Environmental Assessment for Green River National Wildlife Refuge Migratory Game Bird and Big Game Hunting Plan

October 2024

U.S. Fish and Wildlife Service

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Table of Contents

Section B. Environmental Assessment for Green River National Wildlife Refuge Migratory Game Bird and Big Game Hunting Plan, Henderson County, Kentucky

List of Figures – Appendix B

List of Tables

SECTION B. ENVIRONMENTAL ASSESSMENT FOR GREEN RIVER NATIONAL WILDLIFE REFUGE MIGRATORY GAME BIRD, AND BIG GAME HUNTING PLAN, HENDERSON COUNTY, KENTUCKY

This Environmental Assessment (EA) is being prepared by the U.S. Fish and Wildlife Service (Service, USFWS) to evaluate the effects associated with the Proposed Action and to comply with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR §§1500-1509) and Department of the Interior [43 Code of Federal Regulations (CFR) Part 46; 516 DM 8] and Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment. The Hunting Plan outlined in Section A, which is Alternative B in the EA, would amend the refuge's existing Conceptual Management Plan (CMP) (USFWS 2019), providing the details necessary to implement the proposed hunting programs at Green River National Wildlife Refuge (NWR, refuge) to provide users with opportunities for high quality wildlife-dependent outdoor recreation. Other applicable statutes, executive orders, and regulation compliance are listed in Appendix A.

Proposed Action

In 2019, the Service established the Green River NWR, designating a Conservation Partnership Area (CPA) of approximately 53,000 acres along the Ohio and Green rivers in Henderson County, Kentucky (Figure 1, Appendix B). The CPA allows the Service flexibility to acquire up to 24,000 acres within the CPA's landscape of 53,000 acres. It also provides the ability to diversify habitats, increase connectivity of lands, provide resources for wildlife during major flood events, and support public uses. By the end of 2023, the refuge had grown to approximately 2,197 acres, allowing the Service to consider recreational opportunities, such as hunting, to be conservatively opened as outlined in the 2019 CMP (USFWS 2019).

In accordance with the refuge's Land Protection Plan (LPP) and CMP (USFWS 2019), the Service is now proposing to open Green River NWR to limited migratory bird and archery/crossbow big game hunting as outlined in the Hunting Plan (Section A) and Hunting Compatibility Determination (CD, Appendix C), as defined in the refuge-specific regulations published in the Federal Register for the 2024-25 Hunting and Sport Fishing Rule, and as analyzed in this EA (USFWS 2024). The refuge's 2024-25 Hunt Opening Package included Section A Hunting Plan, Section B Environmental Assessment, Appendices (including the Hunting Waterfowl, Other Migratory Birds, and Big Game Compatibility Determination, Appendix C), new refuge-specific regulations in the Code of Federal Regulations (CFR), and an Endangered Species Act Section 7 Biological Evaluation. The Hunting CD in Appendix C (USFWS 2024) would replace the interim Hunting CD of the LPP and CMP (USFWS 2019).

This EA evaluates the entire CPA area for potential future hunting opportunities. Over time, as the Service acquires additional properties within the designated CPA (up to the stated 24,000 acres), as well as additional funding, infrastructure, and staff, new properties and properties currently closed to hunting would be evaluated to be opened to hunting as outlined in the Hunting Plan (Section A) and Hunting CD (Appendix C), in accordance with the 2019 LPP and CMP (USFWS 2019), and as analyzed in this EA. The refuge's hunt program, refuge-specific regulations in CFR and hunting plan may be updated over time, including to add new properties

to the hunt units or new hunts, through appropriate hunting and sport fishing rulemaking process and Service Policy.

Based on Alternative B in this EA, the proposed Hunting Plan (Section A) would amend the CMP, providing details necessary to manage a hunting program at Green River NWR. Upon approval, these documents would open the refuge to recreational hunting of migratory game birds and big game as listed below (and as listed in Table 1 and Section III.B of the Hunting Plan, Section A).

- Migratory Game Birds
    - Duck (see state regulations)
    - Teal (A*nas discors, Anas crecca carolinensis, A. cyanoptera*)
    - Wood Duck (*Aix sponsa*)
    - Merganser (*Mergus serrator, Lophodytes cucullatus, Mergus merganser*)
    - Coot (*Fulica americana*)
    - Goose (*Branta canadensis, B. hutchinsii, Anser albifrons, A. erythropus, Anser caerulescens, A. c. atlantica, A. rossii*)
    - Dove (*Zenaida macroura, Z. asiatica, Streptopelia decaocto, S. risoria*)
- Big Game (Archery/crossbow only)
    - White-tailed Deer (*Odocoileus virginianus*)
    - Turkey (*Meleagris gallopavo silvestris*)

This EA also evaluates potential future hunting of dove. Dove species are included in the current opening package for post 2024-25 and in this EA to allow flexibility to add them at a future date given adequate acreage and staffing. The state of Kentucky has special hunting regulations related to dove hunting that requires non-toxic shot on state wildlife management areas (301 KAR 2:225); Green River NWR will follow these regulations regarding the hunting of doves. Since the Proposed Action includes firearms hunting of migratory game birds and archery and crossbow hunting of white-tailed deer and eastern wild turkey, lead ammunition is not included in the proposed hunts.

A proposed action may evolve during the NEPA process as the agency refines its proposal and gathers feedback from the public, Native American Tribes, and other agencies. Therefore, the final proposed action may be different from the original. Barring the need for additional analysis, the final decision on the Proposed Action would be expected to be made through a Finding of No Significant Impact (FONSI) after the conclusion of the public comment period for the EA, the draft hunt plan, draft compatibility determination, and the draft 2024-2025 Refuge-specific Hunting Regulations published in the Federal Register.

Background

National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purpose(s) of an individual refuge, Service policies, and laws and international treaties. Relevant guidance includes the NWRS Administration Act (NWRSAA) of 1966, as amended by the NWRS Improvement Act (NWRSIA) of 1997, Refuge Recreation Act of 1962, and selected portions of the CFR and Service Manual.

The mission of the NWRS, as outlined by the NWRSAA, as amended by the NWRSIA (16 USC §668dd et seq.], is "... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Additionally, the NWRSAA mandates the Secretary of the Interior in administering the NWRS [16 USC §668dd(a)(4)] to: provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS; ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans; ensure that the mission of the NWRS described at 16 USC §668dd(a)(2) and the purposes of each refuge are carried out; ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the states in which the units of the NWRS are located; assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the NWRS and the purposes of each refuge; recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife; ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses; and monitor the status and trends of fish, wildlife, and plants in each refuge.

It is a priority of the Service to provide for wildlife-dependent recreation opportunities, including hunting, when those opportunities are compatible with the purposes for which a refuge was established and the mission of the NWRS. As outlined in the LPP and CMP (USFWS 2019), Green River NWR will strive to enhance the regional biological diversity by managing, conserving, and preserving a variety of biotic communities occurring on current and future refuge lands while connecting people with nature by developing safe, compatible, quality, wildlife-dependent recreation programs (environmental education, environmental interpretation, wildlife observation, wildlife photography, sport fishing, and hunting); fostering quality outdoor experiences; promoting greater understanding of fish, wildlife, and habitat conservation, and the natural systems of the Ohio River and Green River deltas; and nurturing a greater appreciation for the value of the refuge and the NWRS.

Green River NWR was established pursuant to the NWRSAA of 1966, as amended by the NWRSIA of 1997. The primary purpose of the refuge is the:

> "... conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans..." 16 United States Code (USC) §668dd(a)(2) (NWRSAA of 1966, as amended by the NWRSIA of 1997).

Acquisition of refuge lands can occur through various legislative and administrative authorities, creating related secondary purposes for Green River NWR. As properties are acquired over time, additional secondary purposes may apply, depending on the acquisition authorities used and any special conditions associated with a specific acquisition.

As outlined in the refuge's LPP and Conceptual Management Plan (CMP) (USFWS 2019a), potential secondary purposes for the refuge are listed.

- "…to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" 16 USC§1534 (Endangered Species Act of 1973)

- "…the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..." 16 USC §3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)
- "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…." 16 USC §715d (Migratory Bird Conservation Act)
- "…to conserve and protect migratory birds..., including species that are listed...as endangered species or threatened species, and to restore or develop adequate wildlife habitat." 16 USC §715i (Migratory Bird Conservation Act)
- "…for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 USC §742f(b)(1) "…for the development, advancement, management, conservation, and protection of fish and wildlife resources...." 16 USC §742f(a)(4), (Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956)
- "…suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 USC §460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 USC §460k-2 (Refuge Recreation Act of 1962)

The CMP (USFWS 2019) for Green River NWR envisioned that the refuge would: establish a second national wildlife refuge in Kentucky to support conservation of fish, wildlife, and plants; protect and manage wetlands and bottomland forest habitats to support waterfowl, migratory birds, and threatened and endangered species; provide high-quality hunting opportunities; provide opportunities for public use and environmental education and interpretation; collaborate with partners to protect and enhance biodiversity and water quality and quantity within the Ohio River and Green River watersheds, benefiting both humans and wildlife; and ensure healthy wildlife populations for the benefit of Kentuckians and all Americans.

Although currently an estimated 2,197 acres, the up to 24,000-acre Green River NWR is in five units with the majority of area lying on the south side of the Ohio River (Figure 1, Appendix B). All refuge properties would be in Henderson County, Kentucky. The Scuffletown Unit (within the 29,627-acre Scuffletown CPA) and the Horseshoe Bend Unit (within the 5,443-acre Horseshoe Bend CPA) lie along the south bank of the Ohio River and are separated by U.S. Highway 41. The Race Track Unit (within the 1,994-acre Race Track CPA) is located both east and west of Highway 41 and along the north bank of the Ohio River. The Bluff Unit (within the 5,365-acre Bluff CPA) is bordered by the John J. Audubon State Park on the west, the Green River on the north and east, and a CSX railway on the south; the Bluff Unit includes 2 disconnected units. The Green River Unit (within the 10,202-acre Green River CPA) is located south and east of Spottsville, Kentucky and is bordered by the Green River on the north and east.

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). Evaluation of future hunt opportunities for existing or newly

acquired properties would be obligated to meet all applicable procedures outlined by hunting and sport fishing rulemaking process and Service Policy.

Purpose and Need

As outlined in the 2019 LPP and CMP (USFWS 2019), the purpose is to provide appropriate and compatible public hunting opportunities at Green River NWR in accordance with the primary purpose of the refuge and establishment and acquisition authorities. With the 2019 authorization of the nearly 53,000-acre CPA with authority to purchase up to 24,000 acres and with the ongoing acquisition of property for Green River NWR, the need is to evaluate acquired properties and the entire CPA for any public hunting opportunities through the hunting and sport fishing rulemaking within the context of the purposes of the refuge and the requirements of the NWRSAA, as amended by the NWRSIA, while protecting biological integrity, diversity, and environmental health. Refuge management goals (from the LPP and CMP, USFWS 2019) to be served are listed.

Green River NWR LPP/CMP Goal 1. Protect, Restore, and Manage Habitats for Fish and Wildlife. The Green River NWR would restore, manage, and conserve bottomland hardwoods, adjacent upland habitats, and plant and animal species associated with these communities. The refuge would contribute to the habitat goals presented in the North American Waterfowl Management Plan (NAWMP), various threatened and endangered recovery plans, and Kentucky's State Wildlife Action Plan.

Green River NWR LPP/CMP Goal 3. Connect People with Nature. Visitors would have access to the Green River NWR in order to enjoy and take advantage of opportunities for compatible hunting, sport fishing, wildlife observation, photography, and environmental education and interpretation.

Green River NWR LPP/CMP Goal 4. Promote Conservation Partnerships. The Green River NWR would increase opportunities for collaboration and partnerships in science, education, and research with conservation organizations, private landowners, government agencies, and others. These collaborative efforts will help inform land management decisions on the refuge/landscape and encourage continued responsible stewardship of the refuge and its natural resources.

Alternatives

Two alternatives were fully developed for review in this EA: Alternative A Continue Current Management (No Action Alternative) and Alternative B Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action).

The Hunting Plan (Section A) and Hunting CD (Appendix C) were developed for implementation based on the Proposed Action outlined in Alternative B.

Alternative A – Continue Current Management (No Action Alternative)

Under Alternative A, the Service would not open hunting opportunities on Green River NWR beginning in 2024-25. For 2024-25, the Service would continue managing approximately 2,197

acres (and any additional properties acquired in the future) at the refuge in accordance with the CMP (USFWS 2019), including restoring and managing habitat and connecting people with nature by promoting greater understanding of fish, wildlife, and habitat conservation through environmental education, environmental interpretation, wildlife observation, and wildlife photography, while protecting the biological integrity, diversity, and environmental health of the natural systems of the Ohio River and Green River deltas. The Service would continue its active land acquisition program at Green River NWR, expanding the refuge to up to 24,000 acres within the 53,000-acre CPA landscape of the Ohio and Green rivers in accordance with the 2019 final LPP and CMP as approved in the September 2019 FONSI (USFWS 2019).

Alternative B – Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)

The Service developed the Migratory Game Bird and Big Game Hunting Plan (Section A) and the Hunting CD (Appendix C) based on Alternative B, which are incorporated herein by reference. Under the active land acquisition program for Green River NWR and, following applicable procedures outlined by hunting and sport fishing rulemaking process and Service Policy, the Service could acquire and open up to 24,000 acres at Green River NWR to hunting activities within the 5 designated hunt units (Figure 2, Appendix B). Under the current Proposed Action, in accordance with the 2019 LPP and CMP (USFWS 2019), and as depicted in Figure 3 (Appendix B), the Service would authorize implementation of the 2024-25 Hunting Plan (Section A) for Green River NWR, including the listed actions.

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

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). Refuge management goals and objectives could require increases or decreases to the hunting program opportunities based on harvest data, wildlife population management objectives, public safety, ability to provide high quality hunting opportunities, public use demands, wildlife disease, and other refuge management needs. Adjusting the number of hunters, adjusting the types of equipment allowed, and/or other actions, such as the use of spatial and temporal sanctuaries, quota hunts, or special hunts, may be necessary to meet refuge specific objectives. All or part of the refuge may be closed to hunting by the Refuge Manager at any time, if necessary, for public safety, to provide wildlife sanctuary for trust species, or for other essential management actions to ensure that the uses continue to meet compatibility requirements. The Service will identify criteria to evaluate the compatibility of hunting on future properties, such as the acreage and size of the property; configuration of the property; juxtaposition in the landscape and to other refuge properties; adjacent property uses; wildlife habitat type, availability, and condition; potential management of the property to meet refuge purposes and goals (e.g., sanctuary for migratory waterfowl, closed areas, and visitor use and facilities); and public safety concerns. As previously outlined, the Service has embedded flexibility to open additional migratory bird and big game opportunities including dove hunting. Any future hunt openings, including the addition of dove, would meet all applicable procedures outlined by hunting and sport fishing rulemaking process and Service Policy.

Going beyond Alternative A and opening hunting on the refuge earlier than under Alternative A, Alternative B would meet the intended purpose and management needs identified in the 2019 LPP and CMP (USFWS 2019), including: providing the public with quality and compatible wildlife-dependent recreational opportunities, according to Service laws and policy, including access and opportunities for hunting on the refuge, especially for youth hunters, underserved groups and families; developing and maintaining a compatible hunt program on current and future refuge properties, consistent with Federal and state laws and regulations and in accordance with Service laws and policy, while maintaining sustainable wildlife populations at levels compatible with refuge habitats; and coordinating hunting activities with Native American Tribes, adjacent landowners, the general public, other conservation organizations, and state fish and wildlife agencies, and by aligning as much as possible with state hunting regulations while serving refuge purposes.

Under Alternative B, the hunting season framework on existing and future Service properties at Green River NWR would generally fall within KDFWR guidelines, but in various instances could be more conservative than state seasons and regulations. Refuge management goals and objectives could require occasional modifications to the hunting program based on harvest data, wildlife population management objectives, public safety, ability to provide high quality hunting opportunities, public use demands, and other refuge management needs. Adjusting the number of hunters, adjusting the types of equipment allowed, and/or other actions, such as the use of spatial and temporal sanctuaries, quota hunts, youth hunts, or special hunts, may be necessary to meet refuge specific objectives. All or part of the refuge may be closed to hunting by the Refuge Manager at any time, if necessary, for public safety, to provide wildlife sanctuary for

trust species, or for other management actions to ensure that the uses continue to meet compatibility requirements.

Refuge-specific regulations proposed under Alternative B were published in the Federal Register notice for the 2024-25 Hunting and Sport Fishing Rule and are incorporated herein by reference. Any future changes or updates to the refuge-specific hunting regulations in CFR would occur through the Service's annual hunting and sport fishing rulemaking process, including draft and final publications in the Federal Register. Any changes to the refuge hunt program would be identified through various outlets, including, but not limited to in the refuge's hunt brochure, the refuge's website (https://www.fws.gov/refuge/green-river), the refuge's Facebook site (https://www.facebook.com/GreenRiverNWR/), and the Service's Find Your Hunt website (https://www.fws.gov/refuges/hunting/map/).

Measures to Avoid Conflicts

The refuge strives to meet the guiding principles for quality refuge hunting program identified in Service policy 605 FW 2 (Hunting) and support Presidential Executive Order #13443 Facilitation of Hunting Heritage and Wildlife Conservation by annually evaluating the hunting program. This evaluation would be in close collaboration with our state partners in the KDFWR, incorporating any new science and information, and reflecting the diversity of hunting preferences and opportunities. Specific refuge regulations for Green River NWR would be listed in 50 CFR Part 32, general migratory bird hunting regulations are listed in 50 CFR Part 20, general public entry and use regulations are listed in 50 CFR Part 26, prohibited acts are listed in 50 CFR Part 27, and state hunting regulations are listed under Kentucky Revised Statutes and Kentucky Administrative Regulations, while the refuge's hunt brochure would provide useful information and guidance for hunting on the refuge.

The proposed hunting program at Green River NWR was designed to minimize conflicts between users and user groups, align where possible applicable state and Federal regulations, meet refuge management goals and objectives, and meet Service mandates. Existing and proposed 50 CFR regulations also contain measures to help minimize any conflicts. As more lands are acquired for Green River NWR and funding, staff, and infrastructure are attained, expansion of hunting on additional properties and properties currently closed to hunting would help disperse hunters over a larger area, thereby reducing the level of disturbance associated with hunting, such as loud noises produced by guns and the rapid movement of both hunters and hunting dogs. The Service limits waterfowl hunting to noon each day to reduce noise disturbance from gun fire to resident wildlife and mitigate user conflicts. The Service would consider other actions, such as establishment of no hunting zones, sanctuaries (areas which are closed to all public entry), and quota hunts to avoid conflicts with threatened and endangered species, to further minimize wildlife disturbance, and to minimize conflicts with other recreational uses.

At Green River NWR, the Service will be creating both temporal and spatial areas for wildlife to avoid/recover from disturbance which would be closed to all public entry from late fall to early spring. Migratory waterfowl 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. As the refuge moves forward, it is anticipated impoundments may be created for sanctuaries, some agricultural fields may be reforested, and hydrology could be restored in some areas, creating better habitat for both game and non-game

wildlife species. Under the Proposed Action, hunting would be closed on approximately 1,403 acres. However, as habitat restoration and sanctuaries are developed, portions of these acres could be evaluated for opening to hunting in the future.

Affected Environment and Environmental Consequences

This section is organized by affected resource categories, and for each affected resource discusses both (1) the existing environmental and socioeconomic baseline in the action area for each resource and (2) the effects and impacts of the Proposed Action and any alternatives on each resource. The effects and impacts of the Proposed Action considered here are changes to the human environment, whether adverse or beneficial, that are reasonably foreseeable and have a reasonably close causal relationship to the Proposed Action or alternatives. This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource." Any resources that will not be more than negligibly impacted by the action have been dismissed from further analyses.

Green River NWR is located in the Interior River Lowland Ecoregion (Ecoregion) that encompasses 93,200 square kilometers across southern and western Illinois, southwest Indiana, east-central Missouri, and fractions of northwest Kentucky and southeast Iowa. The Ecoregion includes the confluence areas of the Mississippi, Missouri, Ohio, Illinois, and Wabash rivers and their tributaries. For the purposes of this EA, we limited the affected environment to the portion of the Ecoregion that contains Henderson County, Kentucky and we analyzed the potential environmental consequences for the CPA (Figure 1, Appendix B). Historically, this area was part of a large bottomland hardwood forest, which had extensive oak, hickory, and native pecan components. Some portions of the area were converted to agricultural uses during the early portions of the century; however, the majority of the area was converted into active agricultural production during the late 1960s and early 1970s. This conversion was accomplished by extensive drainage of wetlands, alteration of interior drainage systems, and clearing of the bottomland hardwood forest. Currently, the area consists of ridge and swale farmland, river-scar oxbows, several sloughs, wet depressional areas, and a small amount of bottomland hardwoods. Cypress Slough, on the south side of the Green River in the Scuffletown Unit, is a large natural wetland. A few scattered tracts of cut-over forest remain, consisting predominantly of silver maple, cottonwood, and hackberry, however over 90% of this area is in agricultural production. The majority of the land uses in the CPA are considered to be in open or undeveloped land uses and most parcels are in private ownership. The general types of land cover contained in the Green River NWR CPA are agricultural, developed, forest, shrubs/barrens, and water/wetlands. Agricultural lands dominate the land cover type (over 73 percent), followed by forest and water/wetlands. All other land use classes each contribute less than 5 percent of the total cover. [U.S. Department of Transportation (USDOT) et al. 2018]

Both private and conservation lands currently provide a mix of wildlife habitat in the Green River landscape. The CPA boundary is delimited by floodplain and wetland habitats along the Ohio and Green rivers, as well as by adjacent upland hardwoods and grasslands. Including additional uplands adjacent to flood-prone areas provides safe habitat to wildlife during flood events and provides elevated nesting locations for turtles and other species. The CPA is made up of approximately 39,000 acres of agriculture, 3,000 acres of developed lands, 9,000 acres of

forests, 200 acres of shrub/barrens, and 2,600 acres of wetlands. The CPA also contains a large amount of marginal cropland that is regularly flooded. The Green River State Forest and John James Audubon State Park consists of approximately 1,800 acres of conservation lands within the CPA. Additionally, over 11,000 acres of the Sloughs Wildlife Management Area (WMA) provide complementary habitat with one unit within the CPA, while the remaining four units are east of the CPA. Adjacent to the CPA, Eagle Slough Natural Area provides an additional 127 acres.

For more information regarding the refuge's environment, please see Section II of the refuge's 2019 LPP and CMP (USFWS 2019). Table 1 outlines resource categories that (1) do not exist within the project area, (2) would be expected to have no or only negligible impacts, or (3) would be expected to have greater than negligible impacts; only those impact topics with the potential for greater than negligible impacts are analyzed in more detail in this EA.

Table 1. Potential for Adverse Impacts from Proposed Action and Alternatives

Resources	**Not Applicable:** Resource does not exist in project area	**No/Negligible Impacts:** Exists but no or negligible impacts	**Greater than Negligible Impacts:** Impacts analyzed in this EA
Species to Be Hunted/Fished	☐	☐	☒
Non-Target Wildlife and Aquatic Species	☐	☐	☒
Threatened and Endangered Species and Other Special Status Species	☐	☐	☒
Habitat and Vegetation (including vegetation of special management concern)	☐	☐	☒
Geology and Soils	☐	☒	☐
Air Quality	☐	☒	☐
Water Quality	☐	☒	☐
Floodplains	☐	☒	☐
Wilderness	☒	☐	☐
Visitor Use and Experience	☐	☐	☒
Cultural Resources	☐	☒	☐
Refuge Management and Operations	☐	☐	☒
Socioeconomics	☐	☒	☐

Cultural Resources, Local and Regional Economies, and Environmental Justice

While no or negligible impacts would be anticipated for cultural resources, local and regional economies, and environmental justice, they are summarized here for context.

Cultural Resources

As a Federal land management agency, the Service is responsible for locating and protecting all historic resources, specifically archeological sites, historic landscapes, and historic structures eligible for, or listed in, the National Register of Historic Places. This applies not only to refuge properties, but also to properties affected by refuge activities. For compliance with Section 106 of the National Historic Preservation Act, the Service, during the early planning stages of a proposed new action, coordinates with the Regional Historic Preservation Officer, including providing a description and location of all projects, activities, routine maintenance, and operations that affect ground and structures, details on requests for compatible uses, and the range of alternatives considered. The Regional Historic Preservation Officer analyzes proposed undertakings for their potential to affect historic and prehistoric sites, and consults with the State Historic Preservation Officer, the relevant Native American Tribes, and other parties as appropriate.

Under either alternative, we would evaluate the potential for impacts on archeological, prehistoric, and historical resources. This care would ensure that Green River NWR complies with Section 106 of the National Historic Preservation Act, regardless of the alternative. Both alternatives would work to protect cultural resources and would follow the same laws, regulations, and policies in relation to cultural resource protection, including during any planning, earth moving, maintenance, and management activities. Neither alternative would be anticipated to have adverse impacts to cultural resources.

Local and Regional Economies

The 2022 population in Henderson County was 44,046, which represents one percent of Kentucky's total population of 4,512,310 (U.S. Department of Commerce 2023b). The 2022 population of the City of Henderson was 27,697, which represents 62% of Henderson County's population (U.S. Department of Commerce 2023b). The overall trend in Henderson County over the last 25 years is a less than one percent per year (USDOT et al. 2018) increase. Between 2020 and 2022, however, the population has decreased by 1.7 % (U.S. Department of Commerce 2023b). The Evansville Metropolitan Planning Organization estimates the region will continue to grow at less than one percent per year for the next 25 years (USDOT et al. 2018). In 2021 the three industry sectors with the largest number of jobs were manufacturing (4,863 jobs), government (2,469 jobs), and retail trade (2,262 jobs). However, since 1990, the annual unemployment rate ranged from a low of 3.5% in 2000 to a high of 11.7% in 1986, with 11.5% of the population not having a high school education. In 2022, the unemployment rate in Henderson County, Kentucky was 3.8% with 27.9% of the population not working (U.S. Department of Commerce 2023a).

Kentucky's lush lands and waters are popular for hunting activities. The Outdoor Industry Association report from 2019 shows that annually, outdoor recreation contributes 55,707 jobs, and generates $4.5 billion in consumer spending (Outdoor Industry Association 2019). According to the 2023 Outdoor Industry Association Trends Report, participation in outdoor

recreation grew to 168.1 million participants or 55% of the US Population older than 6 years old (Outdoor Industry Association 2023). Active and prospective hunters and anglers have identified public access sites, within an hour's drive from home, as a most important factor in continuing or resuming participation (KDFWR 2020b). Over one-third (37%) of licensed resident hunters use public lands to hunt in Kentucky (KDFWR 2020b). The estimated economic impact of public hunting lands in Kentucky is $182 per acre per year, which demonstrates the associated economic value in terms of tax revenues, retail expenditures, and ripple effects (KDFWR 2020b). A substantial proportion of nonresident visitors also use public lands and waters for hunting in Kentucky because of the ease of accessibility. Kentucky businesses depend on these nonresidents' tourism dollars. A KDFWR report shows an estimated 347,000 hunters each year, generating a $1.5 billion impact (KDFWR 2020b). Kentucky is known for recreational boating, contributing to the annual $1.7 billion impact in the state by recreational boating, according to the National Marine Manufacturers Association (NMMA 2018). The latest statistics from Kentucky Department of Fish and Wildlife Resources showed 554,000 participating anglers in Kentucky, generating a $1.2 billion impact annually (KDFWR 2020b).

Related to nature-based recreation, the Service analyzed trends in hunting from 2001 to 2016 [U.S. Department of the Interior (DOI) et al. 2016]. In 2016, 35.8 million fished and 11.5 million hunted and 86.0 million participated in at least one type of wildlife observation (DOI et al. 2016). Changing dynamics in a person's preference for outdoor recreation will affect visitation levels on the refuge, which consequently impact the economy of the local communities. While hunting does provide some minor economic benefits to neighboring communities, we do not expect that implementing a hunting program at Green River NWR would have any significant beneficial or adverse impacts on the economies of the towns or county in which the refuge is located.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Before we make any decisions to make major changes in habitat management or the environment, we always inform the various publics, equally, and our programs and facilities will be open to all who are willing to adhere to the established refuge rules and regulations. We do not discriminate in our responses for technical or practical information on conservation issues.

The refuge is located in Henderson County, Kentucky. Compared to 2021 state and national data, Henderson County has lower annual median household income ($53,635) than state ($55,454) and national ($69,021) levels, lower percentage of minorities (14.75%) than state (15.36%) and national (40.55%) levels, higher percentage of families below the poverty line (12.64%) than state (11.87%) and national (8.89%) levels, and higher median age (41 years old) than state (39 years old) and national (38.4 years old) levels (U.S. Department of Commerce 2023b). While minority and low-income populations are located within Henderson County, neither alternative would be expected to place a disproportionately high, adverse, environmental, economic, social, or health effect on minority or low-income communities. None of the potential socioeconomic and environmental effects would be localized nor be placed primarily or unequally on minority and low-income populations near the refuge.

Potentially Impacted Resources

For the potentially impacted resources, tables 2 through 4 provide:

1. a brief description of the relevant general features of the affected environment;
2. a description of relevant environmental trends and planned actions;
3. a brief description of the affected resources in the proposed action area; and
4. impacts of the Proposed Action and any alternatives on those resources.

Table 2. Anticipated Impacts to Natural Resources

Natural Resource Impact Topic
Migratory Game Birds (duck, goose, coot, and merganser beginning in 2024-25 and quota hunts, early teal and wood duck hunts, and dove hunts as potential future hunt opportunities)
Affected Environment Description Migratory birds are managed on a flyway basis and hunting regulations are established in each state based on flyway data. Migratory bird regulations are established at the Federal level each year following a series of meetings involving both state and Federal biologists. To determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. Migratory bird hunting frameworks are inherently designed to support sustainable populations. The Service, working with partners, annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of migratory birds that may be taken and possessed. These frameworks are necessary to allow state selections of season and limits for recreation and sustenance; aid Federal, state, and Tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which states may select season dates, bag limits, shooting hours, and other options for each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort between the state and Federal governments. The programmatic document, "Second Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (EIS 20130139)," filed with the Environmental Protection Agency on May 24, 2013, addresses NEPA compliance by the Service for issuance of the annual framework regulations for hunting of migratory game bird species. A notice of availability was published in the Federal Register on May 30, 2013 (78 FR 32686), and the Record of Decision was published on July 26, 2013 (78 FR 45376). NEPA compliance for waterfowl hunting frameworks is addressed through the annual preparation of separate environmental assessments. After Service establishment of final frameworks for hunting seasons, the states may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal framework. Within this structure, hunting on NWRs may be more conservative than the frameworks of the states. Hunting is allowed on refuges when and where it is found compatible with refuge purposes. Hunting occurs throughout the Mississippi Flyway, including Kentucky, and across the United States as every citizen has the opportunity, under law, to hunt and fish. Both private and public conservation lands currently provide habitat for migratory game bird species within the Green River NWR CPA. Hunting regulations for migratory game birds vary across the conservation lands of the Green River landscape. The Green River State Forest is open to migratory game bird hunting. Additionally, the Sloughs WMA is open to migratory game bird hunting, except for approximately 265 acres of the Sauerheber Unit, which only allows waterfowl quota hunting from November 1 through March 15. The Sloughs WMA reports hosting up to 40,000 geese and 30,000 ducks annually (KDFWR 2021a). However, the 2022 mid-winter waterfowl survey for Kentucky conducted in January reported approximately 7,500 ducks, 15,800 geese, and 50 coots within the Lower Ohio River and Western Coalfield area (KDFWR 2022a). While acquisitions are ongoing, in 2023, Green River NWR is expected to have limited available property to provide habitat for migratory waterfowl (duck, teal, wood duck, goose, coot, and merganser) and other migratory game bird species (dove). Given that the Service currently owns approximately 2,197 acres at Green River NWR, in most cases, habitat for migratory waterfowl along the ridge/swale topography of the floodplain will be contingent on flooding. Subsequently, while flooding will increase waterfowl habitats, it will reduce other migratory game bird habitats. 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). Green River NWR will continue to strive to acquire, develop, and manage a complex of habitats including forest, moist soil, agriculture for hot foods, grasslands, and waters through water manipulation, periodic soil disturbance, as well as mechanical and chemical treatments, to provide quality habitats for migratory game birds.
Environmental Trends and Planned Actions Description Nationally, the number of hunters decreased 16 percent from 2011 to 2016 (DOI et al. 2016). Eleven and a half million people 16 years and older enjoyed hunting a variety of game within the United States in 2016 (DOI et al. 2016). The USFWS Wildlife & Sport Fish Restoration program reports the total number of paid hunting license holders increased by 3.59% in 2023 (15,938,891 licenses sold) from 2022 (15,386,273 licenses sold). This statistic does not account for lifetime license holders, multi-year license holders, and individuals in certain states and age brackets who do not require a license and illegal hunters (USFWS 2023a). Green River NWR is located within the Mississippi Flyway for waterfowl and the Eastern Management Unit (EMU) for mourning doves. Giant Canada goose populations were nearly extirpated in the early 1900s. The Mississippi Flyway population of geese increased an average of 3% a year from 1998 to 2007 (Ducks Unlimited 2019). The 2018 Waterfowl Population Status assessment presented a mixed bag with snow geese and several species of Canada geese increasing, while other populations of Canada geese and white-fronted geese declining (USFWS 2018). In 2017, however, a 16% increase to 1.78 million geese (including the resident population) were recorded in the Mississippi Flyway (USFWS 2017). In the 2020 Waterfowl Population Status Report released by the Service in August 2020, the population estimate for mid-continent lesser snow geese declined by 14%, or 1.57 million geese (USFWS 2020). The population remains abundant at 9.92 million geese (USFWS 2020). Ross's geese were also down 37% over 2019 estimates (USFWS 2020). The mid-continent population of white-fronted geese (i.e., specklebellies) is estimated at 1.27 million, a healthy 64% increase over 2019 (USFWS 2020). In the Waterfowl Population Status Report released by the Service, the total duck population (including teal, merganser, and wood ducks) estimate was approximately 38.9 million birds in 2019 (USFWS 2019) and 34.2 million birds in 2022 (USFWS 2022a). This estimate was 12% lower than the 2019 estimate of 38.9 million and 4% below the long-term average (1955–2019) (USFWS 2022a). Total duck and goose harvest in the Mississippi Flyway from the 2021 hunting seasons was estimated at 3,978,000 ducks harvested from 357,700 duck hunters and 1,015,800 geese harvested from 226,50000 goose hunters. Total duck and goose harvest in the Mississippi Flyway from 2019 was estimated at 4,177,100 ducks harvested from 386,000 duck hunters and 1,023,200 geese harvested from 233,800

Natural Resource Impact Topic
goose hunters (Raftovich et al. 2022). Raftovich et al. (2022) determined that total ducks harvested in Kentucky in 2021 was 120,600 by 8,700 hunters and 8,100 hunters harvested 33,400 geese. American coot populations appear to be stable, according to the North American Breeding Bird Survey and Partners in Flight, estimating the global breeding population at 7.1 million (Cornell 2023). The 2022 mid-winter waterfowl survey (including teal, merganser, and wood ducks) for Kentucky conducted in January reported approximately 7,500 ducks, 15,800 geese, and 50 coots within the Lower Ohio River and Western Coalfield area (KDFWR 2022a). The Migratory Bird Activity Report (Raftovich et al. 2022) estimates only 700 coots harvested in Kentucky in 2021 with only 100 active hunters in the state. There were about 165 million doves in the U.S. in 2021 and 39.5 million in the EMU for mourning doves (Seamans 2022). Estimates for mourning dove total harvest, active hunters, and total days afield in the U.S. in 2021 were 9,202,100 ± 291,200 (estimate ± SE) birds, 642,800 hunters, and 1,710.000 ± 59,200 days afield (Seamans 2022). In 2021 harvest and hunter participation in the EMU were 3,822,100 ±156,700 birds, 256,800 hunters, and 624,300 ± 28,500 days afield (Seamans 2022). Avian influenza is a virus that affects bird populations. Avian influenza viruses occur naturally in wild birds, especially waterfowl, and can be found globally. There are many different strains of avian influenza that cause varying degrees of illness in birds. The most common types of avian influenza are routinely detected in wild birds and cause little concern. Highly pathogenic strains of avian influenza are of greater concern because they are easily spread among birds. The highly pathogenic avian influenza was confirmed in a red-shouldered hawk (*Buteo lineatus*) and a red-tailed hawk (*Buteo jamaicensis)* in Henderson County, Kentucky during 2023 according to KDFWR (KDFWR 2023a). Green River NWR will strive to acquire, develop, and manage a variety of habitats including forests, moist soils, and agricultural lands, as well as restore hydrology. Available open water habitat, conducive for waterfowl in the form of sloughs and oxbows, is likely to be obtained across the refuge, providing habitat to both migratory and resident waterfowl species. In order to meet the North American Waterfowl Management Plan (NAWMP, USFWS et al. 2018) step-down goals and objectives for Green River NWR (Heath Hagy, Legacy Region 4 Waterfowl Ecologist, USFWS, personal communication May 20, 2021) and as updated from the 2019 CMP for the refuge (USFWS 2019), managed impoundments could also be developed to provide both moist soil and hot foods for waterfowl. As the acreage increases over time through acquisitions for Green River NWR, the Service could implement additional time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users such as quota hunts) to reduce negative effects to all wildlife species. The Service works closely with state and provincial governments, as well as with the public, in a joint effort to establish hunting regulations for migratory birds. The programmatic document, “Second Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (EIS 20130139),” filed with the Environmental Protection Agency (EPA) on May 24, 2013, addresses NEPA compliance by the Service for issuance of the annual framework regulations for hunting of migratory game bird species. We published a notice of availability in the Federal Register on May 31, 2013 (78 FR 32686), and our Record of Decision on July 26, 2013 (78 FR 45376). We also address NEPA compliance for waterfowl hunting frameworks through the annual preparation of separate EAs and FONSIs. The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact regional or local migratory game bird populations, including the proposed hunting opportunities. Methods of take and the proposed hunt were developed with humaneness and animal welfare concerns to assure that animals are humanely dispatched. Hunters are tasked with using good judgement aligned with established hunter ethics and responsibilities, including humaneness and animal welfare concerns. No significant adverse or beneficial cumulative impacts would be anticipated for migratory game bird populations. Hunting would not be expected to adversely affect migratory game bird populations that occur on the refuge.

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)

Under Alternative A, no additional take of wildlife would occur, since no hunting activities would be allowed in the near term on existing or future properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, migratory game birds could see a decrease in disturbance and take due to the change in the land use to conservation as properties are acquired under the refuge’s active acquisition program. Other properties might experience additional disturbance due to increased public use of the property; however, any future refuge public use access and opportunities would be designed to minimize adverse impacts with no population impacts anticipated. Migratory game birds would be expected to continue to occur on existing and future refuge properties under Alternative A.

Estimated Annual Migratory Game Bird Hunting Visits: 0
Estimated Annual Migratory Game Bird Take: 0

Alternative B: Implement the 2024 Green River NWR Migratory Game Birds and Big Game Hunting Plan (Proposed Action)
Alternative B would open existing and future properties of Green River NWR to the hunting of identified migratory game birds: duck, goose, coot, and merganser. 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). Dove could be opened at a later date following refuge-specific regulations and state Wildlife Management Area regulations (which require non-toxic ammunition for dove hunting) on designated areas and at designated times identified in the refuge’s annual hunt brochure. Migratory game birds would be expected to continue to occur on existing and future refuge properties under Alternative B. Green River NWR would conduct the proposed hunting program within the framework of state and Federal regulations. Population estimates of huntable species are developed at regional, state, and continental scales. Hunting frameworks and take limits are set based upon these estimates. The proposed refuge hunting program would conform to regulations in the state of Kentucky. By maintaining hunting regulations that are the same as, or are more restrictive than the states, individual refuges ensure that they are maintaining seasons, which are supportive of management on a more regional basis. Such an approach also provides consistency with large-scale population status and objectives and is inherently designed to not have

Natural Resource Impact Topic
adverse impacts to migratory bird populations. Green River NWR would restrict waterfowl hunting from legal shooting hours until noon (12 p.m.), which would help minimize noise disturbance impacts from gun fire for resident wildlife and mitigate user conflicts. Principal concerns are repeated disruption of nesting, resting, or foraging birds, and public safety concerns related to firearms use when hunting. However, hunting is a priority, wildlife-dependent, consumptive activity. General adverse impacts of waterfowl hunting can be mortality, crippling, and disturbance. Belanger and Bedard (1995) concluded that disturbance caused by waterfowl hunting to waterfowl resources can modify the distribution and use of habitats by waterfowl, affect their activity budget and decrease their foraging time, and disrupt pair and family bonds, and contribute to increased hunting mortality. All recreational activity has the potential of impacting waterfowl, marsh birds, and other migratory bird populations feeding and/or resting near a hunting area. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). Responses of wildlife to human activities include departure from site (Owen 1973, Burger 1981, Korschgen et al. 1985, Henson and Grant 1991, Kahl 1991, Klein 1993), use of suboptimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Korschgen et al. 1985, Morton et al. 1989, Ward and Stehn 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. Migratory bird hunters may also disturb migratory birds and other wildlife as they travel to and from their hunting sites or when retrieving downed birds. The level of disturbance associated with hunting can be high due to the loud noises produced by guns and the rapid movement of hunters and hunting dogs within the hunt area. To minimize noise impacts of gun fire, morning only hunting for waterfowl would be instituted on the refuge, reducing hunting noise for resident wildlife, throughout the refuge for approximately 18 hours each day, as well as mitigate user conflicts. Direct disturbance to waterfowl can also occur during big game hunting seasons, as hunters flush big game through wetlands, creeks, and open water habitats. Other non-hunting recreational users can also flush target and non-target species creating disturbance in areas open to public use. Depending on the location and the number and species of migratory birds in the area, a disturbance can be temporary with displaced birds moving to nearby undisturbed areas. Disturbance to wildlife can cause shifts in habitat use, abandonment of habitat, increased energy demands on affected wildlife, changes in nesting and reproductive success, and changes in singing behavior (Knight and Cole 1991, Miller et al. 1998, Schultz and Stock 1993, Gill et al. 1996, Arrese 1987, Gill et al. 2001). Literature reviews of visitor use and its relationship to disturbance to waterbirds support the time/spatial restrictions and are reflected in the hunting regulations of other refuges, particularly in the Service's Southeast Region (DeLong 2002). Havera et al. (1992) and Dahlgren (1988) in comprehensive literature reviews of human disturbances to migrating and wintering waterfowl have noted that the use of sanctuaries (non-hunted areas) was the most common and effective solution to addressing adverse disturbance impacts. Bellrose (1954) wrote of the early 1900s when owners of duck lands found that providing non-hunted areas on their properties was of value in building and holding concentrations of waterfowl. A distinctive degree of sense of security constituted the principal factor governing duck use of areas that were all hunted, half hunted/half not hunted (Bellrose 1954). Hunting measures that serve to minimize adverse impacts to waterfowl are to provide adequate buffer areas and large enough sanctuaries to ensure full use by waterfowl by closing sanctuaries to all public entry from late fall to early spring and creating multiple areas across the refuge designated as sanctuaries. Allowing extensive human disturbance from other recreational activities (e.g., hunting of non-migratory bird species, fishing, boating, and auto touring) is generally incompatible with limiting disturbance and providing sanctuary conditions for waterfowl. Studies indicate that prolonged and extensive disturbances can cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995, Paulus 1984). Various studies indicate an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002). In Connecticut, lesser scaup were observed to forage less in areas that were heavily hunted (Cronan 1957). In California, the numbers of northern pintail on Sacramento NWR's non-hunt areas increased after the first week of hunting and remained high until the hunting season was over (Heitmeyer and Raveling 1988). While some human activities, in some areas, may have differential effects on waterfowl use and behavior (Pease et al. 2005), research shows that even infrequent human disturbances can reduce waterfowl abundance and reduce the quality of sanctuary conditions. While disturbance, mortality, and crippling of waterfowl are direct adverse impacts to migratory bird hunting, for some species, such as bald eagles and other predators, migratory bird hunting can create a readily available food source due to birds lost or wounded. Despite these potential impacts, hunting is designed at the Federal, state, and refuge level to be sustainable, thus, inherently, adverse population impacts are not anticipated. Target and non-target species will be disturbed by hunting (DeLong 2002), but such disturbance is considered temporary, short term, and not pervasive enough to result in negative impacts to populations. Most displacement of wildlife is considered minor, and animals typically will remain within their normal home ranges. It is suggested NWRs influence waterfowl distribution across the landscape by providing managed wetlands, high-density food resources, and sanctuary conditions (Bellrose 1954; Madsen and Fox 1995; Fox and Madsen 1997; Madsen 1998, 1998b). Moreover, NWRs often include sanctuaries where waterfowl congregate and make daily flights to adjacent and nearby private lands to forage (Cox and Afton 1996). Active duck hunters in Kentucky make up approximately 1% of U.S. duck hunters (Lander 2018). The limited number of active duck hunters in Kentucky combined with state and Federal regulations and hunting frameworks reduce the chances of an impact on duck populations migrating through the Mississippi Flyway. Additionally, the State of Kentucky temporally limits the time of day dove hunting is allowed which Green River NWR would institute. As additional properties are acquired for the refuge, the Service would develop sanctuary areas, which are closed to all public use from November through March to provide a disturbance free zone for migrating waterfowl and resident wildlife. Green River NWR would develop managed impoundments to provide both moist soil and hot foods for waterfowl and create quality hunting opportunities; however, additional time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users such as quota hunts) would be implemented to reduce negative effects to migratory game birds and other wildlife species. 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) through 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. While managed hunting opportunities can result in both short- and long-term impacts to individual animals, effects at the population level would be expected to be negligible under Alternative B. Hunting regulations for migratory game bird species would continue to be based on state and Federal frameworks, including specific statewide and nationwide harvest objectives. Additionally, the majority of hunting generally occurs during times of the year when most wildlife are not nesting, birthing, or raising offspring. To estimate hunting numbers and take of migratory game birds under Alternative B, hunter effort and harvest numbers were extrapolated from the migratory bird hunting activity and harvest report (Raftovich et al. 2020), Kentucky harvest data (Raftovich et al. 2020), and data collected at Sloughs WMA (John Brunjes, Program Coordinator, Waterfowl, personal communications; KDFWR 2021a). 2024-2025 (~793.13 acres) (harvest to include duck, goose, coot, teal, wood duck, and merganser) • Estimated Annual Migratory Game Bird Hunting Visits: 100-150

Natural Resource Impact Topic
• Estimated Annual Migratory Game Bird Take: 300-500 Post 2024-2025 (up to 24,000 acres) (harvest potentially to include duck, teal, wood duck, goose, coot, merganser, and dove through quota hunts, early teal and wood duck hunts, and dove hunts) • Estimated Annual Migratory Game Bird Hunting Visits: up to 1,000-1,500 • Estimated Annual Migratory Game Bird Take: up to 3,000-4,000
Big Game (archery and crossbow white-tailed deer and eastern wild turkey beginning in 2024-2025 and potential future hunt opportunities e. g. quota hunts)
Affected Environment Description Both private and public conservation lands currently provide habitat for big game species within the Green River NWR CPA. Hunting regulations for big game vary across the conservation lands of the Green River landscape. Within the CPA, the Green River State Forest and the Sloughs WMA are open to big game hunting, except for approximately 265 acres of the Sauerheber Unit, which only allows waterfowl quota hunting from November 1 through March 15. John James Audubon State Park began permitting special white-tailed deer hunts with limited number of hunters in 2017. Habitats supporting white-tailed deer and eastern wild turkey are abundant throughout the CPA. *White-tailed Deer* White-tailed deer were nearly eliminated from Kentucky; in 1894, the Kentucky legislature passed a law making it illegal to kill a white-tailed deer from March 1 to September 1. These measures did not recover the population, and in 1912, deer hunting was closed in the state. The remaining scattered herds of white-tailed deer were not enough to establish a statewide deer population. Kentucky began a white-tailed deer restoration program and began relocating Wisconsin deer to Christian, Crittenden, Livingston, and Ballard counties. In the 1960s and 1970s, the program intensified, and by 1980s, the western part of the state had a high enough population to open a hunting season. By 2018, the herd had recovered from fewer than 2,000 in 1945 to more than 930,613 statewide, 1.1% above the 10-year average (KDFWR 2020a) and continues to increase with statewide estimate of 933,089 in 2020, a 13.6 % increase above the 10-year average (KDFWR 2022b). Henderson County is in Zone 1 for Kentucky, which has the highest deer densities in the state and is considered a reduction zone by KDFWR (KDFWR 2022b). *Eastern Wild Turkey* While an estimated 10 million wild turkeys were present on the North American continent in the early 1800s, wild turkeys had all but disappeared from Kentucky by 1900. Year-round subsistence hunting and habitat destruction had dramatically depleted the population. Even with relocation efforts, the statewide wild turkey population was estimated at 850 birds in 1954. Much of Kentucky's wild turkey restoration work occurred from 1975 to 1995. Currently, wild turkeys are abundant in all 120 Kentucky counties. (Lander 2017). The statewide population is currently estimated to be between 250,000 and 400,000 turkeys (KDFWR 2022c). KDFWR (2022c) considers the population to be stable based on reported spring harvest and reproductive data.
Environmental Trends and Planned Actions Description While acquisitions are ongoing, in 2024, Green River NWR is expected to have limited available lands to provide habitat for big game (white-tailed deer and eastern wild turkey). 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 big game hunting (e.g. quota hunts). Given that the Service currently owns approximately 2,197 acres with no infrastructure and within the floodplains of the Ohio River, habitat for big game species along the ridge/swale topography of the floodplain will be contingent on flooding. With an active land acquisition program, Green River NWR will increase habitats for all species in the future as more property is acquired and infrastructure is developed. Additionally, management of lands, such as replanting of some agricultural lands to forests or grasslands and/or developing impoundments, will vary, creating a mosaic of successional stages to benefit a wide range of game and non-game species, including big game species. Nationally, the number of hunters decreased 16 percent from 2011 to 2016 (DOI et al. 2016). Eleven and a half million people 16 years and older enjoyed hunting a variety of game within the United States in 2016 (DOI et al. 2016). However, due to the pandemic, numbers of hunting license holders began trending upwards. The USFWS Wildlife & Sport Fish Restoration reports the total number of paid hunting license holders increased by 3.59% in 2023 (15,938,891 license sold) from 2022 (15,386,273 license sold). This statistic does not account for lifetime license holders, multi-year license holders, and individuals in certain states and age brackets who do not require a license and illegal hunters (USFWS 2023a). The Service works closely with state, as well as with the public, in a joint effort to ensure healthy populations of big game species and public safety. Methods of take and the proposed hunt were developed with humaneness and animal welfare concerns to assure that animals are humanely dispatched. Hunters are tasked with using good judgement aligned with established hunter ethics and responsibilities, including humaneness and animal welfare concerns. Green River NWR proposes to open archery and crossbow hunting of white-tailed deer and wild turkey in accordance with state seasons and bag limits. *White-tailed Deer* Kentucky archery and crossbow deer seasons normally open in September and close in January with one antlered deer and unlimited antlerless deer bag limits. Despite a statewide bag limit that allows hunters to shoot more than one deer per year, there appears to be a limit on the number of deer that hunters are willing or able to harvest, as 77% (81,746) of all successful hunters only harvest one deer. The total number of deer harvested during the 2020-21 deer season was 141,620, which is the fifth highest harvest on record, however, this was a 5% decrease from the 2019-20 season (148,385); the 2020-21 season was 3.7% above the 10-year average (137,005). The total antlered buck harvest was 69,441 during the 2020-21 season, which is 2.2% below the five-year average. The total female harvest was 64,599 in the 2020-21 season, which is 1.7% below the five-year average. There were no significant changes in the percentage of the 2020-21 harvest by weapon type compared to the 2019-20 season with the exception of the crossbow harvest. Crossbow harvest increased 34.6% (13,171) from the 2019-20 season (9,784) and was 138.7% above the five-year average (5,518). Nine percent of the total deer harvested in the 2020-21 season came from hunters using crossbows with more female deer taken by crossbows and archery equipment (17,431) than antlered males (12,162). Henderson County, Kentucky currently has 2 public hunting areas totaling approximately 8,200 acres and recorded 156 deer taken during the 2020 season

Natural Resource Impact Topic
(KDFWR 2022b). Chronic wasting disease (CWD) and Hemorrhagic Disease (HD) are important diseases related to white-tailed deer. Chronic wasting disease is a fatal, neurological disease in white-tailed deer, mule deer, elk, moose, and caribou. It causes a characteristic spongy degeneration of the brains of infected animals resulting in emaciation, abnormal behavior, loss of bodily functions, and ultimately death. It is categorized as a transmissible spongiform encephalopathy, a group that includes "mad cow" disease in cattle, Creutzfeldt-Jakob disease in humans, and scrapie in sheep and goats. It has been detected in 26 states, four Canadian provinces, Norway, and South Korea. Six states that border Kentucky have CWD present (West Virginia, Virginia, Missouri, Ohio, Illinois, and Tennessee). It has not been detected in Kentucky. Hemorrhagic disease, which is a vector-borne disease of white-tailed deer, is caused by two related orbiviruses: epizootic hemorrhagic disease virus and bluetongue virus. These HD viruses are considered the most important viral agents affecting deer populations in the United States. The virus is transmitted from animal to animal through the bite of an infected midge which is active in the late summer and early fall. Severe outbreaks are often associated with drought conditions because drought creates an increased amount of breeding habitat for the midges. The midges die off for the year after a hard freeze, eliminating new cases of HD. Hemorrhagic disease is reported in localized areas from at least a few counties nearly every year in Kentucky, although outbreaks can be considerably large and widespread as in 2017, where a large HD outbreak occurred in the eastern portion of Kentucky with over 4,500 suspected cases reported. In 2019, KDFWR biologists had 1,221 suspect HD deer reported across the entire state with 24 confirmed cases of HD occurring in the central, northern, and western portions of the state. Death rates are usually below 25% of the deer population, and no deer population has ever been wiped out by HD. (KDFWR 2019a) *Eastern Wild Turkey* Kentucky's statewide spring turkey regular season is 23 consecutive days beginning the Saturday closest to April 15th (i.e., this varies among years and is generally between April 12th and 18th). A youth-only spring season is 2 days beginning the Saturday closest to April 1st. During the spring turkey season, bag limits are 2 turkeys with visible beards harvested per season and 1 per day. A total of 29,223 turkeys were harvested during the spring 2021 statewide youth and regular seasons combined, which was 8% below 2020, 4% below the 10-year average. Harvest on opening weekend of the regular spring season (34% of the season total) changed by <1% from last season, but it was 10% above the 5-year average. During the 2020 spring season, private land harvest of turkeys (27,476) dropped by 9% compared to the previous year and by 5% compared to the 5-year average. However, during the 2020 spring season, public land harvest (1,746) increased 14% compared to the previous year and 7% compared to the 5-year average. Kentucky also has a fall turkey season from September to mid-January. Currently, the fall season bag limit is 4 turkeys, only 2 of which may be taken during the 2 shotgun seasons (regardless of weapon used), and only 1 of which may be a male bird with a beard length ≥3 inches. The reported harvest during Kentucky's 2020 fall season (2,102) increased 20% from 2019 (1,757). Geographically, fall harvest mirrors spring harvest. Eighty-five percent of successful hunters harvested 1 turkey, 14% harvested 2, 1% harvested 3, and <1% harvested the limit of 4. Sixty-eight percent of fall-harvested turkeys in 2020 were hens, a 26% increase over 2019. Between 2009 and 2017, sales of fall turkey permits declined by 66% among residents and 22% among nonresidents. (KDFWR 2022b). Henderson County, Kentucky currently has 2 public hunting areas totaling approximately 8,200 acres and recorded 32 turkeys taken during the 2022 seasons (KDFWR 2023c). Caused by a virus, avian pox is a major disease of wild turkeys and may have important population-level effects in localized areas, including in Kentucky. It causes visible nodules and lesions (warts) on unfeathered parts of birds (such as the head and legs). It can occur in many different species of birds. The disease is spread by mosquitoes (and possibly other biting flies), through direct contact with infected birds, and through environmental contamination (such as infection of food or stagnant water sources). It is more common in warm, humid parts of the country (KDFWR 2023b). Avian pox is a major disease of wild turkeys and may have important population-level effects in localized areas (KDFWR 2023b). Avian influenza can also impact wild turkeys. *Summary* The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact regional or local big game populations, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for big game populations. Deer hunting does not have regional population impacts due to restricted home ranges. The KDFWR estimates the average home range of a male deer in western Kentucky is 1 square mile or 640 acres. Harvest and survey data confirm that decades of deer hunting on lands surrounding the refuge have not had a local cumulative adverse effect on the deer population. Turkey hunting also does not have regional population impacts due to restricted home ranges. The KDFWR estimates the average home range of wild turkeys in western Kentucky is less than 2,000 acres. Similarly, decades of turkey hunting on lands surrounding the refuge have not had a local cumulative adverse impact on the turkey population. Hunting would not be expected to adversely affect big game bird populations that occur on the refuge.

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)

Under Alternative A, no additional take of wildlife would occur, since no hunting activities would be allowed in the near term on existing or future properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, big game could see a decrease in disturbance and take due to the change in the land use to conservation as properties are acquired under the refuge's active acquisition program. Other properties might experience additional disturbance due to increased public use of the property; however, any future refuge public use access and opportunities would be designed to minimize adverse impacts with no population impacts anticipated. White-tailed deer and eastern wild turkey would be expected to continue to occur on existing and future refuge properties under Alternative A.

Estimated Annual Big Game Hunting Visits: 0
Estimated Annual Big Game Take: 0

Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)
Alternative B would open existing and future properties of Green River NWR to the hunting of white-tailed deer and eastern wild turkey. These big game species would be expected to continue to occur on existing and future refuge properties under Alternative B. The primary tool for deer management in Kentucky is hunting. White-tailed deer overpopulation can have a negative impact on both the natural environment and humans, including damage to agriculture, landscapes, and forest health and regeneration, and they can pose human safety risks due to vehicle collisions and serving as vectors for transmission of tick-borne diseases. The refuge is located in Henderson County, Kentucky. For white-tailed deer, this county falls into Zone 1, which has the most liberal harvest limits in Kentucky indicating the areas with the highest deer populations. Deer management techniques have varied greatly

Natural Resource Impact Topic
across the state over the last decade. Of the 120 counties in Kentucky, 51 are designated as Zone 1, 34 as Zone 2, 13 as Zone 3, and 22 as Zone 4. Zone 1 counties have the highest deer densities in the state, are considered reduction zones, and currently have an unlimited bag limit on antlerless deer. (KDFWR 2019a) Annual white-tailed deer harvest telecheck results, from 2018 to 2022, reveals an average of approximately 1,428 deer harvested in Henderson County, Kentucky which is considered part of the Green River Region in Zone 1 having the highest deer densities (KDFRW 2023c). Henderson County resulted in less than 4% of white-tailed deer harvested annually within the Zone 1 during the same years (KDFWR 2019a). Public lands around the CPA constituted less than 6% of the deer harvested in the Green River Region (KDFRW 2023c). The majority of deer (74%) harvested in Kentucky were harvested using modern gun. An 8.3% decrease was observed for the archery/crossbow deer harvest from 2018-2019 (18,119) to 2019-2020 season (16,606), which was 15.7% below the five-year average (19,701) (KDFWR 2021c). The 2019-20 muzzleloader harvest (11,872) decreased by 9.1% when compared to the 2018-2019 season (13,059) and was 15.8% below the five-year average (14,101) (KDFWR 2021c). The total number of deer harvested during the 2020-21 deer season was 141,620, which is the fifth highest harvest on record, however, this was a 5% decrease from the 2019-20 season (148,385) and the 2020-21 season is 3.7% above the 10-year average (137,005) (KDFWR 2022b). The total antlered buck harvest was 69,441 during the 2020-21 season, which is 2.2% below the five-year average. The total female harvest was 64,599 in the 2020-21 season, which is 1.7% below the five-year average (KDFWR 2022b). Green River State Forest, which lies within the CPA, reports 206 individuals harvesting white-tailed deer over the last five years, with a yearly average of 41.2 deer harvested (KDFWR 2021c). Archery/crossbow, on average, composed 29% of the weapons used to harvest deer over the past five years at Green River State Forest. On average from 2016 to 2020, hunters using archery/crossbow equipment harvested 14.1% of deer taken on Green River State Forest (KDFWR 2021c). However, the 2022 deer public lands telecheck results showed 47 deer harvested by all weapons on Green River State Forest; of the 47, only 10 were harvested with archery and crossbow equipment (KDFWR 2023d). Deer harvest is essential to maintain a healthy herd at or below habitat carrying capacity. Deer, when overpopulated, have the capability of changing vegetation structure and composition (Hester et al. 2000, Hobbs 1996, Schmitz and Sinclair 1997). Overpopulation can also lead to outbreaks of devastating diseases such as epizootic hemorrhagic disease and bluetongue, which have been found locally in overpopulated herds. Overpopulation also leads to starvation, increased car-deer collisions, and poor overall herd health. Deer can easily become overpopulated in high quality habitat due to a lack of natural predators, such as wolves and cougars. Keeping the deer herd at or below the carrying capacity benefits the natural habitat, which supports a variety of wildlife, and increases biological integrity of the refuge. The KDFWR has conducted wild turkey brood surveys each summer since 1984. Representing a 10% increase in reproduction over 2018, the 2019 survey was 25% higher than the 5-year average (KDFWR 2020a). The 2020 spring wild turkey harvest summary reported an 8% increase in overall statewide harvest as compared to the spring of 2019. Survey indices for overall productivity (poults per hen) and poult survival (poults per brood) were better and nesting success (percent hens with brood) appeared stable. The statewide average of poults per hen was 10% higher than in 2018 and 25% higher than the 5-year average (KDFWR 2020a). The statewide poults per brood was also 10% higher than in 2018 (KDFWR 2020a). The percent of hens with a brood was 66%, which was just 4% less than in 2018 (KDFWR 2020a). Henderson County represented 1% or less of wild turkey harvested annually in Kentucky in 2019. The Green River Region produced an average of 28% of the turkeys harvested in Kentucky during the last five years (KDFWR 2021d). Public lands around the CPA constituted less than 2% of the deer harvested in the Green River Region during the same period (KDFWR 2021d). The majority of turkeys were harvested using modern firearms. Green River State Forest, which lies within the CPA, reported that six individual hunters harvested turkey in 2020 with only one individual using archery/crossbow (KDFWR 2021d). The highest number of turkey harvested on Green River State Forest in the past five years was 12, with the majority using firearms (KDFWR 2021d). A total of 29,223 turkeys were harvested during spring 2021 statewide youth and regular seasons combined which was 8% below 2020, 4% below the 10-year average (KDFWR 2022b). In 2021, public land harvest (1,746) increased 14% compared to last year and 7% compared to the 5-year average (KDFWR 2022b). Henderson County, Kentucky currently has 2 public hunting areas totaling approximately 8,200 acres and recorded 32 turkeys taken during the 2022 (KDFWR 2023c). Proposed hunting could have temporary, localized impacts to populations of game and non-game species. The short-term direct effects of hunting include mortality, wounding, and disturbance of target and non-target species (DeLong 2002). Hunting can alter behavior (e.g., foraging time), population structure, general health (e.g., weight loss), and distribution patterns of all wildlife within the hunt area (Owens 1977, Raveling 1979, White-Robinson 1982, Thomas 1983, Bartelt 1987, Madsen 1985, Cole and Knight 1990). The level of disturbance associated with hunting can be high due to the rapid movement of hunters and hunting dogs within the hunt area. Noise from bows ejecting arrows will be significantly less than the noise produced by guns. Disturbance to wildlife can cause shifts in habitat use, abandonment of habitat, increased energy demands on affected wildlife, changes in nesting and reproductive success, and changes in singing behavior (Knight and Cole 1991, Miller et al. 1998, Schultz and Stock 1993, Gill et al. 1996, Arrese 1987, Gill et al. 2001). Target and non-target species will be disturbed by hunting (DeLong 2002), but such disturbance is considered temporary, short term, and not pervasive enough to result in negative impacts to populations. Most displacement of wildlife is considered minor, and animals typically will remain within their normal home ranges. Additionally, the majority of hunting generally occurs during times of the year when most wildlife are not nesting, birthing, or raising offspring. The Service also limits waterfowl hunting to noon each day to minimize noise disturbance from gun fire to resident species and mitigate user conflict. However, the limits set by the state, the design of the refuge's big game hunts, and the expected number of hunting visits dispersed across up to 24,000 acres would help minimize these impacts. In coordination with the state of Kentucky, it was determined that deer and turkey population levels can sustain hunting and are relatively abundant across the state, including western Kentucky. The proposed refuge hunting program's rules would conform to regulations in the state of Kentucky. While managed hunting opportunities can result in both short- and long-term impacts to individual animals, effects at the population level would be expected to be negligible under Alternative B. Hunting regulations for endemic game species would continue to be based on specific statewide harvest objectives and refuge goals. 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 big game hunting (e.g. quota hunts). Hunter effort and harvest numbers were extrapolated from 2016-2020 KDFWR Telecheck harvest results for Henderson County, the Green River Region, and public lands within the Green River Region, as well as from interest in hunting these species at Clarks River NWR. 2024-2025 (~793.13 acres) • Estimated Annual Big Game Hunting Visits: 100-200 • Estimated Annual Big Game Take: <25*

Natural Resource Impact Topic
Post 2024-2025 (up to 24,000 acres) (harvest potential include additional hunting opportunities e.g. quota hunts) • Estimated Annual Big Game Hunting Visits: up to 1,750-2,250 • Estimated Annual Big Game Take: up to 100-175* *The Service would anticipate annual big game take to be composed of 70% white-tailed deer and 30% wild turkey.
Non-Target Wildlife and Aquatic Species
Affected Environment Description Green River NWR supports a diversity of wildlife common to Kentucky. Most of the wildlife that would likely occur on the refuge are those found typically in bottomland hardwood forests. No species surveys have been conducted on the refuge, as of yet. Although actual numbers are hard to accurately quantify, the current wildlife list for Henderson County, Kentucky contains over 500 species, including at least 270 species of birds, 35 species of mammals, 50 species of reptiles and amphibians, and 90 fish species (KDFWR 2021b). A 2023 iNaturalist search showed over 650 verified species recorded in Henderson County, Kentucky. Each of these individual species would have the same general requirements in that they require food, water, and cover to survive. However, the particular food and cover requirements of a given species are often very specialized. The specific habitat needs of each species vary in some degree from those of every other kind of animal, although many different animals may occupy the same general area. A diversity of habitats tends to encourage and support a diversity of wildlife species. The CPA is made up of approximately 39,000 acres of agriculture, 3,000 acres of developed lands, 9,000 acres of forests, 200 acres of shrub/barrens, and 2,600 acres of wetlands. The CPA also contains a large amount of marginal cropland that is regularly flooded. The Green River State Forest and John James Audubon State Park consists of approximately 1,800 acres of conservation lands within the CPA. Additionally, over 11,000 acres of the Sloughs Wildlife Management Area (WMA) provide complementary habitat with one unit within the CPA, while the remaining four units are east of the CPA. Adjacent to the CPA, Eagle Slough Natural Area provides an additional 127 acres.
Environmental Trends and Planned Actions Description An encompassing research report presented in Science magazine in 2019 reported the decline of many North American avifauna; the research described population losses across much of the North American avifauna over 48 years, indicating a net loss approaching 3 billion birds, or 29% of 1970 abundance (Rosenberg et al. 2019). A total of 419 native migratory species experienced a net loss of 2.5 billion individuals, whereas 100 native resident species showed a small net increase (Rosenberg et al. 2019). Overall, proportional loss was greatest among species overwintering in coastal regions of North America (Rosenberg et al. 2019). Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds, including cardinals, titmice, wrens, and chickadees. The effects of disturbance to non-hunted migratory birds under the Proposed Action would be expected to be negligible due to the fact most of the seasons would not coincide with the nesting season. The State Wildlife Action Plan (SWAP) provides detailed descriptions of the habitats, assessment of threats to those habitats, and conservation actions are needed to address those threats. The SWAP recognizes that over 90% of the state is privately owned, and state and Federal land management is only a small part of the conservation efforts statewide. The SWAP describes 79 conservation issues and associated actions, including the need for limiting habitat fragmentation, habitat degradation, and conversion of habitats from development and agriculture, as examples of the major stressors to populations of reptiles, amphibians, and other nongame animals in the state. The SWAP identifies taxa-specific conservation actions for amphibians, birds, mammals, and reptiles. Hunting and fishing were listed as conservation actions in the SWAP. The SWAP also identified key actions related to the Proposed Action: create education programs on proper identification of priority species to decrease impacts; increase awareness among Law Enforcement partners, commercial fishermen, and bait shops about market hunting for human consumption; and partner with private landowners to increase public hunting access for cervids through incentive programs. (KDFWR 2013) The 2022 population in Henderson County was 44,046, which represents one percent of Kentucky's total population of 4,512,310 (U.S. Department of Commerce 2023b). The 2022 population of the City of Henderson was 27,697, which represents 62% of Henderson County's population (U.S. Department of Commerce 2023b). The population has steadily increased in Henderson County over the last 25 years, although at less than one percent per year (USDOT et al. 2018). Between 2022 and 2022, however, the population has decreased by 1.7 % (U.S. Department of Commerce 2023b). The Evansville Metropolitan Planning Organization estimates the region will continue to grow at less than one percent per year for the next 25 years (USDOT et al. 2018). The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact non-target wildlife and aquatic species on the refuge, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for non-target wildlife and aquatic species.
Anticipated Impacts **Alternative A: Continue Current Management (No Action Alternative)** Under Alternative A, no additional take of wildlife would occur, since no hunting activities would be allowed in the near term on existing or future properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, non-target wildlife and aquatic species could see a decrease in disturbance due to the change in the land use to conservation. Other properties might experience additional disturbance due to increased public use of the property; however, any future refuge public use access and opportunities would be designed to minimize adverse impacts with no population impacts anticipated. However, over-abundance of deer can have adverse impacts to a multitude of migrant and resident songbird species through habitat destruction, while also directly impacting ground nesting birds. While these adverse impacts from the overpopulation of deer can impact a

Natural Resource Impact Topic
variety of bird species and some vegetation, the impacts would be discrete and would not be expected to significantly adversely impact the overall populations. Non-target wildlife and aquatic species would be expected to continue to occur on existing and future refuge properties under Alternative A. **Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)** Human presence, including hunters, boaters, and bicyclists, can negatively affect wildlife by causing animals to alter behaviors necessary for survival. Birds exhibit various behavioral and physiological responses to human disturbance and may avoid areas with high levels of human activity (Burger 1981). Physiological responses include the release of stress hormones (Müllner et al. 2004, Thiel et al. 2008) and increased heart rate (Weimerskirch et al. 2002). Behavioral responses include increased vigilance (Frid and Dill 2002), altered singing behavior (Gutzwiller et al. 1994), and flushing (Spahr 1990, Ikuta and Blumstein 2003, Beale and Monaghan 2004, Pease et al. 2005, McLeod et al. 2013, Livezey et al. 2016). Human disturbance can also cause birds to discontinue or avoid foraging (Burger and Gochfield 1998, Thomas et al. 2003, Yasue 2005, Martín et al. 2015) and instead spend more time displaying avoidance behaviors. Further, McNeil et al. (1992) suggested that some waterfowl and shorebird species may forage at night instead of during the day to avoid humans. These physiological and behavioral responses to human activity cause birds to expend energy (Bélanger and Bédard 1990, Weimerskirch et al. 2002) that would otherwise be used for survival, migration, and reproduction. Mammals also exhibit avoidance behaviors in response to human activity (Hammitt and Cole 1998), including bicyclists (Taylor and Knight 2003). Bats expend more energy when disturbed by humans (Speakman et al. 1991), and mammalian species across the globe have become nocturnal to avoid people (Gaynor et al. 2018). Mammals likely to experience adverse impacts from human disturbance are those with limited available habitat; these animals are forced to remain in the disturbed habitat due to a lack of suitable alternatives and suffer the consequences of human disturbance. Outdoor recreational activities, including hunting, can have temporary, localized, short-term impacts to populations of game and non-game species. Marzano and Dandy (2012) cite several studies on birds, deer, and red squirrels that suggest recreational activity does not have a significant long-term impact on animal behavior. Hunting can have temporary, localized impacts to populations of game and non-game species. The short-term direct effects of hunting include mortality, wounding, and disturbance of target and non-target species (DeLong 2002). Hunting can alter behavior (e.g., foraging time), population structure, general health (e.g., weight loss), and distribution patterns of all wildlife within the hunt area (Owens 1977, Raveling 1979, White-Robinson 1982, Thomas 1983, Bartelt 1987, Madsen 1985, Cole and Knight 1990). While highly localized, the level of disturbance associated with hunting can be high due to the loud noises produced by guns and the rapid movement of both hunters and hunting dogs within the hunt area. Noise from bows ejecting arrows will be significantly less than the noise produced by guns. Disturbance to wildlife can cause shifts in habitat use, abandonment of habitat, increased energy demands on affected wildlife, changes in nesting and reproductive success, and changes in singing behavior (Knight and Cole 1991, Miller et al. 1998, Schultz and Stock 1993, Gill et al. 1996, Arrese 1987, Gill et al. 2001). Disturbed wildlife will relocate to avoid hunters or flush and expend more energy than if they had remained at rest. While both target and non-target species will be disturbed by hunting (DeLong 2002), but such disturbance is considered temporary, short term, and not pervasive enough to result in negative impacts to populations. Most displacement of wildlife is considered minor and animals typically will remain within their normal home ranges. Additionally, the majority of hunting generally occurs during times of the year when most wildlife are not nesting, birthing, or raising offspring. To further minimize wildlife disturbance, Green River NWR could establish no hunting zones and areas that are closed to all public entry, and well as temporal zones. The Service also limits waterfowl hunting to noon each day to minimize noise disturbance to non-target wildlife from gun fire and mitigate user conflicts. Intermittent hunting can also be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). Disturbance from hunting, especially when repeated over a period of time, can compel waterfowl and other species to change foraging habits (e.g., foraging at night) or abandon areas of disturbance (Madsen 1995, Wolder 1993). In fact, studies indicate that prolonged and extensive disturbances can cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995, Paulus 1984). Various studies indicate an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002). Following the close of hunting season, ducks generally increase their use of hunt areas, but use of these areas tends to be lower than before the hunting season began. Impacts to waterfowl and other species can be reduced by providing adjacent sanctuary areas where hunting does not occur and where birds can feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et al. 1992). Minor impacts may be associated with bicycling, including temporary wildlife disturbance and littering. However, bicycling would only be permitted on designated roads and trails, limiting disturbance to areas already subject to recreational activities. The impacts of ebikes on wildlife compared to non-motorized bicycles is not well understood, with little research available in the literature. Ebikes may cause greater disturbance to wildlife than non-motorized bikes because they are louder, possibly resulting in shorter flight initiation distances than non-motorized bikes. In addition, ebikes can cover greater distances in a given period than non-motorized bikes and thus may disturb more wildlife per unit of time. However, some studies suggest that ebikes cause less disturbance because they exit the area more quickly than non-motorized bikes (Nielson et al. 2019). Boating, including associated noise, perception of threat, and mere presence, can disturb wildlife, especially birds. Boating can disrupt feeding, loafing, resting, and nesting activities. Recreational boating, including for hunting, can directly impact bird populations, especially during nesting season. Boats can cause birds to flush (Peters and Otis 2006, Livezey et al. 2016); such flushing makes chicks and eggs more vulnerable to predators and overheating (Audubon n.d.). Boating can disrupt aggregation and communication. Physiological and behavioral changes can occur in wildlife in response to boating activities. Disturbance by boating is similar disturbance by hunting and can result in increased energy expenditures from avoidance of the disturbance and decreased energy intake due to interference with feeding activities. Wildlife responds differently to boats based on their size, speed, the amount of noise they make, and how close the crafts get to wildlife. Boats increase the access of visitors to areas not open to most other visitors, thus having a greater potential to cause wildlife disturbance if not managed properly. The speed and manner in which a boat approaches wildlife can influence wildlife responses. Rapid movement directly toward wildlife frightens them, while movement away from or at an oblique angle to the animal is less disturbing (Knight and Cole 1995). Possible short-term adverse impacts include wildlife disturbance, littering, vandalism, and vegetation disturbance, with motorized boats more likely to cause wildlife disturbance than non-motorized boats. Boating has been shown to alter distribution, reduce use of particular habitats by waterfowl and other birds, alter feeding behavior, and cause premature departure from areas. Impacts of boating can occur even at low densities, given the ability of powerboats to cover extensive areas in a short amount of time, the noise they produce, and their speed (Sterling and Dzubin 1967; Bergman 1973; Speight 1973; Skagen 1980; Korschgen et al. 1985; Kahl 1991; Bauer et al. 1992; Dahlgren and Korschgen 1992; Korschgen and Dahlgren 1992). Motorized vehicles including off-road or all-terrain vehicles, would have similar impacts as motorized boats. However, these vehicles would only be permitted on designated roads and trails, limiting disturbance to areas already subject to recreational activities.

Natural Resource Impact Topic
Small mammals, including bats, are inactive during winter when most hunt occurs. Some of these species are also nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blooded reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Encounters with reptiles and amphibians in early fall are few and would not be expected to have adverse effects on reptile and/or amphibian populations. Hunters during spring and summer may encounter some reptiles and amphibians, which could result in disturbance or mortality. However, the impact to the population of amphibians and reptiles during these periods would be expected to be minimal and similar to that of other users. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Some species of bats, butterflies, and moths are migratory. Negative effects to these species at the flyway level would be expected to be negligible. These species are in torpor or have completely passed through western Kentucky by peak hunting season, which occurs in October through January. Some hunting occurs during other months when these species are migrating; however, hunter interaction may be commensurate with that of other users. Fish and mussel species would not be expected to be negatively impacted by the proposed hunting opportunities, however boating for hunting access could have minor adverse impacts. Boat noise can cause sublethal stress responses in fish, increasing heart rate and decreasing stroke volume (Graham and Cooke 2008). Such physiological responses increase energy expenditure, which can have various adverse short-term impacts, such as increased susceptibility to predation and decreased foraging success. Other water-dwelling animals, such as crustaceans, also exhibit physiological stress responses to boat noise (Filiciotto et al. 2014). Boat-related disturbance has been shown to induce morphological and behavioral changes in the black bullhead (*Ameiurus melas*), resulting in observable changes to ciliary bundles and more time spent sheltering (Mickle et al. 2019). Some fish may spend less time guarding young in response to boat noise, exposing eggs and young to predation, which could influence the productivity of fish populations (Maxwell et al. 2018). Boat noise pollution can also disrupt communication among fish (Codarin et al. 2009), which may impede mate attraction, increase predation, and disorient the fish. The effects of disturbance to non-hunted wildlife under the Proposed Action would be expected to be negligible due to the fact most of the seasons would not coincide with the nesting season. Green River NWR would consider the use of quota hunts to help manage wildlife disturbance. Green River NWR could limit hunting activities on certain areas of the refuge specifically to provide areas of sanctuary, once land and infrastructure are acquired/developed. The refuge may also restrict the number of hunters and hunt dates/times in some areas with no public entry outside of those days. With restricted entry on these managed impoundments, waterfowl can use the areas as sanctuary for the majority of the winter. Outside of managed impoundments, in order to minimize noise disturbance from gun fire to resident wildlife and mitigate user conflicts, the refuge would require all waterfowl hunters to be out of the field prior to noon each day of the season. Overall, hunting impacts to other wildlife and their habitats and impacts to the biological diversity of the refuge would be expected to be minor. Collectively, these impacts should result in no significant effects on all non-hunted wildlife species. As public use levels on the refuge increase over time, unanticipated conflicts between user groups may occur. To ensure that uses continue to meet compatibility requirements, the refuge would annually re-evaluate the hunting program to determine if adjustments are needed in order to provide quality wildlife dependent recreational opportunities, while promoting public safety and maintaining healthy populations of wildlife. The refuge's hunt program was designed to be sustainable, inherently minimizing impacts to non-target wildlife and aquatic species. Under Alternative B, impacts to non-target wildlife and aquatic species would range from minor adverse to minor beneficial. Non-target wildlife and aquatic species would be expected to continue to occur on existing and future refuge properties under Alternative B. Wildlife in hunting areas could experience disturbance on days during hunting activities, however these adverse impacts would be expected to be minor, discrete, and short lived, even with the proposed increases in numbers of species taken and areas hunted by increased numbers of hunters. Increased removal of predators would result in neutral to minor beneficial impacts to target prey species, including snakes, ground nesting birds, reptiles, amphibians, and small mammals. Small mammals, including bats, are inactive during winter when hunting season occurs, while many are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations would further minimize possible disturbance by hunters to non-hunted wildlife. Vehicles would be restricted to designated roadways and the harassment or taking of any wildlife other than the game species legal for the season would not be permitted. Disturbance to the daily activities, such as feeding and resting, might occur, but would be transitory as hunters traverse habitat. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users. While managed hunting opportunities can result in both short- and long-term impacts to individual animals, effects at the population level would be expected to be negligible under Alternative B. The addition of the proposed hunting activities would not be expected to have a significant impact on the take of these non-huntable species; the opportunity for illegal take of these species already exists.
Threatened and Endangered Species and Other Special Status Species
Affected Environment Description The Service's Information for Planning and Consultation (IPaC) database includes 17 species in the Green River NWR CPA as threatened or endangered. However, an additional 4 species are listed as potential threatened or endangered, 1 species is listed as a candidate species, and 1 species is listed as a non-essential experimental population could be supported or potentially supported within the CPA. ***Mammals*** Gray Bat (*Myotis grisescens*) – Endangered The 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. The tragus is long and thin. The calcar (heel of the foot) is keeled. The species' historical range included Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Missouri, Oklahoma, Tennessee, Virginia, and West Virginia (USFWS 2023e). 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 (USDOT et al. 2018). Even though gray bats require cave-like habitats, the species summer distribution occurs throughout a slightly larger geographic area than winter

Natural Resource Impact Topic
distribution (USDOT et al. 2018). 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 (USDOT et al. 2018). Currently, KDFWR Distribution Map indicates this species does not occur within Henderson County, Kentucky (KDFWR 2023f). However, a 2023 bat blitz lead by Kentucky Department of Fish and Wildlife Resources capture 9 in and around Henderson, County Kentucky (Michaela Rogers, Wildlife Biologist, KDFWR, personal communication, August 21, 2023). Currently, no maternity roost or hibernaculum are known to occur in the CPA (USDOT et al. 2018). The amount of forested habitat on Green River NWR creates suitable summer roosting, 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 2023f). While critical habitat has been designated for this species, its critical habitat does not occur on the refuge (USFWS 2023f). 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 United States. It occurs from Iowa, Oklahoma, and Wisconsin, northeast to Vermont, and south to northwestern Florida and northern Arkansas (Barbour and Davis 1969). 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. 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 2021e). 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, KDFWR, personal communication, January 2024). Currently, KDFWR Distribution Map indicates known Indiana bat maternity roost occurs within Henderson County, Kentucky (KDFWR 2023e). 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 (USFWS 2023h). 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 United States where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites (USFWS 2023h). 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 the 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 United States (USFWS 2023h). 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 2023h). Available roosting opportunities on the refuge are currently rare, but the bat likely forages along the Ohio River and Green River. 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 2021e). Currently, KDFWR Distribution Map indicates this species occurs within Henderson County, Kentucky (KDFWR 2023g). 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). The amount of forested habitat on Green River NWR creates suitable summer roosting, foraging, and commuting habitat for bats, including this species. 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. 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 2023q Currently, KDFWR Distribution Map indicates this species occurs within Henderson County, Kentucky (KDFWR 2023h).The amount of forested habitat on Green River NWR creates suitable summer roosting, foraging, and commuting habitat for bats, including this species.

Natural Resource Impact Topic
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. The 2023 bat blitz conducted by KDFWR did not capture this species in Henderson County, Kentucky (Michaela Rogers, KDFWR, personal communication, January 2024). 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 America's 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 (USFWS 2023). 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 (USFWS 2023r). 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, and Wyoming (USFWS 2023r). 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/Mussels*** 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 shingle-like 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 2023c). 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 (USDOT et al. 2018). 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. 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 include 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 2023p). 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

Natural Resource Impact Topic
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 2023k). 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 1-69 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 2023m). 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. 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 1-69 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 2023o). 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 (USDOT et al. 2018). 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 (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 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 (USDOT et al. 2018). 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 in side channels and sloughs (USDOT et al. 2018). The species' historical range included Arkansas, Illinois, Indiana, Iowa, Kentucky, Mississippi, Missouri, and Ohio (USFWS 2023d). 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 (USDOT et al. 2018). 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 2023i). In Kentucky, the northern riffleshell's historic distribution includes the Ohio River mainstem, upper Green River, Salt River, Kentucky River, and Licking River (USDOT et al. 2018). 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 (USDOT et al. 2018). The northern riffleshell was reintroduced at four locations in the Licking River during 2013 and 2014. Currently, no sites for this species are known from within the CPA (USDOT et al. 2018).

Natural Resource Impact Topic
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 2023j). 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 2022b). 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 2023b). 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). Currently, no known sites of this species exist within the CPA (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). 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. The 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 2023n). 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), 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 2023l). 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. However, only four populations are currently known in the state of Kentucky, and these do not include any populations in the Ohio River (USDOT et al. 2018). The Draft EIS for the 1-69 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 2023s). 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. 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, the Service found that the petition presented substantial scientific or commercial

Natural Resource Impact Topic
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 historically known from 12 states, though now only occurs in nine. 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 (USFWS 2018). It has suffered impacts from negative influences to 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 (USFWS 2018). In many of these small population size examples, only fresh dead shells have been collected and no live longsolids 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. 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. The pyramid pigtoe is historically known from 18 states, but considered extirpated from 9 states (i.e., Pennsylvania, West Virginia, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Kansas, and Missouri) (USFWS 2021b). 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). 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 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 2023g). 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. Multiple generations of monarchs are 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 km 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. 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. **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 include: 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),* great 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),* short-eared owl (*Asio flammeus),* spotted sandpiper (*Actitis*

Natural Resource Impact Topic
macularius), upland sandpiper (*Bartramia longicauda),* Virginia rail *(Rallus limicola),* yellow-crowned night heron *(Nyctanassa violacea),* evening bat *(ycticeius humeralis),* masked shrew *(Sorex cinereus),* blue scorpion-weed *(Phacelia ranunculacea),* rose turtlehead *(Chelone obliqua var. speciosa),* river bulrush (*Bolboschoenus fluviatilis),* burhead *(Echinodorus berteroi),* floating pennywort (*Hydrocotyle ranunculoides),* small-flower baby-blue-eyes *(Nemophila aphylla),* Tennessee leafcup (*Polymnia laevigata),* large bur-reed (*Sparganium eurycarpum),* and pickerel-weed (*Pontederia cordata)*.

Environmental Trends and Planned Actions Description

It is the policy of the Service to protect and preserve all native species of fish, amphibians, reptiles, birds, mammals, invertebrates, and plants, which are designated threatened or endangered, including their habitats. With the establishment of Green River NWR and an active land acquisition program (as outlined in the LPP [USFWS 2019]), impacts to threatened and endangered species and other special status species would be expected to be beneficial as properties are acquired and managed under the refuge, since they would be protected from being developed or converted into agriculture. Habitat restoration efforts by the Service would also restore hydrology and convert some lands back into the communities of concern listed by the state of Kentucky.

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 in 2007. 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. Green River NWR would protect any known bat roosts and consider augmenting bat roosts by establishing bradenbark poles in areas.

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. Green River NWR is not opening hunting of this species or the similar Sandhill Crane.

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 that can affect the nervous system, lung, heart, and liver). 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 of the Kentucky Energy and Environment Cabinet, the River has not been assessed since 2013, but it is considered healthy since it fully supports the catfish, crappie, bass and other aquatic life that call it home (Van Velzer 2019). As properties are acquired for Green River NWR, management practices could affect the water quality in the Ohio and Green rivers. Planned reforestation of some lands will diminish many of the nonpoint source pollution by removing nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow to protect water quality, create shade to lower water temperature, and provide a source of detritus and large woody debris for aquatic organisms and habitat for wildlife. Additionally, Green River NWR would only permit manual power or electric trolling motors boating to reduce impacts to wildlife including sediment disturbance.

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 2020a). 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 2020a). 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 (USFWS 2020a). Monarchs are present throughout Kentucky, so it can be assumed that monarchs could be found in the CPA. If monarch butterflies are present when hunters are using the refuge, it would most likely be adult butterflies seeking nectar sources for the migration south. Disturbance to vegetation, water, or soils could occur while hunters are

Natural Resource Impact Topic
accessing sites or scouting on vehicles, all-terrain vehicles, boating, biking or by foot. Potential impacts include trampling, damage, and killing of vegetation from walking off trail (Kuss 1986, Roovers et al. 2004, Hammitt and Cole 1998) and accidental introduction or spread of invasive plants, pathogens, or exotic invertebrates, especially along forest roads which can facilitate the spread of invasive plants (Mortensen et al. 2009) and could result in habitat alterations causing short and long-term changes in wildlife communities (deMaynadier and Hunter 1995). Given the limited temporal spring 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. Further, the Service prohibits the take of plants on the refuge. Hunting activities could contribute to some very minor increases in nonpoint source pollution, but these impacts would be negligible, including at the wildlife population scale. The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact Federal threatened and endangered species and other special status species on the refuge or state-listed species, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for threatened, endangered, and special status species.
Anticipated Impacts **Alternative A: Continue Current Management (No Action Alternative)** Under Alternative A, no additional take of wildlife would occur, since no hunting activities would be allowed in the near term on existing or future properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, wildlife (including threatened, endangered, and special status species) could see a decrease in disturbance due to the change in the land use to conservation. Other properties might experience additional disturbance due to increased public use of the property; however, any future refuge public use access and opportunities would be designed to minimize adverse impacts with no population impacts anticipated. Under Alternative A, threatened and endangered species and other species of special management concern would continue to be protected and would be expected to continue to occur on existing and future refuge properties. **Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)** An Intra-Service Section 7 Biological Evaluation was previously completed for the 2019 LPP and CMP, which included hunting, with no effect or not likely to adversely affect determinations (see Appendix C in the final LPP, USFWS 2019). Since many of the properties that are included in the refuge were hunted under the previous landowner and since many properties to be acquired in the future for the refuge could also likewise have been historically hunted, we expect the impacts of the proposed hunting program under Alternative B to be minimal (as outlined in the previous Section 7, EA, and FONSI for the refuge's 2019 LPP and CMP [USFWS 2019]). It is the policy of the Service to protect and preserve all native species of fish, amphibians, reptiles, birds, mammals, invertebrates, and plants, including their habitats, which are designated threatened or endangered. Under Alternative B, threatened and endangered species and other species of special management concern would continue to be protected and would be expected to continue to occur on existing and future refuge properties. Disturbance factors resulting from public use are always considered for all listed species. The proposed hunting program was designed to minimize impacts to threatened, endangered, and other special status species. A draft Section 7 Intra-Service Consultation was developed during this planning process with draft determinations that the Proposed Action (Alternative B) would be not likely to adversely affect or jeopardize threatened and endangered species. Further, the draft Section 7 outlines key actions to minimize impacts, including actions such as prohibiting the take of certain species such as turtle and cranes species, augmenting bat roots such as establishing bradenbark poles, and reforestation of some lands diminishing many of the nonpoint source pollutants. Under Alternative B, impacts to threatened, endangered, and other special status species would be expected to be negligible. While managed hunting opportunities can result in both short- and long-term impacts to individual animals, effects at the population level would be expected to be negligible under Alternative B. General impacts are discussed in non-target wildlife / aquatic species and habitat / vegetation of this EA. No knowns wintering hibernacula exist within the CPA for the threatened and endangered bats analyzed. As a result, these 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 bats from migratory game bird hunting is considered discountable. Bats would also 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 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, biking, or all-terrain vehicles through forested habitat from hunting activity is expected to have discountable or insignificant effects. Indiana, Northern log-eared, and tricolor bats all roost in trees and therefore have the potential to be disturbed by hunters use of tree stands. 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. However, 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. Therefore, 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 during fall deer and turkey hunting. 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 bat 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 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 bats.

Natural Resource Impact Topic
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. The refuge allows ATV/UTV 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 bats from noise during spring turkey archery and crossbow hunting in April and May are considered insignificant. No effects to 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 these factors, effects to bats roosting in trees during deer and turkey archery and crossbow hunting are considered insignificant. No effects are anticipated to 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. 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. As a result, effects to gray bats and their hibernacula and roosting habitat from migratory game bird hunting are considered discountable. Potential disturbance to trees and noise from hunters moving through the CPA, using tree stands, 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. 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. The proposed activities would be limited to daylight hours and would not occur when bats may be foraging and commuting in the CPA. Based on anticipated discountable effects from migratory game bird hunting and insignificant effects from archery and crossbow big game hunting, the Proposed Action is not likely to adversely affect this species. The whooping crane has not been documented in the CPA or in the refuge, and no nesting habitat for this species is present within the CPA. However, given the vicinity of Patoka River refuge, 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 that limited number of whooping cranes in the eastern population, limited interactions with hunters are anticipated. 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 these species of bats. 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. While potentially suitable habitat for all mussel 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. Therefore, the Proposed Action is not likely to adversely affect these species or jeopardize the continued existence of the pyramid pigtoe. 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 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 winter habitat, 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. No significant adverse impacts from the Proposed Action would be expected to any of the above listed threatened, endangered, and other special status species. With the refuge providing both temporal and spatial protections and being more restrictive than state hunting regulations in many cases, disturbance from the Proposed Action would be not likely to adversely affect or jeopardize any threatened species, endangered species, or species of concern. The proposed hunting program was designed to be sustainable and minimize impacts, including to threatened and endangered species and other special status species. Further, refuge staff would actively coordinate with the

Natural Resource Impact Topic
Kentucky Ecological Services Field Office in order to ensure that potential adverse effects on those species would be adequately addressed. It is the policy of the Service to protect and preserve all native species of fish, amphibians, reptiles, birds, mammals, invertebrates, and plants, which are designated threatened or endangered, including their habitats. An Intra-Service Section 7 Biological Evaluation was previously completed for the 2019 LPP and CMP, which included hunting, with no effect or not likely to adversely affect determinations (see Appendix C in the final LPP, USFWS 2019). Incorporated herein by reference, a draft Intra-Service Section 7 Biological Evaluation (with findings of not likely to adversely affect and not likely to jeopardize) was prepared in the development of the 2024-25 Hunting Package for Green River NWR, including this EA, the Hunting Plan (Section A), and the Hunting CD (Appendix C).
Habitat and Vegetation (including vegetation of special management concern)
Affected Environment Description The Green River NWR CPA falls into the Hill Section (Shawnee physiographic area) of the Western Mesophytic Forest Region. The area is further classified as part of the Western Coal Fields physiographic region, which is comprised of low elevation rolling hills with large and wide expanses of floodplain along and adjacent to the banks of the Ohio River and Green River. Outside of the urban, commercial, and residential land coverage types that exist in Henderson County, land use in the region is dominated by a mixture of farmland, forests, and coal mining. The majority of the CPA is dominated by agriculture, bottomland forest, floodplains, and sloughs. The upland forests in this region are generally described as mixed mesophytic forest type on northern slopes and oak or oak-hickory forest on drier slopes and ridges. However, in keeping with the transitional nature of the Western Mesophytic Forest Region, lowland valley areas adjacent to the Ohio River and Green River differ substantially. Bottomland forests in the wide flat silt-filled valleys along the Ohio and Green rivers consist of cottonwood (*Populus deltoides*), pin oak (*Quercus palustris*), swamp white oak (*Q. bicolor*), sugarberry (*Celtis laevigata*), silver maple (*Acer saccharinum*), sweetgum (*Liquidambar styraciflua*), and bald cypress (*Taxodium distichum*). These alluvial valleys act as extensions of the Mississippi alluvial plain and make up a large part of the area. (USDOT et al. 2018)
Environmental Trends and Planned Actions Description As of 2007, the University of Kentucky Cooperative Extension Service reported that twelve million acres, 47% of Kentucky's 25,425,904 acres, were covered in forest (Thomas et al. 2007). Kentucky lost more than 700,000 acres of forest between 1988 and 2004, mostly due to the conversion of forest for development purposes (Thomas et al. 2007). Of the 12 million acres of forest in Kentucky, 11.6 million acres are classified as timber land (Thomas et al. 2007). This acreage has decreased 6% since 1988 (Thomas et al. 2007). Forest conversion is recognized as one of the most serious threats to forests in Kentucky. The state of Kentucky considers bottomland hardwood forest, bottomland marsh, and coastal plain slough as three communities of concern in the state. A major driver of the loss of forests and other habitats is human population growth and development. The 2022 population in Henderson County was 44,046, which represents one percent of Kentucky's total population of 4,512,310 (U.S. Department of Commerce 2023b). The 2022 population of the City of Henderson was 27,697, which represents 62% of Henderson County's population (U.S. Department of Commerce 2023b). The population has steadily increased in Henderson County over the last 25 years, although at less than one percent per year (USDOT et al. 2018). Between 2022 and 2022, however, the population has decreased by 1.7 % (U.S. Department of Commerce 2023b). The Evansville Metropolitan Planning Organization estimates the region will continue to grow at less than one percent per year for the next 25 years (USDOT et al. 2018). As outlined in the LPP, the Service will strive to acquire up to 24,000 acres for Green River NWR to create a mosaic of habitats to support both migratory and endemic species, as well as priority public uses (USFWS 2019). Staff will use multiple habitat techniques to foster developing different habitats to reach the needs of a variety of species. Each area will be evaluated to determine the best wildlife habitat use. Benefitting habitats and vegetation, including vegetation of special management concern, techniques to manage the refuge include, but are not limited to: manage existing forests using harvesting, wildlife stand improvements, and/or herbicides to create diversity of structure and tree species for neotropical migratory birds and other wildlife; reforest some agricultural lands using direct seeding or planting of seedlings to create diversity of structure and tree species for neotropical migratory birds and other wildlife; create new or manage existing impoundments for moist soils and hot foods, which could include periodic soil disturbance, herbicide treatments, planting, and water level manipulation to manage diversity and abundance of food sources to benefit waterfowl, shorebirds, and wading birds; create or manage grasslands and marsh using seeding, prescribed fire, haying, mowing, and/or herbicide treatments to create and maintain open grasslands for a diversity of neotropical migration birds and other wildlife; restore altered hydrology to altered landscape to create and maintain sloughs for a diversity of species; maintain certain agricultural areas to create hot foods using seeding, discing, mowing, and/or herbicide treatments; and treatment invasive and exotic plants and animals. Over time, global climate change is likely to produce serious effects on the natural system of the refuge; however, many of these potential effects are unknown or not predictable with any specificity. At the same time, the Service recognizes that the refuge is already in a period of accelerated change; some of this change may be associated with global climate change, but other factors such as human population growth and associated development are also causal in system changes. The primary roles of the refuge in light of future change associated with global climate change and other anthropogenic factors are maintaining a functioning ecosystem for migratory and native wildlife, fisheries, and plants while monitoring to contribute to an understanding of the ongoing changes and potential for minimizing adverse impacts through active management. Monitoring of range expansions of invasive or exotic species and monitoring of composition, distribution and health of forests are also potentially valuable efforts, particularly if in coordination with regional efforts. The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact habitat and vegetation (including vegetation of special management concern) on the refuge, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for habitat and vegetation, including vegetation of special management concern.

Natural Resource Impact Topic

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)

Under Alternative A, no additional take of wildlife would occur since no hunting activities would be allowed in the near term on existing or future properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, habitat and vegetation, including vegetation of special management concern, could see a decrease in disturbance due to the change in the land use to conservation. Other properties might experience additional disturbance due to increased public use of the property; however, any future refuge public use access and opportunities would be designed to minimize adverse impacts with no population impacts anticipated. Habitat and vegetation (including special management concern vegetation) would continue to be protected and managed on existing and future refuge properties under Alternative A. In the absence of public hunting for deer, higher densities would likely have some adverse effects on habitat quality for a variety of trust species (Ellingwood and Caturano 2009). However, these impacts would be expected to be localized, since hunting activities would continue on other public and private properties under state regulations.

Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)

Any public use activity has the potential to impact habitat and vegetation, including vegetation of special management concern. Potential impacts include the trampling, damage, and killing of vegetation from walking on- and off- trail (Kuss 1986, Roovers et al. 2004, Hammitt and Cole 1998). A plant's response to trampling is heavily influenced by its morphological characteristics (Pescott and Stewart 2014, Marion et al. 2016). The brittle woody stems of shrubs and small trees and rigid stems of tall forbs are susceptible to trampling, which damages buds and flowers and reduces seed production (Cole 1995, Cole and Monz 2002, Marion et al. 2016). Grasses, sedges, and low-growing herbs are more resistant due to flexible stems and underground perennating buds (Hill and Pickering 2009, Striker et al. 2011, Marion et al. 2016). Once trampling occurs, vegetation is slow to recover; however, studies have consistently shown that the most impact occurs with initial or low use, with a diminishing increase in impact associated with increasing traffic levels (Bostrom et al. 2021). Hiking or walking can alter habitats by trampling vegetation, compacting soils, and increasing the potential of erosion. For each mile of trail, approximately 0.6 acres of soil is affected (Liddle 1975). Soil compaction makes root penetration more difficult, making it harder for seedlings to become established. In moderate cases of soil compaction, plant cover and biomass are decreased. In highly compacted soils, plant species abundance and diversity are reduced only the most resistant species survive (Liddle 1975). Hiking may impact vegetation succession as disturbance of vegetation not only results in an alteration of vegetation but also a change in light, moisture, and topographical characteristics that can reduce ground- and shrub-nesting avian species. Nesting success of ground-nesting birds is also influenced by vegetation cover and disturbance (Blakesley and Reese 1988). Similar impacts could occur from accessing hunting areas by bicycle, motor vehicle, all-terrain vehicles, and boats. Bicycle wheels can cause physical impacts on soil surfaces. Cessford (1995) reported that the shearing action of wheels damages trails, with damage increasing during wet conditions and when bicyclists travel up steep slopes. Once vegetation and organic litter are lost, exposed soils are subject to compaction, leading to increased erosion and wetland sedimentation (Cooke and Xia 2020). The consequences of compacted soil include increased soil temperatures, reduced moisture (Marion et al. 2016), reduced soil biota (Liddle 1997), and resistance to seed germination and penetration by plant roots (Alessa and Earnhart 2000). However, soil erosion is largely avoidable with good trail design and maintenance. Properly designed drainage features divert water from a trail, where vegetation and organic litter can filter out sediments (Bostrom et al. 2021). Similar impacts would be expected from the limited use of all-terrain vehicles. The Service would avoid additional soil compaction by restricting bicyclists and motor vehicles including off-road and/or all-terrain vehicles to designated trails and roads. Recreational boat traffic and mooring infrastructure can have long-term impacts on submerged aquatic vegetation abundance in freshwater and coastal systems (Sagerman et al. 2020). Boating can reduce vegetation cover and height and alter its composition (Hansen et al. 2019). The loss, fragmentation, and alteration of aquatic vegetation can affect its beneficial ecological functions. For example, several studies have shown that submerged vegetation's ability to reduce turbidity is related to its abundance and extent (Orth et al. 1999, Moore 2004, Austin et al. 2017). The refuge would limit use of boats to those operated by manual power or electric trolling motors only.

Visitors can introduce invasive plants, animals, and pathogens (Marion et al. 2006, Davies and Sheley 2007, Anderson et al. 2015) regardless of the type of visitation. Once present, invasive species can out-compete native plants and animals, thereby altering habitats (Marion et al. 2006, Anderson et al. 2015). Invasive species can alter animal and plant composition, diversity, and abundance (Eiswerth et al. 2005, Davies and Sheley 2007). These changes may reduce native forage, cover, and water sources (Eiswerth et al. 2005). Certain invasive species may even impede access to other recreational activities, such as hydrilla, which blocks waterways. Repeated visitation to any particular locale at the refuge could cause damage to vegetation and therefore, wildlife habitat. Substantial, widespread habitat degradation could through time result in negative effects to wildlife by reducing available cover, food, and nesting habitat along heavily used access routes. For hunters, impacts to wildlife habitat would be expected to be minimal as most species will have already undergone senescence or become dormant during much of the hunt seasons. Repeated use of an area by boats can damage emergent and submergent vegetation beds. Portions of, or whole plants, can be torn, sometimes by roots, and boat wakes contribute to erosion. Accidental introduction of invasive plants, pathogens, or exotic invertebrates attached to boots or boats is another source of direct adverse impacts. People can be vectors for invasive plants when seeds or other propagules are moved from one area to another. Once established, invasives can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Accidental introduction or spread of invasive plants, pathogens, or exotic invertebrates, especially along forest roads (Mortensen et al. 2009) could result in habitat alterations that may cause short- and long-term changes in wildlife communities (deMaynadier and Hunter 1995). The threat of invasive plant establishment will always be an issue requiring annual monitoring, and when necessary, treatment. In the event new undesirable invasive species are found on the refuge, staff will work to control and eradicate them and educate the visiting public about the problem through the Friends Group, news releases, and postings on the informational kiosks and other popular access points. The proposed hunting program was designed to be sustainable, supporting refuge management goals and objectives, including protection and management of habitat and vegetation, including vegetation of special management concern.

Adverse ecological effects associated with an overpopulated deer herd include lack of oak and other hardwood regeneration, a notable lack of shrub component, and a depauperate herbaceous layer. High deer densities denude the forest of shrubs and saplings, jeopardizing future regeneration and natural successional processes. As trees mature and die, there are no young trees to fill the gaps. Management and control of the deer herd is imperative to accomplish refuge objectives. If left uncontrolled, deer herds can become so numerous that they will adversely affect associated plant and animal communities, by reducing ecological diversity and negatively impacting healthy ecosystem functions. When habitat carrying capacity is exceeded, competition for limited food resources results in over-browsing by deer. Severe over-browsing alters plant species composition, distribution, and abundance, and reduces understory structural diversity. These changes may have a deleterious impact on local animal communities that depend on healthy vegetative systems for food and cover (Ellingwood and Caturano 2009). The reduction of

Natural Resource Impact Topic
the vegetation's physical structure and diversity due to overbrowsing by deer also can negatively impact landbirds (Ellingwood and Caturano 2009). Casey and Hein (1983) have found greatly reduced bird species diversity in areas with long-term, high-density populations of deer. These changes were mainly attributed to habitual landscape alteration with pronounced browse line and sparse cover caused by overbrowsing (Casey and Hein 1983). Refuge management would continue to work with the state and other partners to protect and manage natural resources and minimize adverse impacts to habitat and vegetation, including adverse from native and nonnative species. While not part of the Proposed Action, it is important to note that Service ownership and management should improve local habitat conditions for these species. As properties are acquired for Green River NWR, management practices could affect the water quality in the Ohio and Green rivers. Planned reforestation of some lands will diminish many of the nonpoint source pollution by removing nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow to protect water quality, create shade to lower water temperature, and provide a source of detritus and large woody debris for aquatic organisms and habitat for wildlife. Additionally, Green River NWR only permits manual power or electric trolling motors boating to reduce impacts to wildlife including sediment disturbance. Under Alternative B, habitat and vegetation (including special management concern vegetation) would continue to be protected and managed on existing and future refuge properties. As many of these lands were hunted under the previous landowner, we would expect the impacts under Alternative B to be minimal. The Proposed Action would provide reasonable means for helping control deer densities, which could have beneficial impacts for overall habitat quality. Alternative B would help maintain deer herds at healthy populations, minimizing adverse impacts from overbrowse by deer. Proposed hunting would be expected to result in fewer adverse impacts on native wildlife, vegetation, soils, and aesthetics on recently acquired and future acquired parcels when compared to these impacts during prior ownership. Newly acquired lands to be opened to public use activities would have clearly defined access points, restricting use to designated trails and parking areas. These restrictions should minimize negative impacts to habitat. There would be no expected noticeable adverse impacts of the Proposed Action on the habitat and vegetation, including vegetation of special management concern. In some instances, hunting would benefit vegetation and neighboring crop lands as it is used to help maintain healthy deer populations, if they were to become established, at reasonable densities. The refuge would also control access to minimize habitat degradation. The proposed hunting program was designed to be sustainable, minimizing impacts to habitat and vegetation, including vegetation of special management concern.

Table 3. Anticipated Impacts to Visitor Use and Experience

Visitor Use and Experience
Affected Environment Description With the acquisition of property for Green River NWR beginning in 2019 and with the 2023 acres totaling 2,197 acres, the refuge currently has no visitor access, facilities, or visitation. The 2019 CMP provides an overview of the future visitor services program, while the interim compatibility determinations outline the interim compatible uses on the refuge, including for wildlife observation, wildlife photography, environmental education and interpretation, bicycling for priority uses, commercially guided wildlife observation, commercial photography, cooperative farming, exercise and meditation, firewood cutting, forest management, horseback riding, recreational fishing, recreational hunting, release of rehabilitated wildlife, mobility impaired operation of off-road vehicles, research, and boating (USFWS 2019).
Environmental Trends and Planned Actions Description The Federal government owns 4.25% (1,083,104 acres) of Kentucky's total land, while the state of Kentucky owns, leases, or manages more than 85 wildlife management areas totaling over 500,000 acres (KDFWR 2019e). However, many of these Federal and state lands are located in eastern Kentucky. Of the remainder, located in western Kentucky, many areas open to public hunting is limited to quota hunting. Currently due to the limited land base of Green River NWR, additional recreational opportunities on the refuge are proposed to be limited by quota hunts and zoning/temporal restrictions. Because trends show a declining number of hunters participating in the sport, offering these additional opportunities on public lands and waters could potentially increase the overall numbers of hunters. The proposed hunting program was designed to be sustainable. Green River NWR would contribute to the increased participation of hunters, and by extension, would also contribute to associated positive economic impacts for state and local economies, by providing additional public use opportunities for hunting in western Kentucky. However, the proposed refuge hunting alone would provide only a small percentage of hunting opportunities in the larger area and would have minor beneficial economic impacts. Over time as the refuge provides access and visitor facilities as discussed in the CMP (USFWS 2019), visitors that use the refuge would partake in non-consumptive wildlife-dependent recreational activities, such as wildlife observation, photography, and environmental education and interpretation. Wildlife-dependent recreation in general would be expected to continue to be a socioeconomic driver locally, regionally, and at the state level. Offering hunting opportunities on the refuge would not be expected to decrease hunting opportunities on other areas near the refuge and would not be expected to adversely impact private land hunting. In fact, the refuge could have positive impacts on the surrounding area. The refuges' proposed hunting program was designed to provide high quality and safe outdoor recreational opportunities. As the Service continues to acquire lands and offer more visitor amenities at Green River NWR, wildlife-oriented visitation is expected to continue to increase on the refuge. The Service would continue to evaluate uses and impacts of and toward those uses to ensure compatibility requirements are met, address any conflicts between users and between user groups, assure public safety, and balance other refuge management priorities. As needed and in response to changing conditions, refuge uses would be modified to ensure that they remain compatible, including meeting quality and safety needs. As public use levels on the refuge expand across time, unanticipated conflicts between user groups may occur. In an effort to minimize conflicts with priority non-hunting recreational uses outlined in the NWRSIA, and for public safety, the Service may designate areas closed to hunting and consider space or time zoning as well. To ensure that uses continue to meet compatibility requirements, the refuge would annually re-evaluate the hunting program to determine if adjustments are needed to provide quality wildlife-dependent recreational opportunities, while promoting public safety and maintaining healthy populations of wildlife.

Visitor Use and Experience
The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact visitor use and experience on the refuge, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for visitor use and experience on the refuge.

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)
Under Alternative A, no additional take of wildlife would occur since no hunting activities would be allowed in the near term on existing or future properties. As additional properties are acquired and opened to public use activities, visitor use and experience would increase and improve as outlined in the CMP (USFWS 2019), including wildlife observation, wildlife photography, environmental education, and interpretation.

2024-2025 Estimated Total Annual Hunting Visits: 0
Post 2024-2025 (up to 24,000 acres) Estimated Total Annual Hunting Visits: 0

Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)
Under Alternative B, the Service would open existing and future refuge properties to hunting activities. Further, as outlined in the CMP (USFWS 2019), the Service would also likely provide opportunities for other public use activities on existing and future refuge properties, including wildlife observation, wildlife photography, environmental education, and interpretation. The Proposed Action would not be expected to cause major conflicts with other priority public uses due to the nature of the proposed hunting uses, consumptive use areas, closed areas, and time of season identified. Similarly, other priority public uses would not preclude the Proposed Action. Hunting, sport fishing, wildlife observation, wildlife photography, environmental education, and interpretation were previously analyzed and approved for the refuge in the CMP (USFWS 2019). As future refuge properties are acquired and public amenities are developed, many of these areas could be opened to compatible public-use activities, resulting in an increase in all priority public uses on the refuge. As public use levels likely increase through time, unanticipated conflicts between user groups may occur. These conflicts could be minimized or resolved by providing competing interest groups with alternative access opportunities. The desired outcome would be to not cause long-term conflicts among user groups. The Service would regularly evaluate its visitor services program to understand the quality of the opportunities being provided, ensure that uses continue to meet compatibility requirements, and annually re-evaluate the hunting program to determine if adjustments are needed in order to provide quality wildlife dependent recreational opportunities, while promoting public safety and maintaining healthy populations of wildlife. By maintaining hunting regulations that are often more restrictive than state standards, the refuge could promote a better diversity of management options across the landscape, including those that may favor wildlife observation, outreach, and education. Impacts associated with solitude would be expected to be minimal given temporal and spatial management techniques used to avoid conflicts among user groups. Alternative B would be expected to result in a net gain of public hunting opportunities, positively impacting the general public, nearby residents, and refuge visitors. The refuge expects increased visitation and tourism to bring additional revenues to local communities. Through these direct and indirect economic impacts, community support would likely increase for refuge property acquisition, habitat management, and public use funding. Under Alternative B, visitor use and experience would be anticipated to have beneficial impacts with the provision of high quality, public, safe, and compatible opportunities for these uses. As outlined above in Table 2, the estimates below were extrapolated from hunting activity and harvest reports, county and statewide harvest data, WMA data, statewide license data, and known interest and hunting levels at Green River NWR.

2024-2025 Estimated Total Annual Hunting Visits (793.13 acres): 200-350
- 100-150 Estimated Annual Hunting Visits for Migratory Game Birds
- 100-200 Estimated Annual Hunting Visits for Big Game

Post 2024-2025 (up to 24,000 acres) Estimated Total Annual Hunting Visits: 2,750-3,750 (harvest potentially to include additional migratory bird and big game hunts)
- 1,000-1,500 Estimated Annual Hunting Visits for Migratory Game Birds
- 1,750-2,250 Estimated Annual Hunting Visits for Big Game

Table 4. Anticipated Impacts to Refuge Management and Operations

Refuge Management and Operations
Land Use on the Refuge

Affected Environment Description

The predominant land uses that would be associated with refuge management actions in support of the refuge's conservation of wildlife and provision of recreational opportunities are reforestation and management of bottomland hardwood forests; restoration of hydrology and management of sloughs; and development and management of impoundments to provide foods for waterfowl, wading birds, and shorebirds. Consistent with its establishing purpose and as outlined in the LPP and CMP (USFWS 2019), Green River NWR will strive to conduct a broad array of activities for wildlife, recreation, and habitat management. Efforts will be made to balance competing demands for natural resources, wildlife, and public access and use. The future development of the refuge's Comprehensive Conservation Plan (refuge management plan) and any associated step-down plans will provide direction for refuge

Refuge Management and Operations

habitat management programs, visitor services activities, and wildlife management programs. Refuge planning and management, however, are a continual work in progress and evolve over time, depending on feedback and monitoring, as well as on changing values, needs, and priorities in wildlife management at the refuge, regional, and national scale.

Environmental Trends and Planned Actions Description

As outlined in the LPP and CMP (USFWS 2019), Green River NWR will strive to acquire up to 24,000 acres to create a mosaic of habitats to support both migratory and endemic species, as well as provide opportunities for priority public uses, including hunting. As the Service acquires property for the refuge, land use of those properties will change to conservation. As outlined in the LPP and CMP (USFWS 2019), the Service will work to acquire, develop, and manage a mosaic of forest, sloughs, moist soil units, and unharvested hot foods at Green River NWR. Staff will use multiple habitat techniques to foster developing different habitats to reach the needs of a variety of species. Each area will be evaluated to determine the priority wildlife habitat use. Techniques to develop the areas for neotropical migratory birds and other wildlife include, but are not limited to: management of existing forests using harvesting, wildlife stand improvements, and/or herbicides to create diversity of structure and tree species; reforestation of some agricultural lands using direct seeding or planting of seedlings; creation or management of existing impoundments for moist soils and hot foods which could have periodic soil disturbance, herbicide treatments, planting, and water level manipulation; creation or management of grasslands and marsh using seeding, prescribed fire, haying, mowing, and/or herbicide treatments; restoration of altered hydrology to altered landscape to create and maintain slough; management of agricultural fields using discing, seeding, and herbicide treatments for hot foods; and treatment of invasive and exotic plants and animals. The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact land use on the refuge, including the proposed opening and/or expanding hunting opportunities. **No significant adverse or beneficial cumulative impacts would be anticipated for land use on the refuge; properties purchased for the refuge would be managed as outlined in the LPP and CMP (USFWS 2019) and any step-down management plans (e.g., Hunting Plan) to support outlined refuge management goals.**

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)
While the Service would continue planned acquisitions and management outlined in the LPP and CMP (USFWS 2019) under Alternative A, no hunting activities would be allowed in the near term on existing or future properties for the refuge. While land uses following Service acquisition would likely change to conservation, these changes were previously analyzed and outlined in the 2019 LPP, EA, and CMP (USFWS 2019). Under Alternative A, other than what was outlined in the LPP and CMP (USFWS 2019) no additional changes to land uses would be expected.

Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)
Under Alternative B, the Service would continue planned acquisitions and management outlined in the LPP and CMP (USFWS 2019), the Hunting Plan (Section A), and the Hunting CD (Appendix C). While land uses following Service acquisition would likely change to conservation, these changes were previously analyzed and outlined in the 2019 LPP, EA, and CMP (USFWS 2019). Under Alternative B, minimal land use changes would occur through the potential future development of visitor amenities supporting hunting, such as boat ramps, parking lots, and trails. Any such future visitor amenity development would be expected to serve multiple uses, including hunting, sport fishing, wildlife observation, photography, environmental education, and interpretation. Further, any such future visitor amenity development would be required to meet all appropriate planning and compliance requirements, including public engagement (e.g., NEPA, National Historic Preservation Act, and Endangered Species Act).

Administration

Affected Environment Description

Currently, the administration of Green River NWR is through Clarks River NWR, which is located about two hours southwest of the refuge in Benton, Kentucky. Green River NWR has no full-time staff stationed on site presently. As outlined in the LPP and CMP (USFWS 2019), future programs and development of infrastructure to support them and other refuge objectives would be dependent on on-site staffing and refuge specific funding. The CMP outlined staffing for the refuge (USFWS 2019). Annual administration costs for the proposed hunting programs at Green River NWR, including salary, equipment, law enforcement, brochures, and collection of data and analysis of biological information, would total approximately $32,850. This annual estimate would not include any potential facility development or habitat enhancement and maintenance activities; any associated one-time and recurring costs for those potential developments would be separate from the funding to maintain the proposed hunting program. It is anticipated that funding would be provided to support and enhance the proposed hunting programs at Green River NWR as lands are acquired and user opportunities increase. In the interim, as properties are acquired and as public use opportunities are expanded on Green River NWR, funding and staffing support would continue from Clarks River NWR, including to support the proposed hunting programs.

The Service is exploring the implementation of a refuge-specific permit and fee structure for the 2025-26 hunting season. Implementation of a fee program will not only allow the Refuge to better track visitor numbers, harvest data, and visitor usage of the refuge, but fees garnered through this program will be used to offset expenses for road and parking lot maintenance, boundary maintenance, brochures, public education programs, law enforcement salaries, and expansion/improvements of visitor amenities. Fees would also support habitat management and enforcement activities by Federal Wildlife Officers, and other staff support.

Refuge Management and Operations

Environmental Trends and Planned Actions Description

The refuge would strive to meet the demands of the public by maintaining the proposed hunting program, as well as, meeting the purpose and goals for which the refuge was established. As public use levels expand across time, unanticipated conflicts among and within user groups may occur. To ensure that uses continue to meet compatibility requirements, the refuge would re-evaluate the hunting program to determine if adjustments are needed in order to provide quality wildlife dependent recreational opportunities, while promoting public safety and maintaining healthy populations of wildlife. Hunting season dates and regulations would be set and regulated to allow all user groups to experience solitude while on the refuge, and the refuge would have the flexibility to modify the hunting program to meet the needs of all wildlife-dependent recreational users groups. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts among and within user groups. Adverse impacts to other wildlife-dependent recreational user groups on the refuge associated with hunting activities would be expected to be insignificant over time. Monitoring and adaptive management would help ensure that the proposed hunting use remain compatible, minimizing any user conflicts, assuring public safety, and balancing other refuge management priorities. As needed, additional regulations could be developed to address conflicts and minimize impacts.

Of the potential 24,000 acres targeted to be acquired within the CPA, the Service has currently acquired approximately 2,197 acres. When future refuge parcels are acquired, these areas will be evaluated for the potential to be opened to compatible public-use activities, including hunting. Opening refuge parcels acquired since approval of the 2019 LPP to hunting would be expected to create additional hunting opportunities, as recommended by the 2019 CMP (USFWS 2019) and NWRSIA. Under the Proposed Action, a careful balance of hunting seasons has been fully examined to ensure that proposed hunting would not conflict with other wildlife-dependent recreation. The Proposed Action would have a minor beneficial impact due to the potential of acquiring additional acres, whereby these acres could be opened for proposed hunting, and the public would gain from a net increase in public use. Collectively, these impacts should result in no significant cumulative effects for all user groups.

Existing staff at Clarks River NWR would continue to manage all aspects of Green River NWR (other than land acquisition activities, which are managed out of the Service's Southeast Regional Office), including the proposed hunting program. At some point with or without the proposed hunting program, based on a sizeable property base, wildlife and habitat needs, refuge management needs, available funding, and visitor use, Green River NWR would be likely to have designated staff to manage the refuge.

Development, maintenance, and/or improvement of existing and new facilities (e.g., parking areas, roads, trails, and levees) could cause minimal short-term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. Development of future visitor amenities would be addressed in future plans, and are not included in this EA. Any facility maintenance and improvement activities would be periodically conducted to accommodate daily refuge management operations and general public use. These activities would generally be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife and minimize impacts to refuge users. During times when roads are impassible due to flood events or other natural causes, those roads, parking lots, trails, and levees impacted by the event may be closed to vehicular use. Any negative impacts to refuge facilities would be further reduced by regulating vehicle and all-terrain vehicle use on the refuge. Collectively, these impacts would result in insignificant impacts to refuge facilities and administration.

The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact refuge administration, including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated for refuge administration.

Anticipated Impacts

Alternative A: Continue Current Management (No Action Alternative)
Under Alternative A, no additional refuge administration would occur since no hunting activities would be allowed in the near term on existing or future properties. However, under Alternative A, other refuge management and public use activities would likely occur on existing and future refuge properties as outlined in the CMP (USFWS 2019), requiring refuge administration support. Existing staff at Clarks River NWR would continue to manage all aspects of Green River NWR (other than land acquisition activities, which are managed out of the Service's Southeast Regional Office), including any future hunting program. At some point, based on a sizeable property base, wildlife and habitat needs, refuge management needs, available funding, and visitor use, Green River NWR would be likely to have designated staff to manage the refuge.

Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)
Under Alternative B to support the proposed visitation of up to 3,750 annual hunting visits on up to 24,000 acres, annual administration costs for the proposed hunting program at Green River NWR, including salary, equipment, law enforcement, brochures, and collection of data and analysis of biological information, would total approximately $32,850, which would be an increase from current conditions. However, as with Alternative A, other refuge management and public use activities would likely occur on existing and future refuge properties as outlined in the CMP (USFWS 2019), requiring refuge administration support. Existing staff at Clarks River NWR would continue to manage all aspects of Green River NWR (other than land acquisition activities, which are managed out of the Service's Southeast Regional Office), including the proposed hunting program. At some point, based on a sizeable property base, wildlife and habitat needs, refuge management needs, available funding, and visitor use, Green River NWR would be likely to have designated staff to manage the refuge, including the proposed hunting program. Such staff could be shared with Clarks River NWR and/or be refuge specific. Any refuge-specific staff would likely be tasked with a variety of refuge management responsibilities, with a portion of their time likely dedicated to supporting visitor use on the refuge, including the proposed hunting program.

Table 5. Affected Socioeconomics and Environmental Justice and Anticipated Impacts

Socioeconomics and Environmental Justice
Affected Environment Description From 1970 to 2021, population grew from 35,991 to 44,329 people, a 23% increase (U.S. Department of Commerce 2023a). The 2022 population in Henderson County was 44,046, which represents one percent of Kentucky's total population of 4,512,310 (U.S. Department of Commerce 2023b). The 2022 population of the City of Henderson was 27,697, which represents 62% of Henderson County's population (U.S. Department of Commerce 2023b). The population has steadily increased in Henderson County over the last 25 years, although at less than one percent per year (USDOT et al. 2018). Between 2020 and 2022, however, the population has decreased by 1.7 % (U.S. Department of Commerce 2023b). Compared to 2021 state and national data, Henderson County has lower annual median household income ($53,635) than state ($55,454) and national ($69,021) levels, lower percentage of minorities (14.75%) than state (15.36%) and national (40.55%) levels, higher percentage of families below the poverty line (12.64%) than state (11.87%) and national (8.89%) levels, and higher median age (41 years old) than state (39 years old) and national (38.4 years old) levels. In 2021 the three industry sectors with the largest number of jobs were manufacturing (4,863 jobs), government (2,469 jobs), and retail trade (2,262 jobs). However, since 1990, the annual unemployment rate ranged from a low of 3.5% in 2000 to a high of 11.7% in 1986, with 11.5% of the population not having a high school education. In 2022, the unemployment rate in Henderson County, Kentucky was 3.8% with 27.9% of the population not working. In 2021, Henderson County had 7.2 % of the population in "deep poverty", 12.6% of families in poverty, and 5.3 % of single mother families in poverty. (U.S. Department of Commerce 2023a) While minority and low-income populations are located within Henderson County, neither alternative would be expected to place a disproportionately high, adverse, environmental, economic, social, or health effect on minority or low-income persons. None of the potential socioeconomic and environmental effects would be localized nor be placed primarily or unequally on minority and low-income population persons who reside near the refuge.
Environmental Trends and Planned Actions Description Kentucky's lush lands and waters are popular for hunting activities. The Outdoor Industry Association report from 2019 shows that annually, outdoor recreation contributes 55,707 jobs, and generates $4.5 billion in consumer spending (Outdoor Industry Association 2019). According to the 2023 Outdoor Industry Association Trends Report, participation in outdoor recreation grew to 168.1 million participants or 55% of the US Population older than 6 years old (Outdoor Industry Association 2023). Active and prospective hunters and anglers have identified public access sites, within an hour's drive from home, as a most important factor in continuing or resuming participation (KDFWR 2020b). Over one-third (37%) of licensed resident hunters use public lands to hunt in Kentucky (KDFWR 2020b). The estimated economic impact of public hunting lands in Kentucky is $182 per acre per year, which demonstrates the associated economic value in terms of tax revenues, retail expenditures and ripple effects (KDFWR 2020b). A substantial proportion of nonresident visitors also use public lands and waters for hunting a in Kentucky because of the ease of accessibility. Kentucky businesses depend on these nonresidents' tourism dollars. A KDFWR report shows an estimated 347,000 hunters each year, generating a $1.5 billion impact (KDFWR 2020b). Related to nature-based recreation, the Service analyzed trends in hunting from 2001 to 2016 [U.S. Department of the Interior (DOI) et al. 2016]. In 2016, 35.8 million fished and 11.5 million hunted and 86.0 million participated in at least on type of wildlife observation (DOI et al. 2016). Changing dynamics in a person's preference for outdoor recreation will affect visitation levels on the refuge, which consequently impacts the economy of the local communities. While hunting does provide some minor economic benefits to neighboring communities, we do not expect that implementing a hunting program at Green River NWR would have any significant impacts on the economies of the towns or county in which the refuge is located. From 2000 to 2010, Henderson County, Kentucky had a 21.6% increase in residential development with the average acreage of 6.28 acres per person in residential development. The Evansville Metropolitan Planning Organization estimates the region will continue to grow at less than one percent per year for the next 25 years (USDOT et al. 2018). Henderson County is 97.4% privately owned leaving only 2.6% of the land base in public lands owned by the state or Federal governments (U.S. Department of Commerce 2023a). The Service is unaware of any other adverse environmental trends or planned actions that would adversely impact the socioeconomics or environmental justice including the proposed hunting opportunities. No significant adverse or beneficial cumulative impacts would be anticipated.
Anticipated Impacts **Alternative A: Continue Current Management (No Action Alternative)** Under Alternative A, no hunting activities would be allowed in the near term on existing or future properties. While minority and low-income populations are located within Henderson County, this alternative would not be expected to place a disproportionately high, adverse, environmental, economic, social, or health effect on minority or low-income populations. None of the potential socioeconomic and environmental effects would be localized nor be placed primarily or unequally on minority and low-income populations near the refuge. **Alternative B: Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)** Under Alternative B, Green River NWR would be open to limited hunting. With the limited available public hunting opportunities near Henderson, Kentucky, the Proposed Action could result in a minor beneficial impact to the local economy with revenues representing a minor impact in the context of the local economy. In addition to environmental health, there also are other beneficial effects to hunting on the refuges (and future acquired lands). Increased wildlife-dependent recreation, including increased opportunities for mobility-impaired hunters and youth; beneficial use of renewable, sustainable wildlife resources; and increased appreciation for wildlife conservation, and the role of national wildlife refuges in wildlife conservation, habitat management, and restoration all ultimately result from hunting programs on NWRs. While minority and low-income populations are located within Henderson County, this alternative would not be expected to place a disproportionately high, adverse, environmental, economic, social, or health effect on minority or low-income populations. None of the potential socioeconomic and environmental effects would be localized nor be placed primarily or unequally on minority and low-income populations near the refuge.

Monitoring

The Service minimizes conflicts related to biological resources by adopting a “wildlife first” principle explicitly stated in the NWRSIA. Staff monitors wildlife population trends to ensure that target species can be hunted on the refuge without adversely affecting the populations, other wildlife, habitat, and other priority public uses. These monitoring activities include direct observation of populations, consultation with state and Service species specialists, and review of current species survey information and research. Refuge Managers may establish specific regulations for individual species or for portions of a refuge, depending on conflicts with refuge management priorities and activities and/or other wildlife-dependent recreation priorities. Permanent or periodic hunting closures for specific species, or closures of portions of a refuge may be necessary if the Refuge Manager determines that there is a specific habitat, wildlife protection, refuge management, and/or public safety conflict. The need to deploy impact minimization measures would be evaluated annually; at this time, there would be no perceived conflict or need for additional measures for the proposed hunting activities. All hunting would be conducted in accordance with all applicable state, refuge-specific, and other Federal regulations. Coordination with the public and refuge stakeholders, including KDFWR, would help promote continuity and understanding of refuge and Service resource goals and objectives, and would help assure that the decision-making process considers all interests. Continued biological monitoring of both resident and migratory wildlife and their habitats would occur on the refuge in conjunction with our state partners. The KDFWR will continue to monitor endemic wildlife populations in the state to determine the response of these wildlife species to hunting management actions. In addition, the refuge will continue to stay apprised on the status of threatened and endangered species and other species of special management concern occurring on the refuge through consultation and local monitoring. The Service would maintain compliance with hunting regulations by dispatching Service Law Enforcement Officers to perform field checks.

Adaptive management is a key part of understanding and addressing any conflicts. The need for adaptive management is compelling because our present knowledge and information on refuge habitats and species is incomplete, provisional, and subject to change as new information is acquired. Adaptive management is a proactive process of learning what works on the ground by constantly adjusting strategies, responding to new information, spatial and temporal changes, and environmental and climatic events, whether foreseen or unforeseen, measured against a clearly defined goal or set of conditions. On March 9, 2007, the Secretary of the Interior issued Order No. 3270 that provides policy on the procedures for implementing adaptive management in agencies within the U.S. Department of the Interior. As it relates to refuge management, adaptive management promotes flexible decision-making through an iterative learning process to deal with uncertainty, resulting in more effective decisions. At the refuge level, monitoring management actions and outcomes and key resources of concern are critical to the process.

Under the Proposed Action, monitoring and assessing management actions and outcomes, and tracking critical resources and indicators of environmental health would be very important. The refuge would change management actions and strategies if they do not produce the desired conditions. Any changes in management actions and strategies would be initiated in accordance with procedures outlined by the hunting and sport fishing rulemaking process and

Service Policy. Any minor changes would be documented as an important element of the adaptive management process; NEPA analysis and public involvement may or may not be warranted, depending on the specifics of the potential change. Established hunter training including ethics would help ensure that hunters continue to use good judgment related to humaneness and animal welfare. Wanton waste and Federal regulations on prohibited activities would help reduce impacts on the refuge's wildlife, plants, and cultural resources, as well as the local community.

Summary of Analysis

The purpose of this EA is to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). The proposed hunting program was based on Federal and state frameworks and was designed to be sustainable. Based on the Hunting Plan (Section A), the Hunting CD (Appendix C), the refuge-specific regulations published in the Federal Register, and the analysis in this EA, no significant adverse or beneficial direct, indirect, short-term, long-term, or cumulative impacts would be anticipated from the implementation of the Proposed Action (Alternative B). The Cumulative Impacts Report for the 2024-25 Refuge-specific Hunting and Sport Fishing Rule identified and assessed the direct, indirect, short-term, long-term, and cumulative impacts for all the proposed actions included in the 2024-25 Hunting and Sport Fishing Rule; the Cumulative Impacts Report was published in the Federal Register and is incorporated herein by reference.

The EA analyzes the entire CPA for a future hunting area on the refuge of up to 24,000 acres. The Hunting Plan (Section A), the Hunting CD (Appendix C), and/or refuge-specific hunting regulations in CFR may be updated over time to reflect changes to the hunt program and/or the opening of new properties to public hunting. As additional lands are acquired as part of Green River NWR, the Service would evaluate and potentially open to hunting activities on up to 24,000 acres as outlined in this plan, the 2019 LPP, and CMP (USFWS 2019a) and as analyzed in the EA (Section B), in accordance with procedures outlined by hunting and sport fishing rulemaking process and Service Policy.

Alternative A – Continue Current Management (No Action Alternative)

As described above, under Alternative A, hunting would not be permitted on Green River NWR in the near term. As outlined in the CMP (USFWS 2019), under Alternative A the Service would consider opening the refuge to hunting in the future. The LPP (USFWS 2019) outlined the Service's intent to add property to Green River NWR up to 24,000 acres within the designated 53,000-acre CPA, which would continue under Alternative A. Further, under Alternative A, existing and future refuge properties would serve as habitat for fish and wildlife, as well as provide outdoor recreational opportunities for other priority wildlife dependent public uses, including wildlife observation, wildlife photography, environmental education, and interpretation. Refuge management and partner activities would control adverse impacts from invasive species. Under Alternative A, no additional take of wildlife would occur since no hunting activities would be allowed in the near term on existing and future refuge properties. Depending on the pre-acquisition use of a property and following the acquisition of that property, wildlife and habitat could see a decrease in disturbance due to the change in the land use to

conservation as properties are acquired under the refuge's active acquisition program. Migratory game birds, big game, non-target wildlife and aquatic species, threatened and endangered species and other special status species, and habitat and vegetation (including vegetation of special management concern) would be expected to continue to occur on existing and future refuge properties under Alternative A. These resources would be anticipated to continue to experience neutral to minor beneficial impacts under Alternative A due to the acquisition and conservation of additional properties as outlined in the 2019 LPP and CMP (USFWS 2019).

Hunting activities would not be utilized to support or manage healthy wildlife populations or negative environmental impacts of overpopulation of some species. In addition, the refuge's ability to connect with certain segments of the public would potentially be weakened. Hunters would continue to pursue opportunities off-refuge, and thus the refuge's ability to reach those members of the public and promote natural resources conservation, environmental education, and natural resource stewardship would be limited. In addition, under Alternative A, the refuge would not align with state regulations for hunting. All other public uses on the refuge would not change and would continue to be managed as described in current plans. Wildlife and habitat could experience impacts ranging from minor adverse to minor beneficial due to potential overpopulation of certain species (e.g., white-tailed deer).

As outlined, resultant overall impacts from the implementation of Alternative A would be expected to be minor with no significant beneficial or adverse impacts anticipated.

Alternative B – Implement the 2024 Green River NWR Migratory Game Bird and Big Game Hunting Plan (Proposed Action)

As described above, Alternative B would open hunting on the current approximately 793.13 acres and future acquired refuge properties up to 24,000 acres within the 53,000-acre CPA. While Alternative B would represent the take of individual animals, population impacts would be expected to be negligible since the proposed hunting program was designed to be sustainable, adaptable, and based on state and Federal regulations and frameworks. Depending on the pre-acquisition use of a property and following the acquisition of that property, wildlife and habitat could see a decrease in disturbance due to the change in the land use to conservation as properties are acquired under the refuge's active acquisition program. Migratory game birds, big game, non-target wildlife and aquatic species, threatened and endangered species and other special status species, and habitat and vegetation (including vegetation of special management concern) would be expected to continue to occur on existing and future refuge properties under Alternative B. These resources would be anticipated to continue to experience neutral to minor beneficial impacts under Alternative B due to existing acquisition and conservation of additional properties as outlined in the 2019 LPP and CMP (USFWS 2019) and due to management under the proposed hunting program. Further, minor beneficial impacts would be expected for visitor use and experience under Alternative B. The proposed hunting activities, under this proposal, would potentially manage local deer populations at levels more favorable for the species' overall health. Habitat and crop damage by deer would be reduced. Refuge management and partner activities would continue to control or eliminate adverse impacts from invasive species, such as the feral hog. Further, neutral impacts would be anticipated for Federally listed species; an Endangered Species Act Section 7 consultation was developed with the determination that the Proposed Action would not likely conflict with recovery

or protection of these species. The refuge would limit or exclude hunting activities where biological concerns exist or arise. Hunting opportunities can potentially cause conflicts with other users; however, this impact would be expected to be minor. The Service would continue to evaluate uses and impacts of and toward those uses to ensure compatibility requirements are met, address any conflicts between users and between user groups, assure public safety, and balance other refuge management priorities. As needed and in response to changing conditions, refuge uses would be modified to ensure that they remain compatible, including meeting quality and safety needs. As public use levels on the refuge expand across time, unanticipated conflicts between user groups may occur. In an effort to minimize conflicts with priority non-hunting recreational uses outlined in the NWRSIA, and for public safety, the refuge may designate areas closed to hunting and consider space or time zoning as well. To ensure that uses continue to meet compatibility requirements, the refuge would annually re-evaluate the hunting program to determine if adjustments are needed to provide quality wildlife-dependent recreational opportunities, while promoting public safety and maintaining healthy populations of wildlife.

Compared to Alternative A, Alternative B best meets the stated purpose and need. Alternative B implements portions of the CMP (USFWS 2019) related to providing high quality opportunities for compatible hunting on the refuge. Further, Alternative B, as outlined in the Hunting Plan (Section A) and the Hunting CD (Appendix C) and as analyzed in this EA, would conserve, manage, and restore fish, wildlife, and plant resources; conserve Federally listed species; conserve wetlands to maintain public benefits and help meet international obligations; provide sanctuary for migratory birds; and provide opportunities for wildlife-oriented recreation. The Proposed Action in Alternative B serves the NWRSIA; evaluates compatibility of the proposed hunting uses; and protects the biological integrity, diversity, and environmental health of the refuge. Serving goals outlined in the CMP (USFWS 2019) and helping to make hunting more accessible to the American public, Alternative B helps align the refuge with state hunting regulations and serves stated Service priorities and mandates.

All proposed methods of approved take have been developed with the objective of humanely dispatching the animal. Approved hunts, including dates, time, and method of take, while involving the killing of individuals, are developed with humaneness and animal welfare concerns. Established hunter training, hunter ethics, and hunter responsibilities would help ensure hunters continue to use good judgment related to humaneness and animal welfare. Over time, harvest information collected, by either the Service or KDFWR, and refuge public use evaluations would allow the Service to make any needed modifications to refuge-specific regulations and the hunting program to assure that these proposed uses serve refuge purposes, refuge management priorities and goals, and public safety needs, and continue to meet compatibility requirements.

The proposed hunting program was designed to be sustainable, meeting compatibility requirements, under Federal and state frameworks, within outlined hunting visit and species take estimates. Based on the analysis within the EA, the Hunting Plan (Section A) and the Hunting CD (Appendix C) would provide the Service the flexibility to meet compatibility requirements, provide opportunities for high quality hunting, and assure public safety, while also responding to the acquisition of new properties and the potential to include those properties in the hunting program, responding to changing wildlife needs, responding to changing habitat

conditions, and adapting refuge management and public use programs accordingly to serve refuge purposes and the mission of the NWRS.

Alternative B, Proposed Action, would offer new hunting opportunities for the public and would implement and achieve a number of objectives in the LPP and CMP. The Service previously determined in the 2019 LPP and CMP that hunting is compatible with the purpose(s) of Green River NWR and the mission of the NWRS. The estimated annual costs to administer the proposed hunting program would be approximately $32,850. The associated costs would primarily involve issuing refuge-specific hunt permits, brochures, law enforcement, and staff activities.

As outlined, resultant overall impacts from the implementation of Alternative B would be expected to be minor with no significant beneficial or adverse impacts anticipated. Alternative B best meets the stated purpose and need.

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State Coordination

National wildlife refuges, including the Green River NWR, conduct hunting programs within the framework of state and Federal regulations. Authorized hunting opportunities for the Green River NWR would be conducted under state regulations; however, the refuge may elect to be more restrictive to support refuge management goals. In development of this proposal, the Service coordinated with the state partners and reviewed the operations and regulations for neighboring state wildlife management areas and other refuges to find consistency where possible. Building on the 2019 LPP and CMP and building on the Service Hunt Opportunity Tool coordination activities with the state, the refuge began coordination with the state of Kentucky in 2021 for the current proposal, including working with the local State Biologist and KDFWR Conservation Officers. Refuge staff contacted the local State Biologist for specific population and take estimates when developing this EA. Refuge staff would continue to coordinate with the KDFWR to address implementation of hunting activities. The Service sent a scoping letter to KDFWR on March 31, 2021 with a follow up letter on January 4, 2024 to engage it early in the planning process for the proposed hunting program at Green River NWR to provide comments and input into the development of this proposal to open hunting on the refuge and to help align state and refuge-specific regulations, where possible. The EA, draft Hunting Plan (Section A), draft Hunting CD (Appendix C), and draft refuge-specific regulations were made available for public review and comment in summer 2024 nationally through the Federal Register and locally through the refuge's website (https://www.fws.gov/refuge/green-river) and Facebook page (https://www.facebook.com/GreenRiverNWR/). Separate notice was also provided in 2024 to KDFWR. The Service will continue to consult and coordinate with KDFWR to maintain regulations and programs that align with the state as much as possible, as well as to monitor

populations of game species and set harvest goals. The Service will strive to maintain consistent regulations with each state agency whenever applicable.

Disease management activities, including chronic wasting disease, will continue to be coordinated through the states. The Association of Fish and Wildlife Agencies Technical Report on Best Management Practices for the Prevention, Surveillance, and Management of Chronic Wasting Disease (Gillin and Mawdsley 2018) provides guidance and will help the Service and states to work jointly to implement a response plan for any other wildlife disease that surfaces in this area.

The Service would continue to work with the state of Kentucky to ensure safe and enjoyable recreational hunting opportunities on the refuge. Hunter participation and harvest data may be collected by the state or the refuge. Law enforcement officers from Service and the state would work together to patrol the refuge, safeguarding hunters, visitors, game and nongame species, and other resources.

Tribal Consultation

The Service sent scoping letters to nine potentially interested Native American Tribes (i.e., Cherokee Nation, Chickasaw Nation, Delaware Nation of Oklahoma, Eastern Band of Cherokees, Miami Tribe of Oklahoma, Osage Nation, Peoria Tribe of Indians of Oklahoma, Quapaw Tribal Business Committee, and United Keetoowah Band of Cherokee Indians) on March 31, 2021 with follow up letters on January 4, 2024 to engage them early in the planning process for the proposed hunting program at Green River NWR. The EA, draft Hunting Plan (Section A), draft Hunting CD (Appendix C), and draft refuge-specific regulations were made available for public review and comment in summer 2024 nationally through the Federal Register and locally through the refuge's website (https://www.fws.gov/refuge/green-river) and Facebook page (https://www.facebook.com/GreenRiverNWR/). Separate notice was also provided in spring 2024 to the nine above mentioned Native American Tribes.

Public Outreach

In addition to coordination with KDFWR and the above-mentioned Native American Tribes, the Service also provided national and local notice. The EA, draft Hunting Plan (Section A), draft Hunting CD (Appendix C), and draft refuge-specific regulations were made available for public review and comment in 2024 nationally through the Federal Register and locally through the refuge's website (https://www.fws.gov/refuge/green-river) and Facebook page (https://www.facebook.com/GreenRiverNWR/). All comments received were reviewed in the development of final documents. All comments received become part of the official public record. We will handle all requests for such comments in accordance with the Freedom of Information Act and NEPA regulations in 40 CFR §1506.6(f). Only one comment was received on the refuge's hunt package; it was non-substantive.

The refuge maintains a contact list, for information bulletin purposes, to local newspapers, radio, and television news stations. Special announcements and articles may be released in conjunction with hunting seasons. In addition, information about proposed hunting and sport would be available on the Green River NWR website (https://www.fws.gov/refuge/green-river),

social media pages (https://www.facebook.com/GreenRiverNWR/), and the Service's Find Your Hunt website (https://www.fws.gov/refuges/hunting/map/).

Determination

This section will be filled out upon completion of any public comment period and at the time of finalization of the Environmental Assessment.

☒ The Service's action will not result in a significant impact on the quality of the human environment. See the attached **"Finding of No Significant Impact."**

☐ The Service's action **may significantly affect** the quality of the human environment and the Service will prepare an Environmental Impact Statement.

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Appendix A. Other Applicable Laws, Regulations, and Executive Orders

Multiple other statutes, Executive Orders, and regulations apply; the most notable are included here.

Cultural Resources

- American Indian Religious Freedom Act, as amended, 42 USC §§1996 – 1996a; 43 CFR Part 7
- Antiquities Act of 1906, 16 USC §§431-433; 43 CFR Part 3
- Archaeological Resources Protection Act of 1979, 16 USC §§470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7
- National Historic Preservation Act of 1966, as amended, 16 USC §§470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810
- Paleontological Resources Protection Act, 16 USC §§470aaa – 470aaa-11
- Native American Graves Protection and Repatriation Act, 25 USC §§3001-3013; 43 CFR Part 10
- Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971)
- Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)

Fish and Wildlife

- Bald and Golden Eagle Protection Act, as amended, 16 USC §§668-668c, 50 CFR 22
- Endangered Species Act of 1973, as amended, 16 USC §§1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450
- Fish and Wildlife Act of 1956, 16 USC §§742 a-m
- Lacey Act, as amended, 16 USC §3371 et seq.; 15 CFR Parts 10, 11, 12, 14, 300, and 904
- Migratory Bird Treaty Act, as amended, 16 USC §§703-712; 50 CFR Parts 10, 12, 20, and 21
- Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)

Natural Resources

- Clean Air Act, as amended, 42 USC §§7401-7671q; 40 CFR Parts 23, 50, 51, 52, 58, 60, 61, 82, and 93; 48 CFR Part 23
- Wilderness Act, 16 USC §1131 et seq.
- Wild and Scenic Rivers Act, 16 USC §1271 et seq.
- Executive Order 13112 – Invasive Species, 64 Fed. Reg. 6183 (1999)

Water Resources

- Coastal Zone Management Act of 1972, 16 USC §1451 et seq.; 15 CFR Parts 923, 930, 933
- Federal Water Pollution Control Act of 1972 (commonly referred to as Clean Water Act), 33 USC §1251 et seq.; 33 CFR Parts 320-330; 40 CFR Parts 110, 112, 116, 117, 230-232, 323, and 328
- Rivers and Harbors Act of 1899, as amended, 33 USC §401 et seq.; 33 CFR Parts 114, 115, 116, 321, 322, and 333
- Safe Drinking Water Act of 1974, 42 USC §300f et seq.; 40 CFR Parts 141-148
- Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977)
- Executive Order 11990 – Protection of Wetlands, 42 Fed. Reg. 26961 (1977)

Appendix B. Figures

Figure 1. Conservation Partnership Area for Green River National Wildlife Refuge

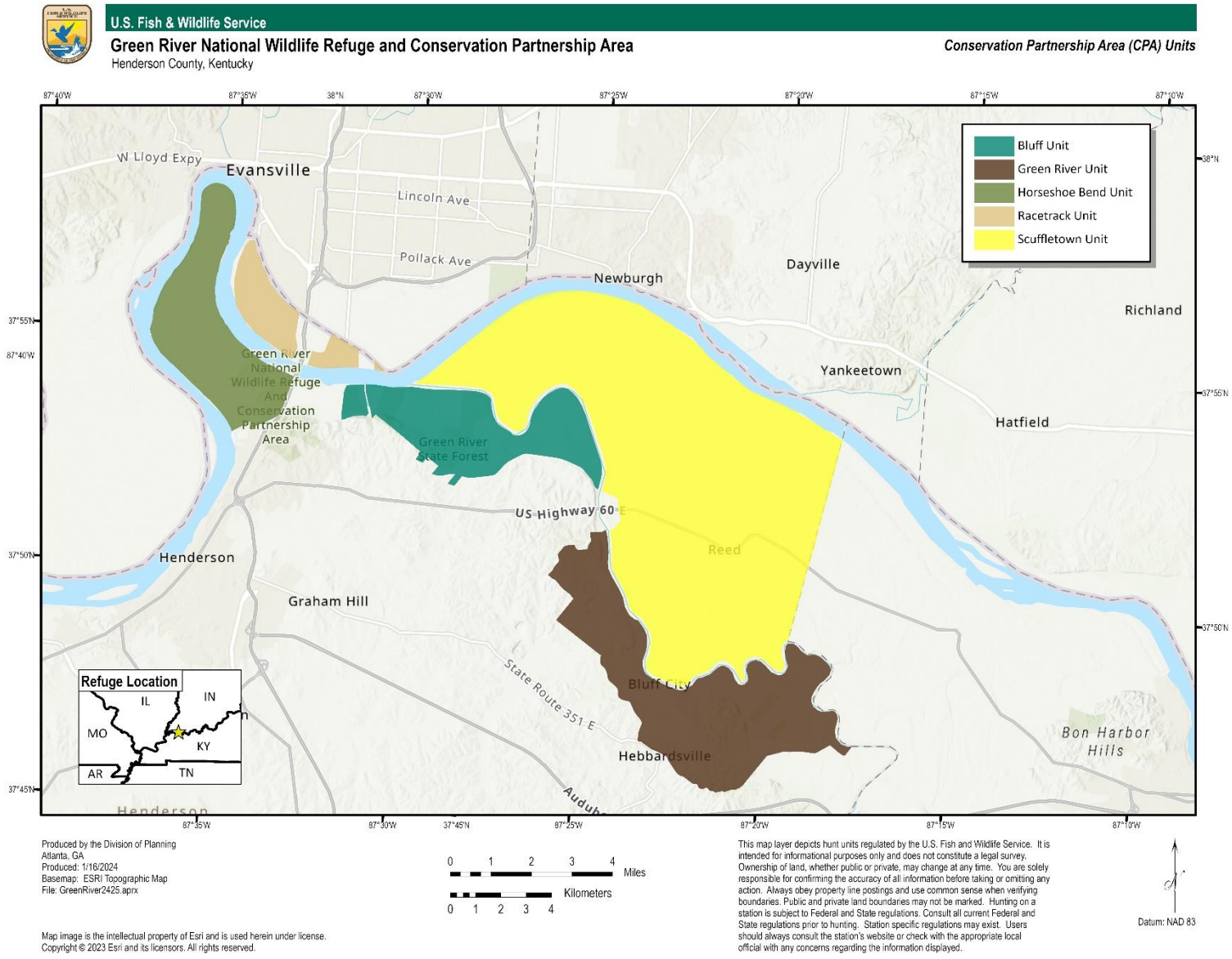


Figure 2. Proposed Green River NWR Hunt Units

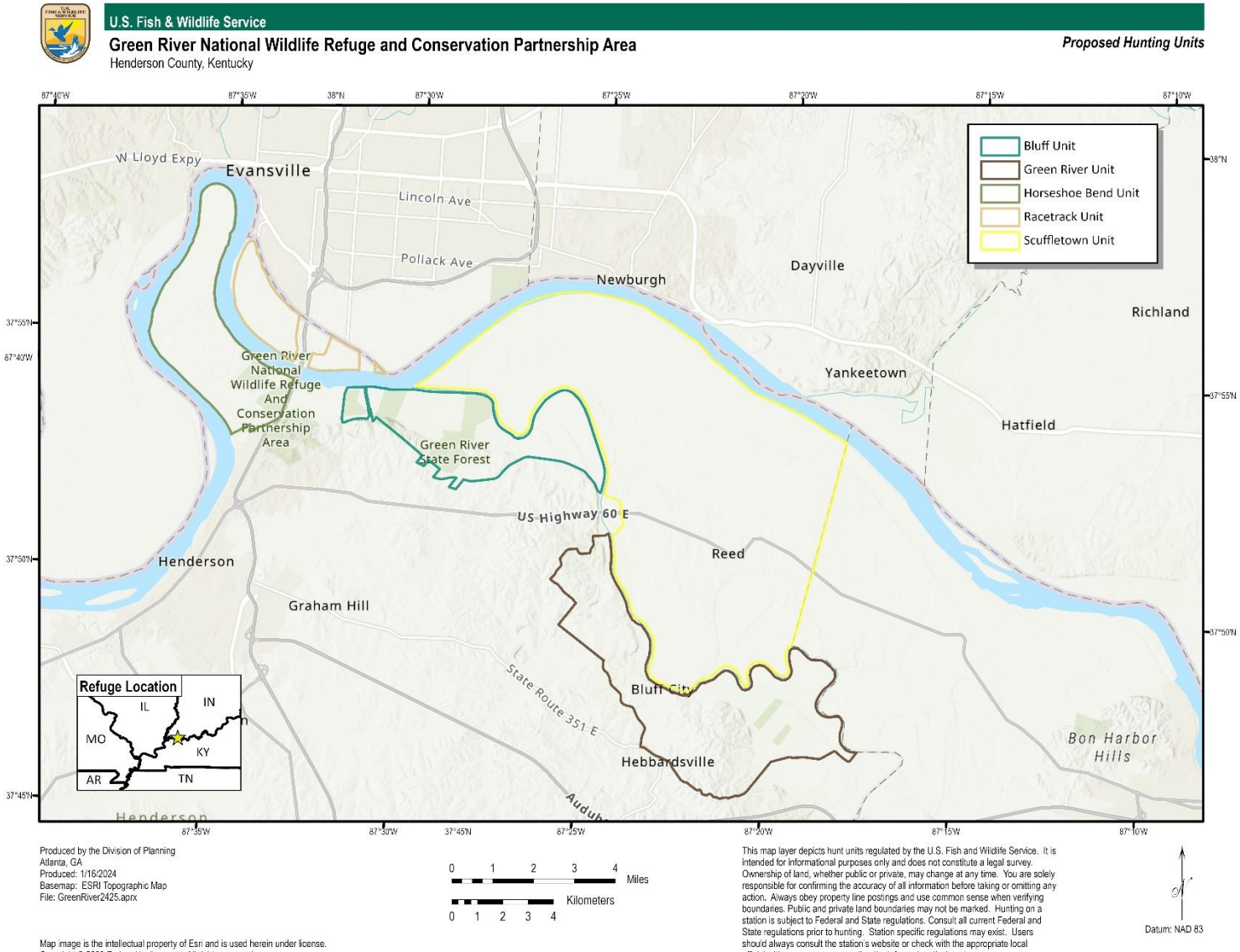
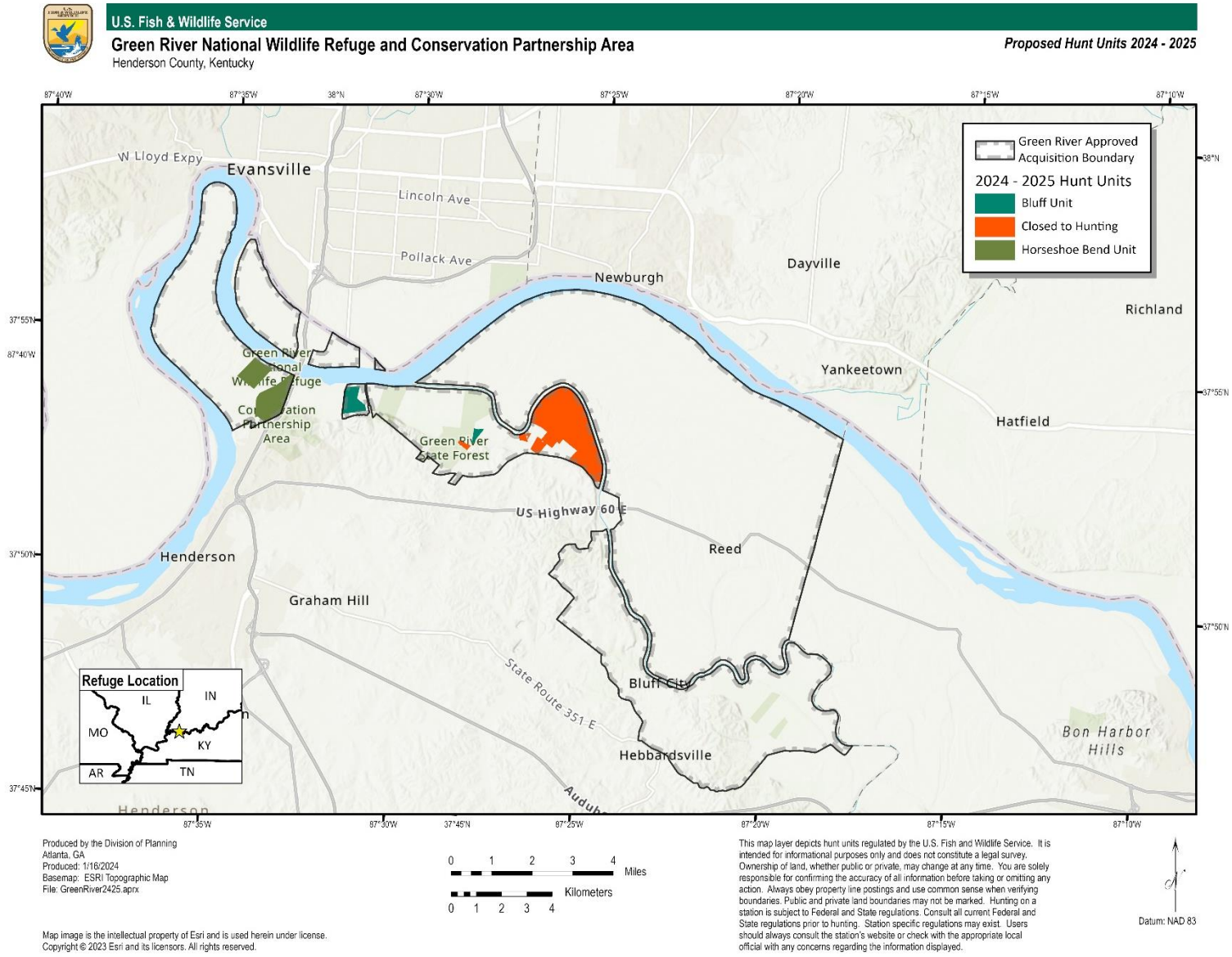


Figure 3. Green River NWR Properties to be Opened to Hunting in 2024-25



Appendix C. Hunting Compatibility Determination for Green River National Wildlife Refuge

Appendix D. Finding of No Significant Impact