United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Re: U.S. Environmental Protection Agency's Evaluation of West Virginia's Revised Whole-Body Fish Tissue Selenium Criterion Element for the Protection of Aquatic Life Project, West Virginia (FWS File Number 2027-0006440)

Dear Jessica Martinsen,

This letter responds to your request for concurrence with the U.S. Environmental Protection Agency's (EPA) determinations that the proposed project may affect, but is not likely to adversely affect, candy darter (*Etheostoma osburni*), diamond darter (*Crystallaria cincotta*), clubshell (*Pleurobema clava*), fanshell (*Cyprogenia stegaria*), James spinymussel (*Parvaspina collina*), longsolid (*Fusconaia subrotunda*), northern riffleshell (*Epioblasma rangiana*), pink mucket (*Lampsilis abrupta*), purple cat's paw (*Epioblasma obliquata*), rayed bean (*Villosa fabalis*), round hickorynut (*Obovaria subrotunda*), sheepnose mussel (*Plethobasus cyphyus*), snuffbox mussel (*Epioblasma triquetra*), spectaclecase (*Cumberlandia monodonta*), Big Sandy crayfish (*Cambarus callainus*), Guyandotte River crayfish (*Cambarus veteranus*), Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), gray bat (*Myotis grisescens*),Virginia big-eared bat (*Corynorhinus townsendii virginianus*), harperella (*Ptilimnium nodosum*), Virginia spiraea (*Spiraea virginiana*), candy darter critical habitat, diamond darter critical habitat, longsolid critical habitat, round hickorynut critical habitat, snuffbox mussel critical habitat, spectaclecase critical habitat, Big Sandy crayfish critical habitat, and Guyandotte River crayfish critical habitat. The EPA provided submittals for this project on October 8, 2026, October 20, 2026, and October 30, 2026. The project encompasses the surface waters throughout the entire state of West Virginia. This project has been assigned FWS File Number 2027-0006440, and all future correspondence should reference this file number.

It is the U.S. Fish and Wildlife Service's (FWS) West Virginia Field Office's (WVFO) understanding that the EPA is proposing to approve the 2026 revisions to West Virginia's selenium criterion for the protection of aquatic life use (categories B1, B2, and B4), as set forth in its Water Quality Standards Rule (47 West Virginia Code of State Rules 47-2). Under the Clean Water Act (CWA) Section 303(c) and its implementing regulations at 40 C.F.R. Part 131, States and authorized Tribes have primary responsibility for developing and adopting water quality standards to protect their waters. As required by CWA Section 303(c) and 40 C.F.R. Part

131, the EPA reviews new and revised water quality standards adopted by States and authorized Tribes. New and revised water quality standards are not considered effective for CWA purposes until approved by the EPA under CWA Section 303(c).

The proposed selenium criterion revision (Table 1), submitted to the EPA by the West Virginia Department of Environmental Protection (WVDEP), consists of two components: i) a fish whole-body selenium concentration of 8.5 milligrams per kilogram of dry weight (mg/kg dw) for waters where sturgeon are present, and ii) a fish whole-body selenium concentration of 9.5 mg/kg dw for waters where sturgeon are not present. West Virginia defines sturgeon waters as the Ohio River and the Kanawha River up to Kanawha Falls, approximately at river mile 95.8 (47 West Virginia Code of State Rules 47-2-8 Appendix E, Table 1, footnote g). All other waters are considered non-sturgeon waters (Figure 1). The EPA's Evaluation of West Virginia's Revised Whole-Body Fish Tissue Selenium Criterion Element for the Protection of Aquatic Life Project (Project) focuses on the approval of these revisions. The proposed whole-body concentration for sturgeon waters aligns with the EPA's recommended criterion concentration under CWA Section 304(a) (EPA 2021). The recalculated concentration for non-sturgeon waters is based on the criterion recommended by CWA Section 304(a) and uses the EPA's recommended recalculation method (EPA 2013). All elements of EPA's 304(a) recommended criterion for selenium aim to protect against reproductive effects from chronic exposure in freshwater fish, using the egg-ovary element, which is the most sensitive endpoint for the most sensitive taxa (Chapman et al. 2009; Janz et al. 2010; EPA 2021).

Table 1. The current and revised selenium water quality standards for West Virginia as outlined in 47 West Virginia Code of State Rules 47-2-8 Appendix E, Table 1. The new revisions are indicated by the underlined, bold text.

Element	Current EPA Approved Freshwater Selenium Criterion	Revised Freshwater Selenium Criterion	
		Sturgeon Waters	Non-Sturgeon Waters
8.27 Selenium (µg/l) Water Column Concentration[f]	5	5	5
8.27.1 Selenium (µg/g)[g] (based on instantaneous measurement)			
Whole-Body	8.0	**8.5**	**9.5**
Fillet (skinless, boneless)	11.3	11.3	11.3
8.27.2 Selenium (µg/g) Fish Egg/Ovary Concentration[h] (based on instantaneous measurement)	15.8	15.8	15.8

8.27 footnote f - Water column values take precedence over fish tissue values when new inputs of selenium occur in waters previously unimpacted by selenium, until equilibrium is reached between the water column and fish tissue.

8.27.1 footnote g - Overrides any water column concentration when water concentrations and either fish whole body or fish muscle (skinless, boneless fillet) are measured, except in situations described in 8.27 footnote f. Sturgeon

waters are the entire Ohio River mainstem and the Kanawha River mainstem extended upstream to the Kanawha Falls at river mile 95.8, which may support sturgeon species.

8.27.2 footnote h - Overrides any fish whole-body, fish muscle (skinless, boneless fillet), or water column concentration when fish egg/ovary concentrations are measured, except in situations described in 8.27 footnote f.

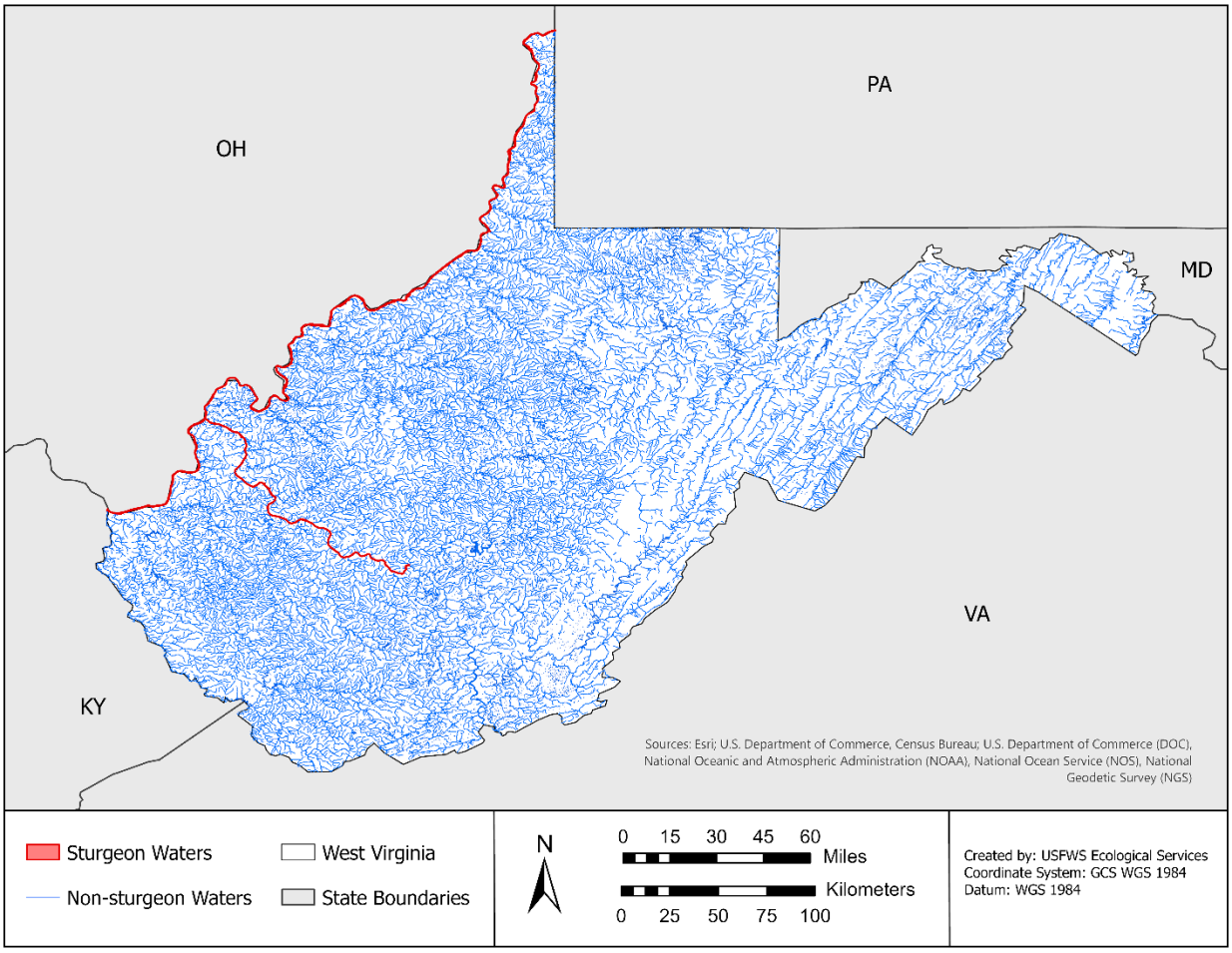


Figure 1. Map of West Virginia depicting sturgeon waters (red polygon) and non-sturgeon waters (blue polyline). The FWS makes no warranty for the use of this map. The original data were compiled from various sources and may be updated without prior notification.

Selenium has emerged as a potential environmental contaminant of concern in North America (Chapman et al. 2009). Environmental selenium can originate from various industrial activities, including mining (e.g., coal, hard rock, uranium, and phosphate) and power generation. It is often found in organic-rich shales that serve as source rocks for these activities. Increases in environmental selenium also pose concerns in agriculture, primarily due to the discharge of subsurface irrigation drainage waters and the addition of this often-deficient essential element through animal husbandry. Selenium concentrations are rising in many areas of North America (Chapman et al. 2009), making it crucial to establish regulatory guidelines and best management practices.

Selenium is a naturally occurring element found in sedimentary rocks and soils. It is an essential nutrient at low concentrations but becomes toxic at higher levels (Lemly 1993; Hesketh 2008; Janz et al. 2010). The risk associated with selenium is the narrow margin between its essential roles (e.g., DNA synthesis, protein repair, oxidative stress defense) and its potential toxicity. Selenium uptake by biota can occur through water or diet, though dietary exposure is often the primary route of exposure for animals (Chapman et al. 2009). For aquatic life and wildlife that depend on aquatic environments, selenium toxicity typically results from bioaccumulation in the food web rather than from direct exposure to dissolved selenium in the water (Hamilton 2004; EPA 2016).

The primary contributor to selenium accumulation in aquatic ecosystems occurs at the base of the food web, where algae and other microorganisms absorb selenium from the water. Lower-trophic-level organisms function as vectors, transferring selenium to more vulnerable organisms through trophic transfer. Maternal deposition of selenium into eggs and its subsequent assimilation by the developing embryo determine selenium's reproductive effects in oviparous vertebrates (Blackburn 1998; Romano et al. 2004), and, depending on concentration, selenium can increase the rates of deformities and mortality. Species differ markedly in reproductive strategies, reproductive physiology, oogenesis patterns, the biochemical and physical properties of their eggs, and behaviors that may influence selenium deposition in eggs. Additionally, the type and amount of contaminated prey consumed influence a species' susceptibility to selenium toxicity (Hamilton 2004; Janz et al. 2010). Furthermore, hydrologic conditions and water chemistry of a body of water influence bioaccumulation (Lemly 1999). Results from lotic studies, which show low bioaccumulation rates, are often considered inapplicable to lentic studies with higher rates; however, understanding the interconnectedness of these systems is crucial for assessing selenium impacts on aquatic resources (Hamilton and Lemly 1999; Kennedy et al. 2000; Hamilton 2004). Overall, oviparous (i.e., egg-laying) vertebrates appear to be the most affected group, and fish and birds are generally the most sensitive taxa to selenium in aquatic systems (Janz et al. 2010).

These comments are provided pursuant to the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.; ESA). The EPA has determined the following federally listed species may occur within the action area and may be affected by the project, but are not likely to be adversely affected: candy darter, diamond darter, clubshell, fanshell, James spinymussel, longsolid, northern riffleshell, pink mucket, purple cat's paw, rayed bean, round hickorynut, sheepnose mussel, snuffbox mussel, spectaclecase, Big Sandy crayfish, Guyandotte River crayfish, Indiana bat, northern long-eared bat, gray bat, Virginia big-eared bat, harperella, and Virginia spiraea. Additionally, the EPA determined that federally designated critical habitat for the following species overlap with the action area and may be affected by the project, but are not likely to be adversely affected: candy darter, diamond darter, longsolid, round hickorynut, snuffbox mussel, spectaclecase, Big Sandy crayfish, and Guyandotte River crayfish. As discussed below, FWS concurs with these determinations.

Additionally, the EPA made a "no effect" determination for the Cheat Mountain salamander (*Plethodon nettingi*), flat-spired three-toothed snail (*Triodopsis platysayoides*), Madison Cave isopod (*Antrolana lira*), rusty patched bumble bee (*Bombus affinis*), shale barren rock cress (*Boechera serotina*), and small whorled pogonia (*Isotria medeoloides*), as well as for the critical

habitats of the Indiana bat, the rusty patched bumble bee, and the Virginia big-eared bat. As such, these species and critical habitats are not addressed below.

Lastly, the EPA determined that the project is not likely to jeopardize the continued existence of the federally proposed endangered eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*), salamander mussel (*Simpsonaias ambigua*), and tricolored bat (*Perimyotis subflavus*), as well as the federally proposed threatened green floater (*Lasmigona subviridis*) and monarch butterfly (*Danaus plexippus*). The EPA also determined that the project will not destroy or adversely modify the proposed critical habitats for the green floater and the salamander mussel. There is no requirement to coordinate with the FWS regarding species or critical habitats proposed for listing unless the Federal action agency determines that its proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. The FWS acknowledges the EPA's determinations.

Federally listed fishes and critical habitat

Candy darter

The candy darter was listed as endangered on November 21, 2018 (83 FR 58747), and critical habitat was designated on May 7, 2021 (86 FR 17956). The designated critical habitat comprises 368 stream miles (593 stream kilometers) across five units in Virginia and West Virginia: (i) the Greenbrier, (ii) the Middle New, (iii) the Lower Gauley, (iv) the Upper New, and (v) the Upper Gauley. The proposed project overlaps with 338 stream miles (544 stream kilometers) of critical habitat in the Greenbrier, Lower Gauley, and Upper Gauley units.

The candy darter is a small (2.2 to 3.4 inches standard length) freshwater fish endemic to second order and larger streams and rivers within portions of the upper Kanawha River basin, which is synonymous with the Gauley and greater New River watersheds in Virginia and West Virginia. The candy darter is a habitat specialist, typically found in high- to moderate-gradient, cool- or cold-water stream ecosystems, although it can tolerate warm-water conditions. The species is most often found in riffle, glide, or run habitats and is relatively uncommon in pool habitats. Candy darters are generally intolerant of excessive stream sedimentation and the resulting cobble embeddedness (i.e., the degree to which cobbles are covered by fine-sized substrate particles). However, young-of-year and juveniles may be better able to use habitats with slower-moving water, smaller substrate, and a greater proportion of fine sediments than adults. Candy darters are benthic invertivores, and their main prey items are benthic macroinvertebrates such as mayflies and caddisflies.

Candy darter habitat requirements change as individuals mature, and seasonal plasticity may complicate the identification of suitable habitat for some candy darter populations (Dunn and Angermeier 2016). During early life stages, larvae are likely to move greater distances and are initially prone to moving downstream, but then tend to move upstream for the remainder of their first two years of life. For example, studies have suggested that both *Etheostoma* and *Percina* darter species may exhibit seasonal migration, in which they move from warmer mainstem waters into cooler, spring-fed tributaries during the late summer and early fall (Mundahl and Ingersoll 1983; Schaefer et al. 2003), and candy darters are suspected to act similarly (S. Welsh, personal communication, 2018).

Diamond darter
The diamond darter was listed as endangered on August 26, 2013 (78 FR 45074), and critical habitat was designated on September 23, 2013 (78 FR 52364). The designated critical habitat comprises 122.5 stream miles (197.1 stream kilometers) in two units: (i) the Lower Elk River and (ii) the Green River. The species is currently found only in the Elk River in West Virginia. The proposed project encompasses the entire Lower Elk River critical habitat unit, which is 28 stream miles (45 stream kilometers).

The diamond darter (Osier 2005) has limited natural history information due to its rarity, but some life-history traits can be inferred from the crystal darter (*Crystallaria asprella*). In captivity, female diamond darters were gravid from late March through May and spawned from late March to early July at temperatures ranging from 58 to 74 degrees Fahrenheit. Larvae hatch within seven to nine days and may drift for up to 30 days before settling in low-velocity habitats. Adults primarily feed on benthic invertebrates using a lie-in-wait strategy.

Diamond darters inhabit riffle-pool complexes in stable, moderate- to large-sized streams, particularly in transitional zones between riffles and pools (Welsh et al. 2013). They prefer shallow, slow-moving waters and may bury in sand during high flows (Rizzo et al. 2017). Ongoing threats include sedimentation, which affects benthic organisms and aquatic insect diversity, and water-quality degradation from nearby industrial activities, such as mining and urban development (e.g., acid mine drainage and elevated fecal coliform levels).

Historically, diamond darters ranged throughout the Ohio River basin, but dams and water-quality issues have severely reduced their habitat. Essential habitats must include riffle-pool complexes with silt-free substrates, stable flows, good water quality, and a sufficient prey base to support sustainable life-history processes. Any adverse impacts on the Elk River's habitat or water quality could hinder this species' recovery.

When evaluating potential effects on listed species, the WVFO considers the species' biological requirements, the project's location, and the extent of anticipated impacts. The proposed project involves revisions to West Virginia's whole-body fish tissue selenium criterion, which could increase overall selenium levels in West Virginia streams and affect freshwater fishes through dietary exposure. Species-specific selenium toxicity data are unavailable for diamond darter and candy darter, and high-quality chronic toxicity data are lacking at the genus and family levels. In the absence of such data, the best available science relies on closely related surrogate species expected to exhibit similar physiological and biological responses to selenium exposure. To evaluate the potential sensitivity of these darter species, the EPA used surrogate species within the order Perciformes, including bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus nigricans*) (EPA 2016; EPA 2021). These surrogate species are appropriate because they overlap geographically with the darters and share similar life-history characteristics and dietary pathways for selenium exposure. Using established EPA methods to derive protective chronic toxicity thresholds (i.e., based on EC5s, which represent the concentration of a substance that produces a 5 percent effect on a test population relative to a control group, and are minimal and appropriate for sensitive or listed species) from available toxicity data (EPA 2016; EPA 2021; EPA 2022), the EPA estimated an order-level chronic toxicity threshold for Perciformes of 13.77 mg/kg dw. This value exceeds the revised whole-body selenium criteria of 8.5 mg/kg dw

for sturgeon waters and 9.5 mg/kg dw for non-sturgeon waters, indicating that the revised criteria remain below concentrations associated with chronic effects in the best available surrogate species for diamond darter and candy darter. Additionally, all elements of EPA's 304(a) recommended selenium criterion are intended to protect against reproductive effects from chronic exposure in freshwater fish, with the egg-ovary element serving as the most sensitive endpoint for the most sensitive taxa (Dobbs et al. 1996; Conley et al. 2013; Chapman et al. 2009; Stewart et al. 2010; EPA 2016; EPA 2021). The selenium egg/ovary concentration criterion remains unchanged in West Virginia. Furthermore, the revision of the whole-body selenium criterion does not include in-stream disturbances, physical habitat changes, flow modifications, or other direct hydrological impacts. The revised criterion is not expected to significantly change water quality or directly impact fish or stream habitat. Therefore, WVFO concludes that potential impacts to candy darter, diamond darter, and their respective critical habitats are considered insignificant and/or discountable.

Federally listed mussels and critical habitat

There are 12 federally listed freshwater mussel species that may occur within the proposed project area. The FWS listed the pink mucket as endangered on July 14, 1976 (41 FR 24062); James spinymussel as endangered on August 22, 1988 (53 FR 27689); fanshell as endangered on July 23, 1990 (55 FR 25591); purple cat's paw as endangered on August 9, 1990 (55 FR 28209); clubshell and northern riffleshell as endangered on February 22, 1993 (58 FR 5638); snuffbox mussel and rayed bean as endangered on March 15, 2012 (77 FR 8632); sheepnose mussel and spectaclecase as endangered on April 12, 2012 (77 FR 14914); and longsolid and round hickorynut as threatened on April 10, 2023 (88 FR 14794). The action area overlaps with six federally listed mussel species with designated critical habitat, four of which have critical habitat units within the action area (Table 2). The following is an overview of freshwater mussel biology and common threats they face.

Freshwater mussels feed by filtering food particles from the water. Both juvenile and adult mussels have been observed to consume detritus, diatoms, phytoplankton, and zooplankton. Freshwater mussels depend on fish to complete their life cycles. When adult female mussels release their larvae, known as glochidia, the glochidia must attach to a suitable host fish within a few days. They then parasitize the host for a short period while developing into juvenile mussels.

Freshwater mussels play a crucial role in maintaining the health of aquatic environments. They help improve water quality, cycle nutrients, stabilize substrates, remove suspended sediments, and create habitat complexity (Anderson and Kreeger 2010). Mussels achieve this by filter-feeding, straining water through their gills to capture microscopic food particles. As a result, mussels are sensitive to excessive sedimentation from runoff. When sediment accumulates in a stream, it can reduce suitable habitat for mussels and even suffocate them, leading to death. Higher levels of suspended sediment can disrupt a mussel's feeding behavior, resulting in acute stress, chronic stress, or both. Consequently, excessive sedimentation can lead to declines in mussel populations and reductions in the ecosystem benefits they provide (Ellis 1931; Ellis 1936; Houp 1993; Brim-Box and Mossa 1999; Anderson and Kreeger 2010).

Any factors that degrade water quality (e.g., contaminant discharges, erosion, in-stream construction, riparian habitat disturbance, sedimentation, siltation) can harm mussel species.

These stressors can reduce habitat availability and food supply, lower reproductive success, and increase mortality among mussels (Williams et al. 1993). The decline of many historical mussel populations and the ongoing degradation of current populations are attributed to waterway impoundments, navigation projects, deteriorating water quality (e.g., agricultural and industrial waste, environmental releases and spills, land cover changes, sand and gravel dredging), and other forms of habitat alteration. Additionally, the reduction or elimination of host fish can negatively impact mussel species. To ensure the sustainability of freshwater mussel species, it is essential to maintain suitable water quality and local biodiversity (Poole and Downing 2004; Warren Jr. and Haag 2005; Haag et al. 2019) and to manage surrounding terrestrial landscapes to conserve and restore aquatic ecosystems (Page et al. 1997; Haag et al. 2019).

The following physical or biological features were identified in the critical habitat determination as essential for the conservation of the longsolid, round hickorynut, snuffbox mussel, and spectaclecase: (i) Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species are found and to maintain stream connectivity; (ii) Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks with habitats that support a diversity of freshwater mussel and native fish; (iii) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages; and (iv) the presence and abundance of fish hosts necessary for recruitment of freshwater mussels.

Table 2. The details of federally designated critical habitat within the action area.

Species	Date Designated	Total Stream Miles (Stream Kilometers)	Stream Miles (Stream Kilometers) in West Virginia	Units in West Virginia
Longsolid	April 10, 2023	1,115 (1,794)	259 (418.6)	Middle Island Creek, Little Kanawha River, Elk River, Kanawha River
Round hickorynut	April 10, 2023	921 (1,482)	323.5 (520.8)	Middle Island Creek, Little Kanawha River, Elk River, Kanawha River
Snuffbox mussel	May 27, 2026	2,425 (3,902)	367 (590)	West Fork River, Middle Island Creek, Little Kanawha River, Kanawha River
Spectaclecase	May 27, 2026	1,140 (1,835)	16 (25)	Kanawha

When evaluating potential effects on listed species, the WVFO considers the species' biological requirements, the project's location, and the extent of anticipated impacts. The proposed project involves revisions to West Virginia's whole-body fish tissue selenium criterion, which could increase overall selenium levels in West Virginia streams and affect freshwater mussels through filter feeding and impacts on fish hosts. However, several factors indicate that potential impacts

have been minimized or avoided. All elements of EPA's 304(a) recommended selenium criterion are intended to ultimately protect against reproductive effects from chronic exposure in freshwater fish, using the egg-ovary element, the most sensitive endpoint for the most sensitive taxa (Dobbs et al. 1996; Conley et al. 2013; Chapman et al. 2009; Stewart et al. 2010; EPA 2016; EPA 2021). The selenium egg/ovary concentration criterion remains unchanged in West Virginia. Protecting the most sensitive endpoint ensures that all aquatic life is protected by this criterion (EPA 2016; EPA 2021). This minimizes potential impacts to host fish and mussel reproduction. In addition, mussels are considered less sensitive to selenium levels than the most sensitive fish taxa (Chapman et al. 2009; Janz et al. 2010; EPA 2021). Furthermore, the revision of the whole-body selenium criterion does not include in-stream disturbances, physical habitat changes, flow modifications, or other direct hydrological impacts. The revised criterion is not expected to significantly change water quality or directly impact mussels or stream habitat. Therefore, WVFO concludes the potential impacts to clubshell, fanshell, James spinymussel, longsolid, northern riffleshell, pink mucket, purple cat's paw, rayed bean, round hickorynut, sheepnose mussel, snuffbox mussel, spectaclecase, and the critical habitats of longsolid, round hickorynut, snuffbox mussel, and spectaclecase are considered insignificant and/or discountable.

Federally listed crayfishes and critical habitat

The Big Sandy crayfish was listed as an endangered species on May 9, 2016 (81 FR 20449). Critical habitat for this species was designated on April 14, 2022 (87 FR 14662). The designated critical habitat comprises 362 stream miles (582 stream kilometers) across four units: (i) Upper Levisa Fork, (ii) Russell Fork, (iii) Lower Levisa Fork, and (iv) Tug Fork. The proposed project overlaps with 126.4 stream miles (203.4 stream kilometers) of critical habitat within the Tug Fork unit.

The Guyandotte River crayfish was listed as endangered on May 9, 2016 (81 FR 20449). The species is found only in the Guyandotte River watershed in West Virginia. Currently, only two known populations exist throughout its range. Critical habitat for this species was designated on April 14, 2022 (87 FR 14662). The designated critical habitat includes a total of 84 stream miles (135 stream kilometers) organized into one main unit and five subunits. These are: (1) Upper Guyandotte, (1A) Pinnacle Creek, (1B) Clear Fork and Laurel Fork, (1C) Guyandotte River, (1D) Indian Creek, and (1E) Huff Creek. The proposed project encompasses all designated critical habitat for the species.

The presence of the Big Sandy crayfish and the Guyandotte River crayfish is correlated with habitat quality, generally occurring in third-order or larger streams with slab boulders and low levels of sedimentation and substrate embeddedness (FWS 2016; Loughman et al. 2016; Sadecky 2020). This species is considered a tertiary burrower, meaning it takes shelter beneath large boulders within the stream. Best available scientific data indicate that the species has experienced widespread water-quality effects (FWS 2016). Pollutants that affect water quality for this species include pH impairments, selenium associated with coal mining, and bacteria related to sewage discharges (FWS 2016). Changes in water quality and increased substrate embeddedness from habitat disturbance, instream construction, or sedimentation and erosion not only reduce habitat availability (Pond et al. 2008, Loughman et al. 2016) but can also impact crayfish physiology and behavior (Rosewarne et al. 2014). Additionally, because the species occurs in small, isolated populations, it is more vulnerable to extirpation. Therefore, any impacts

that degrade water quality, such as direct habitat disturbance, instream construction, sedimentation and erosion, or containment discharges, could negatively affect this species.

The following physical or biological features were identified in the critical habitat determination as essential for the conservation of the Big Sandy and Guyandotte River crayfishes: (i) Fast-flowing stream reaches with unembedded slab boulders, cobbles, or isolated boulder clusters within an unobstructed stream continuum of permanent, moderate- to large-sized (generally third order and larger) streams and rivers; (ii) streams and rivers with natural variations in flow and seasonal flooding sufficient to effectively transport sediment and prevent substrate embeddedness; (iii) water quality characterized by seasonally moderated temperatures and physical and chemical parameters sufficient for the normal behavior, growth, reproduction, and viability of all life stages of the species; (iv) an adequate food base, indicated by a healthy aquatic community structure including native benthic macroinvertebrates, fishes, and plant matter; (v) aquatic habitats protected from riparian and instream activities that degrade the physical or biological features described in (i) through (iv), above, or cause physical injury or death to individual crayfish; and (vi) An interconnected network of streams and rivers that have the physical or biological features described in (i) through (iv), above, that allow for the movement of individual crayfish in response to environmental, physiological, or behavioral drivers at a scale sufficient to allow for gene flow within and among watersheds.

When evaluating potential effects on listed species, the WVFO considers the species' biological requirements, the project's location, and the extent of anticipated impacts. The proposed project involves revisions to West Virginia's whole-body fish tissue selenium criterion, which could increase selenium levels in West Virginia streams and affect crayfish through increased dietary uptake. However, several factors indicate that potential impacts have been minimized or avoided. All elements of EPA's 304(a) recommended selenium criterion are linked to ultimately protecting against reproductive effects from chronic exposure in freshwater fish, using the egg-ovary element, which is the most sensitive endpoint for the most sensitive taxa (Dobbs et al. 1996; Conley et al. 2013; Chapman et al. 2009; Stewart et al. 2010; EPA 2016; EPA 2021). The selenium egg/ovary concentration criterion remains unchanged in West Virginia. Protecting the most sensitive endpoint ensures that all aquatic life is protected by this criterion (EPA 2016; EPA 2021). In addition, crayfish are considered less sensitive to selenium than the most sensitive fish taxa (Chapman et al. 2009; Janz et al. 2010; EPA 2021). Furthermore, the revision of the whole-body selenium criterion does not include disturbance or other physical habitat changes. The revised criterion is not expected to significantly change water quality or directly impact crayfish or stream habitat. Therefore, WVFO concludes that potential impacts to Big Sandy crayfish, Guyandotte River crayfish, and their respective critical habitats are considered insignificant and/or discountable.

Federally listed bats

Indiana bat and northern long-eared bat

The Indiana bat was listed as endangered on March 11, 1967 (32 FR 4001). The northern long-eared bat was listed as threatened on April 2, 2015 (80 FR 17974) and then reclassified as endangered on March 31, 2023 (88 FR 4908). Both species may use the project area for foraging and roosting between April 1 and November 15.

Indiana bat summer foraging habitats are generally defined as riparian areas, bottomland, upland forests, and old fields or pastures with scattered trees. Northern long-eared bat summer foraging habitat is similar, including forested hillsides and ridges, as well as habitats near small ponds or streams. Both species forage in forest canopies and along wooded linear features such as fencerows, cropland borders, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregations of trees with variable canopy closure. Indiana bats also forage in open areas, such as over clearings with early-successional vegetation (e.g., old fields) and farm ponds in pastures. Indiana and northern long-eared bats feed on flying insects that emerge from aquatic and terrestrial habitats. Moths, caddisflies, flies, mosquitoes, and midges are major prey items. Aquatic insects with concentrated emergences or that form large mating aggregations above or near water appear to be preferred prey. As a result, streams, wetlands, and associated riparian forests are often preferred foraging habitats for pregnant and lactating bats. Increased erosion and sedimentation in streams reduce the diversity and biomass of benthic invertebrates, such as insects. These impacts on aquatic environments, including streams and wetlands, may decrease the availability of insects for the species to forage on.

Roosting or maternity habitat for both species consists primarily of live or dead hardwood trees with exfoliating bark, which provide space for bats to roost between the bark and the bole. Tree cavities, crevices, splits, or hollow portions of tree boles and limbs also provide roost sites. In West Virginia, all forested habitats containing trees at least five inches in diameter at breast height are potentially suitable as summer roosting and foraging habitats for the Indiana bat. Northern long-eared bats are typically associated with large tracts of mature, upland forests and with more canopy cover than preferred by Indiana bats. The species also seems more flexible in selecting roosts than the Indiana bat, choosing roost trees based on their suitability for retaining bark or for providing cavities or crevices. In West Virginia, all forested habitats containing trees at least three inches in diameter at breast height are potentially suitable as summer roosting and foraging habitats for the northern long-eared bat. The northern long-eared bat also uses a wider variety of roost types than the Indiana bat. Males and non-reproductive females of the northern long-eared bat may also roost in cooler places, such as caves and mines, or in structures like barns and sheds.

Indiana bats and northern long-eared bats hibernate in caves or mine portals from November 15 to March 31. Furthermore, there may be other landscape features used by northern long-eared bats as hibernacula during winter that have not yet been documented. Both species utilize hibernacula and surrounding areas for fall swarming from August 15 to November 14 and for spring staging from April 1 to May 14.

Gray bat
The gray bat was listed as endangered on April 28, 1976 (41 FR 17736). The species may use the project area for foraging between April 1 and November 15 and may roost there year-round. Gray bats roost primarily in caves or cave-like structures year-round. However, gray bats have also been found in bridge crevices and in culverts. Summer roosting habitat must be warm or contain restricted chambers that can trap the body heat of clustered bats. Winter hibernation habitat is often deep vertical caves or cave-like structures (e.g., mine portals) that trap large volumes of cold air.

Gray bats primarily feed on aquatic and terrestrial insects that emerge over rivers, streams, and lakes. Asiatic oak weevils, mayflies, caddisflies, and stoneflies make up the majority of their diet, though beetles and moths are also consumed. Aquatic insects with concentrated emergences or large mating aggregations above or near water appear to be preferred prey. Most foraging occurs within five meters of the water's surface. As a result, streams, wetlands, and associated riparian forests are often preferred foraging habitats. Increased erosion and sedimentation within streams reduce the diversity and biomass of benthic invertebrates (i.e., insects). Impacts to aquatic features such as streams or wetlands could reduce the number of insects available to the species for foraging.

Gray bats use caves or mine portals for winter hibernation in West Virginia from November 15 to March 31. These bats also use hibernacula and the surrounding areas for fall-swarming and spring-staging activity (August 15 to November 14 and April 1 to May 14 in West Virginia, respectively). Some bats may remain near hibernacula during the summer and use them as summer roosting sites.

Virginia big-eared bat
The Virginia big-eared bat was listed as endangered on November 30, 1979 (44 FR 69206). The species may forage in the project area between April 1 and November 15 and may roost there year-round. Virginia big-eared bats primarily roost in caves, with most of the population concentrated in ten hibernacula and eighteen maternity sites across four geographically distinct regions (Piaggio et al. 2009, FWS 2019). They require a narrow range of microclimatic conditions (cooler for hibernation, warmer for maternity colonies). They typically use caves in karst regions, which are characterized by limestone caves and sinkholes dominated by oak-hickory or beech-maple-hemlock forests.

Typical foraging habitats include primarily forested areas interspersed with open fields or hay fields, cliff lines, rock shelters or outcrops, riparian areas, and water sources such as streams, ponds, and wetlands. Virginia big-eared bats are foraging specialists, with more than eighty percent of their prey consisting of lepidopterans (moths) (Lacki and Dodd 2011). Foraging strategies include aerial hawking and gleaning (catching insects in flight or from surface). Their ability to glean prey allows them to feed later at night, when temperatures are cooler, and for a longer season than bats that rely solely on catching prey in flight. Foraging occurs up to seven miles from, but generally much closer to, cave or mine roost sites.

Virginia big-eared bats use cave or mine portals for winter hibernation in West Virginia between November 15 and March 31. Both hibernacula and summer bachelor colony sites may be used for fall-swarming and spring staging (August 15 to November 14 and April 1 to May 14 in West Virginia, respectively. Certain hibernacula may also serve as maternity roost sites if they have suitable microclimatic conditions.

When evaluating potential impacts on listed species, the WVFO considers species' biological requirements, the project location, and the extent of anticipated impacts. The proposed project involves revisions to West Virginia's whole-body fish tissue selenium criterion and is within the range and habitat of the federally listed Indiana bat, northern long-eared bat, gray bat, and Virginia big-eared bat. Increases in overall selenium levels in West Virginia streams may affect

bats. However, several factors indicate that these impacts have been minimized or avoided. Direct impacts to bats are not expected because the action will not alter suitable roosting, foraging, commuting, or hibernating habitat through tree removal. Indirect impacts may occur if increased selenium in West Virginia water bodies reduces the abundance and diversity of emergent aquatic insects, which are major prey items for bats. The effects of selenium on aquatic insects appear to vary: decreased diversity and density of certain families after experimental selenium addition in a lentic ecosystem (Graves et al. 2019), but no consistent differences in insect abundance or diversity in experimental lotic systems (Swift 2002, Henry and Wesner 2018). Additionally, bats consume insects with fully terrestrial life cycles (e.g., moths, weevils) as well as aquatic insects and are thus expected to adapt their foraging if aquatic insect abundances are affected. The revised criterion is not expected to significantly change water quality or directly impact bats or their suitable habitats. Therefore, WVFO concludes potential impacts to Indiana bat, northern long-eared bat, gray bat, and Virginia big-eared bat are considered insignificant and/or discountable.

Federally listed plants

Harperella

Harperella (*Ptilimnium nodosum*) was listed as endangered on October 28, 1988 (53 FR 37978). It is a small, herbaceous plant with clusters of small white flowers arranged in umbels.

Across its range, harperella occurs in two distinct habitat types: shallow, seasonally flooded ponds in the coastal plain and riverine environments with rocky, gravelly, or cobble substrates that experience scour in the Mid-Atlantic portion of its range. Habitat suitability in these riverine environments is tied to the frequency of scour, which reduces competition from other vegetation and maintains the open sites preferred by the species. Plants displaced by scour events can re-root from stem nodes in shallow soil deposits among exposed rocks or along stream margins.

Because harperella is adapted to natural flood regimes and requires periodic inundation, alterations to hydrologic flow regimes can adversely affect harperella. Activities that cause excessive flooding, prolonged inundation, or increased sediment deposition can negatively impact the species.

Virginia spiraea

Virginia spiraea (*Spiraea virginiana*) was listed as threatened on July 16, 1990 (55 FR 24241). It is a perennial, clonal shrub with a modular growth form, allowing it to spread through interconnected root systems. These traits enable the species to persist under and depend on disturbance regimes that maintain open, dynamic streambank conditions (FWS 1992).

Virginia spiraea occupies highly specialized riparian habitats. It is typically found on scoured banks of high-gradient streams, as well as on meander scrolls, point bars, natural levees, and braided channel features in lower stream reaches. Habitat suitability is closely tied to the intensity and frequency of scour. Disturbance must be strong enough to limit canopy closure but not so extreme as to eliminate small woody vegetation entirely. The species grows most vigorously in full sunlight, though it can tolerate partial shade until competition from trees, large shrubs, or vines intensifies. Individuals occur within the maximum floodplain, usually near the water’s edge, among other disturbance-tolerant plant species.

Because the species relies on periodic scour to maintain habitat structure and facilitate dispersal, alterations to hydrologic flow regimes can adversely affect Virginia spiraea. Activities that reduce natural scour, disturb streambanks, or increase sedimentation may change the distribution, abundance, or quality of scour-maintained habitats. Such changes can limit the species' ability to persist, expand, or reestablish within suitable riparian areas.

When evaluating potential impacts on listed species, the WVFO considers species' biological requirements, the project location, and the extent of anticipated impacts. The proposed project is within the range and habitat of the federally listed harperella and Virginia spiraea. The proposed action will not affect hydrologic flow regimes, cause streambank disturbance, or increase sedimentation, so no direct impacts from habitat alteration are expected. Indirect impacts from the approval of the revised whole-body selenium criteria for fish are also expected to be minimal, as plants appear relatively tolerant of selenium in water. Ornes et al. (1991) found that growth of four species of aquatic plants was unaffected at selenium concentrations below 1,250 micrograms per liter. Similarly, studies on freshwater plants indicate that growth is not affected at selenate concentrations below 100 micrograms per liter (EPA 2021). Thus, freshwater plants appear less sensitive to selenium than fish. Given this lower sensitivity, and the limited exposure of harperella and Virginia spiraea to aqueous selenium (i.e., only during flood events), the revised criterion is not expected to significantly change their suitable habitats. Therefore, WVFO concludes potential impacts to harperella and Virginia spiraea are considered insignificant and/or discountable.

Conclusion

Based on the information provided, the WVFO concurs with the EPA's determination that the project may affect, but is not likely to adversely affect, the candy darter, diamond darter, clubshell, fanshell, James spinymussel, longsolid, northern riffleshell, pink mucket, purple cat's paw, rayed bean, round hickorynut, sheepnose mussel, snuffbox mussel, spectaclecase, Big Sandy crayfish, Guyandotte River crayfish, Indiana bat, northern long-eared bat, gray bat, Virginia big-eared bat, harperella, and Virginia spiraea. The WVFO also concurs with the EPA's determination that the project may affect, but is not likely to adversely affect, critical habitat for the candy darter, diamond darter, longsolid, round hickorynut, snuffbox mussel, spectaclecase, Big Sandy crayfish, and Guyandotte River crayfish.

This letter serves as completed ESA Section 7 coordination for this project. As provided in 50 CFR § 402.16, reinitiation of consultation is required and shall be requested by the federal action agency or the FWS when discretionary federal involvement or control over the action has been retained or is authorized by law and any of the following occur: new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion or written concurrence; or a new species is listed or critical habitat is designated that may be affected by the action. If it is determined that reinitiation is required, the concurrence provided by this document must be reconsidered through coordination with the FWS.

If you have any questions regarding this letter, please contact our team at the WVFO's office-wide email (fw5_wvfo@fws.gov).

Sincerely,

JENNA HINCKS

Digitally signed by JENNA HINCKS
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