REGION 4
INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

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Date:

PROJECT NAME (Grant Title/Number): 2024-25 Hunt Opening Package for Green River National Wildlife Refuge; Project Code: 2024-0018317

I. **Service Program:**
- ○ **Ecological Services**
- ○ **Federal Aid**
- ○ **Clean Vessel Act**
- ○ **Coastal Wetlands**
- ○ **Endangered Species**
- ○ **Section 6 Partners for**
- ○ **Fish and Wildlife**
- ○ **Sport Fish Restoration**
- ○ **Wildlife Restoration**
- ○ **Fisheries**
- • **Refuges/Wildlife**

II. **State/Agency:** Kentucky/US Fish and Wildlife Service

III. **Station Name:** Green River National Wildlife Refuge

IV. **Description of Proposed Action:**

The U.S. Fish and Wildlife Service (Service, USFWS) proposes to implement Alternative B in the Environmental Assessment (EA, Section B, USFWS 2024) for the 2024-25 Hunt Package for Green River National Wildlife Refuge (refuge, NWR) to open current and future properties of the Green River NWR to migratory bird and archery/crossbow big game hunting opportunities as outlined in the proposed Hunting Plan (Section A, USFWS 2024), serving goals outlined in the refuge's 2019 Land Protection Plan (LPP) and Conceptual Management Plan (CMP, USFWS 2019). Included in the Service's 2024-25 Hunting Sport Fishing Rule, the 2024-25 Hunting Package for Green River NWR includes the Hunting Plan (Section A), EA (Section B), Hunting Compatibility

Determination (CD, Appendix C), refuge-specific regulations [50 Code of Federal Regulations (CFR) §32.36], and this Intra-Service Section 7 Biological Evaluation.

The 2019 LPP for Green River NWR outlined a 53,000-acre Conservation Partnership Area (CPA) within which the Service is authorized to acquire up to 24,000 acres for Green River NWR (USFWS 2019). As of December 31, 2023, Green River NWR (Figure 1) currently owns and manages approximately 2,197 acres. Under the proposal, and as previously analyzed (USFWS 2019), the Service would open the listed hunts.

Beginning in the 2024-25 hunt season, the Service proposes to open the 589.13 acres of the Horseshoe Bend Unit to the listed hunts.

- Migratory waterfowl hunting (duck, goose, coot, and merganser) for youth, seniors, and disabled hunters, as defined by the state, during the months of December and January of the statewide season and for youth and veterans in February for the state-wide Veterans and youth dates
- Deer and turkey archery and crossbow only hunting for youth, seniors, and disabled hunters, as defined by the state, during the months of September and October of the statewide season
- Turkey archery and crossbow only hunting for youth only, as defined by the state, during the months of April and May of the statewide season

Beginning in the 2024-25 hunt season, the Service proposes to open the 204 acres of the Tscharner West section of the Bluff Unit to the listed hunts.

- Deer and turkey archery and crossbow only hunting for youth, seniors, and disabled hunters, as defined by the state, during the months of September and October of the statewide season
- Turkey archery and crossbow only hunting for youth only, as defined by the state, during the months of April and May of the statewide season

Beginning in the 2025-26 hunt season, given the logistical timing of approval for hunt plans, as well as the time needed for applications, awards, and permit issuance, the Service proposes to open approximately 793.13 acres (i.e., 589.13 acres in Horseshoe Bend and 204 acres of the Tscharner West section of Bluff Unit) to the listed hunts.

- Quota archery and crossbow deer/turkey in November of the statewide season

In the future based on acreage, staffing, habitat restoration, infrastructure, and visitor amenities, the Service will work at the refuge to refine existing opportunities and/or develop additional migratory game bird hunting (e.g., quota hunts, early teal and wood duck hunts, and dove hunts) and additional big game hunting (e.g. quota hunts). Since the Proposed Action includes firearms hunting of waterfowl and archery and crossbow hunting of white-tailed deer and eastern wild turkey, lead ammunition is not included in the proposed hunts.

In accordance with existing Federal, state, local, and refuge-specific regulations as outlined in Table 1, the Service developed refuge-specific spatial and temporal regulations to ensure compatibility of hunting for Green River NWR as part of the 2024-25 Migratory Game Bird and Big Game Hunting Plan. In the future based on acreage, staffing, habitat restoration, infrastructure, and visitor amenities, the Service will work at the refuge to refine existing opportunities and/or develop additional migratory game bird hunting (e.g., quota hunts, early teal and wood duck hunts, and dove hunts) and additional big game hunting (e.g. quota hunts).

Table 1. New species to be opened for hunting on Green River NWR

Species	Scientific Name(s)
Waterfowl Species	
Mallard	*Anas platyrhynchos*
American Black Duck	*Anas rubripes*
Gadwall	*Mareca strepera*
American Wigeon	*Mareca americana*
Mexican Duck	*Anas diazi*
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Northern Shoveler	*Spatula clypeata*
Black Bellied Whistling Duck	*Dendrocygna autumnalis*
Teal	*Anas discors, Anas crecca carolinensis, A. cyanoptera*

Species	Scientific Name(s)
Wood Duck	*Aix sponsa*
Merganser	*Mergus serrator, Lophodytes cucullatus, Mergus merganser*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Scaup	*Aythya infinis, A. marila*
Ring-necked Duck	*Aythya collaris*
Goldeneye	*Bucephala clangula, B. islandica*
Bufflehead	*Bucephala albeola*
Ruddy Duck	*Oxyura jamaicensis*
Long-tailed Duck	*Clangula hyemalis*
Scoter	*Melanitta deglandi, M. perspicilatta*
Dark Geese	*Branta canadensis, B. hutchinsii, Anser albifrons, A. erythropus*
Light Geese	*Anser caerulescens, A. c. atlantica, A. rossii*
Dove	*Zenaida macroura, Z. asiatica, Streptopelia decaocto, S. risoria*
Big Game Species	
White-tailed Deer	*Odocoileus virginianus*
Turkey	*Meleagris gallopavo silvestris*

Green River NWR has an active acquisition program. Over time, as the Service acquires additional properties, staff, and funding for the refuge, each newly acquired parcel and existing properties currently closed to hunting would be evaluated to be opened to hunting as outlined in the Hunting Plan (Section A) and in the 2019 LPP and CMP (USFWS 2019) and as analyzed in the EA (Section B). Upon acquisition of a property within the Green River NWR CPA, the Service would evaluate the property regarding the potential for opening it to public use activities, including hunting opportunities. The Service would follow all required processes and reviews to add any new properties to the hunting program, including any required CFR changes, planning, public engagement, environmental analysis, and inclusion in future Hunting and Sport Fishing Rulemaking. Criteria used to evaluate compatibility of hunting and sport fishing on future properties would include the acreage and size of the property;

configuration of the property; juxtaposition in the landscape and to other refuge property; adjacent property uses; wildlife habitat type, availability, and condition; potential management of property to meet refuge purposes and goals (e.g., sanctuary for migratory waterfowl, closed areas, and visitor use and facilities); and public safety concerns. Table 2 outlines by management unit the CPA acreage total, the total acreage owned or managed (as of December 31, 2023), the acres to be opened and closed to hunting for 2024-25, and the estimated acres for potential future acquisitions, while Figure 1 outlines the proposed hunt unit areas for Green River NWR, of which the Service is authorized to acquire up to 24,000 acres.

Table 2. **Conservation Partnership Area Acres, Acres to be Opened and Closed to Hunting in 2024-25, and Potential Future Acquisition Acres are Divided by Management Unit**

Units	Total CPA Acres	Approximate Total Acres Owned or Managed by FWS (as of December 31, 2023)	Approximate Acres to be Evaluated for Inclusion in Hunting Program for the 2024-25 Hunt Season*	Approximate Acres for Potential Future Acquisition
Scuffletown Unit	29,627	0	0	Up to 21,803.48
Horseshoe Bend Unit	5,443	589.13	589.13	Up to 4,853.50
Race Track Unit	1,994	0	0	Up to 1,994.00
Bluff Unit	5,365	1,607.39	204.00	Up to 3,757.61
Green River Unit	10,202	0	0	Up to 10,202.00
Total Acres	52,631	2,196.52	793.13	Up to 21,803.48

*Approximately 1,403.39 acres would currently be closed to hunting.

Note: Under the active acquisition program for Green River NWR and through procedures outlined by hunting and sport fishing rulemaking process and Service Policy, the Service could acquire and open to hunting activities up to

24,000 acres as outlined in this plan, the 2019 LPP, and CMP (USFWS 2019) and as analyzed in the EA (Section B).

V. Pertinent Species and Habitat:

Listed species and habitat occurrence on the refuge are based on the expert opinion of Service biologists, supplemented with site specific information and information from the Environmental Conservation Online System (ECOS, https://ecos.fws.gov/ecp/) and Information for Planning and Consultation (IPaC, https://ecos.fws.gov/ipac/) databases. Since research activities are ongoing in this area and since the ECOS and IPaC databases are regularly updated, approximately every 90 days, it is possible that the specific threatened and endangered species identified as present on or near the refuge may change between the finalization of this Biological Evaluation and its publication.

A. Include species/habitat occurrence maps:

-See ECOS range maps at https://ecos.fws.gov/ecp/

B. Listed Species and Any Designated Critical Habitat:

SPECIES/CRITICAL HABITAT Species Common Name (Scientific Name)	STATUS*
Gray Bat (*Myotis grisescens*)	E
Indiana Bat (*Myotis sodalis*)	E
Northern Long-eared Bat (*Myotis septentrionalis*)	E
Tricolored Bat (*Perimyotis subflavus*)	PE
Whooping Crane (*Grus americana*)	EPNE
Fanshell (*Cyprogenia stegaria*)	E
Snuffbox (*Epioblasma triquetra*)	E
Pink Mucket (*Lampsilis abrupta*)	E
Ring Pink (*Obovaria retusa*)	E
Sheepnose (*Plethobasus cyphyus*)	E
Fat Pocketbook (*Potamilus capax*)	E
Northern Riffleshell (*Epioblasma torulosa rangiana*)	E
Orangefoot Pimpleback (*Plethobasus cooperianus*)	E
Clubshell (*Pleurobema clava*)	E
Rough Pigtoe (*Pleurobema plenum*)	E

SPECIES/CRITICAL HABITAT Species Common Name (Scientific Name)	STATUS*
Rabbitsfoot (*Quadrula cylindrica cylindrica*)	T
Longsolid (*Fusconaia subrotunda*)	T
Pyramid pigtoe (*Pleurobema rubrum*)	PT
Monarch Butterfly (*Danaus plexippus*)	C

*STATUS: E=endangered; T=threatened; PE=proposed endangered; PT=proposed threatened; CH=critical habitat; PCH=proposed critical habitat; EPNE= Experimental Population, Non-Essential; C=candidate species; UR=under review

Mammals

According to the North American Bat Conservation Alliance (NABCA) State of the Bats reports (2023), over 1,460 bat species exist worldwide, of which 154 species occur in North America. Most bat species support ecosystem health in our forests, deserts, grasslands, and agricultural lands by devouring insects (NABCA 2023). Top threats to bats include climate change, habitat loss, wind energy, and a bat disease called white-nose syndrome that has killed millions of hibernating bats in the United States and Canada (NABCA 2023). Bats populations in North America have declined from a fatal fungus known as white-nose syndrome, first discovered in the United States in2007. The fungus has spread across the United States and Canada, killing 9 out of 10 little brown bats, northern long-eared bats, and tricolored bats (NABCA 2023). Twelve North American bat species are known to be susceptible to white-nose syndrome when they hibernate during winter (NABCA 2023). According to the State of Bats report, experts now estimate that 52% of bat species in North America are at risk of populations declining severely in the next 15 years (NABCA 2023). Most bats are infected by this disease during hibernation in caves. Bats use a wide variety of forested habitats for roosting, foraging, and traveling during the summer. Bats may also utilize adjacent and interspersed non-forested habitat, such as emergent wetlands and edges of fields. Summer roosting habitats on Green River NWR would include forested areas with live trees and/or snags with exfoliating bark, cracks, crevices, or other cavities. During the winter, most bats hibernate in caves or mines.

Gray Bat (*Myotis grisescens*) - Endangered

Gray bat (*Myotis grisescens*) was listed as an endangered species on April 28, 1976, under the ESA (Public Law 93-205). The recovery plan was published by

USFWS in 1982 (USFWS 1982) and has not been revised since. The gray bat has long, glossy fur, light brown to brown. Ears are dark, usually black; longer than in any other *Myotis*; and, when laid forward, extend 1/4 cm (7 mm) beyond nose. Tragus long and thin. Calcar keeled. The species' historical range included Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Missouri, Oklahoma, Tennessee, Virginia, and West Virginia (USFWS 2023d). Occurrence maps are located at https://ecos.fws.gov/ecp/species/6329. The gray bat is restricted in distribution to the limestone-karst areas of the eastern and southern United States (Hall 1981, Hall and Wilson 1966, USFWS 1982). The only major gray bat hibernacula in Kentucky are found near Mammoth Cave National Park. Even though gray bats require cave-like habitats, the species summer distribution occurs throughout a slightly larger geographic area than winter distribution. Gray bats can establish maternity and bachelor colonies in dams, under bridges, and in storm sewers, which enables them to venture away from karst regions. Currently, Kentucky Department of Fish and Wildlife Resources (KDFWR) Distribution Map indicates this species does not occur within Henderson County, Kentucky (KDFWR 2023b). However, a 2023 bat blitz led by Kentucky Department of Fish and Wildlife Resources captured 9 in and around Henderson County, Kentucky (Michaela Rogers, Wildlife Biologist, KDFWR, personal communication, August 21, 2023). Currently, no maternity roost or hibernacula are known to occur in the CPA (USDOT et al. 2018). The amount of forested habitat on Green River NWR creates suitable summer foraging and commuting habitat for bats, including this species.

Indiana Bat (*Myotis sodalis*) - Endangered

The Indiana bat was listed as endangered by USFWS on March 11, 1967 (32 FR 4001). The Indiana bat is a medium-sized *Myotis*, closely resembling the little brown bat (*Myotis lucifugus*) but differing in coloration. Its fur is a dull grayish chestnut rather than bronze, with the basal portion of the hairs on the back a dull-lead color. This bat's underparts are pinkish to cinnamon, and its hind feet are smaller and more delicate than in *M. lucifugus*. The calcar (heel of the foot) is strongly keeled. The species' historical range included Alabama, Arkansas, Connecticut, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia (USFWS 2023e). Occurrence maps are located at https://ecos.fws.gov/ecp/species/5949. While critical habitat has been designated for this species, its critical habitat does not occur on the refuge (USFWS 2023e). During the winter, the Indiana bat generally hibernates in

caves, although abandoned mines, abandoned railroad tunnels, and even a hydroelectric dam have also been used (USFWS 2007). The range of the Indiana bat includes much of the eastern US. It occurs from Iowa, Oklahoma and Wisconsin, northeast to Vermont, and south to northwestern Florida and northern Arkansas (Barbour and Davis 1969). The majority of the wintering population occurs within the limestone cave region of Indiana, Kentucky, and Missouri. As of the 2017 surveying period, 530,705 Indiana bats were estimated range-wide, and hibernacula that contained these occurred in 17 states, including Alabama, Arkansas, Georgia, Illinois, Indiana, Kentucky, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia (USFWS 2017). Currently, critical winter habitat is established and includes 11 caves and two non-coal mines, including six in Missouri, two each in Indiana and Kentucky; and one each in Illinois, Tennessee, and West Virginia (USFWS 2007). Summer distribution of the Indiana bat occurs throughout a wider geographic area than winter distribution. The core summer range includes southern Iowa, northern Missouri, northern Illinois, northern Indiana, southern Michigan, and western Ohio (USFWS 2007). The presence of Indiana bats in a particular area during the summer appears to be determined largely by the availability of suitable natural roost structures. Dead trees with a combination of loose, exfoliating bark, cracks, and crevices are preferred as maternity roosts; however, live trees are often used as secondary roosts depending on microclimate conditions (USFWS 2007). Prior to white-nose syndrome, Kentucky Department of Fish and Wildlife Resources reports 2 captures of Indiana bats for Henderson County, Kentucky (KDFWR 2021). The 2023 bat blitz conducted by KDFWR captured 5 Indiana Bats in Henderson County, Kentucky and tracked multiple bats to Sloughs Wildlife Management Area, including one roosting male Indiana Bat tagged in Union County (Michaela Rogers, personal communication, January 2023). Currently, KDFWR Distribution Map indicates known Indiana bat maternity roost occurs within Henderson County, Kentucky (KDFWR 2023a). The amount of forested habitat on Green River NWR creates suitable summer roosting, foraging, and commuting habitat for bats, including this species.

Northern Long-eared Bat (*Myotis septentrionalis*) - Endangered

The northern long-eared bat is a medium-sized bat about 3 to 3.7 inches in length but with a wingspan of 9 to 10 inches. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are bats noted for their small ears (myotis means mouse-

eared). The northern long-eared bat uses a wide variety of forested habitats for roosting, foraging, and traveling and may also utilize some adjacent and interspersed non-forested habitat, such as emergent wetlands and edges of fields. Roosting habitat includes forested areas with live trees and/or snags with a diameter at breast height (DBH) of equal to or greater than three inches that exhibit exfoliating bark, cracks, crevices, and/or other cavities (USFWS 2017). According to USFWS (2017), any forest where trees equal to or greater than three inches DBH are present is considered to have potential roosting habitat for the northern long-eared bat. The northern long-eared bat is found across much of the eastern and north central United States and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species' range includes 37 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this bat, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. Although the disease has not yet spread throughout the northern long-eared bat's entire range (white-nose syndrome is currently found in at least 25 of 37 states where the northern long-eared bat occurs), it continues to spread. Experts expect that where it spreads, it will have the same impact as seen in the Northeast (USFWS 2023g). The species' historical range included Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming (USFWS 2023g). Occurrence maps are located at https://ecos.fws.gov/ecp/species/9045. The amount of forested habitat on Green River NWR creates suitable summer roosting, foraging, and commuting habitat for bats, including this species. In Kentucky, the northern long-eared bat is either known from or thought to likely occur in every county in the state. Prior to white-nose syndrome, Kentucky Department of Fish and Wildlife Resources reports multiple captures of northern long-eared bats for Henderson County, Kentucky (KDFWR 2021). Currently, KDFWR Distribution Map indicates this species occurs within Henderson County, Kentucky, however, Henderson County, Kentucky has no post white-nose syndrome records for Northern long-eared bats (KDFWR 2023c).

Tricolored Bat (*Perimyotis subflavus*) - Proposed Endangered

The tricolored bat is a small insectivorous bat that is distinguished by its unique tricolored fur and often appears yellowish to nearly orange. The once common species is wide ranging across the eastern and central United States and portions of southern Canada, Mexico and Central America. During the winter, tricolored bats are often found in caves and abandoned mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts where they exhibit shorter torpor bouts and forage during warm nights. During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures. Tricolored bats face extinction due primarily to the range-wide impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the continent. White-nose syndrome has caused estimated declines of more than 90 percent in affected tricolored bat colonies across the majority of the species range (USFWS 2023p). The species' historical range included Alabama, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming (USFWS 2023p). Occurrence maps are located at https://ecos.fws.gov/ecp/species/10515. The amount of forested habitat on Green River NWR creates suitable summer roosting, foraging, and commuting habitat for bats, including this species. KDFWR has records of this species occurring within Henderson County, Kentucky prior to white-nose syndrome, however, Henderson County, Kentucky has no post white-nose syndrome records for Tricolor bats (KDFWR 2023d). The 2023 bat blitz conducted by KDFWR did not capture this species in Henderson County, Kentucky (Michaela Rogers, personal communication, January 2024).

Bird

Whooping crane (*Grus americana*) - Experimental Population, Non-Essential

This non-essential experimental population of the whooping crane is treated as a threatened species when a proposed action is located within a National Wildlife Refuge. Due to the location of the proposed action within Green River NWR, this species will be addressed as threatened for the proposed action.

The whooping crane occurs only in North America and is North Americas tallest bird, with males approaching 1.5 meters (5 feet) when standing erect. The whooping crane adult plumage is snowy white except for black primaries, black or grayish alula (specialized feathers attached to the upper leading end of the wing), sparse black bristly feathers on the carmine crown and malar region (side of the head from the bill to the angle of the jaw), and a dark gray-black wedge-shaped patch on the nape. The common name "whooping crane" probably originated from the loud, single-note vocalization given repeatedly by the birds when they are alarmed. Whooping cranes are a long-lived species; current estimates suggest a maximum longevity in the wild of at least 30 years. Whooping cranes currently exist in the wild at 3 locations and in captivity at 12 sites. The July 2010 total wild population was estimated at 383. There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas at Aransas. In addition, there is a small captive-raised, non-migratory population in central Florida, and a small migratory population of individuals introduced that migrate between Wisconsin and Florida in an eastern migratory population (USFWS 2023q). The species' historical range included Alabama, Arkansas, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, Wyoming (USFWS 2023q). Occurrence maps located at (https://ecos.fws.gov/ecp/species/758). In 2001, the U.S. Fish and Wildlife Service initiated a reintroduction of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States. The intent was to establish a migratory flock that would summer and breed in Wisconsin and winter in west-central Florida which was historical habitat (USFWS 2008). Since the migration route is a learned rather than an innate behavior, captive-reared Whooping Cranes released in Wisconsin were led by ultralight aircraft to establish their historical flight path to suitable wintering areas in Florida. Five Whooping Crane yearlings were led over 1,200-miles in 2001, followed by 16 in 2002, 15 in 2003, 17 in 2004, 21 in 2005 and 18 in 2006 (USFWS 2008). The International Crane Foundation March 2023 update on the eastern whooping crane populations reported 73 individuals with 8 located in Kentucky. Three cranes were documented in Hopkins County, Kentucky south of Henderson County Kentucky where the CPA is located.

Clams

Unionid population decline is being driven by human impact on the environment. Point and non-point pollution can harm unionid health and even lead to death. Point pollution is pollution that enters the environment from one place such as discharge pipes, and non-point pollution is pollution that is released in a wide area such as pollutants that get transported by runoff. Unionids are affected by non-point pollution such as runoff that contains pesticides, herbicides, and fertilizers as well as point pollution. Pollution also affects unionids indirectly by negatively affecting the host fish necessary for the Unionid life cycle. Heavy metals can disrupt the immune and reproductive systems of fish and PCBs can cause deformities, reproductive issues, and even death in fish (Modesto et al. 2017). To avoid impacted areas, fish might move to more habitable areas. Unionids live stationary lives and thus cannot move with their host fish species that they require for their life cycle and dispersal (Modesto et al. 2017). The major impacts to the Ohio River are dredging and harmful algal blooms. Dredging, in support of navigation, negatively impacts aquatic habitat, fish, unionids, and the overall biological community by suspending sediments into the water column for downstream transport. Harmful algal blooms, which are common, are an issue because of the cyanotoxins produced and dissolved oxygen depletion, which results in fish kills. Additionally, non-point source pollution, exacerbated by impervious surfaces and flashy streams, conveys soil and associated contaminants into the Ohio River waters on a routine basis. Nutrient impacts in the Green River watershed are from agriculture, commercial and residential property, stormwater runoff, and landfills. Riparian buffers are needed along streams to filter excess nutrients and other contaminates before the runoff reaches the stream. Excessive fertilizing of residential lawns and golf courses also impacts water quality. Coal ash from the Green Station Landfill in Wester County is seeping into the Green River toward its confluence with the Ohio River. This leachate mixture, containing elevated levels of carcinogenic and neurotoxic chemicals, was first reported in flowing into the Green River in 2017 (Van Velzer 2019). The Green Station Landfill was used to store leftover ash by three coal-fired power plants; one has since closed, another sits idle, but the Robert Green unit still burns coal to make electricity. At one of the seeps along the river, inspectors reported finding high levels of the cancer-causing pollutant arsenic as well as mercury — a neurotoxin that accumulates in the environment — and thallium, an element which can affect the nervous system, lung, heart and liver (Van Velzer 2019). At other seeps along the river, the landfill reported finding

elevated levels of lead (a neurotoxin), cadmium (a carcinogen), and the radioactive element radium (Van Velzer 2019). According to the Division of Water, the river has not been assessed since 2013, but is considered healthy since it fully supports the catfish, crappie, bass, and other aquatic life that call it home (Van Velzer 2019).

Fanshell (*Cyprogenia stegaria*) - Endangered

The fanshell was listed as an endangered mussel under the Endangered Species Act (ESA) on June 21, 1990 (Federal Register 55: 25591). The fanshell grows to 3-4 inches and is characterized by its numerous fine green dots, dashes, sometimes bundled into broken rays on the shell and shinglelike growth rings, and knobs on the anterior half of the shell. Habitat for the fanshell includes a gravel and coarse sand substrate in relatively deep water with moderate currents of medium to large rivers (USDOT et al. 2018). The species' historical range included Alabama, Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia (USFWS 2023b). Occurrence maps are located at https://ecos.fws.gov/ecp/species/4822. The fanshell's historic distribution includes the Ohio River mainstream, lower Tennessee and Clark's Rivers, lower Cumberland River, lower and upper Green River, Barren River, Salt River, upper Cumberland River below Cumberland Falls, Kentucky River, Licking River, Tygarts Creek, and Big Sandy River. As of 1991, extant populations in the Commonwealth only occurred in short sections of the Green and Licking Rivers, Rolling Fork, and in the lower Tennessee River below Kentucky Lake Dam where it was reintroduced (USDOT et al. 2018). Based on the Draft Environmental Impact Statement (EIS) for the I-69 Ohio River Crossing Project, the fanshell was recovered from the Angel State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of Henderson, Kentucky (USDOT et al. 2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Snuffbox (*Epioblasma triquetra*) – Endangered

The snuffbox was formally listed as an endangered mussel under the ESA on February 14, 2012 (77 Federal Register 8632). The snuffbox is a small- to medium-sized mussel, with males reaching up to 2.8 in (7.0 cm) in length (Cummings and Mayer 1992; Parmalee and Bogan 1998). The maximum length of females is about 1.8 in (4.5 cm) (Parmalee and Bogan 1998). The shape of the

shell is somewhat triangular (females), oblong, or ovate (males), with the valves solid, thick, and very inflated. The beaks are located somewhat anterior of the middle, and are swollen, turned forward and inward, and extended above the hingeline (Cummings and Mayer 1992). Beak sculpture consists of three or four faint, double-looped bars (Cummings and Mayer 1992; Parmalee and Bogan 1998). The anterior end of the shell is rounded, and the posterior end is truncated, highly so in females. The posterior ridge is prominent, being high and rounded, while the posterior slope is widely flattened. The posterior ridge and slope in females are covered with fine ridges and grooves, and the posterioventral shell edge is finely toothed (Cummings and Mayer 1992). The ventral margin is slightly rounded in males and nearly straight in females. Females have recurved denticles (downward curved tooth-like structures) on the posterior shell margin that aid in holding host fish (Barnhart et al. 2008). The periostracum (external shell surface) is generally smooth and yellowish or yellowish-green in young individuals, becoming darker with age. Green, squarish, triangular, or chevron-shaped marks cover the umbone (the inflated area of the shell along the dorsal margin), but they become poorly delineated stripes with age. Internally, the left valve has two high, thin, triangular, emarginate pseudocardinal teeth (the front tooth being thinner than the back tooth) and two short, strong, slightly curved, and finely striated lateral teeth. The right valve has a high, triangular pseudocardinal tooth with a single short, erect, and heavy lateral tooth. The interdentum (a flattened area between the pseudocardinal and lateral teeth) is absent, and the beak cavity is wide and deep. The color of the nacre is white, often with a silvery luster, and a gray-blue or gray-green tinge in the beak cavity. Key characters useful for distinguishing the snuffbox from other species includee its unique color pattern, shape (especially in females), and high degree of inflation. The species' historical range included Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin (USFWS 2023o). Occurrence maps are located at https://ecos.fws.gov/ecp/species/4135. Historically, the snuffbox was widespread in the Ohio River and all major drainages, with the exception of the lowland habitats in western Kentucky including most of the lower Green River drainage (USDOT et al. 2018). Based on the Draft EIS for the 1-69 Ohio River Crossing Project, the snuffbox was recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of the Henderson, Kentucky (USDOT et al. 2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the

border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Pink Mucket (*Lampsilis abrupta*) - Endangered

The pink mucket was listed as an endangered mussel by USFWS on June 14, 1976 (USFWS 1985). The pink mucket is a medium sized mussel with a smooth yellow or yellowish-green shell with faint green rays (USFWS 1985). The shells of the pink mucket are somewhat inflated and valves become thick and heavy in mature individuals, which can reach lengths of 4.72 inches. The pink mucket typically inhabits medium to large rivers. Preferred substrates include sand, gravel, and mud in slower moving waters and rocky ledges in higher velocity flows. The pink mucket occurs in free-flowing reaches of larger rivers and is occasionally found in large creeks in gravel with sand where currents keep silt washed away from the mussels. (USDOT et al. 2018) The species' historical range included Alabama, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia (USFWS 2023j). Occurrence maps are located at https://ecos.fws.gov/ecp/species/7829. Historically, the pink mucket had a widespread distribution occurring in at least 25 rivers and tributaries, including the Ohio River, Kanawha River, Green River, and Mississippi River (USDOT et al. 2018). Based on the Draft EIS for the I-69 Ohio River Crossing Project, the pink mucket was recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of Henderson, Kentucky (USDOT et al. 2018).

Ring Pink (*Obovaria retusa*) - Endangered

The ring pink, formerly known as golf (Federal Register 54(43): 9529-9533) stick pearly mussel, was proposed as an endangered mussel species on March 7, 1989. A final listing occurred on September 29, 1989 (Federal Register 54(188): 40109-40112). The shell of the ring pink is medium sized (up to 3.15 inches in length) with pale yellowish-green to tan periostracum, heavy to massive, and rounded or square with prominent umbo (Watters et al. 2009). The umbo is very wide and prominent, distinctly twisted anteriorly and becomes more so with age, eventually looking like "golf stick driver head." The nacre is unique in this mussel with pale to dark purple in the middle, including the hinge and teeth, and abruptly changing to white at the pallial line. The ring pink inhabits deep stretches of rivers with swift current and coarse sand and gravel

substrates (USDOT et al. 2018). The species' historical range included Alabama, Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia (USFWS 2023l). Occurrence maps are located at https://ecos.fws.gov/ecp/species/4128. In Kentucky, the ring pink's historic distribution includes the mainstem Ohio River, lower Tennessee and Clark's rivers, lower Cumberland River, lower and upper Green River, Barren River, upper Cumberland River below Cumberland Falls, and Kentucky River (USDOT et al. 2018). As with other listed mussels, habitat alteration has eliminated the species from most of its range in Kentucky (USDOT et al. 2018). As of 2016, it is thought that the only extant population of the ring pink occurs in a short section of the Green River in Warren, Edmonson, and Hart counties (USDOT et al. 2018). Based on the Draft EIS for the I-69 Ohio River Crossing Project, the ring pink was recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of Henderson, Kentucky (USDOT et al. 2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Sheepnose (*Plethobasus cyphyus*) - Endangered

The sheepnose was listed in March 2013 by USFWS as a Federally listed endangered mussel species (USFWS 2012). The sheepnose has a thick, oval or oblong, somewhat elongate, and slightly inflated shell that can be up to 5 inches in length with a rounded anterior end and bluntly pointed posterior end. The sheepnose has many low, wide bumps run in a single file line down the outer shell surface, from the beak (the swelling above the point where the 2 shell halves join) to the opposite shell edge. The rest of the shell surface is smooth (without bumps) and looks slightly pressed-in from the beak to the shell edge (similar to the pressed-in mark the length of your finger would make on wet clay), parallel to the row of bumps. Young mussels may have 2 raised ridges (one on either side of the pressed-in mark). It inhabits medium to large rivers in shallow areas with moderate to swift current that flows over gravel or mixed sand and gravel substrate. The species' historical range included Alabama, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin (USFWS 2023n). Occurrence maps are located at https://ecos.fws.gov/ecp/species/6903. It is known to occur within the Ohio River from the confluence with the Mississippi River upstream to Pennsylvania,

including extant populations in western Kentucky and southern Indiana. The populations in the lower Ohio River may be contiguous with those in the lower Tennessee and Green Rivers. Based on the Draft EIS for the 1-69 Ohio River Crossing Project, one pre-1990 site is located at the mouth of the Green River. Additionally, the species was represented by shells recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, IN, approximately 5.5 miles east of Henderson, Kentucky (USDOT et al. 2018). The Draft EIS for the 1-69 Ohio River Crossing Project reports a sheepnose was recently found near the I-69 ORX study area, in the Ohio River (RM 783.4) upstream from the confluence of the Green River (USDOT et al. 2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Fat Pocketbook (*Potamilus capax*) – Endangered

The fat pocketbook (*Potamilus capax*) was proposed as an endangered mussel species on September 26, 1975 (Federal Register 40(188):44329-44333). A final listing occurred on June 14, 1976 (Federal Register 41(115):24062-24067). The fat pocketbook has a large (five inches), rounded to somewhat oblong, and greatly inflated, thin to moderately thick shell. The shell's periostracum is smooth and very shiny, yellow, yellowish-tan, or olive in color without rays and becomes dark brown in older individuals. The nacre of the shell is white, sometimes tinged with pink or salmon. The fat pocketbook's habitat seems to be medium sized to large rivers in depositional backwater areas along shore, behind wing dams, or inside channels and sloughs. (USDOT et al. 2018) The species' historical range included Arkansas, Illinois, Indiana, Iowa, Kentucky, Mississippi, Missouri, and Ohio (USFWS 2023c). Occurrence maps are located at https://ecos.fws.gov/ecp/species/2780. In Kentucky, the fat pocketbook has been reported from the Mississippi River, the Ohio River mainstem up to near the mouth of Green River, and the lower Cumberland, Green, Clark's, and Tradewater Rivers. Populations in the lower Ohio River appear to be large and healthy, and together with the large population in the Wabash River may form one single metapopulation. Individual fat pocketbooks have been found in the Ohio River just upstream of Henderson, Kentucky, approximately two miles upstream from the mouth of the Green River and have also been found approximately 4.5 miles downstream of Henderson, Kentucky (USDOT et al. 2018). The site upstream of Green River is located in Henderson County, Kentucky at RM 782.3 and was documented on October 3, 2008 (USDOT et al.

2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Northern Riffleshell (*Epioblasma torulosa rangiana*) - Endangered
The northern riffleshell was listed as an endangered mussel without critical habitat on February 22, 1993, by USFWS (Federal Register 58(13): 5638-5642). The northern riffleshell is a small to medium size (up to 3 inches long) freshwater mussel. Its shell exterior is brownish yellow to yellowish green with fine green rays. The shell interior is typically white. The species is sexually dimorphic; male shells are irregular ovate in outline, with a wide shallow sulcus just anterior to the posterior ridge. Female shells are obovate in outline, and greatly expanded post ventrally. The expanded shell shape of the female riffleshell results from shell growth around the expanded marsupial region. Habitat for the northern riffleshell is variable. The northern riffleshell occurs in riffle areas with swift currents in a substrate of coarse sand and gravel to a substrate of firmly packed fine gravel, typically in shallow (few inches to six feet deep) water. The species' historical range included Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and West Virginia (USFWS 2023h). Occurrence maps are located at https://ecos.fws.gov/ecp/species/527. In Kentucky, the northern riffleshell's historic distribution includes the Ohio River mainstem, upper Green River, Salt River, Kentucky River, and Licking River). Natural populations of the northern riffleshell in Kentucky appear to be extirpated. If naturally occurring populations do occur in Kentucky, they would be in free-flowing sections of the Green River. The northern riffleshell was reintroduced at four locations in the Licking River during 2013 and 2014 (USDOT et al. 2018). Currently, no sites for this species are known from within the CPA (USDOT et al. 2018).

Orangefoot Pimpleback (*Plethobasus cooperianus*) – Endangered
The orangefoot pimpleback was listed by USFWS as an endangered mussel species in September 1975 (Federal Register 40(188):44329-44333). A final listing occurred on June 14, 1976 (Federal Register 41(115):24062-24067). The orangefoot pimpleback has a round shell with pustules only on the posterior three-fourths of the shell, no green ray on the umbo, and an orange foot on living species. This species is found in medium to large rivers in sand, gravel, and cobble substrates in riffles and shoals in deep water and steady currents as well as some shallower shoals and riffles. The species' historical range included

Alabama, Illinois, Indiana, Iowa, Kentucky, Ohio, Pennsylvania, and Tennessee (USFWS 2023i). Occurrence maps are located at https://ecos.fws.gov/ecp/species/1132. In Kentucky, the orange-foot pimpleback's historic distribution includes the Ohio River mainstem, lower Tennessee and Clark's Rivers, lower Cumberland River, lower and upper Green River, Barren River, Salt River, and upper Cumberland River below Cumberland Falls (USDOT et al. 2018). Habitat alteration, especially impoundments, navigation facilities, channel dredging, sand and gravel mining, sedimentation, and water pollution, has eliminated the species from most of its range in Kentucky. Extant populations and potentially occupied reaches of orangefoot pimpleback are located within a 34-mile reach of the Ohio River downstream of the mouth of the Tennessee River; a mainstem reach of the Tennessee River approximately 45 miles in Tennessee downstream of Pickwick Landing Dam and largely upstream of Kentucky Lake; a 22-mile riverine reach of the Tennessee River downstream of Kentucky Lock and Dam; a 35-mile reach of the Tennessee River downstream of Chickamauga Lock and Dam and upstream of Nickajack Lake; and in the Cumberland River (USFWS 2022). Currently, no known sites of this species exist within the CPA (USDOT et al. 2018).

Clubshell (*Pleurobema clava*) - Endangered

The clubshell was listed as an endangered mussel by USFWS on February 22, 1993 (50 CFR § 17). The clubshell is a small to medium size (up to 3 inches long) freshwater mussel that was listed as endangered, without critical habitat, in 1993 (58 FR 5638-5642). Its shell exterior is yellow to brown with bright green blotchy rays and shell interior is typically white. The shell is wedge shaped and solid, with a pointed and fairly high umbo. Habitat for the clubshell includes a variety of riverine environments ranging from large rivers to smaller channel streams with clean coarse sand, gravel, and cobble, where it may bury several inches into the substrate. The species' historical range included Alabama, Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, Tennessee, and West Virginia (USFWS 2023a). Occurrence maps are located at https://ecos.fws.gov/ecp/species/3789. Historically, the clubshell was widely distributed in the Ohio River basin and occurred in most of the major drainages. Its distribution is now restricted to roughly 13 populations in the Ohio River and Lake Erie Basins (USDOT et al. 2018). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Currently, no known sites of this species exist within the CPA (USDOT et al. 2018).

Rough Pigtoe (*Pleurobema plenum*) – Endangered

The rough pigtoe was listed as an endangered mussel without critical habitat on June 14, 1976, by USFWS (Federal Register 41(115):24062-24067). The rough pigtoe is a medium sized (up to 3.54 inches) mussel with a rather thick, moderately inflated, triangular shaped shell. The shell's periostracum is coarse, with a satin finish, and tan, yellowish, or reddish brown in color and becomes darker with age (Watters et al. 2009). The periostracum of juvenile rough pigtoe often have green stripes that are often lost in adults. Nacre of the shell is porcelain white, rarely with rose flush, and with some iridescent posteriorly. Although rough pigtoes can become established in small rivers or head water stretches of medium-sized rivers, they are typically found in large rivers, in firmly packed gravel and sand substrates. They may also occur in stable muddy, sand, and cobble of large rivers and their impoundments. The species' historical range included Alabama, Indiana, Kentucky, Pennsylvania, Tennessee, and Virginia (USFWS 2023m). Occurrence maps are located at https://ecos.fws.gov/ecp/species/6894. In Kentucky, the rough pigtoe's historic distribution included the Ohio River mainstream, lower and upper Green River, Barren River, upper Cumberland River below Cumberland Falls, Kentucky River, and Licking River. Current distribution of this species is restricted to the Tennessee River mainstem and the upper Clinch River in Tennessee, and the Green River and the Barren River in Kentucky, and possibly in the Cumberland River (USDOT et al. 2018). Currently, no known sites of this species exist within the CPA. (USDOT et al. 2018). The 2021 rough pigtoe 5-year review (USFWS 2021a) showed the best remaining population occurring on Green River Mile 108.5 near Rochester, Kentucky, upstream to a mussel bed near Munfordville, Kentucky, excluding the area between mile markers 168.1-181.7. Conservation partners are working to remove locks and dams along the Green River to re-establish natural flows and substate condition to improve rough pigtoe mussel populations.

Rabbitsfoot (*Quadrula cylindrica cylindrica*) - Threatened

The rabbitsfoot was listed as a Federally threatened mussel by USFWS on September 17, 2013 (50 CFR § 17). The rabbitsfoot is a medium to large mussel, elongate and rectangular, reaching 12 cm (6 inches) in length (Oesch 1984). Parmalee and Bogan (1998) describe the beaks as moderately elevated and raised only slightly above the hinge line. Beak sculpture consists of a few strong

ridges or folds continuing onto the newer growth of the umbo (raised or domed part of the dorsal margin of the shell) as small tubercles (small, rounded projection on surface of the shell). Shell sculpture consists of a few large, rounded, low tubercles on the posterior slope, although some individuals will have numerous small, elongated pustules (small, raised spots) particularly on the anterior. The periostracum (external shell surface) is generally smooth and yellowish, greenish, or olive in color becoming darker and yellowish-brown with age and usually covered with dark green or nearly black chevrons and triangles pointed ventrally (Say 1817). These patterns are absent in some individuals. Internally, the color of the nacre is white and iridescent, often with a grayish-green tinge in the umbo cavity. Specimens from the southern periphery of its range are occasionally purplish. Soft parts generally have an orange coloration (Oesch 1984; Parmalee and Bogan 1998). However, Vidrine (1993) noted that the rabbitsfoot in the Ouachita River system in Louisiana had black soft parts. Aspects of the soft anatomy are described by Ortmann (1912), Utterback (1915-1916), Davis and Fuller (1981), and Oesch (1984). The species' historical range included Alabama, Arkansas, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia (USFWS 2023k). Occurrence maps are located at https://ecos.fws.gov/ecp/species/5165. In the Ohio River basin, this species ranges from the junction with the Mississippi River upstream to Pennsylvania. This species is only marginally tolerant of impoundment and has been extirpated in most large rivers, with localized populations surviving in the lower Ohio River (USDOT et al. 2018). Two records of the rabbitsfoot in the Ohio River upstream of the study area near Owensboro exist after 1990 (USDOT et al. 2018). However, only four populations are currently known in the state of Kentucky, and these do not include any populations in the Ohio River. The Draft EIS for the I-69 Ohio River Crossing Project, one historic site is located in the Ohio River between river miles (RMs) 784.6 and 786.7 (USDOT et al. 2018). Additionally, the species was represented by shells recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of Henderson, Kentucky (USDOT et al. 2018). The draft 2022 Recovery Plan for the rabbitsfoot reports the Ohio River from Green River confluence upstream to Cannelton Lock and Dam with at least one watershed in high and one in medium watershed condition for successful establishment/reintroductions (USFWS 2023r). USFWS Kentucky Ecological Service Field Office has historical records of this species in the Ohio River along the border of Henderson County, Kentucky, and along the edge of the refuge

CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Longsolid (*Fusconaia subrotunda*) - Threatened

The Service was petitioned to list the longsolid as an endangered or threatened species under the Endangered Species Act of 1973, as amended (Act). This petition was part of a 2010 petition to list 404 aquatic, riparian, and wetland species in the southeastern United States (CBD 2010, pp. 538–540). On September 27, 2011, we found that the petition presented substantial scientific or commercial information indicating that listing the longsolid may be warranted (76 FR 59836 59862). Longsolid adult mussels are light brown in color but darken with age. The shell is thick and medium-sized (up to 5 inches [125 millimeters]), and typically has a dull sheen. The longsolid exhibits a preference for sand and gravel in streams and small rivers, but also may be found in coarse gravel and cobble in larger rivers. In streams and rivers, they can be found at depths less than 2 feet (31 centimeters), but in large rivers can be commonly found at depths of 12 to 18 feet (3.7 to 5.5 meters); but also, at depths of over 20 feet. The longsolid is known to or is believed to occur in Alabama, Georgia, Illinois, Indiana, Kentucky, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia (USFWS 2018). Occurrence maps are located at https://ecos.fws.gov/ecp/species/9880. It is currently found in three major river basins: the Ohio (where is most prevalent), Cumberland (where it is rarest), and Tennessee, it is considered extirpated from the Great Lakes basin. Known populations have declined in number from 160 historically to 60 today. It has suffered impacts from negative influences on aquatic species commonly found in the central and eastern U.S. including habitat fragmentation from dams and other barriers; habitat loss; degraded water quality from chemical contamination and erosion from poorly managed development, agriculture, mining, and timber operations; direct mortality from dredging and harvest; and the proliferation of invasive species, such as the zebra mussel (USFWS 2018). The 6 populations in the Ohio River mainstem are represented by very few individuals since 1990. In many of these small population size examples, only fresh dead shells have been collected and no live longsolid have been observed (USFWS 2018). A single weathered shell of the longsolid was found in the Ohio River in a cobble substrate sample collected downstream of one of the alternative routes for I-69 corridor (USDOT et al. 2018).

Pyramid pigtoe (*Pleurobema rubrum*) - Proposed Threatened

The Service was petitioned to list the pyramid pigtoe as an endangered or threatened species under the Endangered Species Act of 1973, as amended

(Act). This petition was part of a 2010 petition to list 404 aquatic, riparian, and wetland species in the southeastern United States (CBD 2010, pp. 538–540). Pyramid pigtoes are reddish to chestnut brown in color with a smooth periostracum but darken with age. The beak cavity of the pyramid pigtoe is deep, the hinge teeth are heavy, and the pseudocardinal teeth are thick and low, and near the umbo. It is found in medium to large rivers, and prefers a mixture of sand, gravel, and cobble substrates (USFWS 2021b). The pyramid pigtoe is historically known from 18 states, but considered extirpated from 9 states (Pennsylvania, West Virginia, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Kansas, Missouri). The species has been recorded live during surveys since 2000 from the states of Kentucky, Tennessee, Virginia, Ohio, Alabama, Oklahoma, Arkansas, Mississippi, and Louisiana (USFWS 2021b). Occurrence maps are located at https://ecos.fws.gov/ecp/species/2781. It is distributed throughout the Ohio River basin and in the majority of its large tributaries up to Pennsylvania. The historical range of this species is difficult to determine, however, due to probable misidentification of several other closely related species. Despite misidentifications, the pyramid pigtoe was clearly a common and distinguishing member of large-stream mussel communities throughout the Ohio River basin in Kentucky (USDOT et al. 2018). Being relatively intolerant of river dams, most of its habitat has been drastically altered, and there are no confirmed records of live or recent dead individuals in the Ohio River itself in over 50 years. A single dead shell was recovered near the study area post-1990 near the mouth of the lower Green River (USDOT et al. 2018). Restricted to the main channel of medium to large rivers, the pyramid pigtoe is found in gravel and sand substrates and usually is a small component of mussel assemblages (Haag and Cicerello 2016). The pyramid pigtoe is also a minnow (Cyprinidae) host specialist (Haag and Cicerello 2016). Based on data obtained from Kentucky State Nature Preserves Commission, a historic site occurs between RMs 800.9 and 801.2 in the Ohio River west of Henderson and a shell was recovered from the Angel Mounds State Historic Site along the north bank of the Ohio River, 2.5 miles west of Newburgh, in Vanderburgh County, Indiana, approximately 5.5 miles east of the study area (USDOT et al. 2018). The Upper Green River has the highest resiliency for the pyramid pigtoe in the Ohio and Tennessee basins. Densities of pyramid pigtoe decrease proceeding downstream in the Green River, and the population in the river is fragmented by multiple dams (USFWS 2021b). However, the Barren River, a tributary of the Green River, is also occupied and currently in medium condition. This non-linear distribution with a stronghold in the upper reaches and a medium condition tributary population makes the Green River watershed in central Kentucky the most viable and important for Pyramid Pigtoe persistence in the eastern portion of its range (USFWS 2021b). However, the CPA is on the lower reaches of the Green River and currently cut off from these populations of pyramid pigtoe. However,

USFWS Kentucky Ecological Service Field Office has 2015 historical records of this species in the Green River at the Spottsville bridge in Henderson County, Kentucky, and along the edge of the refuge CPA (Seth Bishop, Kentucky Ecological Services, personal communications, January 2024).

Insects

Monarch Butterfly (*Danaus plexippus*) – Candidate
Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side of the wings. Adult monarchs are sexually dimorphic, with males having narrower wing venation and scent patches. The bright coloring of a monarch serves as a warning to predators that eating them can be toxic. (USFWS 2023f)

During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.), and larvae emerge after two to five days. Larvae develop through 5 larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter reproductive diapause (suspended reproduction) and live six to nine months.

In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 kilometers and can last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds, and their offspring start the cycle of generational migration over again. Occurrence maps are located at https://ecos.fws.gov/ecp/species/9743.

Monarch butterflies in eastern and western North America represent the ancestral origin for the species worldwide. Butterflies, including monarch

butterflies, and butterfly habitats have not been surveyed on the refuge but are likely to occur within the refuge.

For more than 20 years, communities and scientists have been tracking monarch populations, with growing concern as the number of monarchs at overwintering sites has declined (USFWS 2020). Two North American populations, the migratory populations located east and west of the Rocky Mountains. The primary drivers affecting the health of the two North American migratory populations are primarily: loss and degradation of habitat (from conversion of grasslands to agriculture, widespread use of herbicides, logging/thinning at overwintering sites in Mexico, senescence and incompatible management of overwintering sites in California, urban development, and drought), continued exposure to insecticides, and effects of climate change (USFWS 2020). In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded at this time by higher priority listing actions. With this finding, the monarch butterfly becomes a candidate for listing; we will review its status each year until we are able to begin developing a proposal to list the monarch (USFWS 2020). The monarch butterfly is a migratory insect species that spends part of its life cycle in North America. The monarch butterfly is currently considered a candidate species under the Endangered Species Act. Monarch butterflies spend spring and summer in areas of North America and prefer open field and grassland habitats. The primary host plant for the monarch in North America is milkweed.

Considered but not analyzed: Two insects, the American burying beetle (*Nicrophorus americanus*) and a Leptophlebiid mayfly (*Traverella lewisi*), were historically found within the CPA, but removed from further analysis because they are considered extirpated from within the CPA, respectively. The least tern (*Sternula antillarum*) was removed from the endangered species list in January 2021.

State-listed species of concern that could potentially occur within the CPA are little spectaclecase (*Villosa lienosa*), pocketbook (*Lampsilis ovata*), lake chubsucker (*Erimyzon sucetta*), black buffalo (*Ictiobus niger*), copperbelly water snake (*Nerodia Erythrogaster neglecta*), eastern hellbender (*Cryptobranchus alleganiensis*), bird-voiced treefrog (*Hyla avivoca*), northern crawfish frog (*Rana areolata circulosa),* midland smooth apalone *(mutica mutica),* western mud snake *(Farancia Abacura reinwardtii),* eastern ribbon snake *(Thamnophis sauritus sauritus),* American bittern (*Botaurus lentiginosus),* bald eagle (*Haliaeetus leucocephalus),* bank swallow *(Riparia riparia),* double-crested cormorant (*Phalacrocorax auritus),* fish crow *(Corvus ossifragus), g*reat egret

(*Ardea alba),* hooded merganser (*Lophodytes cucullatus),* king rail *(Rallus elegans),* least bittern (*Ixobrychus exilis),* brown creeper (*Certhia americana),* common gallinule *(Gallinula galeata),* osprey *(Pandion haliaetus),* peregrine falcon *(Falco peregrinus),* sedge wren (*Cistothorus platensis), s*hort-eared owl (*Asio flammeus),* spotted sandpiper (*Actitis macularius),* upland sandpiper (*Bartramia longicauda),* Virginia rail *(Rallus limicola),* yellow-crowned night heron *(Nyctanassa violacea),* evening bat *(Nycticeius humeralis),* masked shrew *(Sorex cinereus),* blue scorpion-weed *(Phacelia ranunculacea),* rose turtlehead *(Chelone obliqua var. Speciosa), r*iver bulrush (*Bolboschoenus fluviatilis),* burhead *(Echinodorus berteroi),* floating pennywort (*Hydrocotyle ranunculoides), s*mall-flower baby-blue-eyes *(Nemophila aphylla),* Tennessee leafcup (*Polymnia laevigata),* large bur-reed (*Sparganium eurycarpum),* and pickerel-weed (*Pontederia cordata).*

VI. Location:

See Figure 1 for the proposed hunt units for the refuge.

A. **Ecoregion Number and Name:** 72a: Wabash-Ohio Bottomlands / 72c: Green River-Southern Wabash Lowlands

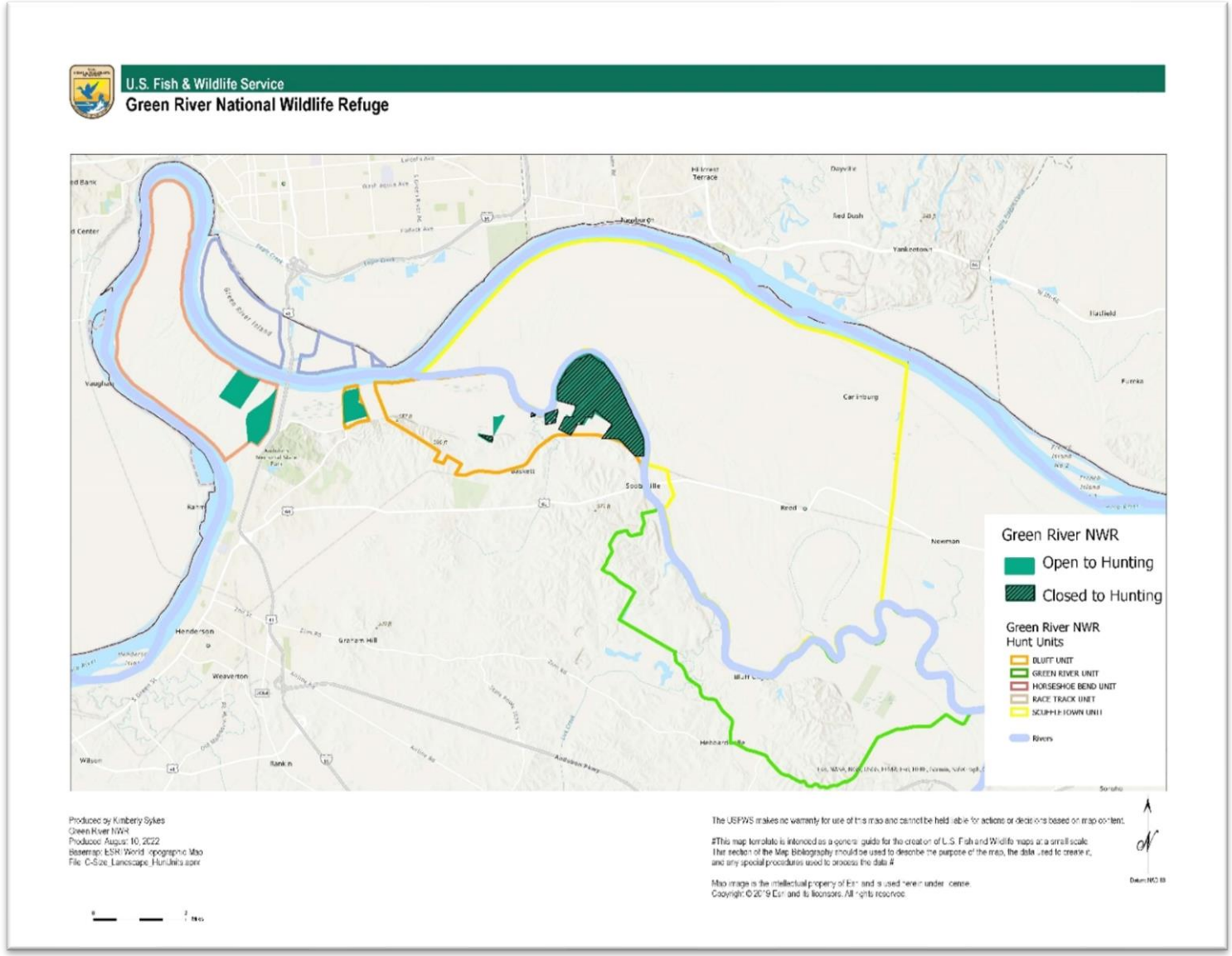
B. **County and State:** Henderson County, Kentucky

C. **Section, township, and range (or latitude and longitude):** 37.840427, -87.578888

D. **Distance (miles) and direction to nearest town:** Between 0.5-16 miles from Henderson, Kentucky

E. **Species/habitat occurrence:** See ECOS - https://ecos.fws.gov/ecp/

Figure 1. Proposed 2024-25 Hunt Units for Green River NWR



VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item:

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
Indiana Bat (*Myotis sodalis*)	Not likely to adversely affect. No known wintering hibernacula for the Indiana bat exist within the CPA. As a result, Indiana bats would not be present in the CPA during migratory game bird hunting seasons (September through March). Additionally, migratory game bird hunting will not result in impacts to winter habitat or suitable summer roosting, foraging, or commuting habitat for this species in the CPA. Therefore, effects to Indiana bats from migratory game bird hunting is considered discountable. Indiana bats would not be present in the CPA during fall deer and turkey archery and crossbow hunting seasons (September through January). Although the potential for overlap between Indiana bats and hunters exists in the CPA during turkey archery and crossbow hunting in April and May, any potential disturbance to bats due to hiking or biking through forested habitat from hunting activity is expected to have discountable or insignificant effects. Trees that bats select for roosting typically are dead or dying, with large, thick slabs of peeling bark. These trees are typically not the same trees that hunters select for tree stands for safety reasons or due to lack of coverage for camouflage. It is possible that the use of portable, removable tree stands and climbing on trees could disturb and flush individuals of this species utilizing the same tree as hunters. However, the likelihood of bats and hunters using the same trees would be very low given most hunters will only use tree stands for deer

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	hunting during fall deer and turkey hunting season. Even if a hunter used a tree for a tree stand that a bat happened to be roosting in, the bats would likely not leave the roost tree during daylight hours. If a bat was flushed from a tree, the individual could likely move to other suitable roosting habitat nearby and would not experience mortality or harassment reaching the level of take. The individual would also be able to return to the roost later in the day or the following day when the hunter was no longer present. Use of tree stands is also not anticipated to impact suitable roost trees. As previously discussed, hunters do not typically use trees or the portions of trees that provide suitable roosting habitat for Indiana bats. Any use of suitable roost trees by hunters would result in minimal damage, if any, to a small portion of the tree's exterior and is unlikely to affect the suitability of the tree for Indiana bats. Based on these factors, effects to Indiana bats roosting in trees during deer and turkey archery and crossbow hunting are considered insignificant. No effects are anticipated to Indiana bats from archery and crossbow hunting in the winter because the species will not be present in the CPA during that time. Effects to tree-roosting individuals from hunting techniques that do not require use of a tree (i.e., spring turkey hunting) are considered discountable. Noise from hunters moving to and from hunting locations is expected to be minimal and not rise above typical ambient noise levels in the hunting areas. Some noise may be generated during installation of tree stands but is expected to be localized to the immediate area and will be short-term in nature. As previously discussed, hunters are unlikely to be using the same

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	trees as bats; therefore, noise from tree stand installation is not anticipated to affect roosting bats. Additionally, a roosting bat that is flushed would be able to find other suitable roosting habitat nearby. Arrows being discharged from bows or crossbows will produce little to no noise and are not anticipated to affect roosting bats. The refuge allows all-terrain vehicles use for mobility-impaired hunters only. Access via these vehicles will only be permitted on established trails. While some noise disturbance could be caused by motorized vehicles, they would only be permitted on designated roads and trails, limiting disturbance to areas already subject to recreational activities. As a result, effects to Indiana bats from noise during spring turkey archery and crossbow hunting in April and May are considered insignificant. No effects to Indiana bats are expected during September through January archery and crossbow hunting of deer and turkey due to the absence of bats in the CPA during that time. Based on anticipated discountable effects from migratory game bird hunting and insignificant effects from archery and crossbow hunting, the Proposed Action is not likely to adversely affect this species.
Gray Bat (*Myotis grisescens*)	Not likely to adversely affect No wintering hibernacula for the gray bat are known to occur within the CPA; therefore, no individuals will be present during migratory game bird hunting from September through January. Additionally, this type of hunting will not result in impacts to potential hibernacula or roosting habitat for this species in the CPA. As a result, effects to gray bats and their hibernacula and roosting habitat from migratory game bird hunting are considered discountable.

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	To maintain the integrity of streams, slough, and other waterbodies, the refuge limits the use of motorized vehicles. Only boats operated by manual power or electric trolling motors are allows to access the refuge. Hunters using bikes or approved mobility impaired hunters using all-terrain vehicles will be allowed access along designated routes only (graveled and paved roads, and established trails) managed by the Service as part of Green River NWR. The refuge prohibits the use of internal combustion motors, personal watercraft (e.g., jet skis), airboats, and hovercraft on lands owned and managed by Green River NWR. The refuge does not allow blinds or tree stand to be left overnight. Additionally, the refuge prohibits the removal of plants including the cutting of trees or brush which helps to reduce habitat modification. Therefore, impacts to bat foraging habitat from hunting are considered discountable. Potential disturbance to trees and noise from hunters moving through the CPA, using tree stands for deer hunting, and shooting arrows during turkey archery and crossbow hunting in April and May and deer and turkey archery and crossbow hunting in September through January would not affect gray bats because the species does not roost in trees. These activities would also be limited to daylight hours and would not occur when bats may be foraging and commuting in the CPA. Based on these factors, effects to the gray bat from deer and turkey archery and crossbow hunting are expected to be discountable.
Northern long-eared Bat (*Myotis septentrionalis*)	Not likely to adversely affect No known wintering hibernacula for the northern long-eared bat exist within the CPA. As a result, Northern long-eared bats would not be present in the CPA during

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	migratory game bird hunting from September through March. Additionally, this hunting type will not result in impacts to winter habitat or suitable summer roosting, foraging, or commuting habitat for this species in the CPA. Therefore, effects to northern long-eared bats from migratory game bird hunting are considered discountable. Effects to northern long-eared bats from potential disturbance from hunters moving through forested habitat or using tree stands for deer hunting during turkey archery and crossbow hunting in April and May and deer and turkey archery and crossbow hunting season in September through January from hunting activity are expected to have discountable or insignificant effects. Trees that bats select for roosting typically are dead or dying, with peeling bark, cavities, and/or crevices, and are typically not the same trees that hunters select for tree stands for safety reasons or due to lack of coverage for camouflage. Northern long-eared bats will use trees with less dead or damaged areas than Indiana bats, and it's possible that hunters could install a tree stand in a tree that contains a roosting individual. If the amount of disturbance is minimal and the hunter is not in close proximity to the roosting individual, the bat may remain in the tree. If the bat flushed from the tree, the individual could likely move to other suitable roosting habitat nearby and would not experience mortality or harassment reaching the level of take, especially since this species will use a variety of tree types and roosting locations. The individual would also be able to return to the roost later in the day or the following day when the hunter was no longer present. Use of tree stands is also not anticipated to impact suitable roost trees. Any use of suitable roost trees by hunters would result in minimal damage, if any, to a

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	small portion of the tree's exterior and is unlikely to affect the suitability of the tree for northern long-eared bats. No effects are anticipated to Northern long-eared bats from archery and crossbow hunting from September through January because the species will not be present in the CPA during that time. Based on these factors, effects to northern long-eared bats roosting in trees during deer and turkey archery and crossbow hunting are considered insignificant. Effects to tree-roosting individuals from hunting techniques that do not require use of a tree (April and May archery and crossbow turkey hunting) are considered discountable. Noise from hunters moving to and from hunting locations is expected to be minimal and not rise above typical ambient noise levels in the hunting areas. Some noise may be generated during installation of tree stands but is expected to be localized to the immediate area and will be short-term in nature. As previously discussed, hunters are unlikely to be using the same trees as bats; therefore, noise from tree stand installation is not anticipated to affect roosting bats. Additionally, a roosting bat that is flushed would be able to find other suitable roosting habitat nearby. Arrows being discharged from bows or crossbows will produce little to no noise and are not anticipated to affect roosting bats. As a result, effects to northern long-eared bats from noise during spring turkey archery and crossbow hunting is considered insignificant. No effects to Northern long-eared bats are expected during September through January archery and crossbow hunting due to the absence of bats in the CPA during that time.

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	Based on anticipated discountable effects from migratory game bird hunting and insignificant effects from big game archery and crossbow hunting, the Proposed Action is not likely to adversely affect this species.
Tricolored Bat (*Perimyotis subflavus*)	Not likely to jeopardize No known wintering hibernacula for the tricolored bat exist within the CPA. The proposed hunt package would have similar effects to this species as those previously discussed for the Indiana and Northern long-eared bat. These effects are considered discountable or insignificant and would not jeopardize the continued existence of the species due to the minimal potential for disturbance during a small portion of the summer roosting period that overlaps with spring turkey hunting, as discussed above, and the minimal number of tricolored bats that could be affected given no post white-nose syndrome records for this species has been recorded in Henderson County, Kentucky.
Whooping Crane (*Grus americana*)	Not likely to adversely affect. This experimental population of whooping cranes has not been documented in the CPA or on the refuge, and no nesting habitat for this species is present within the CPA. However, given the vicinity of Patoka River NWR, whooping cranes could stop over on Green River NWR to forage during their fall or spring migration, which may coincide with the proposed hunting periods. Green River NWR is not opening hunting of this species or the similar sandhill crane. Therefore, take of this species is not anticipated from hunting. Disturbance from hunters and noise caused by hunters could cause whooping cranes to flush; however, disturbance is anticipated to be short-term, temporary, and discrete. Given the

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	limited number of whooping cranes in the experimental eastern population, limited interactions with hunters are anticipated on the refuge. An administrative closure may be warranted if whooping cranes are found to occur on the refuge in areas open to hunting, pursuant to 50 CFR §25.21(e), to reduce any impacts from disturbance due to these activities. As a result, effects to the whooping crane from hunting is considered insignificant, and the Proposed Action is not likely to adversely affect this species.
Fanshell (*Cyprogenia stegaria*) Snuffbox (*Epioblasma triquetra*) Pink Mucket (*Lampsilis abrupta*) Ring Pink (*Obovaria retusa*) Sheepnose (*Plethobasus cyphyus*) Fat Pocketbook (*Potamilus capax*) Northern Riffleshell (*Epioblasma torulosa rangiana*) Orangefoot	Not likely to adversely affect. While potentially suitable habitat for all of these species exists in the project area within the Ohio River and Green River, the CPA does not include these rivers. As a result, there is no suitable habitat within the CPA for these species. Suitable habitat for these mussel species exists in the Ohio River, which is adjacent to portions of the CPA. Hunters could disturb sediment while moving through streams, sloughs, wetlands, and other tributaries of the river during migratory game bird hunting which could be transported downstream into the Ohio River. However, sediment disturbance from hunter movements is expected to be minimal and would likely be transported only a short distance before resettling due to the slow-flowing, lentic nature of these waterbodies. As a result, effects from migratory game bird hunting to mussels potentially located in the Ohio River are considered discountable. No effects to these mussel species are anticipated from deer and turkey archery and crossbow hunting due to the lack of hunter activity in tributaries of the Ohio River. Therefore, the Proposed Action is not likely to adversely affect these species.

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
Pimpleback (*Plethobasus cooperianus*) Clubshell (*Pleurobema clava*) Rough Pigtoe (*Pleurobema plenum*) Rabbitsfoot (*Quadrula cylindrica cylindrica*) Longsolid (*Fusconaia subrotunda*)	
Pyramid Pigtoe (*Pleurobema rubrum*)	Not likely to jeopardize The hunt package would have similar effects on this species as those discussed above for the other mussel species. Therefore, the Proposed Action is not likely to jeopardize this species.
Monarch Butterfly (*Danaus plexippus*)	Not likely to jeopardize. Monarchs are present throughout Kentucky. Monarchs begin migrating to their wintering grounds in October and begin returning to Kentucky in March and April. The monarchs would not be present in the CPA during the majority of migratory game bird hunting seasons (September through March) or deer and turkey archery and crossbow hunting (September through January). Although the potential for overlap between monarch butterflies and hunters exists in the CPA during turkey archery and crossbow hunting in April and May, any

SPECIES / CRITICAL HABITAT	IMPACTS TO SPECIES / CRITICAL HABITAT
	potential disturbance to monarchs due to hiking or biking through forested habitat or use of tree stands from hunting activity is expected to have discountable or insignificant effects. Given the limited temporal overlap when hunters could be in the proposed hunt area while monarch butterflies and caterpillars could potentially be there, encounters with monarch butterflies or caterpillars would be infrequent; even so, the presence of humans would likely not disturb the monarchs, given they are fairly tolerant of human presence. Hunting will not result in impacts to habitat during the winter, given the nectar plants or milkweed required by monarchs and their caterpillars would be dormant. Suitable summer habitat for monarch butterflies exists on the CPA. Potential damage to nectar plants from off-trail foot traffic to access hunting areas during the spring could occur. Milkweed, being grown from rhizomes, are very hardy plants. Therefore, injury from trampling by hunters is expected to be insignificant. Additionally, the Service prohibits the take of plants or removal of vegetation, including nectar sources or milkweed, on the refuge. The refuge also prohibits the cutting of trees or brush which helps to reduce habitat modification. Thus, impacts to monarch foraging habitat from hunting are considered discountable. Therefore, the Proposed Action is not likely to not jeopardize the continued existence of the species.

B. Explanation of actions to be implemented to reduce adverse effects:

The 2019 LPP for Green River NWR outlined a 53,000-acre Conservation Partnership Area (CPA) within which the Service is authorized to acquire up to 24,000 acres for Green River NWR (USFWS 2019). As of December 31, 2023,

Green River NWR (Figure 1) currently owns and manages approximately 2,197 acres. Under the proposal, and as previously analyzed (USFWS 2019), the Service would open approximately 793.13 acres to the hunting of duck, goose, coot, and merganser and archery/crossbow hunting of deer and turkey in the 2024-2025 hunting season. In the future based on acreage, staffing, habitat restoration, infrastructure, and visitor amenities, the Service will work at the refuge to refine existing opportunities and/or develop additional migratory game bird hunting (e.g., quota hunts, early teal and wood duck hunts, and dove hunts) and additional big game hunting (e.g. quota hunts).

Green River NWR is creating both temporal and spatial areas for wildlife to avoid/recover from disturbance. Migratory game bird hunting will be restricted by the number of hunters, dates hunting is allowed, and time in the field for hunters. Deer and turkey hunting will be restricted by the number of hunters and dates hunting is allowed.

The 50 CFR Part 32 outlines refuge-specific regulations, 50 CFR Part 20 outlines migratory bird hunting, 50 CFR Part 26 outlines Public Entry and Use, and 50 CFR Part 27 outlines prohibited acts. The refuge hunt brochure would provide important information and requirements for hunting on the refuge. Seasons would be set annually and would be published in the refuge hunt brochure. Refuge-specific regulations and other CFR outline key requirements and prohibitions. Below are regulations, requirements, and prohibitions that will be implemented to avoid and minimize potential adverse effects to listed and proposed species.

- No hunting in designated closed areas
- No reserving hunting areas by leaving boat, decoys, portable blinds, tree stands or other materials or items. All items must be removed at the end of each hunt.
- No using all-terrain vehicles (ATV and OHV) use without a Special Use Permit (OMB Control No. 1018-0102; FWS Form 3-1383-G) or off designated trails.
- No using internal combustion motors, personal watercraft (e.g., jet skis), airboats, and hovercraft.
- No discharging a weapon outside of hunting season including target practice.
- No using motor vehicle, bikes, or e-bikes on other than designated routes
- No unauthorized taking, disturbing, injuring and damaging of wildlife and plants (includes cutting trees or brush).
- No introducing or release of plants and animals or their parts taken elsewhere.
- No using artificial light to locate wildlife.
- No littering.

- No cleaning of harvested game and/or discarding of carcasses in public use areas.
- No using permanent structures including stands or blinds or blinds.
- No using or building fires.
- No having pets not on a leash, except for legal use of hunting dogs.
- No driving a nail, spike, or other metal object in tree or hunting from tree with such an object in it.
- No using arrows to which any drug, chemical, or toxic substance has been added.
- No hunting of any wildlife by the aid of or distributing any feed, salt, minerals, or other ingestible attractants.

The refuge is closed at night. As outlined above, hunters may enter the refuge two hours prior to legal sunrise and must leave within two hours after legal sunset. Special closures are in effect during waterfowl season.

The lands proposed to be open to hunting are comprised of bottomland hardwoods and open fields newly acquired land by Green River NWR. Green River NWR will consider the implementation of quotas, permits, period limitations, and other measures on some areas to facilitate a quality, safe hunting experience, while meeting other refuge management priorities, goals, and objectives. Many of these lands have previously been hunted. The other refuge hunt programs have not resulted in any documented adverse impacts to these species. The increase in acres, hunting visits, and take of migratory birds, deer, or turkey under the Proposed Action would not be expected to change this. Many hunt days during the work week do not have any hunt visitors to the refuge.

The presence of Federal and state wildlife law enforcement officers would provide a deterrent to the take of non-target species. Hunter numbers are minimized since the Proposed Action is for migratory bird and archery deer and turkey hunting. This would also help minimize any potential disturbance to listed species.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MINIMIZE IMPACTS
Gray Bat (*Myotis grisescens*)	No actions necessary.
Indiana Bat (*Myotis sodalis*)	No actions necessary.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MINIMIZE IMPACTS
Northern Long-eared Bat (*Myotis septentrionalis*)	No actions necessary.
Tricolored Bat (*Perimyotis subflavus*)	No actions necessary.
Whooping Crane (*Grus americana*)	No actions necessary.
Fanshell (*Cyprogenia stegaria*)	No actions necessary.
Snuffbox (E*pioblasma triquetra*)	No actions necessary.
Pink Mucket (*Lampsilis abrupta*)	No actions necessary.
Ring Pink (*Obovaria retusa*)	No actions necessary.
Sheepnose (*Plethobasus cyphyus*)	No actions necessary.
Fat Pocketbook (*Potamilus capax*)	No actions necessary.
Northern Riffleshell (*Epioblasma torulosa rangiana*)	No actions necessary.
Orangefoot Pimpleback (*Plethobasus cooperianus*)	No actions necessary.
Clubshell (*Pleurobema clava*)	No actions necessary.
Rough Pigtoe (*Pleurobema plenum*)	No actions necessary.
Rabbitsfoot (*Quadrula cylindrica cylindrica*)	No actions necessary.
Longsolid (*Fusconaia subrotunda*)	No actions necessary.
Pyramid pigtoe (*Pleurobema rubrum*)	No actions necessary.

VIII. Effect Determination and Response Requested:

SPECIES / CRITICAL HABITAT	NE[1]	NJ[1]	NA[1]	AA[1]	RESPONSE[1] REQUESTED
Gray Bat (*Myotis grisescens*)			X		Concurrence
Indiana Bat (*Myotis sodalis*)			X		Concurrence
Northern Long-eared Bat (*Myotis septentrionalis*)			X		Concurrence
Tricolored Bat (*Perimyotis subflavus*)		X			Concurrence

SPECIES / CRITICAL HABITAT	NE[1]	NJ[1]	NA[1]	AA[1]	RESPONSE[1] REQUESTED
Whooping Crane (*Grus americana*)			X		Concurrence
Fanshell (*Cyprogenia stegaria*)			X		Concurrence
Snuffbox (E*pioblasma triquetra*)			X		Concurrence
Pink Mucket (*Lampsilis abrupta*)			X		Concurrence
Ring Pink (*Obovaria retusa*)			X		Concurrence
Sheepnose (*Plethobasus cyphyus*)			X		Concurrence
Fat Pocketbook (*Potamilus capax*)			X		Concurrence
Northern Riffleshell (*Epioblasma torulosa rangiana*)			X		Concurrence
Orangefoot Pimpleback (*Plethobasus cooperianus*)			X		Concurrence
Clubshell (*Pleurobema clava*)			X		Concurrence
Rough Pigtoe (*Pleurobema plenum*)			X		Concurrence
Rabbitsfoot (*Quadrula cylindrica cylindrica*)			X		Concurrence
Longsolid (*Fusconaia subrotunda*)			X		Concurrence
Pyramid pigtoe (*Pleurobema rubrum*)		X			Concurrence
Monarch Butterfly (*Danaus plexippus*)		X			Concurrence

[1]DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NJ = not likely to jeopardize. This determination is appropriate when the proposed action is not likely to jeopardize the continued existence of the proposed listed species. Response Requested is a "Concurrence".

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

Signature/Date

MICHAEL JOHNSON

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IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence __X_____ Non-concurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

VIRGIL ANDREWS

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Title/Office

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