to the small size and limited distribution of the only remaining population, the diamond darter is potentially vulnerable to overutilization. Particular care must be used to ensure that collection for scientific purposes does not become a long-term or substantial threat. It is possible that previous scientific studies may have impacted the population. Of the fewer than 50 individuals captured to date, 14 either died as a result of the capture or were sacrificed for use in scientific studies. Nineteen were removed from the system and were used for the establishment of a captive breeding program. Two have died in captivity. It should be noted that there were valid scientific purposes for most of these collections. In order to verify the identification and permanently document the first record of the species in West Virginia, the specimen captured in 1980 was preserved as a voucher specimen consistent with general scientific protocols of the time. Subsequent surveys in the 1990s were conducted for the specific purpose of collecting additional specimens to be used in the genetic and morphological analyses required to determine the taxonomic and conservation status of the species. The extent and scope of these studies were determined and reviewed by a variety of entities including the WVDNR, the Service, USGS, university scientists, and professional ichthyologists (Tolin 1995, p. 1; Wood and Raley 2000, pp. 20–26; Lemarie 2004, pp. 1–57; Welsh and Wood 2008, pp. 62–68).

In addition, when these collections were initiated, insufficient data were available to establish the overall imperiled and unique status of the species. Because these studies are now complete, there should be limited need to sacrifice additional individuals for scientific analysis. The captive breeding program was established after a review of the conservation status of the species identified that there were imminent threats to the last remaining population, and species experts identified the need to establish a captive ''ark'' population in order to avert extinction in the event of a spill or continued chronic threats to the species. The establishment of this program should contribute to the overall conservation of the species and may lead to the eventual augmentation of populations. However, caution must still be used to ensure that any additional collections do not affect the status of wild populations.

It is possible that future surveys conducted within the range of the species could inadvertently result in mortality of additional individuals. For example, during some types of inventory work, fish captured are preserved in the field and brought back to the lab for identification. Young-of-the-year diamond darters are not easily distinguished from other species, and their presence within these samples may not be realized until after the samples are processed. This was the case during studies recently conducted by a local university (Cincotta 2009a, p. 1). Future surveys should be designed with protocols in place to minimize the risk that diamond darters will be inadvertently taken during nontarget studies. The WVDNR currently issues collecting permits for all surveys and scientific collections conducted within the State and incorporates appropriate conditions into any permits issued for studies that will occur within the potential range of the species. This limits the overall potential for overutilization for scientific purposes.

Although the species has no present commercial value, it is possible that live specimens may be collected for the aquarium trade (Walsh *et al.* 2003 in Grandmaison *et al.* 2003 p. 19), and that once its rarity becomes more widely known, it may become attractive to collectors. However, there is no information available to suggest that this is currently a threat. There are no known recreational or educational uses for the species.

As a result, we find that overutilization for commercial, recreational, scientific, or educational purposes is not an imminent threat to the diamond darter at this time. For a species with a limited range and population size, there is the potential that overutilization for scientific purposes could have an effect on the viability of the species. However, there is limited need for additional research that would require the sacrifice of individuals. Based on our review of the best available scientific and commercial information, overutilization is not currently or likely to become a significant threat to the species in the future.

*Factor C. Disease or Predation*

There is no specific information available to suggest that disease or predation present an unusual threat to diamond darters. Although some natural predation by fish and wildlife may occur, darters usually constitute only an almost incidental component in the diet of predators (Page 1983, p. 172). This incidental predation is not considered to currently pose a significant threat to the species.

Commonly reported parasites and diseases of darters, in general, include black-spot disease, flukes, nematodes, leeches, spiny-headed worms, and copepods (Page 1983, p. 173). None of the best available information regarding diamond darters captured to date, or reports on the related crystal darter, note any incidences of these types of issues. As a result, we find that disease or predation does not currently pose a threat to the species, and we found no available information that indicates disease or predation is currently or likely to become a threat to the diamond darter in the future.

*Factor D. The Inadequacy of Existing Regulatory Mechanisms*

There are few existing Federal or State regulatory mechanisms that specifically protect the diamond darter or its aquatic habitat where it currently occurs. The diamond darter and its habitats are afforded some protection from water quality and habitat degradation under the Clean Water Act of 1977 (33 U.S.C. 1251 *et seq.*), Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1234–1328), West Virginia Logging and Sediment Control Act (WVSC § 19–1B), and additional West Virginia laws and regulations regarding natural resources and environmental protection (WVSC § 20–2–50; § 22–6A; § 22–26–3). However, as demonstrated under Factor A, degradation of habitat for this species is ongoing despite the protection afforded by these laws and corresponding regulations. While these laws have resulted in some improvements in water quality and stream habitat for aquatic life, including the diamond darter, they alone have not been adequate to fully protect this species. Water quality degradation, sedimentation, nonpoint-source pollutants, and habitat alteration continue to threaten the species.

Although water quality has generally improved since 1977 when the Clean Water Act (33 U.S.C. 1251 *et seq.*) and Surface Mining Control and Reclamation Act (30 U.S.C. 1234–1328) were enacted or amended in 1977, there is continuing, ongoing degradation of water quality within the range of the diamond darter. A total of 214 streams within the Elk River watershed have been identified as impaired by the WVDEP and placed on the State's 303(d) list (WVDEP 2011b, p. viii). Causes of impairment that were identified include existing mining operations, abandoned mine lands, fecal coliform from sewage discharges, roads, oil and gas operations, timbering, land use disturbance (urban, residential, or agriculture), and stream bank erosion (WVDEP 2011b, pp. viii–ix). For water bodies on the 303(d) list, States are required under the Clean Water Act to establish a TMDL for the pollutants of concern that will improve water quality to meet the applicable standards. The WVDEP has established TMDLs for total iron, dissolved aluminum, total selenium, pH, and fecal coliform bacteria. The total iron TMDL is used as a surrogate to address impacts associated with excess sediments (WVDEP 2011b, p. 47). Because these TMDLs have just recently been established, it is not known how effective they will be at reducing the levels of these pollutants, or how long streams within the Elk River watershed will remain impaired. In addition, TMDLs apply primarily to point-source discharge permits, and since nonpoint sources may also contribute to sediment loading in the watershed, TMDLs are not, at this time, an adequate mechanism to address sedimentation. The Service is also not aware of any other current or future changes to State or Federal water quality or mining laws that will substantially affect the currently observed degradation of water quality.

Nonpoint-source pollution, originating from many sources at different locations, is considered to be a continuing threat to diamond darter habitats. Current laws do not adequately protect diamond darter and its habitats from nonpoint-source pollution, because there is limited compliance with existing laws to prevent sediment entering waterways. For example, forestry operations do not have permitting requirements under the Clean Water Act because there is a silvicultural exemption as long as best management practices (BMPs) are used to help control nonpoint-source pollution (Ryder and Edwards 2006, p. 272). The West Virginia Logging Sediment Control Act was developed to protect aquatic resources, such as the diamond darter's habitat, in response to the requirements of the Clean Water Act and mandates the use of BMPS in order to reduce the amount of sediment from logging operations that enters nearby waterways (West Virginia Division of Forestry (WVDOF) undated, p. 1). Without properly installed BMPs, logging operations can increase sediment loading into streams (WVDEP 2011b, p. 35).

A survey of randomly selected logging operations throughout West Virginia estimated that overall compliance with these BMPs averaged 74 percent, and compliance with specific categories of BMPs varied from 81 percent compliance with BMPs related to construction of haul roads, to only 55 percent compliance with BMPs related to the establishment and protection of streamside management zones (Wang *et al.* 2007, p. 60). Another study evaluating the effects of forestry haul roads documented that watershed turbidities increased significantly following road construction and that silt fences installed to control erosion became ineffectual near stream crossings and allowed substantial amounts of sediment to reach the channel (Wang *et al.* 2010, p. 1). Because the BMPs are not always strictly applied and logging activities can still be a significant nonpoint-source of water quality impairment, the West Virginia Logging Sediment Control Act is currently considered an inadequate regulatory mechanism for the protection of aquatic habitats that support the diamond darter.

West Virginia State laws regarding oil and gas drilling, including recently enacted changes to West Virginia State Code § 22–6A, are generally designed to protect fresh water resources like the diamond darter's habitat, but the laws do not contain specific provisions requiring an analysis of project impacts to fish and wildlife resources. They also do not contain or provide any formal mechanism requiring coordination with, or input from, the Service or the WVDNR regarding the presence of federally threatened, endangered, or candidate species, or other rare and sensitive species. Thus, although the State Code is designed to protect fresh water resources and the environment, compliance with this existing oil and gas development regulatory mechanism is insufficient to protect the diamond darter or its habitat.

West Virginia State Code § 20–2–50 prohibits taking fish species for scientific purposes without a permit. The WVDNR currently issues collecting permits for surveys conducted within the State and incorporates appropriate conditions into any permits issued for studies that will occur within the potential range of the species. While this should limit the number of individuals impacted by survey and research efforts, this requirement does not provide any protection to the species' habitat.

The diamond darter is indirectly provided some protection from Federal actions and activities through the Federal Endangered Species Act because the Elk River also supports five federally endangered mussel species. The reach of the Elk River currently known to support the diamond darter also supports the pink mucket (*Lampsilis abrupta*), the northern riffleshell (*Epioblasma torulosa rangiana*), the rayed bean (*Villosa fabalis*), and the snuffbox (*Epioblasma triquetra).* The clubshell mussel (*Pleurobema clava*) occurs in the reach of the Elk River upstream of the diamond darter. However, protective measures for listed freshwater mussels have generally involved surveys for mussel species presence and minimization of direct habitat disturbance in areas with confirmed presence. The diamond darter is more mobile and therefore is likely to be present within a less restricted area than most mussel species. Surveys for mussels will not detect diamond darters. As a result, these measures provide some limited protection for the diamond darter, but only in specific locations where it co-occurs with these mussel species.

In summary, degradation of habitat for the diamond darter is ongoing despite existing regulatory mechanisms. These regulatory measures have been insufficient to significantly reduce or remove the threats to the diamond darter.

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

Didymosphenia geminate

The presence of *Didymosphenia geminate,* an alga known as ''didymo'' or ''rock snot'' has the potential to adversely affect diamond darter populations in the Elk River. This alga, historically reported to occur in cold, northern portions of North America (e.g., British Columbia), has been steadily expanding its range within the last 10 to 20 years, and has now been reported to occur in watersheds as far east and south as Arkansas and North Carolina (Spaulding and Elwell 2007, pp. 8–21). The species has also begun occurring in large nuisance blooms that can dominate stream surfaces by covering 100 percent of the substrate with mats up to 20 cm (8 in) thick, extending over 1 km (0.6 mi) and persisting for several months (Spaulding and Elwell 2007, pp. 3, 6). Didymo can greatly alter the physical and biological conditions of streams in which it occurs and cause changes to algal, invertebrate, and fish species diversity and population sizes; stream foodweb structure; and stream hydraulics (Spaulding and Elwell 2007, pp. 3, 12). Didymo is predicted to have particularly detrimental effects on fish, such as the diamond darter, that inhabit stream bottom habitats or consume bottom-dwelling prey (Spaulding and Elwell 2007, p. 15).

While didymo was previously thought to be restricted to cold water streams, it is now known to occur in a wider range of temperatures, and it has been documented in waters that were up as high as 27 °C (80 °F) (Spaulding and Elwell 2007, pp. 8, 10, 16). It can also occur in a wide range of hydraulic conditions including slow-moving, shallow areas, and areas with high depths and velocities (Spaulding and Elwell 2007, pp. 16–17). Didymo can be spread large distances either through the water column or when items such as fishing equipment, boots, neoprene waders, and boats are moved between affected and unaffected sites (Spaulding and Elwell 2007, pp. 19–20). For example, in New Zealand, didymo spread to two sites over 100 km (62.1 mi) and 450 km (279.6 mi) away from the location of the first documented bloom within 1 year (Kilroy and Unwin 2011, p. 254).

Although it has not been documented to occur in the lower Elk River where the diamond darter occurs, in 2008 the WVDNR documented the presence of didymo in the upper Elk River, above Sutton Dam near Webster Springs, which is over 120 km (74.5 mi) upstream from known diamond darter locations (WVDNR 2008, p. 1). Anglers have also reported seeing heavy algal mats, assumed to be didymo, in the upstream reach of the river (WVDNR 2008, p. 1). Therefore, there is potential that the species could spread downstream to within the current range of the diamond darter in the future. If it does spread into the diamond darter habitat, it could degrade habitat quality and pose a significant threat to the species.

Geographic Isolation, Loss of Genetic Variation, and Climate Change

The one existing diamond darter population is small in size and range, and it is geographically isolated from other areas that previously supported the species. The diamond darter's distribution is restricted to a short stream reach, and its small population size makes it extremely susceptible to extirpation from a single catastrophic event (such as a toxic chemical spill or storm event that destroys its habitat). Therefore, reducing the potential ability to recover from the cumulative effects of smaller chronic impacts to the population and habitat such as progressive degradation from runoff (nonpoint source pollutants), and direct disturbances.

Species that are restricted in range and population size are more likely to suffer loss of genetic diversity due to genetic drift, potentially increasing their susceptibility to inbreeding depression, and reducing the fitness of individuals (Soule 1980, pp. 157–158; Hunter 2002, pp. 97–101; Allendorf and Luikart 2007, pp. 117–146). Similarly, the random loss of adaptive genes through genetic drift may limit the ability of diamond darters to respond to changes in their environment such as climate change, or the catastrophic events and chronic impacts described above (Noss and Cooperrider 1994, p. 61). Small population sizes and inhibited gene flow between populations may increase the likelihood of local extirpation (Gilpin and Soulé 1986, pp. 32–34). The long-term viability of a species is founded on the conservation of numerous local populations throughout its geographic range (Harris 1984, pp. 93–104). These separate populations are essential for the species to recover and adapt to environmental change (Harris 1984, pp. 93–104; Noss and Cooperrider 1994, pp. 264–297). The current population of the diamond darter is restricted to one section of one stream. This population is isolated from other suitable and historical habitats by dams that are barriers to fish movement. The level of isolation and restricted range seen in this species makes natural repopulation of historical habitats or other new areas following previous localized extirpations virtually impossible without human intervention.

Climate change has the potential to increase the vulnerability of the diamond darter to random catastrophic events and to compound the effects of restricted genetic variation and isolation. Current climate change predictions for the central Appalachians indicate that aquatic habitats will be subject to increased temperatures and increased drought stress, especially during the summer and early fall (Buzby and Perry 2000, p. 1774; Byers and Norris 2011, p. 20). There will likely be an increase in the variability of stream flow, and the frequency of extreme events such as drought, severe storms, and flooding is likely to increase statewide (Buzby and Perry 2000, p. 1774; Byers and Norris 2011, p. 20). While the currently available information on the effects of climate change is not precise enough to predict the extent to which climate change will degrade diamond darter habitat, species with limited ranges that are faced with either natural or anthropomorphic barriers to movement, such as the dams that fragmented and isolated the historical diamond darter habitat, have been found to be especially vulnerable to the effects of climate change (Byers and Norris 2011, p. 18). Thus, the small population size and distribution of the diamond darter makes the species particularly susceptible to risks from catastrophic events, loss of genetic variation, and climate change.

Summary of Factor E

In summary, because the diamond darter has a limited geographic range and small population size, it is subject to several other ongoing, natural and manmade threats. These threats include the spread of *Didymosphenia geminate;* loss of genetic fitness; and susceptibility to spills, catastrophic events, and impacts from climate change. These threats to the diamond darter are current and are expected to continue rangewide into the future. The severity of these threats is high because of the reduced range and population size which result in a reduced ability to adapt to environmental change. Further, our review of the best available scientific and commercial information indicates that these threats are likely to continue or increase in the future.

**Proposed Determination**

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the diamond darter. The primary threats to the diamond darter are related to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A). The species is currently known to exist only in the lower Elk River, West Virginia. This portion of the watershed is currently impacted by ongoing water quality degradation and habitat loss from activities associated with coal mining and oil and gas development, siltation from these and other sources, inadequate sewage and wastewater treatment, and direct habitat loss and alteration. The impoundment of rivers in the Ohio River Basin, such as the Kanawha, Ohio, and Cumberland Rivers, has eliminated much of the species' habitat and isolated the existing population from other watersheds that the species historically occupied.

The species could potentially be vulnerable to overutilization for scientific purposes (Factor B), but the significance of this threat is adequately regulated through the State's administration of scientific collecting permits. There are no known threats to the diamond darter from disease or predation (Factor C). Existing Federal and State regulatory mechanisms such as the Clean Water Act, Surface Mining Control and Reclamation Act, and the West Virginia Sediment Logging Control Act do not provide adequate protections for the diamond darter or its aquatic habitat (Factor D). The small size and restricted range of the remaining diamond darter population makes it particularly susceptible to the spread of didymo and effects of genetic inbreeding, and extirpation from spills and other catastrophic events (Factor E). In addition to the individual threats discussed under Factors A and E, each of which is sufficient to warrant the species' listing, the cumulative effect of Factors A, D, and E is such that the magnitude and imminence of threats to the diamond darter are significant throughout its entire current range.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that the diamond darter, which consists of only one population (occurrence), is presently in danger of extinction throughout its entire range, due to the immediacy, severity, and scope of the threats described above. Because the species is currently limited to one small, isolated population in an aquatic environment that is currently facing numerous, severe, and ongoing water quality threats which are likely to increase over time, we find that the diamond darter does not meet the definition of a threatened species. Therefore, on the basis of the best available scientific and commercial information, we propose listing the diamond darter as endangered in accordance with sections 3(6) and 4(a)(1) of the Act.

Under the Act and our implementing regulations, a species may warrant listing if it is threatened or endangered throughout all or a significant portion of its range. The diamond darter proposed for listing in this rule is highly restricted in its range and the threats to the survival of the species are not restricted to any particular significant portion of that range. Therefore, we assessed the status of the species throughout its entire range. Accordingly, our assessment and proposed determination apply to the species throughout its entire range.

**Available Conservation Measures**

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

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, such that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species, unless we find that such a plan will not promote the conservation of the species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed, and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that will achieve recovery of the species, measurable criteria that set a trigger for review of the five factors that control whether a species remains endangered or may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (comprising species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our Web site (*http://www.fws.gov/endangered*), or from our West Virginia Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, states, tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, state programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of West Virginia, Kentucky, Tennessee, and Ohio would be eligible for Federal funds to implement management actions that promote the protection or recovery of the diamond darter. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants.*

Although the diamond darter is only proposed for listing under the Act at this time, please inform us of your interest in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include the issuance of section 404 Clean Water Act permits by the Army Corps of Engineers; construction and management of gas pipeline and power line rights-of-way or hydropower facilities by the Federal Energy Regulatory Commission; construction and maintenance of roads, highways, and bridges by the Federal Highway Administration; pesticide regulation by the U.S. Environmental Protection Agency; and issuance of coal mining permits by the Office of Surface Mining.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered wildlife. The prohibitions of section 9(a)(2) of the Act, codified at 50 CFR 17.21 for endangered wildlife, in part, make it illegal for any person subject to the jurisdiction of the United States to take (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import, export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. Under the Lacey Act (18 U.S.C. 42–43; 16 U.S.C. 3371–3378), it is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and state conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species, and at 17.32 for threatened species. With regard to endangered wildlife, a permit must be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities.

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

(1) Unauthorized collecting, handling, possessing, selling, delivering, carrying, or transporting of the species, including import or export across State lines and international boundaries, except for properly documented antique specimens at least 100 years old, as defined by section 10(h)(1) of the Act.

(2) Violation of any permit that results in harm or death to any individuals of this species or that results in degradation of its habitat to an extent that essential behaviors such as breeding, feeding and sheltering are impaired.

(3) Unlawful destruction or alteration of diamond darter habitats (e.g., unpermitted instream dredging, impoundment, water diversion or withdrawal, channelization, discharge of fill material) that impairs essential behaviors such as breeding, feeding, or sheltering, or results in killing or injuring a diamond darter.

(4) Unauthorized discharges or dumping of toxic chemicals or other pollutants into waters supporting the diamond darter that kills or injures individuals, or otherwise impairs essential life-sustaining behaviors such as breeding, feeding, or finding shelter.

Other activities not identified above will be reviewed on a case-by-case basis to determine if a violation of section 9 of the Act may be likely to result from such activity should we list the diamond darter as endangered. Compliance with a State permit, or lack of need for a State permit, does not necessarily provide coverage against violations of section 9 of the Act, particularly if the State review has not yet included protections to ensure that adverse effects to federally listed species are avoided. The Service does not consider the description of future and ongoing activities provided above to be exhaustive; we provide them simply as information to the public.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the West Virginia Field Office (see **FOR FURTHER INFORMATION CONTACT**). Requests for copies of the regulations concerning listed animals and general inquiries regarding prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Endangered Species Permits, 300 Westgate Center Drive, Hadley, MA 01035–9589 (Phone 413–253–8200; Fax 413–253–8482) or information can be viewed at our permit Web site at *http://www.fws.gov/endangered/permits/how-to-apply.html.*

## Critical Habitat Designation for Diamond Darter

### Background

It is our intent to discuss below only those topics directly relevant to the designation of critical habitat for the diamond darter in this section of the proposed rule.

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;

(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.

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. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the 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 and biological features within an area, we focus on the principal biological or physical constituent elements (primary constituent elements such as roost sites, nesting grounds, seasonal wetlands, water quality, tide, soil type) that are essential to the conservation of the species. Primary constituent elements are those specific elements of physical or biological features that provide for a species' life-history processes, and are essential to the conservation of the species.

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. For example, an area currently occupied by the species but that was not occupied at the time of listing may be essential to the conservation of the species and may be included in the critical habitat designation. We designate critical habitat in areas outside the geographical area occupied by a species only when a designation limited to its range would be inadequate to ensure the conservation of the species.

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

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

Habitat is dynamic, and species may move from one area to another over time. Climate change will be a particular challenge for biodiversity because the interaction of additional stressors associated with climate change and current stressors may push species beyond their ability to survive (Lovejoy 2005, pp. 325–326). The synergistic implications of climate change and habitat fragmentation are the most threatening facet of climate change for biodiversity (Hannah and Lovejoy 2003, p. 4). In particular, we recognize that climate change may cause changes in the arrangement of occupied habitat and stream reaches. Current climate change predictions for the central Appalachians indicate that aquatic habitats will be subject to increased temperatures and increased drought stress, especially during the summer and early fall. There will likely be an increase in the variability of stream flow, and the frequency of extreme events, such as drought, severe storms, and flooding, is likely to increase statewide (Buzby and Perry 2000, p. 1774; Byers and Norris 2011, p. 20). Species with limited ranges and that are faced with either natural or anthropomorphic barriers to movement, such as the dams that fragment and isolate diamond darter habitat, have been found to be especially vulnerable to the effects of climate change (Byers and Norris 2011, p. 18).

Precise estimates of the location and magnitude of impacts from global climate change and increasing temperatures cannot be made from the currently available information. Nor are we currently aware of any climate change information specific to the habitat of the diamond darter that would indicate what areas may become important to the species in the future. However, among the most powerful strategies for the long-term conservation of biodiversity is establishment of networks of intact habitats and conservation areas that represent a full range of ecosystems, and include multiple, robust examples of each type. The principles of resiliency and redundancy are at the core of many conservation planning efforts, and are increasingly important as the stresses of climate change erode existing habitats (Byers and Norris 2011, p. 24). Therefore, we have attempted to incorporate these principles into our proposed determination of critical habitat by delineating two units that are representative of the range of habitats currently and previously occupied by the species.

We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act, (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species, and (3) section 9's prohibition 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 basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts calls for a different outcome.

*Prudency Determination*

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Our regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species; or (2) such designation of critical habitat would not be beneficial to the species.

There is no documentation of commercial or private collection of the diamond darter. Although that activity is identified as a possible but unlikely threat to the species, the significance of collection to the viability of the species' populations is not known. In the absence of a finding that the designation of critical habitat would increase threats to a species, if there are any benefits to a critical habitat designation, then a prudent finding is warranted. The potential benefits include: (1) Triggering consultation under section 7 of the Act, in new areas for actions in which there may be a Federal nexus where it would not otherwise occur because, for example, it is or has become unoccupied or the occupancy is in question; (2) focusing conservation activities on the most essential features and areas; (3) providing educational benefits to State or county governments or private entities; and (4) preventing people from causing inadvertent harm to the species.

The primary regulatory effect of critical habitat is the section 7(a)(2) requirement that Federal agencies refrain from taking any action that destroys or adversely modifies critical habitat. At this time, the diamond darter occurs on State and private lands along the Elk River in West Virginia. Lands proposed for designation as critical habitat would be subject to Federal actions that trigger section 7 consultation requirements. These include land management planning and Federal agency actions. There may also be educational or outreach benefits to the designation of critical habitat. These benefits include the notification of lessees and the general public of the importance of protecting the habitats of both of these rare species.

In the case of the diamond darter, these aspects of critical habitat designation would potentially benefit the conservation of the species. Therefore, if the threat of commercial or private collection exists for the species, it is outweighed by the conservation benefits derived from the designation of critical habitat. We therefore find that designation of critical habitat is prudent for the diamond darter.

*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 eight 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) Information sufficient to perform required analyses of the impacts of the designation is lacking, or

(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C. 1533(b)(6)(C)(ii)).

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

*Physical or Biological Features*

In accordance with section 3(5)(A)(i) and 4(b)(2) of the Act and regulations at 50 CFR 424.12, 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 (50 CFR 424.12(b)). 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.

We derive the specific physical or biological features required for the diamond darter from studies of this species' habitat, ecology, and life history as described below. Because diamond darters are so rare, there is very little information available with which to quantitatively define the optimal or range of suitable conditions for a specific biological or physical feature needed by the species. However, the available, species-specific information, in combination with information from the closely related crystal darter and other similar darter species, provides sufficient information to qualitatively discuss the physical and biological features needed to support the species. Based on this review, we have determined that the following physical and biological features are essential for the diamond darter:

Space for Individual and Population Growth and for Normal Behavior

The diamond darter inhabits moderate to large, warmwater streams with clean sand and gravel substrates (Simon and Wallus 2006, p. 52). Moderate to large warmwater streams are defined as fourth to eighth order streams with a drainage area exceeding 518 km² (200 mi²) and temperatures exceeding 20 °C (68 °F) at some point during the year (Winger 1981, p. 40;

Oliverio and Anderson 2008, p. 12). In the Elk River, the diamond darter has been collected in transition areas between riffles and pools where substrates were greater than 40 percent sand and gravel (Welsh *et al.* 2004, p. 6; Osier 2005, p. 11; Welsh and Wood 2008, pp. 62–68). These habitat characteristics are similar to those described for the crystal darter (Welsh *et al.* 2008, p. 1). Many studies have found that the crystal darter does not occur in areas with large amounts of mud, clay, detritus, or submerged vegetation (George *et al.* 1996, p. 71; Shepard *et al.* 1999 in Osier 2005, p. 11; NatureServe 2008, p. 1). The presence of clean sand and gravel substrates with low levels of silt appears to be a critical component of diamond darter habitat.

Siltation (excess sediments suspended or deposited in a stream) has been shown to negatively impact fish growth, survival, and reproduction (Berkman and Rabeni 1987, p. 285). Both the diamond darter and the crystal darter are noted to be particularly susceptible to the effects of siltation and may have been extirpated from historical habitats due to excessive siltation (Grandmaison *et al.* 2003, pp. 17–18). Siltation can result from increased erosion along stream banks and roads and deposition caused by land-based disturbances (Rosgen 1996, p. 1-3). Coal mining, oil and gas development, timber harvesting, and all-terrain vehicle usage have been identified as land-based disturbances that are sources of increased siltation within the Elk River watershed (USEPA 2001b, pp. 1–1, 3–4, 6; WVDEP 2008b, p. 1). Increased siltation can also result from stream bank erosion and channel instability (Rosgen 1996, p. 1–3). Geomorphically stable streams transport sediment while maintaining their horizontal and vertical dimensions (width/depth ratio and cross-sectional area), pattern (sinuosity), longitudinal profile (riffles, runs, and pools), and substrate composition (Rosgen 1996, pp. 1–3 to 1–6). Thus, geomorphically stable streams maintain the riffles and pools and silt-free substrates necessary to provide typical habitats for the diamond darter.

Fragmentation and destruction of habitat has reduced the current range of the diamond darter to only one stream and has isolated the last remaining population, reducing the currently available space for rearing and reproduction. Small, isolated populations may have reduced adaptive capability and an increased likelihood of extinction (Gilpin and Soulé 1986, pp. 32–34; Noss and Cooperrider 1994, p. 61). Continuity of water flow and connectivity between remaining suitable habitats is essential in preventing further fragmentation of the species' habitat and population. Free movement of water within the stream allows darters to move between available habitats. This is necessary to provide sufficient space for the population to grow and to promote genetic flow throughout the population. Continuity of habitat helps to maintain space for spawning, foraging, and resting sites, and also permits improvement in water quality and water quantity by allowing unobstructed water flow throughout the connected habitats. Thus, free movement of water that provides connectivity between habitats is necessary to support diamond darter populations.

There is little information available on the amount of space needed by either the diamond darter or the crystal darter for population growth and normal behavior. Many individuals of other darter species that use similar habitat types have been found to remain in one habitat area during short-term mark and recapture studies. However upstream and downstream movements of other darters between riffles and between riffles and pools have been documented. Within-year movements typically ranged from 36 to 420 meters (118.1 to 1,378.0 ft), and movements of up to 4.8 km (3.0 mi) have been documented (May 1969, pp. 86–87, 91; Freeman 1995, p. 363; Roberts and Angermeier 2007, pp. 422, 424–427).

In addition, a number of researchers have suggested that *Crystallaria* move upstream to reproduce when they mature, and that free-floating young-of-the-year disperse considerable distances downstream during spring high water where they eventually find suitable habitat to grow and mature (Stewart *et al.* 2005, p. 472; Hrabik 2012, p. 1). This suggests that *Crystallaria* may make long-distance movements in large rivers. This type of migratory behavior has been documented in bluebreast darters (*Etheostoma camurum*) (Trautman 1981, pp. 673–675). This species inhabits moderate to large-sized streams with low turbidity and is typically found in riffles, similar to the diamond darter. Trautman (1981, pp. 673–675) found that bluebreast darters were well distributed throughout a 51-km (32-mile) reach of river during the breeding season, but that there was a reduction in numbers in the upper half of this reach starting in September and continuing through late winter to early spring. There was a corresponding increase in numbers in the lower half of the reach during this time. Individual darters captured in the spring were documented to have moved 152 m (500 ft) in a single day. In September and October, Trautman captured bluebreast darters in deep, low-velocity pools, which are not typical habitats for the species. He concluded that bluebreast and other darter species migrated upstream in spring and downstream in the fall (Trautman 1981, pp. 673–675). Based on this information, free movement between habitat types within a significant length of stream may be important to provide sufficient space to support normal behavior and genetic mixing of the diamond darter.

Based on the biological information and needs discussed above, we identify riffle-pool complexes in moderate to large-sized (fourth to eighth order), warmwater streams that are geomorphically stable with moderate current, clean sand and gravel substrates, and low levels of siltation to be physical or biological features essential to the conservation of the diamond darter.

Food, Water, Air, Light, Minerals, or Other Nutritional or Physiological Requirements

Feeding habits of the diamond darter in the wild are not known. However, it is expected that, similar to the crystal darter, adult diamond darters are benthic invertivores (NatureServe 2008, p. 8). Crystal darters eat midge and caddisfly larvae, and water mites in lesser quantities (Osier 2005, p. 13). Juvenile and young crystal darters feed on immature stages of aquatic insects such as mayflies, craneflies, blackflies, caddisflies, and midges (Simon and Wallus 2006, pp. 56–57). Diamond darters kept in captivity were fed and survived on live blackworms, daphnia, and dragonfly larvae, frozen bloodworms, and adult brine shrimp (Ruble *et al.* 2010, p. 4). Diamond darters may use an ambush foraging tactic by burying in the sand and darting out at prey (Robinson 1992 and Hatch 1997 in Osier 2005, pp. 12–13; NatureServe 2008, p. 1; Ruble 2011c, p. 1). When in captivity, diamond darters were also observed resting on the bottom of the tank and taking food from slightly above their position, in front of them, or off the bottom (Welsh 2009c, p. 1). Juvenile diamond darters hatched in captivity had teeth and a large gape width, which suggests that the larvae may feed on other smaller fish larvae (Ruble *et al.* 2010, p. 15).

Researchers were unable to confirm this hypothesis due to poor survivorship of the diamond darter larvae and lack of available smaller fish larvae to provide as a potential food source (Ruble *et al.* 2010, pp. 12–14). As explained in the Life History and Habitat section above, the juveniles may also eat zooplankton prey, which is more typical for pelagic larval percids (Rakes 2011, p. 1). This information suggests that loose sandy substrates suitable for ambush feeding behavior and healthy populations of benthic invertebrates and fish larvae for prey items are required to support the feeding requirements of the diamond darter.

Like most other darters, the diamond darter depends on clean water and perennial stream flows to successfully complete its life cycle (Page 1983, pp. 160–170). Sufficient water quality and quantity is required to support normal reproduction, growth, and survival. Because so few diamond darters have been captured, there are insufficient data available to quantitatively define the standards for water quantity or quality that are suitable to support the species. However, some data are available from areas that are known to support the diamond darter or the closely related crystal darter that provide examples of suitable conditions.

Water quantity, including depth and current velocity, are known to be important habitat characteristics that determine whether an area is suitable to support a specific species of fish (Osier 2005, p. 3). Sites where *Crystallaria* have been captured are consistently described as having moderate to strong velocities (Grandmaison *et al.* 2003, p. 4; Osier 2005, p. 15). Moderate to strong velocities contribute to the clean swept substrates and lack of silt commonly reported in documented crystal darter habitat (Osier 2005, p. 11). In the Elk River, the diamond darter has been collected from transition areas between riffles and pools at depths from 50 to 150 cm (20 to 59 in) and in moderate to strong velocities that are typically greater than 20 cm/sec (8 in/sec) (Osier 2005, p. 31). Similarly, the crystal darter has been described as generally inhabiting waters deeper than 60 cm (24 inches) with strong currents typically greater than 32 cm/sec (13 inch/sec) (Grandmaison *et al.* 2003, p. 4). Crystal darters were collected in Arkansas in water from 114 to 148 cm (45 to 58 in) deep with current velocities between 46 and 90 cm/sec (18 and 35 in/sec) (George *et al.* 1996 in Grandmaison *et al.* 2003, p. 4). Many of the measurements were taken at base or low flows when it is easiest to conduct fish surveys. Current velocity, water depth, and stream discharge are interrelated and variable, dependent on seasonal and daily patterns of rainfall (Bain and Stevenson 1999, p. 77; Grandmaison *et al.* 2003, p. 4). Therefore, velocities and depths at suitable habitat sites may change over time, or diamond darters may also move to other locations within a stream as seasonal and daily velocity and depth conditions change.

Water quality is also important to the persistence of the diamond darter. Specific water quality requirements (such as temperature, dissolved oxygen, pH, and conductivity) for the species have not been determined, but existing data provide some examples of conditions where *Crystallaria* were present. Diamond darters were successfully maintained in captivity when water temperatures did not go below 2 °C (35.6 °F) in the winter or above 25 °C (77 °F) in the summer (Ruble *et al.* 2010, p. 4). In Arkansas, crystal darter capture areas had dissolved oxygen levels that ranged from 6.81 to 11.0 parts per million; pH levels from 5.7 to 6.6; specific conductivities from 175 to 250 μS/cm, and water temperatures from 14.5 to 26.8 °C (58 to 80 °F) (George *et al.* 1996, p. 71). In general, optimal water quality conditions for warmwater fishes are characterized as having moderate stream temperatures, high dissolved oxygen concentrations, and near-neutral pH levels. They are also characterized as lacking harmful levels of conductivity or pollutants including inorganic contaminants like iron, manganese, selenium, and cadmium; and organic contaminants such as human and animal waste products, pesticides and herbicides, fertilizers, and petroleum distillates (Winger 1981, pp. 36–38; Alabama Department of Environmental Management 1996, pp. 13–15; Maum and Moulton undated, pp. 1–2).

Good water quality that is not degraded by inorganic or organic pollutants, low dissolved oxygen, or excessive conductivity is an important habitat component for the diamond darter.

As described in the Summary of Factors Affecting the Species section above, impoundment of many rivers that historically supported the diamond darter has altered the quantity and flow of water in those rivers. This has reduced or eliminated riffle habitats, reduced current velocities, and increased the amount of fine particles in the substrate (Rinne *et al.* 2005, pp. 3–5, 432–433). Diamond darters have been extirpated from many areas as a result (Grandmaison *et al.* 2003, p. 18; Trautman 1981, p. 25). Excessive water withdrawals can also reduce current velocities, reduce water depth, increase temperatures, concentrate pollution levels, and result in deposition of fine particles in the substrate, making the areas less suitable to support the diamond darter (PSU 2010, p. 9; Freeman and Marcinek 2006, p. 445). An ample and unimpeded supply of flowing water that closely resembles natural peaks and lows typically provides a means of maintaining riffle habitats, transporting nutrients and food items, moderating water temperatures and dissolved oxygen levels, removing fine sediments that could damage spawning or foraging habitats, and diluting nonpoint-source pollutants, and is thus essential to the diamond darter.

Based on the biological information and needs discussed above, we identify perennial streams containing riffle-pool transition areas with moderate velocities, seasonally moderated temperatures, and good water quality with healthy populations of benthic invertebrates and fish larvae for prey items and loose, sandy substrates to be physical or biological features essential to the conservation for the diamond darter.

Cover or Shelter

Diamond darters and crystal darters typically have been captured in riffle-pool transition areas with predominately (greater than 20 percent each) sand and gravel substrates (Osier 2005, pp. 51–52). Diamond darters will bury in these types of substrates for cover and shelter. Individuals observed in captivity were frequently seen either completely buried in the sand during the day or partially buried with only the head (eyes and top of the snout) out of the sand. However, individuals were often on top of the sand at night time (Welsh 2009c, p. 1). Burying occurred by the individual rising slightly up above the substrate and then plunging headfirst into the sand and using its tail motion to burrow (Welsh 2009c, p. 1). This type of burying behavior has also been reported in the crystal darter (Osier 2005, p. 11; NatureServe 2008, p. 1). Heavily embedded substrates may impede this behavior. Embeddedness is the degree that cobble or gravel substrates are impacted by being surrounded or covered by fine silty materials (Shipman 2000, p. 12). Embedded substrates are not easily dislodged, and would therefore be difficult for the diamond darter to burrow into for cover. Heavily embedded substrates can be the result of human activities increasing the amount of siltation occurring in the stream (Shipman 2000, p. 12). While diamond darter capture sites in the Elk River have had a sparse (25–50 percent) to low (less than 25 percent) degree of embeddedness, these sites were less embedded than other surrounding areas (Shipman 2000, p. 12; Welsh *et al.* 2004, p. 7; Osier 2005, p. 57), and lower levels of embeddedness are preferred by the diamond darter.

Variability in the substrate and available habitat is also an important sheltering requirement for the diamond darter. Darters may shift to different habitat types due to changing environmental conditions such as high water or warm temperatures (Osier 2005, p. 7). Deeper or sheltered habitats may provide refuge during warm weather and it has been suggested that *Crystallaria* species may use deeper pools during the day (Osier 2005, p. 10). Substrate variety, such as the presence of boulders or woody materials, provides velocity shelters for young darters during high flows (Osier 2005, p. 4).

Based on the biological information and needs discussed above, we identify riffle-pool transition areas with relatively sand and gravel substrates, as well as access to a variety of other substrate and habitat types, including pool habitats, to be physical or biological cover and shelter features essential to the conservation for the diamond darter.

Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring

Very little information is available on reproductive biology and early life history of the diamond darter (Welsh *et al.* 2008, p. 1; Ruble and Welsh 2010, p. 1), and to date, only one young-of-the-year of this species has been found in the wild. We have not been able to obtain specific information on this collection, which probably occurred in 2007 in the Elk River near the confluence with the Kanawha River, West Virginia (Cincotta 2009a, p. 1). However, research on reproductive biology of the species was recently initiated by Conservation Fisheries Inc. (CFI) in partnership with the USGS West Virginia Cooperative Fish and Wildlife Research Unit at West Virginia University (WVU). Five individual diamond darters, consisting of at least three females, one male, and one of undetermined sex, have been held in captivity at the CFI facility and were maintained in simulated stream conditions. Water temperature and daylight were also adjusted throughout the seasons to simulate natural fluctuations that would be experienced in the wild (Ruble and Welsh 2010, p. 2).

Spawning began when water temperatures were consistently above 15 °C and ceased when temperatures reached 22 °C (Ruble 2011b, p. 2). Females showed signs of being gravid from late March to May (Ruble *et al.* 2010, p. 11–12). Both eggs and hatched larvae were observed in April (Ruble *et al.* 2010, p. 11–12; Ruble 2011, p. 1). Peak breeding time is likely mid-April when water temperatures range from 15 to 20 °C (59 to 68 °F) (Ruble *et al.* 2010, p. 12). Although incubation time is difficult to determine because most eggs that survived already showed considerable development, it is estimated that at 15 °C (59 °F), hatch time is 7 to 9 days (Ruble *et al.* 2010, p. 11). Although eggs were produced in both years, no young survived and matured during either year (Ruble *et al.* 2010, pp. 11–12; Ruble 2011b, p. 1).

Because no young have been successfully maintained in captivity and no studies of wild populations are available, we are not able to quantify the range of water quality conditions needed for successful reproduction. Factors that can impair egg viability include high temperatures, low oxygen levels, siltation, and other water quality conditions (Ruble 2011, p. 2). Inadequate water flow through the substrate or low oxygen levels within the substrate can lead to poor egg development or poor larval condition (Ruble 2011, p. 2).

There is also some information available on reproduction of the crystal darter (Welsh *et al.* 2008, p. 1). In Arkansas, the reproductive season was from late January through mid-April, roughly correlating with early April in the Ohio River Basin (George *et al.* 1996, p. 75; Simon and Wallus 2006, p. 52). Evidence suggests that females are capable of multiple spawning events and producing multiple clutches of eggs in one season (George *et al.* 1996, p. 75). Spawning occurs in the spring when the crystal darters lay their eggs in side channel riffle habitats over sand and gravel substrates in moderate current. Adult darters do not guard their eggs (Simon and Wallus 2006, p. 56). Embryos develop in the clean interstitial spaces of the coarse substrate (Simon and Wallus 2006, p. 56). After hatching, the larvae are pelagic and drift within the water column (Osier 2005, p. 12; Simon and Wallus 2006, p. 56; NatureServe 2008, p. 1).

Based on the biological information and needs discussed above, we identify streams with naturally fluctuating and seasonally moderated water temperatures, high dissolved oxygen levels, and clean, relatively silt-free sand and gravel substrates to be physical or biological breeding, reproduction, or rearing of offspring features essential to the conservation for the diamond darter.

Habitats That Are Protected From Disturbance or Are Representative of the Historical, Geographical, and Ecological Distributions of a Species

As described above, clean, stable substrates, good water quality, and healthy benthic invertebrate populations are habitat features essential to the diamond darter. Direct disturbance, alteration, or fill of instream habitat can degrade these essential features. Disturbance, alteration, and instream fill can kill or injure adult fish, young, or eggs; destabilize the substrates leading to increased sedimentation or erosion; and reduce the amount of available food and habitat to support fish populations. These impacts make the area less suitable for the fish such as the diamond darter (Reid and Anderson 1999, pp. 235–245; Levesque and Dube 2007, pp. 396–402; Welsh 2009d, p. 1; Penkal and Phillips 2011, pp. 6–7). Direct disturbance and instream construction can also increase substrate compaction and silt deposition within the direct impact area and downstream, reducing water flow through the substrate, and increasing substrate embeddedness (Reid and Anderson 1999, p. 243; Levesque and Dube 2007, pp. 396–397; Penkal and Phillips 2011, pp. 6–7). This can impede the normal burrowing behavior of the diamond darter required for successful foraging and shelter, degrade spawning habitat, result in the production of fewer and smaller eggs, and impair egg and larvae development (Reid and Anderson 1999, pp. 244–245; Levesque and Dube 2007, pp. 401–402). Intact riparian vegetation is also an important component of aquatic habitats that support the diamond darter. Darters are particularly susceptible to impacts associated with disturbance to riparian vegetation such as increased sedimentation and alteration of instream habitat characteristics (Jones *et al.* 1999, pp. 1461–1462; Pusey and Arthington 2003, p. 1). Removal of riparian vegetation can lead to decreases in fish species, such as the diamond darter, that do not guard eggs or that are dependent on swift, shallow water that flows over relatively sediment-free substrates (Jones *et al.* 1999, p. 1462). Thus, avoiding disturbances to stream beds and banks is important to maintaining stable substrates, food availability, successful reproduction, and habitat suitability for the diamond darter.

All current and historical capture locations of the diamond darter are from moderate to large, fourth to eighth order, warmwater streams within the Ohio River Watershed (Welsh 2008, p. 3;

SARP 2011, pp. 1–19). The species was historically distributed in at least four major drainages throughout the watershed and is now likely extirpated from Ohio, Kentucky, and Tennessee. The current range is restricted to a small segment of one river within West Virginia. Therefore, the current range of the species is not representative of the historical or geographical distribution of the species and not sufficient for the conservation of the diamond darter. Given the distribution is restricted to approximately 45 km (27.96 mi) within one river, the species is vulnerable to the threats of reduced fitness through genetic inbreeding, and extinction from a combination of cumulative effects or a single catastrophic event such as a toxic chemical spill (Gilpin and Soule 1986, pp. 23–33; Noss and Cooperrider 1994, p. 61). In addition, because the current range is isolated from other suitable habitats due to the presence of dams and impoundments, the species has limited ability to naturally expand its current range and recolonize previously occupied habitats (Warren *et al.* 2000 in Grandmaison *et al.* 2003, p. 18). A species distribution that includes populations in more than one moderate to large river within the Ohio River watershed would provide some protection against these threats and would be more representative of the historical geographic distribution of the species.

Based on the biological information and needs discussed above, we identify stable, undisturbed stream beds and banks, and ability for populations to be distributed in multiple moderate-to-large (fourth to eighth order) streams throughout the Ohio River watershed to be physical or biological features protected from disturbance or are representative of the historical, geographical, and ecological distributions that are essential to the conservation for the diamond darter.

Primary Constituent Elements for the Diamond Darter

Under the Act and its implementing regulations, we are required to identify the physical or biological features essential to the conservation of the diamond darter in areas occupied at the time of listing, focusing on the features' primary constituent elements. Primary constituent elements are those specific elements of physical or biological features that provide for a species' life-history processes and are essential to the conservation of the species.

Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determine that the primary constituent elements specific to the diamond darter are:

(1) Primary Constituent Element 1—A series of connected riffle-pool complexes with moderate velocities in moderate to large-sized (fourth to eighth order), geomorphically stable streams within the Ohio River watershed.

(2) Primary Constituent Element 2—Stable, undisturbed bottom substrates composed of relatively silt-free, unembedded sand and gravel.

(3) Primary Constituent Element 3—An instream flow regime (magnitude, frequency, duration, and seasonality of discharge over time) that is relatively unimpeded by impoundment or diversions such that there is minimal departure from a natural hydrograph.

(4) Primary Constituent Element 4—Adequate water quality characterized by seasonally moderated temperatures, high dissolved oxygen levels, and moderate pH, and low levels of pollutants and siltation. Adequate water quality is defined as the quality necessary for normal behavior, growth, and viability of all life stages of the diamond darter.

(5) Primary Constituent Element 5—A prey base of other fish larvae and benthic invertebrates including midge, caddisfly, and mayfly larvae.

With this proposed designation of critical habitat, we intend to identify the physical or biological features essential to the conservation of the species, through the identification of the primary constituent elements sufficient to support the life-history processes of the species.

*Special Management Considerations or Protection*

When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. The area we are proposing for designation as currently occupied critical habitat for the diamond darter is not under special management or protection provided by a legally operative management plan or agreement specific to conservation of the diamond darter and has not been designated as critical habitat for other species under the Act. This unit will require some level of management to address the current and future threats to the physical and biological features (PBFs) of the species. Various activities in or adjacent to the critical habitat unit described in this proposed rule may affect one or more of the primary constituent elements (PCEs) and may require special management considerations or protection. Some of these activities include, but are not limited to, those discussed in the ''Summary of Factors Affecting the Species,'' above. Other activities that may affect PCEs in the proposed critical habitat unit include those listed in the ''Available Conservation Measures'' section and include resource extraction (coal mining, timber harvests, natural gas and oil development activities); construction and maintenance projects; stream bottom disturbance from sewer, gas, and water lines; lack of adequate riparian buffers; and other sources of nonpoint-source pollution.

Management activities that could ameliorate these threats include, but are not limited to: use of BMPs designed to reduce sedimentation, erosion, and stream bank destruction; development of alternatives that avoid and minimize streambed disturbances; implementation of regulations that control the amount and quality of point-source discharges; and reduction of other watershed and floodplain disturbances that release sediments or other pollutants. Special management consideration or protection may be required to eliminate, or to reduce to negligible levels, the threats affecting the physical or biological features of each unit. Additional discussion of threats facing individual units is provided in the individual unit descriptions below.

*Criteria Used To Identify Critical Habitat*

As required by section 4(b)(2)(A) of the Act, we use the best scientific data available to designate critical habitat. We review available information pertaining to the habitat requirements of the species. In accordance with the Act and its implementing regulation at 50 CFR 424.12(e), we consider whether designating additional areas, outside those currently occupied as well as those occupied at the time of listing, are necessary to ensure the conservation of the species. We are proposing to designate as critical habitat all habitat that is currently occupied by the species; that is, the lower Elk River. This one river reach constitutes the entire current range of the species. We are also proposing to designate a specific area that is not currently occupied by the diamond darter but was historically occupied, because we have determined this area (i.e., the Green River) is essential for the conservation of the diamond darter and designating only occupied habitat is not sufficient to conserve this species.

For our evaluation of potential critical habitat, we reviewed available literature, reports, and field notes prepared by biologists, as well as historical and current survey results. We also spoke to fisheries experts and conservation professionals that are familiar with darters or the current status of aquatic systems within the current and historical range of the species.

In order to identify currently occupied habitats, we delineated known capture sites and reviewed habitat assessments and mapping efforts that have been conducted on the Elk River. Known occurrences of the diamond darter are extremely localized, and the species can be difficult to locate. Because it is reasonably likely that this rare and cryptic species is present in suitable habitats outside the immediate locations of the known captures, we considered the entire reach between the uppermost and lowermost locations as occupied habitat. We also included some areas of the mainstem Elk River that have not been specifically surveyed for diamond darters but have been determined to have suitable habitat for the species based on diamond darter species-specific habitat assessments (Osier 2005, pp. ii–50). These areas are contiguous with known capture sites, have similar habitat characteristics, have no barriers to dispersal, and are within general darter dispersal capabilities. In addition, river habitats are highly dependent upon upstream and downstream habitat conditions for their maintenance, so these contiguous areas upstream and downstream are critical to maintaining habitat conditions of known capture sites.

Areas of the Elk River downstream of the proposed unit near the confluence with the Kanawha River that do not currently provide the PCEs required to support the species, and no longer have suitable habitat characteristics because they are affected by impoundment or routine navigation dredging, were not included. The downstream reach of the Elk River to the confluence with the Kanawha River is affected by impoundment from the Winfield Lock and Dam on the Kanawha River. It is also routinely dredged for commercial navigation by the ACOE.

The portion of the Elk River upstream of the proposed unit may provide suitable habitat for the diamond darter, but we have no records of diamond darters being captured in this reach or diamond darter species-specific habitat assessments like there have been in the lower Elk River. The upper Elk River reach does contain the favorable general habitat characteristics of riffle-pool complexes with sand and gravel substrates, and there are no barriers to upstream fish movement (Service 2008, entire). However, only limited survey efforts and no diamond darter species-specific habitat assessments have been conducted that would allow us to further refine our assessment of whether this area contains any of the PCEs necessary to support the species. Additional survey efforts are being planned that may further define whether the upstream area is occupied by the diamond darter or which, if any, PCEs are present that may require special management considerations. As a result, we are not proposing to designate additional critical habitat upstream of King Shoals.

We have not included Elk River tributaries as part of the proposed designation because we have no records of the diamond darter occurring in those locations, and there have been no species-specific habitat assessments in the tributaries documenting that these areas are suitable to support the species.

We then considered whether occupied habitat was adequate for the conservation of the species. Currently occupied habitats of the diamond darter are highly localized and isolated, and are restricted to one reach of the Elk River. The range has been severely curtailed, and population size is small. Small isolated aquatic populations are subject to chance catastrophic events and to changes in human activities and land use practices that may result in their elimination. Threats to the diamond darter are imminent and are present throughout the entire range of the species. As described under Factor E, these threats are compounded by its limited distribution and isolation making the species extremely vulnerable to extinction; therefore, it is unlikely that currently occupied habitat is adequate for its conservation (Soule 1980, pp. 157–158; Noss and Cooperrider 1994, p. 61; Hunter 2002, pp. 97–101; Allendorf and Luikart 2007, pp. 117–146). Larger, more dispersed populations can reduce the threat of extinction due to habitat fragmentation and isolation (Harris 1984, pp. 93–104; Noss and Cooperrider 1994, pp. 264–297; Warren *et al.* 2000 in Grandmaison *et al.* 2003, p. 18). For these reasons, we find that conservation of the diamond darter requires expanding its range into suitable, currently unoccupied portions of its historical habitat. The inclusion of essential, unoccupied areas will provide habitat for population reintroduction and will improve the species' status through added redundancy, resiliency, and representation.

In order to identify areas of unoccupied habitat that should be designated as critical habitat, we focused on rivers that had historical records confirmed to be diamond darter through the examination of available museum specimens. For rivers that had more than one historical capture, approximate capture locations were mapped so that the minimal, previously occupied extent could be established. We then identified areas of contiguous habitat that still contained the habitat characteristics sufficient to support the life history of the species. Areas that no longer provided suitable habitat were impounded, or did not contain a series of connected riffle-pool complexes were eliminated from consideration. We then applied the following criteria to identify the unoccupied, potential critical habitat: (1) The reach supports fish species with habitat preferences similar to the diamond darter such as the shoal chub (*Macrhybopsis hyostoma*) and the streamline chub (*Erimystax dissimilis*); (2) the reach supports diverse populations of fish and mussels including other sensitive, rare, or threatened and endangered species; and (3) the reach has special management or protections in place such as being a designated wild river or exceptional use waters under State law. The reach that we identified in the Green River of Kentucky met all three criteria. These factors helped to confirm that the identified area had high-quality habitats sufficient to support the species and could be managed for the conservation of the species. No other areas were identified that met the full screening process.

We delineated the upstream and downstream boundaries of the proposed unit on the Green River based on the following information. The Green River immediately downstream of Green River Lake (River Mile 308.8 to 294.8) is excluded from the proposed critical habitat unit due to artificially variable flow, temperature, and dissolved oxygen conditions resulting from periodic discharges from Green River Dam. Fish community data collected between Greensburg and Green River Dam indicate a general trend of increasing species richness and abundance from Tebb's Bend (approximately 2.7 km [1.7 mi] below the dam) downstream to Roachville Ford (approximately 22.7 km [14.1 mi] below the dam). Also, some relatively intolerant benthic fish species present at Roachville Ford and other sites downstream within the Bioreserve are absent at Tebb's Bend, including mountain madtom (*Noturus eleutherus*), spotted darter (*Etheostoma maculatum*), and Tippecanoe darter (*E. Tippecanoe*) (Thomas *et al.* 2004, p. 10). In contrast with Roachville Ford and other downstream sites, cobble and gravel substrates at Tebb's Bend are coated with a black substance characteristic of manganese and iron, which precipitates out and is deposited on the stream bed following hypolimnetic discharge from reservoirs (Thomas 2012, p. 1). Because fish community structure and habitat conditions at Roachville Ford are more similar to other locations in the Green River Bioreserve, this location (River Mile 294.8) represents the upstream limit of the proposed critical habitat section, which continues downstream to Cave Island (River Mile 200.3) within Mammoth Cave National Park.

Downstream of Cave Island, the Green River becomes affected by impoundment from the ACOE Lock and Dam #6. The lock and dam was constructed in 1906 and was disabled in 1950. Although the lock has been disabled and is becoming unstable, the dam still partially impedes water flow resulting in a system with slower, warmer water and a loss of riffle and shoal habitat types (Grubbs and Taylor 2004, p. 26; Olson 2006, pp. 295–297). The delineation between the portions of the river affected by Lock and Dam #6 and those that retain free-flowing characteristics occurs distinctly at Cave Island (Grubbs and Taylor 2004, pp. 19–26). There is a marked decrease in benthic macroinvertebrates that are intolerant of siltation below this point, which is attributable to slower current velocities and a lack of shallow riffles and associated course sediments (Grubbs and Taylor 2004, p. 26). For these reasons, Cave Island was selected as the downstream limit of the critical habitat designation in this unit.

Once we determined that the areas of Elk and Green Rivers met our criteria, we then used ArcGIS software and the National Hydrography Dataset (NHD) to delineate the specific river reach being proposed for diamond darter critical habitat. Areas proposed for diamond darter critical habitat include only Elk and Green River mainstem stream channels within the ordinary high-water line. We have not included Elk or Green River tributaries as part of the proposed designation because we have no records of the diamond darter occurring in those locations. We set the upstream and downstream limits of each critical habitat unit by identifying landmarks (islands, confluences, roadways, crossings, dams) that clearly delineated each river reach. Stream confluences are often used to delineate the boundaries of a unit for an aquatic species because the confluence of a tributary typically marks a significant change in the size or habitat characteristics of the stream. Stream confluences are logical and recognizable termini. When a named tributary was not available, or if another landmark provided a more recognizable boundary, another landmark was used. In the unit descriptions, distances between the upstream or downstream extent of a stream segment are given in kilometers (km) rounded to one decimal point and equivalent miles (mi). Distances for the Elk River were measured by tracing the course of the stream as depicted by the NHD. Distances for the Green River were measured using river miles as designated by the Kentucky Division of Water which were generated using the NHD.

When determining proposed critical habitat boundaries, we made every effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features essential for the conservation of diamond darter. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification, unless the specific action would affect the physical or biological features in the adjacent critical habitat. The designation of critical habitat does not imply that lands or streams outside of critical habitat do not play an important role in the conservation of the diamond darter.

We are proposing for designation of critical habitat lands and waters that we have determined are occupied at the time of listing and contain sufficient elements of physical or biological features to support life-history processes essential tor the conservation of the species and that may require special management considerations. This area of the Elk River in West Virginia is identified as Unit 1. We are also proposing to designate lands and waters outside of the geographical area occupied at the time of listing that we have determined are essential for the conservation of the diamond darter. This area of the Green River in Kentucky is identified as Unit 2. The two proposed units contain sufficient (more than one, but not all) elements of physical and biological features (PBFs) present to support diamond darter life-history processes, but may require special management considerations or protection to achieve the presence of all the identified PBFs.

The critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document in the rule portion. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on *http://www.regulations.gov* at Docket No. FWS–R5–ES–2012–0045, on our Internet site at *http://www.fws.gov/westvirginiafieldoffice/index.html*, and at the field office responsible for the designation (see **FOR FURTHER INFORMATION CONTACT** above).

## Proposed Critical Habitat Designation

We are proposing two units as critical habitat for the diamond darter. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for the diamond darter. The areas we propose as critical habitat are: (1) The lower Elk River; and (2) the Green River. Table 2 shows the occupancy of the units and ownership of the proposed designated areas for the diamond darter.

TABLE 2—OCCUPANCY AND OWNERSHIP OF PROPOSED DIAMOND DARTER CRITICAL HABITAT UNITS

| Unit | Location | Occupied? | Federal, State, or other public ownership km (mi) | Private ownership km (mi) | Total length km (mi) |
|---|---|---|---|---|---|
| 1 | Lower Elk River | yes | 45.0 * (28.0) | none | 45.0 (28.0) |
| 2 | Green River | no | 16.3 (10.1) | 135.8 (84.4) | 152.1 (94.5) |

TABLE 2—OCCUPANCY AND OWNERSHIP OF PROPOSED DIAMOND DARTER CRITICAL HABITAT UNITS—Continued

| Unit | Location | Occupied? | Federal, State, or other public ownership km (mi) | Private ownership km (mi) | Total length km (mi) |
|---|---|---|---|---|---|
| Total ** | | | | | 197.1 (122.5) |

* As described below, this includes a combination of State ownership and easements. The State considers the easement area under their jurisdiction. This is the best information available to us for calculating river mile ownership in the Elk River. Therefore, we have included this habitat under public ownership.

** Totals may not sum due to rounding.

We present brief descriptions of each unit and reasons why each unit meets the definition of critical habitat below. The critical habitat units include the stream channels of the rivers within the ordinary high-water line. As defined in 33 CFR 329.11, the ordinary high-water line 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 water line impressed on the bank; 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. In West Virginia, the State owns the bed and banks of streams between the ordinary low-water marks, and is vested with a public easement between the ordinary low-water and high-water marks (George 1998, p. 461). The water is also under State jurisdiction (WVSC § 22–26–3). In Kentucky, landowners own the land under streams (*e.g.,* the stream channel or bottom) in the designated unit, but the water is under State jurisdiction.

*Unit 1: Lower Elk River, Kanawha and Clay Counties, West Virginia*

Unit 1 represents the habitat supporting the only remaining occupied diamond darter population. This population could provide a source to repopulate other areas within the diamond darter's historical range. Unit 1 includes 45.0 km (28.0 mi) of the Elk River from the confluence with King Shoals Run near Wallback Wildlife Management Area downstream to the confluence with an unnamed tributary entering the Elk River on the right descending bank adjacent to Knollwood Drive in Charleston, West Virginia. As described above, all of the habitat within this unit is under public control or ownership (see Table 1 above). The State of West Virginia owns or has a public easement on the streambed and banks of the Elk River up to the ordinary high-water mark (George 1998, p. 461). The water is also publically owned. The majority of lands adjacent to this unit are privately owned. There are two areas of public land within the watershed: The 3,996-ha (9,874-ac) Morris Creek Wildlife Management Area, which is leased and managed by the WVDNR (2007, p. 9), and Coonskin Park, an approximately 405-ha (1,000-ac) park owned by Kanawha County (Kanawha County Parks and Recreation 2008, p. 1).

Live diamond darters have been documented at four sites within this unit, including at sites near Clendenin, Mink Shoals, Reamer Hill, and between Broad Run and Burke Branch. This unit contains space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, or rearing (or development) of offspring, and is essential to the conservation of the species. Diamond darter habitat assessments have documented that this reach of the Elk River contains 28 riffle-pool transition areas with moderate currents and sand and gravel substrates that are suitable for the diamond darter (PCEs 1 and 2) (Osier 2005, p. 34). There is connectivity between these habitats to provide access to various spawning, foraging, and resting sites and promote gene flow (PCE 1). This reach of the Elk River also has a natural flow regime that is relatively unimpeded by impoundment (PCE 3), and has healthy benthic macroinvertebrate populations (PCE 5) (WVDEP 1997, pp. 20–89). However, water quality within this unit is impaired due to high levels of fecal coliform bacteria and iron (PCE 4) (WVDEP 2010, p. 16).

Within this unit, the diamond darter and its habitat may require special management considerations or protection to address threats from resource extraction (coal mining, timber harvests, natural gas and oil development activities); impoundment; water diversion or withdrawals; construction and maintenance projects; stream bottom disturbance from sewer, gas, and water line crossings; lack of adequate riparian buffers; sewage discharges, and nonpoint-source pollution. Special management to address water quality degradation is particularly important since prolonged water quality impairments can also affect the availability of relatively silt-free sand and gravel substrates (PCE 2) and healthy populations of fish larvae and benthic invertebrates that provide a prey base for the diamond darter (PCE 5).

*Unit 2: Green River, Edmonson, Hart, and Green Counties, Kentucky*

Unit 2 represents the best remaining historically occupied habitat for future diamond darter reintroductions that will improve the species' redundancy, resiliency, and representation essential for its conservation. Unit 2 includes 152.1 km (94.5 mi) of the Green River from Roachville Ford near Greensburg (River Mile 294.8) downstream to the end of Cave Island in Mammoth Cave National Park (NP) (River Mile 200.3). Approximately 16.3 km (10.1 mi) of this unit is publically owned (see Table 1 above) and is contained within the 20,750-ha (51,274.1-ac) Mammoth Cave NP. The remainder of the unit, 135.8 km (84.4 mi), is privately owned. With the exception of the lands owned by Mammoth Cave NP, the lands within the Green River watershed are also privately owned. Through the U.S. Department of Agriculture's (USDA) Conservation Reserve Program (CRP) and other conservation programs, the Nature Conservancy owns or has easements on approximately 794.4 ha (1,962.9 ac) within the watershed, either adjacent to or in close proximity to the river. In addition, Western Kentucky University owns or manages 1,300 ac (526.1 ha) along the Green River in Hart County as part of the Upper Green River Biological Preserve (Western Kentucky University 2012, p. 1). In Kentucky, landowners own the land under streams (e.g., the stream channel or bottom) in the designated units, but the water is under State jurisdiction.

This unit is within the historical range of the species, but is not currently considered occupied. Between 1890 and 1929, diamond darters were recorded from three locations within this unit: Adjacent to Cave Island in Edmonson

County, and near Price Hole and Greensburg, in Green County.

The Green River is a seventh-order warmwater stream with a total drainage area of 23,879.7 km$^2$ (9,220 mi$^2$). The largely free-flowing 160.3-km (100-mile) section of the Green River from the Green River Dam downstream to its confluence with the Nolin River in Mammoth Cave NP is among the most significant aquatic systems in the United States in terms of aquatic species diversity and endemism and supports over 150 species of fish and 70 species of freshwater mussels, including 7 federally endangered mussel species, but no designated critical habitat (Thomas *et al.* 2004, p. 5; USDA 2006, p.16). Populations of fish species that have similar habitat preferences as the diamond darter, such as the shoal chub and streamline chub are present throughout this reach (Thomas 2012, p. 1).

The entire reach of the Green River within this unit is designated by Kentucky as both Outstanding State Resource Waters and Exceptional Waters. Outstanding State Resource Waters are those surface waters designated by the Energy and Environment Cabinet as containing federally threatened and endangered species. Exceptional Waters are waterbodies whose quality exceeds that necessary to support propagation of fish, shellfish, wildlife, and recreation. These waters support excellent fish and macroinvertebrate communities (KYEEC 2012, p. 1). The entire reach of the river within Mammoth Cave NP, including the 16.3 km (10.1 mi) that are proposed as critical habitat, is also designated as a Kentucky Wild River. These rivers have exceptional quality and aesthetic character and are designated by the State General Assembly in recognition of their unspoiled character, outstanding water quality, and natural characteristics (KYEEC 2012, p. 1). Each Wild River is actually a linear corridor encompassing all visible land on each side of the river up to a distance of 609.6 m (2,000 ft). In order to protect their features and quality, land-use changes are regulated by a permit system, and certain highly destructive land-use changes, such as strip mining and clear-cutting, are prohibited within corridor boundaries (KYEEC 2012, p.1).

As described in the *Criteria Used to Identify Critical Habitat* section above, the inclusion of unoccupied areas is essential for the conservation of the diamond darter because it will provide currently suitable habitat for a population reintroduction that will allow expansion of diamond darter populations into historically occupied habitat adding to the species' redundancy, resiliency, and representation. In addition, this reach of the Green River is a moderate-to-large warmwater stream with a series of connected riffle-pool complexes that is unaffected by impoundment (PCEs 1 and 3). The reach has good water quality and supports fish species that have similar habitat requirements including clean sand and gravel substrates, low levels of siltation, and healthy benthic macroinvertebrate populations for prey items (PCEs 2, 3, and 4).

The reach of the Green River being proposed as critical habitat is the focus of many ongoing conservation efforts. The Nature Conservancy has designated this area as the Green River Bioreserve (Thomas *et al.* 2004, p. 5) and the Kentucky Department of Fish and Wildlife Resources identified this portion of the Green River as a Priority Conservation Area in their Comprehensive Wildlife Conservation Strategy (USDA 2006, p. 35). Since 2001, more than 40,568.6 ha (100,000 ac) within the watershed have been enrolled in CRP (USDA 2010, p. 3). The goal of this program is to work with private landowners to greatly reduce sediments, nutrients, pesticides, and pathogens from agricultural sources that could have an adverse effect on the health of the Green River system (USDA 2006, p. 16). These organizations along with the Service, Western Kentucky University, Kentucky State University, the ACOE, private landowners, and other partners are also working towards conserving natural resources in this watershed by restoring riparian buffers, constructing fences to keep livestock out of the river, managing dam operations at the Green River Reservoir to more closely mimic natural discharges, and conducting long-term ecological research on fish and invertebrates (Hensley 2012, p. 1; TNC 2012, p. 1; WKU 2012, p.1). The feasibility of removing Lock and Dam #6 has also been evaluated, but no decision on this proposal has been made yet (Olson 2006, pp. 295–297).

Land use within this watershed is primarily agricultural or forested. There is also some oil and gas development within the watershed. Management may be needed to address resource extraction (timber harvests, natural gas and oil development activities); water discharges or withdrawals; construction and maintenance projects; stream bottom disturbance from sewer, gas, and water line crossings; lack of adequate riparian buffers; sedimentation, sewage discharges, and nonpoint-source pollution.

## 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 that is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat.

Decisions by the 5th and 9th Circuit Courts of Appeals have invalidated our regulatory definition of ''destruction or adverse modification'' (50 CFR 402.02) (see *Gifford Pinchot Task Force* v. *U.S. Fish and Wildlife Service,* 378 F. 3d 1059 (9th Cir. 2004) and *Sierra Club* v. *U.S. Fish and Wildlife Service et al.,* 245 F.3d 434, 442 (5th Cir. 2001)), and we do not rely on this regulatory definition when analyzing whether an action is likely to destroy or adversely modify critical habitat. Under the statutory provisions of the Act, we determine destruction or adverse modification on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would continue to serve its intended conservation role for the 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 ACOE 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 Endangered Species Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat and actions on state, tribal, local, or private lands that are not federally funded or authorized do not require section 7 consultation.

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

(1) A concurrence letter for Federal actions that may affect, but are not

likely to adversely affect, listed species or critical habitat; or

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

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

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

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

(3) Are economically and technologically feasible; and

(4) Would, in the 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 in instances where we have listed a new species or subsequently designated critical habitat that may be affected and the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law). Consequently, Federal agencies sometimes may need to request reinitiation of consultation with us on actions for which formal consultation has been completed, if those actions with discretionary involvement or control may affect subsequently listed species or designated critical habitat.

*Application of the ''Adverse Modification'' Standard*

The key factor related to the adverse modification determination is whether, with implementation of the proposed Federal action, the affected critical habitat would continue to serve its intended conservation role for the species. Activities that may destroy or adversely modify critical habitat are those that alter the physical or biological features to an extent that appreciably reduces the conservation value of critical habitat for the diamond darter. As discussed above, the role of critical habitat is to support life-history needs of the 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 may affect critical habitat, when carried out, funded, or authorized by a Federal agency, should result in consultation for the diamond darter. These activities include, but are not limited to:

(1) Actions that would alter the geomorphology of stream habitats. Such activities could include, but are not limited to, instream excavation or dredging, impoundment, channelization, removal of riparian vegetation, road and bridge construction, discharge of mine waste or spoil, and other discharges of fill materials. These activities could cause aggradation or degradation of the channel bed elevation or significant bank erosion, result in entrainment or burial of these fishes, and cause other direct or cumulative adverse effects to the species.

(2) Actions that would significantly alter the existing flow regime or water quantity. Such activities could include, but are not limited to, impoundment, water diversion, water withdrawal, and hydropower generation. These activities could eliminate or reduce the habitat necessary for growth and reproduction of the diamond darter.

(3) Actions that would significantly alter water chemistry or water quality (for example, dissolved oxygen, temperature, pH, contaminants, and excess nutrients). Such activities could include, but are not limited to, hydropower discharges or the release of chemicals, biological pollutants, or toxic effluents into surface water or connected groundwater at a point source or by dispersed release (nonpoint source). These activities could alter water conditions beyond the tolerances of these fish and result in direct or cumulative adverse effects to the species.

(4) Actions that would significantly alter stream bed material composition and quality by increasing sediment deposition or embeddedness. Such activities could include, but are not limited to, certain construction projects, oil and gas development, mining, timber harvest, and other watershed and floodplain disturbances if they release sediments or nutrients into the water. These activities could eliminate or reduce habitats necessary for the growth and reproduction of these fish by causing excessive sedimentation or nutrification.

**Exemptions**

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

The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a) required each military installation that includes land and water suitable for the conservation and management of natural resources to complete an integrated natural resources management plan (INRMP) by November 17, 2001. An INRMP integrates implementation of the military mission of the installation with stewardship of the natural resources found on the base. Each INRMP includes:

(1) An assessment of the ecological needs on the installation, including the need to provide for the conservation of listed species;

(2) A statement of goals and priorities;

(3) A detailed description of management actions to be implemented to provide for these ecological needs; and

(4) A monitoring and adaptive management plan.

Among other things, each INRMP must, to the extent appropriate and applicable, provide for fish and wildlife management; fish and wildlife habitat enhancement or modification; wetland protection, enhancement, and restoration where necessary to support fish and wildlife; and enforcement of applicable natural resource laws.

The National Defense Authorization Act for Fiscal Year 2004 (Pub. L. 108–136) amended the Act to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) now provides: ''The Secretary [of the Interior (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 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.

## Exclusions

*Application of 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.

Under section 4(b)(2) of the Act, we may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise his discretion to exclude the area only if such exclusion would not result in the extinction of the species.

*Exclusions Based on Economic Impacts*

Under section 4(b)(2) of the Act, we consider the economic impacts of specifying any particular area as critical habitat. In order to consider economic impacts, we are preparing an analysis of the economic impacts of the proposed critical habitat designation and related factors.

We will announce the availability of the draft economic analysis as soon as it is completed, at which time we will seek public review and comment. At that time, copies of the draft economic analysis will be available for downloading from the Internet at *http://www.regulations.gov,* or by contacting the West Virginia Ecological Services Field Office directly (see **FOR FURTHER INFORMATION CONTACT** section). During the development of a final designation, we will consider economic impacts, public comments, and other new information, 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.

*Exclusion Based on National Security Impacts*

Under section 4(b)(2) of the Act, we consider whether there are lands owned or managed by the DOD where a national security impact might exist. In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for the diamond darter are not owned or managed by the DOD, and therefore, we anticipate no impact to national security.

*Exclusions Based on Other Relevant Impacts*

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security. We consider a number of factors including whether landowners have developed any conservation plans or other management plans for the area, or whether there are conservation partnerships that would be encouraged by designation of, or exclusion of lands from, critical habitat. In addition, we look at any tribal issues, 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 proposed rule, we have determined that there are currently no conservation plans or other management plans for the species, and the proposed designation does not include any tribal lands or trust resources. We anticipate no impact to tribal lands, partnerships, or management plans from this proposed critical habitat designation.

Notwithstanding these decisions, as stated under ''Public Comments'' above, we are seeking specific comments on whether any areas we are proposing for designation should be excluded under section 4(b)(2) of the Act.

## Peer Review

In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three appropriate and independent specialists regarding this proposed rule. The purpose of peer review is to ensure that our critical habitat designation is based on scientifically sound data, assumptions, and analyses. We will invite these peer reviewers to comment during this public comment period on our specific assumptions and conclusions in this proposed designation of critical habitat.

We will consider all comments and information received during this comment period on this proposed rule during our preparation of a final determination. Accordingly, the final decision may differ from this proposal.

## Public Hearings

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

## Required Determinations

*Regulatory Planning and Review—Executive Orders 12866 and 13563*

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

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

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

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C. 801 *et seq.*), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (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 such businesses as 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 forestry and logging operations with fewer than 500 employees and annual business less than $7 million. To determine whether small entities may be affected, we will consider 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.

Importantly, the incremental impacts of a rule must be both significant and substantial to prevent certification of the rule under the RFA and to require the preparation of an initial regulatory flexibility analysis. If a substantial number of small entities are affected by the proposed critical habitat designation, but the per-entity economic impact is not significant, the Service may certify. Likewise, if the per-entity economic impact is likely to be significant, but the number of affected entities is not substantial, the Service may also certify.

Under the RFA, as amended, and following recent court decisions, Federal agencies are only required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself, and not the potential impacts to indirectly affected 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 by the Agency is not likely to adversely modify critical habitat. Therefore, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Under these circumstances, it is our position that only Federal action agencies will be directly regulated by this designation. Therefore, because Federal agencies are not small entities, the Service may certify that the proposed critical habitat rule will not have a significant economic impact on a substantial number of small entities.

We acknowledge, however, that in some cases, third-party proponents of the action subject to permitting or funding may participate in a section 7 consultation, and thus may be indirectly affected. We believe it is good policy to assess these impacts if we have sufficient data before us to complete the necessary analysis, whether or not this analysis is strictly required by the RFA. While this regulation does not directly regulate these entities, in our draft economic analysis we will conduct a brief evaluation of the potential number of third parties participating in consultations on an annual basis in order to ensure a more complete examination of the incremental effects of this proposed rule in the context of the RFA.

In conclusion, we believe that, based on our interpretation of directly regulated entities under the RFA and relevant case law, this designation of critical habitat will only directly regulate Federal agencies, which are not by definition small business entities. And as such, we certify that, if promulgated, this designation of critical habitat would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required. However, though not necessarily required by the RFA, in our draft economic analysis for this proposal, we will consider and evaluate the potential effects to third parties that may be involved with consultations with Federal action agencies related to this action.

*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. We do not expect the designation of this proposed critical habitat to significantly affect energy supplies, distribution, or use.

Natural gas and oil exploration and development activities occur or could potentially occur in both of the proposed critical habitat units for the diamond darter. Both of the proposed units already support other federally endangered species, and the Service is already actively engaged in discussions with many gas companies to develop measures to avoid impacts to these habitats. Oil and gas exploration and development within the Green River unit is expected to be limited. There are at least six existing gas pipelines crossing the Elk River within the proposed unit, and others may be proposed in the future. Development and compliance with voluntary BMPs and avoidance measures such as the use of directional drilling or rerouting proposed transmission lines would be expected to minimize impacts of natural gas and oil exploration and development in the areas of proposed critical habitat. These types of measures are already being implemented by some oil and gas companies or other industries in the proposed units or in other areas.

Coal mining occurs or could potentially occur in the Elk River proposed critical habitat unit for the diamond darter. Incidental take for listed species associated with surface coal mining activities is currently covered under a programmatic, nonjeopardy biological opinion between the Office of Surface Mining and the Service completed in 1996 (Service 1996, entire). The biological opinion covers existing, proposed, and future endangered and threatened species that may be affected by the implementation and administration of surface coal mining programs under the Surface Mining Control and Reclamation Act of 1977. Through its analysis, the Service concluded that the proposed action (surface coal mining and reclamation activities) was not likely to jeopardize the continued existence of any threatened, endangered, or proposed species or result in adverse modification of designated or proposed critical habitat.

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

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

(2) We do not believe that this rule will significantly or uniquely affect small governments. The diamond darter only occurs in navigable waters within West Virginia in which the river bottom is owned by the State of West Virginia. The adjacent upland properties are owned by private entities. Within Kentucky, the lands being proposed for critical habitat are mostly owned by private landowners; a small portion is owned by Mammoth Cave National Park. None of these government entities fit the definition of ''small governmental jurisdiction.'' Small governments will be affected only to the extent that any programs having Federal funds, permits, or other authorized activities must ensure that their actions will not adversely affect the critical habitat. As such, a Small Government Agency Plan is not required. We will, however, further evaluate this issue as we conduct our economic analysis and revise this assessment if appropriate.

*Takings—Executive Order 12630*

In accordance with Executive Order 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for the diamond darter in a takings implications assessment. Critical habitat designation 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 not require Federal funding or permits to go forward. The takings implications assessment concludes that this designation of critical habitat for the diamond darter does not pose significant takings implications for lands within or affected by the designation.

*Federalism—Executive Order 13132*

In accordance with Executive Order 13132 (Federalism), the rule does not have significant Federalism effects. A Federalism assessment 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 West Virginia and Kentucky. The designation of critical habitat in areas currently occupied by this fish may impose nominal additional regulatory restrictions to those currently in place for other listed species and, therefore, may have little incremental impact on state and local governments and their activities. The designation may have some benefit to these governments because the areas that contain the physical or biological features essential to the conservation of the species are more clearly defined, and the elements of the 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 local governments in long-range planning (rather than having them 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 (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 have proposed designating critical habitat in accordance with the provisions of the Act. This proposed rule uses standard property descriptions and identifies the elements of physical or biological features essential to the conservation of the diamond darter within the designated areas to assist the public in understanding the habitat needs of the species.

*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 OMB under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). This rule will not impose recordkeeping or reporting requirements on state or local governments, individuals, businesses, or organizations. 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.)*

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*), need not be prepared in connection with listing a species as endangered or threatened under the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

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 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)).

*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 the **ADDRESSES** section. 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.

*Government-to-Government Relationship With Tribes*

In accordance with the Presidential 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 diamond darter at the time of this proposal that contain the features essential for conservation of the species, and no tribal lands unoccupied by the diamond darter that are essential for the conservation of the species. Therefore, we are not proposing to designate critical habitat for the diamond darter on tribal lands.

**References Cited**

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

**Authors**

The primary authors of this package are the staff members of 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—[AMENDED]

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

**Authority:** 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. In § 17.11(h) add the following to the List of Endangered and Threatened in alphabetical order under FISHES:

**§ 17.11 Endangered and threatened wildlife.**

* * * * *

(h) * * *

| Species | | Historic range | Vertebrate population where endangered or threatened | Status | When listed | Critical habitat | Special rules |
|---|---|---|---|---|---|---|---|
| Common name | Scientific name | | | | | | |
| * | * | * | * | * | * | | * |
| FISHES | | | | | | | |
| * | * | * | * | * | * | | * |
| Darter, diamond ....... | *Crystallaria cincotta* | U.S.A. (OH, WV, KY, TN). | Entire ...................... | E | TBD | 17.95(e) | NA |
| * | * | * | * | * | * | | * |

3. In § 17.95, amend paragraph (e) by adding an entry for ''Diamond Darter (*Crystallaria cincotta*),'' in the same alphabetical order that the species appears in the table at § 17.11(h), to read as follows:

**§ 17.95 Critical habitat—fish and wildlife.**

* * * * *

(e) *Fishes.*

* * * * *

Diamond Darter (*Crystallaria cincotta*)

(1) Critical habitat units are depicted for Kanawha and Clay Counties, West Virginia, and Edmonson, Hart, and Green Counties, Kentucky, on the maps below.

(2) Within these areas, the primary constituent elements of the physical or biological features essential to the conservation of diamond darter consist of five components:

(i) A series of connected riffle-pool complexes with moderate velocities in moderate to large-sized (fourth to eighth order), geomorphically stable streams within the Ohio River watershed.

(ii) Stable, undisturbed, bottom substrates composed of relatively silt-free, unembedded sand and gravel.

(iii) An instream flow regime (magnitude, frequency, duration, and seasonality of discharge over time) that is relatively unimpeded by impoundment or diversions such that there is minimal departure from a natural hydrograph.

(iv) Adequate water quality characterized by seasonally moderated temperatures, high dissolved oxygen levels, and moderate pH, and low levels of pollutants and siltation. Adequate water quality is defined as the quality necessary for normal behavior, growth, and viability of all life stages of the diamond darter.

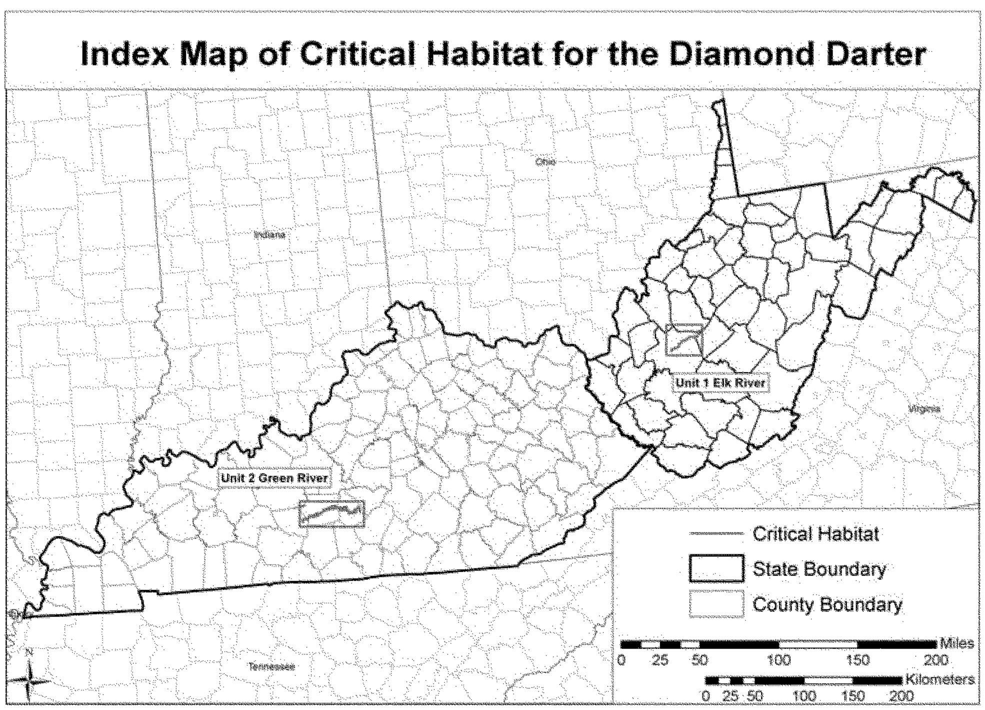
(v) A prey base of other fish larvae and benthic invertebrates including midge, caddisfly and mayfly larvae.

(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 with USGS NHD GIS data. ESRI's ArcGIS 10.1 software was used to determine longitude and latitude in decimal degrees for the river reaches. The projection used in mapping was Universal Transverse Mercator (UTM), NAD 83, Zone 16 North for the Green River, Kentucky, unit; and UTM, NAD 83, Zone 17 North for the Elk River, West Virginia, unit. The following data sources were referenced to identify features used to delineate the upstream and downstream reaches of critical habitat units: USGS 7.5' quadrangles and topographic maps, NHD data, 2005 National Inventory of Dams, Kentucky Land Stewardship data, pool and shoal data on the Elk River, ESRI's Bing Maps Road. 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 field office internet site (*http://www.fws.gov/westvirginiafieldoffice/index.html*), *http://www.regulations.gov* at Docket No. FWS–R5–ES–2012–0045 and at the Service's West Virginia Field 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 locations for the diamond darter in West Virginia and Kentucky follows:

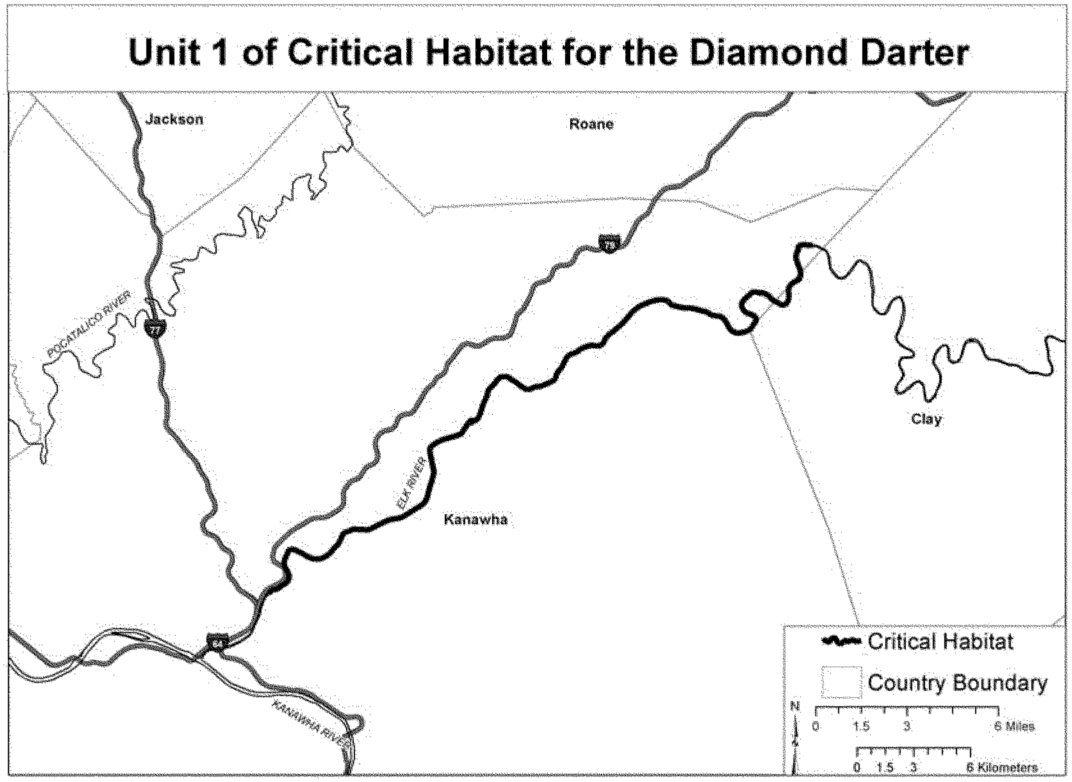
BILLING CODE 4310–55–P




(6) Unit 1: Lower Elk River, Kanawha and Clay Counties, West Virginia.

(i) Unit 1 includes 45.0 km (28.0 mi) of the Elk River from the confluence with King Shoals Run near Wallback Wildlife Management Area downstream to the confluence with an unnamed tributary entering the Elk River on the right descending bank adjacent to Knollwood Drive in Charleston, West Virginia.

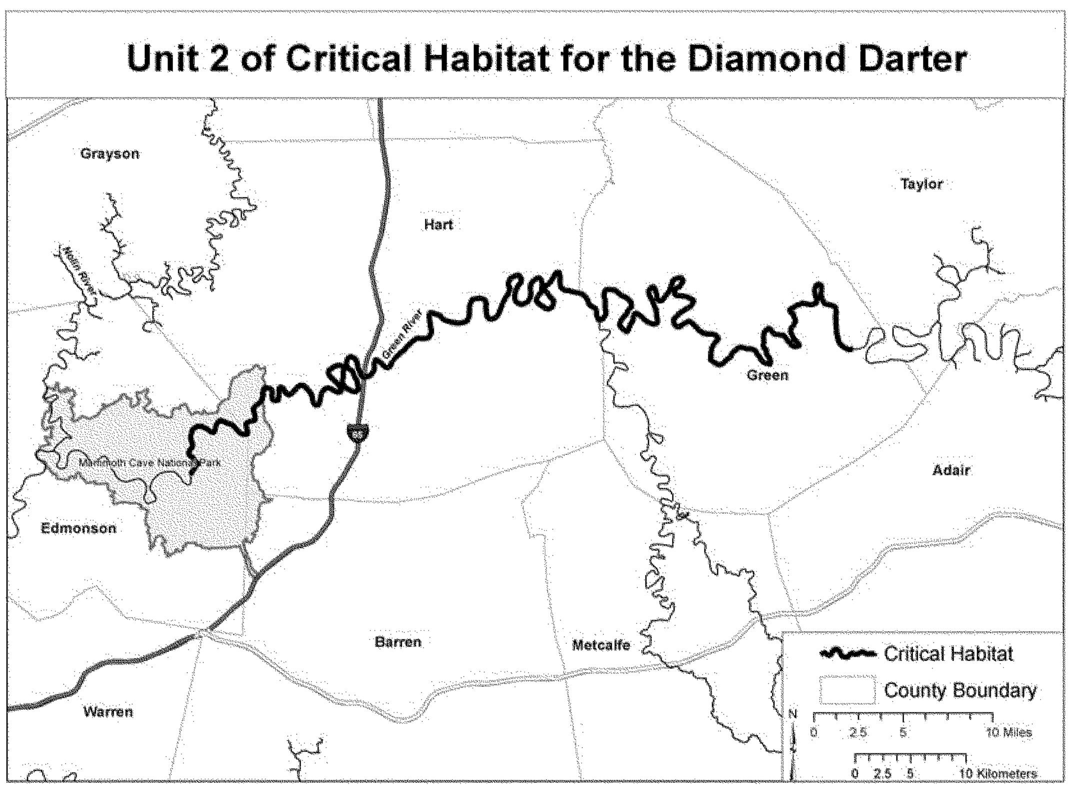
(ii) *Note:* Map of Unit 1 (lower Elk River) follows:




(7) Unit 2: Green River, Edmonson, Hart, and Green Counties, Kentucky.

(i) Unit 2 includes 152.1 km (94.5 mi) of the Green River from Roachville Ford near Greensburg (River Mile 294.8) downstream to the downstream end of Cave Island in Mammoth Cave National Park (River Mile 200.3).

(ii) *Note:* Map of Unit 2 (Green River) follows:



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Dated: July 13, 2012.

**Michael Bean,**

*Acting Assistant Secretary for Fish and Wildlife and Parks.*

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