Environmental Assessment for Key Cave NWR Sport Hunting Decision Document Package

Date: February 7, 2019

This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposed action and complies 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 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment.

Proposed Action:

The U.S. Fish and Wildlife Service (Service) is proposing to open opportunities for white-tailed deer, American woodcock, snipe, crow, starling, feral hog, coyote, bobcat, gray fox and red fox on the Key Cave National Wildlife Refuge (NWR) in accordance with the Wheeler NWR Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (USFWS 2007). Currently, all 1,060 acres of Key Cave NWR are open to hunting dove, quail, rabbit, opossum, and raccoon. This plan includes maintaining the seasons for the aforementioned species and adding ten other species (white-tailed deer, American woodcock, snipe, crow, starling, feral hog, coyote, bobcat, gray fox and red fox) to the hunt program on the same 1,060 acres.

Hunting is consistent with the 2007 Wheeler NWR Complex CCP and EA. Hunting of game species on Key Cave NWR, when those activities are determined to be compatible with other Refuge purposes and activities, is considered a useful tool to aid the State in management of wildlife populations. Providing the public with quality, safe hunting opportunities on the Refuge was identified as an objective in the CCP (Objective 4.1, Wheeler NWR Complex CCP/EA pg. 119). Hunting opportunities would include, but not be necessarily limited to: white-tailed deer, feral hog, squirrel, rabbit, raccoon, opossum, mourning dove, and northern bobwhite quail, consistent with sound, biological principles, in support of the Complex's wildlife management objectives, and in accordance with Refuge System policy and State and Federal laws.

This proposed action is often iterative and evolves over time during the process as the agency refines its proposal and learns more from the public, tribes, and other agencies. Therefore, the final proposed action may be different from the original. The final decision on the proposed action will be made at the conclusion of the public comment period for the EA Draft Key Cave NWR Hunting Regulations

Background:

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The refuge was established pursuant to the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742a-742j, not including 742d-l), and the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544), to ensure that the biological integrity of Key Cave, Collier Cave, Collier Bone Cave, and their common aquifer remains intact. The primary purpose of the refuge is:

"…for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to terms of any restrictive or affirmative covenant, or condition of servitude" *(16 U.S.C. 742f (b1), Fish and Wildlife Act of 1956*) and to;

"…to conserve (A) fish or wildlife which are listed as endangered species or threatened species" *(Endangered Species Act of 1973, as amended).*

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is to:

"... 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"

The NWRSAA mandates the Secretary of the Interior in administering the System to (16 U.S.C. 668dd(a)(4):

- 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 U.S.C. 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.

Therefore, it is a priority of the Service to provide for wildlife-dependent recreation opportunities, including hunting and fishing, when those opportunities are compatible with the purposes for which the refuge was established and the mission of the National Wildlife Refuge System.

Public hunts began on Key Cave NWR in 1998. Those hunts provided opportunities for the public to hunt dove, northern bobwhite quail, rabbit, squirrel, raccoon and opossum on Mondays, Tuesdays, Fridays and Saturdays during their respective season(s). The proposed action will be maintaining the current hunting programs and expanding opportunities on Key Cave NWR.

Purpose and Need for the Proposed Action:

The purpose of this proposed action is to provide compatible wildlife-dependent recreational opportunities on Key Cave NWR. The need of the proposed action is to meet the Service's priorities and mandates as outlined by the NWRSAA to "recognize compatible wildlife-dependent recreational uses as the priority general uses of the NWRS" and "ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses." 16 U.S.C. 668dd(a)(4)). The proposed action is needed to implement the Sport Hunting Plan for Key Cave NWR which would provide the public with a high quality recreational experience and provide the refuge with a wildlife management tool to promote the biological integrity of the refuge.

Alternatives Considered

The alternatives considered for hunting on Key Cave National Wildlife Refuge. These alternatives are the A) proposed action, which implements the Refuge's 2019 Sport Hunting Management Plan and, B) no action Alternative.

Alternative A – Proposed Action: 2019 Sport Hunting Plan for Key Cave NWR

The proposed action would allow hunting of deer, American woodcock, feral swine, bobcat, coyote, and grey and red fox (via incidental take during deer, and potentially other appropriate seasons) in addition to the exiting hunts authorized by the 2007 Sport Hunting Plan (USFWS 2007) on the entire 1,060-acre refuge (Figure 1). All or parts of the refuge may be closed to hunting at any time if necessary for public safety, to provide wildlife sanctuary, or for administrative reasons.

The refuge has prepared a hunt plan (Section A), which is presented in this document as the Proposed Action Alternative.

A. Under the Proposed Action Alternative, **Areas to be Opened to Hunting**

The Refuge is considered one hunt unit; the entire 1,060-acre Refuge is open to hunting. There are no restricted hunting zones on the Refuge. See attached Map:

- Seven-Mile Island Wildlife Management Area (WMA) Hunt Permit/ Map

B. Species to be Taken, Hunting periods, Hunting Access

- MIGRATORY BIRD HUNTING: Currently, migratory bird hunting opportunities is limited to mourning dove and white-winged dove. Dove hunting is allowed throughout the Refuge acreage; however, most hunting takes place in the agricultural fields; either in the fields planted to sunflowers or in harvested corn fields.

  The Refuge proposes to open the entire refuge acreage (1,060 acres) for a hunt season on the following migratory bird species: American woodcock, snipe and crow. Demand for hunting these species is limited and the anticipated take on these three species is expected to be low. Population numbers for these species are unknown on the Refuge and all three species are defined as migratory birds, monitored and managed by the U.S. Fish and Wildlife Service.

  The woodcock has experienced a decline in population, -0.56% to -1.0% per year during the years 1968-2017. The major causes of these declines are believed to be degradation and loss of habitat on breeding and wintering grounds (Seamans, M.E., and R.D. Rau. 2017). Hunting of woodcock is not believed to contribute to the declining population of this species. This assertion was tested in a study conducted by the U.S. Geological Patuxent Wildlife Research Center in 2005 (McAuley *et al.* 2005). Results showed no significant differences in woodcock survival between hunted and non-hunted areas. Furthermore, the authors concluded that hunting was not having a considerable impact on woodcock numbers in the Northeast (McAuley *et al.* 2005). Therefore, opening a hunt season for American woodcock on the Refuge is not likely to have an adverse effect on their population numbers.

  Population sizes and trends in abundance of snipe are unknown at the national or flyway level (Case, D. J. and Danna D. McCool. 2009). Loss of suitable habitat (e.g., salt marsh and freshwater emergent marsh) for this species through changes to landscape management, hydrological regime, industrial, commercial, and residential development has likely resulted in the decline of the snipe (Dahl, T.E. 2006). However, due to the Refuge having limited suitable habitat for snipe, opening a hunting season for this species on the Refuge is not likely to have an adverse effect on the population numbers.

  Crows and starlings have been declared nuisance species by many State agencies. In Alabama, crows and starlings are not regulated, other than on WMA properties. The crow and starling season normally runs concurrently on the WMA.

  For the three, aforementioned species, the Refuge adopts the hunting seasons, bag limits, and methods of take (i.e., weaponry, ammunition) as specified in the annual Alabama Hunting & Fishing Digest, the Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife, and on the Seven-Mile Island WMA Hunt Permit. However, the Refuge restricts the hunt to only four days a week: Monday, Tuesday, Friday and Saturday, during each particular species' hunt season. These hunts will be administered

by USFWS and the Alabama Department of Conservation and Natural Resources (ADCNR).

The Refuge is closed to waterfowl hunting, but has the potential to provide ducks and geese with a sanctuary when the 38-acre sinkhole holds water. The sinkhole has not held water since the winter of 2000-2001. If the sinkhole fills with water and if waterfowl are utilizing it during dove or woodcock hunting seasons, some minor disturbances from hunters may occur as they make visual and/or audible contact with waterfowl using the Refuge sinkhole. This manner of disturbance to waterfowl is tolerable given the anticipated low density of hunters using the refuge during the winter and the limiting habitat factor that the sinkhole has not held water in over 16 years.

- SMALL GAME HUNTING: Rabbit, squirrel, opossum, raccoon, and quail seasons will be maintained on the Refuge (refer to the "Alabama Hunting & Fishing Digest" and/or the "Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife" publications and the Seven-Mile Island WMA Hunt Permit for further details on hunting regulations, seasons, bag limits, weaponry and ammunition restrictions for each of the aforementioned species).

- BIG GAME HUNTING: White-tailed deer and feral hog hunting will occur throughout the 1,060-acre Refuge. The Refuge adopts the hunting seasons, bag limits, and methods of take (i.e., weaponry, ammunition) as specified in the annual Alabama Hunting & Fishing Digest; the Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife; and the Seven-Mile Island WMA Hunt Permit. However, the Refuge restricts the hunt to only four days a week: Monday, Tuesday, Friday and Saturday, during each particular species' hunt season. Legal hunting hours are daylight hours (defined as beginning 30 minutes before official sunrise time until 30 minutes after official sunset time) only, and will be administered by USFWS and ADCNR. Hunters will self-navigate to their hunt location.

- Coyote, bobcat, gray fox and red fox hunting will occur during any other authorized Refuge Hunting Season using weaponry and ammunition approved for those hunts. No dogs allowed.

C. Hunter Permit Requirements (if applicable)

Hunters will be required to have in their possession a valid Alabama Hunting License, as well as a signed Seven-Mile Island WMA Hunt Permit on which the hunting season dates, bag limits, legal times for hunting, legal arms and ammunition, and information or additional restrictions are specified to legally hunt on Key Cave NWR. See "Hunter Permit Application and/or Registration Procedures" below.

This alternative offers increased opportunities for public hunting/fishing and fulfills the Service's mandate under the National Wildlife Refuge System Improvement Act of 1997. The Service has determined that the hunt plan is compatible with the purposes of the Key Cave NWR and the mission of the NWRS.

Alternative B – No Action Alternative: 2007 Sport Hunting Plan for Key Cave NWR

Under this alternative, dove and small game hunting of would continue on the entire 1,060-acre refuge (Figure 1), which has been ongoing since the Finding of No Significant Impact in 1998 and 2007 (USFWS 1998 and USFWS 2007). All or parts of the refuge may be closed to hunting at any time if necessary for public safety, to provide wildlife sanctuary, or for administrative reasons.

Affected Environment

The Key Cave NWR was established on January 3, 1997. It is located in Lauderdale County in northwest Alabama (Figure 1). Key Cave NWR is part of the Wheeler NWR Complex which consists of: Wheeler NWR (37,200 acres); Key Cave NWR (1,060 acres); Sauta Cave NWR (264 acres); and Fern Cave NWR (199 acres); plus the five FSA conservation easements (Coley Tract - 161 acres, Pepper Tract - 49 acres, Rollins Tract - 20 acres, Speed Tract #1 - 83 acres, and Speed Tract #2 - 63.43 acres). All together, properties in the Wheeler Complex total approximately 38,900 acres (Figure 2). Key Cave NWR contains 1,060 acres that is bound on the south by Tennessee Valley Authority lands administered by the Alabama Department of Conservation and Natural Resources – Division of Wildlife and Freshwater Fisheries as Seven-Mile Island Wildlife Management Area, and on the west, east and north by privately-owned land.

Key Cave NWR consists of rolling hills, upland forests, and cropland. Approximately 295 acres are in row crop production (corn, soybeans, or wheat) under a Cooperative Farm Agreement, 327 acres are in early-successional fields or native warm season grasses (big bluestem, little bluestem, indiangrass, sideoats grama, switchgrass, and eastern gamagrass), 122 acres of former cropland have been planted to hardwoods, 30 acres of erosion drainages are being restored to grassland or hedgerow habitat, 16 acres are managed as shallow water areas, 75 acres are being converted to an oak savanna, and the remaining 195 acres consist of upland forested land dominated by oaks and hickories. Key Cave NWR is located within the Interior Low Plateau physiographic region and is part of the Lower Tennessee-Cumberland Ecosystem.

Table 1 provides additional, brief descriptions of each resource affected by the proposed action.

For more information regarding the affected environment, please see Chapter II, Refuge Overview of the Wheeler NWR Complex (USFWS 2007), which can be found here and is incorporated by reference: https://ecos.fws.gov/ServCat/Reference/Profile/1468

Environmental Consequences of the Action

This section analyzes the environmental consequences of the action on each affected resource, including direct and indirect effects. This EA only includes the written analyses of the environmental consequences on a resource 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.

Table 1 provides:

1. A brief description of the affected resources in the proposed action area;
2. Impacts of the proposed action and any alternatives on those resources, including direct and indirect effects.

Table 2 provides a brief description of the cumulative impacts of the proposed action and any alternatives.

Impact Types:

- *Direct effects* are those which are caused by the action and occur at the same time and place.
- *Indirect effects* are those which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- *Cumulative impacts* result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions.

TABLE 1. AFFECTED NATURAL RESOURCES AND ANTICIPATED IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

NATURAL RESOURCES	
AFFECTED RESOURCE	**ANTICIPATED DIRECT AND INDIRECT IMPACTS**
American Woodcock, American snipe and other migratory birds Key Cave NWR provides habitat for a variety of migratory and resident wildlife species. One hundred and sixty-six bird species have been sighted on the refuge. Several grassland-dependent bird species are commonly seen during the breeding season, including dickcissel, grasshopper sparrow, field sparrow, and northern bobwhite. Other commonly seen birds are eastern meadowlarks, mourning doves, horned larks, and eastern bluebirds. In addition, northern harriers can be seen flying low over refuge grasslands searching for prey during the winter months and short-eared owls can also be seen occasionally during the winter.	**Alternative A:** The woodcock has experienced a decline in population, -0.56% to -1.0% per year during the years 1968-2017. The major causes of these declines are believed to be degradation and loss of habitat on breeding and wintering grounds (Seamans, M.E., and R.D. Rau. 2017). Hunting of woodcock is not believed to contribute to the declining population of this species. This assertion was tested in a study conducted by the U.S. Geological Patuxent Wildlife Research Center in 2005 (McAuley *et al.* 2005). Results showed no significant differences in woodcock survival between hunted and non-hunted areas. Furthermore, the authors concluded that hunting was not having a considerable impact on woodcock numbers in the Northeast (McAuley *et al.* 2005). Therefore, opening a hunt season for American woodcock on the Refuge is not likely to have an adverse effect on their population numbers. Population sizes and trends in abundance of snipe are unknown at the national or flyway level (Case, D. J. and Danna D. McCool. 2009). Loss of suitable habitat (e.g., salt marsh and freshwater emergent marsh) for this species through changes to landscape management, hydrological regime, industrial, commercial, and residential development has likely resulted in the decline of the snipe (Dahl, T.E. 2006). However, due to the Refuge having limited suitable habitat for snipe, opening a hunting season for this species on the Refuge is not likely to have an adverse effect on the population numbers.

	Crows and starlings have been declared nuisance species by many State agencies. In Alabama, crows and starlings are not regulated, other than on WMA properties. The crow and starling season normally runs concurrently on the WMA. For the three, aforementioned species, the Refuge adopts the hunting seasons, bag limits, and methods of take (i.e., weaponry, ammunition) as specified in the annual Alabama Hunting & Fishing Digest, the Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife, and on the Seven-Mile Island WMA Hunt Permit. However, the Refuge restricts the hunt to only four days a week: Monday, Tuesday, Friday and Saturday, during each particular species' hunt season. These hunts will be administered by USFWS and the Alabama Department of Conservation and Natural Resources (ADCNR). The Refuge is closed to waterfowl hunting, but has the potential to provide ducks and geese with a sanctuary when the 38-acre sinkhole holds water. The sinkhole has not held water since the winter of 2000-2001. If the sinkhole fills with water and if waterfowl are utilizing it during dove or woodcock hunting seasons, some minor disturbances from hunters may occur as they make visual and/or audible contact with waterfowl using the Refuge sinkhole. This manner of disturbance to waterfowl is tolerable given the anticipated low density of hunters using the refuge during the winter and the limiting habitat factor that the sinkhole has not held water in over 16 years. The active breeding season for most birds (with the exception of winter breeding raptors) is within April-July. Hunting will not occur within this period therefore no conflict is expected. **Alternative B:** Additional mortality of individual hunted animals would not occur under this alternative. Increased disturbance by hunters to hunted wildlife would not occur; however, other public uses that cause disturbance, such as wildlife observation and photography, would still be permitted.
Small and Big Game and Other Species Other commonly seen wildlife species include cottontail rabbits, coyotes, white-tailed deer, gray squirrels, bobcat, grey fox and red fox. Recently, feral hogs have been documented on Key Cave NWR. These invasive animals have been destroying habitat and damaging crops. Observations indicate that the population of feral hogs is increasing at Key Cave NWR. Current efforts to control the feral hogs by complex staff	**Alternative A**: Rabbit, squirrel, opossum, raccoon, and quail seasons will be maintained on the Refuge (refer to the "Alabama Hunting & Fishing Digest" and/or the "Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife" publications and the Seven-Mile Island WMA Hunt Permit for further details on hunting regulations, seasons, bag limits, weaponry and ammunition restrictions for each of the aforementioned species). White-tailed deer and feral hog hunting will occur throughout the 1,060-acre Refuge. The Refuge adopts the hunting seasons, bag limits, and methods of take (i.e., weaponry, ammunition) as specified in the annual Alabama Hunting & Fishing Digest; the Alabama Regulations Relating to Game, Fish, Furbearers and Other Wildlife; and the Seven-Mile Island WMA Hunt Permit. However, the Refuge restricts the hunt

and volunteers have been unsuccessful.	to only four days a week: Monday, Tuesday, Friday and Saturday, during each particular species' hunt season. Legal hunting hours are daylight hours (defined as beginning 30 minutes before official sunrise time until 30 minutes after official sunset time) only, and will be administered by USFWS and ADCNR. Hunters will self-navigate to their hunt location. Coyote, bobcat, gray fox and red fox hunting will occur during any other authorized Refuge Hunting Season using weaponry and ammunition approved for those hunts, and will be maintained within State set limits. **Alternative B**: Coyote, bobcat, red and grey fox may become overpopulated, depredating turkey, turtle, and songbird nests at high rates. Under this alternative, feral hog populations would increase dramatically. Non-native hogs are predators of small mammals and deer fawns as well as ground-nesting birds such as turkeys. Increased disturbance to non-hunted wildlife would not occur on the refuge; however, non-consumptive users would still be permitted to access this land, which might cause disturbance to wildlife.
Other Wildlife and Aquatic Species Many other wildlife species can be found on Key Cave NWR, including a wide variety of invertebrates, amphibians, reptiles, and mammals.	**Alternative A:** Increased hunting may result in additional short-term disturbance to wildlife over a larger area, since additional species would be open to hunting. This includes temporary displacement of wildlife from foot traffic moving through the area. Incidental take of feral hogs will lessen impacts of feral hogs on other wildlife species, such as: nest depredation; competition for resources; direct consumption of small mammals, amphibians, and snakes; and so forth. In comparison to Alternative B, disturbance effects to wildlife may be negligible in the short-term and are not likely to significantly affect wildlife populations. Moderate beneficial effects are expected by reducing feral hog populations and improving deer herd management. **Alternative B:** Increased disturbance to non-hunted wildlife would not occur on the refuge; however, non-consumptive users would still be permitted to access this land, which might cause disturbance to wildlife.
Threatened and Endangered Species and Other Special Status Species Key Cave NWR is the only known location of the Alabama cavefish, a small, blind colorless fish which inhabits the underground pools in Key	**Alternative A:** While Alabama cavefish and gray bats may occur in the units that are hunted, these species reside underground in the cave, no hunting occurs in or near the cave nor during nesting season, so there will be no impacts to the these species under this alternative. **Alternative B:**

Cave. Only nine specimens are known to exist in scientific collections, and few individuals have been observed in the wild. Considering the limited distribution and the few species seen or collected, this species appears to be one of the rarest of all North American freshwater fish (Boschung and Mayden 2004). The cave is also a priority one maternity cave for the endangered gray bat. Gray bat emergence counts are conducted annually at Key Cave and have averaged 33,400 gray bats since 1997. Approximately 12,000-13,000 young gray bats are produced annually by this maternity colony. In addition to the gray bat, two species of blind crayfish also inhabit Key Cave.	Because current public use levels on the refuge would remain the same, there would be no increased chance of adversely affecting threatened and endangered species.
Vegetation (including vegetation of special management concern) *Karst Formations (Caves and Sinkholes)* Key Cave NWR is located in an area of karst topology that has numerous sinkholes and caves that surround the refuge. When the refuge was first established in 1997, it had a 38-acre sinkhole pond on the property. However, the sinkhole has been dry since September 2000, only holding a small amount of water for very short durations. Just south of the property boundary for Key Cave NWR lies the entrance to Key Cave. To the southeast of the refuge lie the entrances to Collier Cave and Collier Bone Cave. All three cave entrances are located on lands owned by TVA and are sometimes underwater when the Pickwick Reservoir is flooded. *Shallow Water Areas* In 1999, two small (1-2 acre) shallow water areas (SWAs) were constructed to capture runoff surface water within grassed waterways. Then during late 2001 and early 2002, a larger (approximately 10- acre) SWA was constructed, which included a 700-foot dike and a 24-inch screwgate WCS. All of these SWAs were	**Alternative A:** Negligible effect expected to vegetation from trampling of hunters, because of the low number of users and days of use expected. Moderate, beneficial impacts to vegetation and to a variety of species habitat to the decrease in overabundance of deer and feral hogs, which was causing adverse impacts to vegetative community shifts. **Alternative B:** Under this alternative, the refuge would not be opened to deer and hog hunting. When deer are overpopulated, they overbrowse their habitat, which can change the structure and plant composition of a forest. Young tree seedlings (1-9 years old) can be killed by overbrowsing. Bottomland hardwood forests are a threatened ecosystem. Failure to establish this forest would have negative impacts on future resident and non-resident wildlife populations as well as the purpose of the refuge. Feral hogs are considered a threat to the biological integrity of the refuge because they are an extremely invasive, non-native species. By rooting and wallowing, feral hogs destroy wildlife habitat. Damage includes erosion along waterways and wetlands and the loss of native plants. Although hunters would not be traversing across the refuge, which could cause damage to individual plants by trampling vegetation, non-consumptive users would still be able to walk throughout the area.

designed to provide habitat for waterfowl and other wetland associated wildlife, as well as to capture silt from erosion before it enters the Key Cave aquifer. However, none of the SWAs on Key Cave NWR have held much water since they were constructed. *Dry (Upland) Hardwood Forest* As of this date, a Forest Management Plan has not been developed for Key Cave NWR, but as per the June 18, 1997 Regional Reforestation of Federal Lands Memorandum, the refuge has reforested approximately 122 acres along the refuge's southern boundary. Native hardwoods, such as white oak, northern red oak, water oak, Shumard oak, cherrybark oak, common persimmon, and flowering dogwood, were planted with the help of volunteers. Including this additional acreage, Key Cave NWR has approximately 317 acres of upland hardwood forests. *Oak Savanna Forest* An oak savanna forest is a community of 10 percent or more scattered oak trees and shrubs above a layer of grasses and forbs. The trees are spread out so that there is no closed canopy and the grasses and forbs receive plenty of sunlight. It is a transition ecosystem between grassland and woodland environments, so it is an important habitat for both woodland and prairie species. On Key Cave NWR, a 75-acre oak woodlot tract is currently being converted to oak savanna habitat to help promote a diversity of wildlife species. *Cropland* Currently at Key Cave NWR, one farmer plants approximately 295 acres annually through a cooperative farming agreement in which a portion of the crop remains in the fields as rent. Rent portions and crops grown are similar to the farming program at	

Wheeler NWR to support a variety of wildlife. *Grasslands* Native warm season grassland (NWSG) restoration has been on-going since the establishment of Key Cave NWR in 1997. Currently, approximately 327 acres of NWSG consisting of big bluestem, little bluestem, indiangrass, sideoats grama, switchgrass, and eastern gamagrass are maintained for management of grassland-dependent and early successional species. Prescribed fire is used to maintain the NWSG.	
Geology & Soils Key Cave NWR exists along the northern shore of the Pickwick Reservoir of the Tennessee River and resides within the Limestone Valley physiographic subdivision. It is also underlain by Tuscumbia Limestone, whose weathering has produced many karst features, including numerous springs, sinkholes, and several underground cave systems. There are very few exposures of bedrock except for locations along the bluff line at the margin of the Tennessee River (Aley 1990). Topology is comprised of flat to gently rolling upland terraces with slopes ranging from one to fifteen percent. Elevation of the land surface generally ranges from about 500 to 580 feet above MSL (Kidd et al., 2001). The majority of the soils located on lands within the Wheeler Complex have developed from the weathering of high-grade limestone, the deposition of alluvial material from the Tennessee River, or the deposition of colluvium from weathering sandstones in the higher elevations. Soils are generally acidic, low in organic matter, and are usually fertile.	**Alternative A:** Some disturbance to surface soils, topography and geology would occur on the refuge. Vehicles would only be allowed on designated roadways and designated parking areas. **Alternative B:** No new effects.

Air Quality The Air Division of the Alabama Department of Environmental Management (ADEM) monitors all of these pollutants for counties in the State of Alabama. The closest monitoring stations located near refuges within the Wheeler Complex are located in Colbert, Madison, and Morgan Counties. In general, data from 2004 indicate that the Alabama counties within the Tennessee River Valley are meeting all of the NAAQS and have recently been designated in attainment with the new 8-hour ground-level ozone and fine particulate matter (PM2.5) standards (TVA 2003). In fact, Huntsville is presently an attainment area for all federal air quality standards (City of Huntsville 2004). However, the Huntsville area remains close to the 8-hour ozone and fine particle standards, which were promulgated by EPA in 1997. The revised ozone standard is more stringent than the former 1-hour standard, and attainment of the new fine particulate matter standard (the PM2.5 NAAQS) is similarly far more difficult than attainment of the PM10 standard. In the Huntsville area, ongoing pollution control efforts and favorable meteorological conditions over the past three years have resulted in ambient pollutant concentrations below the levels specified in the new federal standards (City of Huntsville 2004).	**Alternative A:** Minimal effect to air quality due to visitor's vehicle emissions. **Alternative B:** No additional effects to air quality.
Water Resources In 2001, the Service installed semi-permeable membrane devices (SPMD) for water sampling inside Key Cave. These devices consist of low-density polyethylene tubes filled with triolein (fish lipid). The device sequesters lipid-soluble contaminants (i.e., organochlorines, PAH, pyrethroids, and several herbicides) from the water column. They may be left in place for extended periods of time; therefore the devices are effective in detecting	**Alternative A:** The effects of hunter use on natural water resources and hydrology would be negligible. **Alternative B:** No Effect.

contaminants at very low concentrations and at capturing episodic events (e.g., temporary increases in contaminant concentrations due to stormwater runoff). The SPMDs were retrieved and replaced in the Cave every two months (six times per year) in order to develop baseline water quality data. At the time of this publication, the samples have not yet been analyzed.

Water quantity measurements for the Key Cave aquifer have been conducted in the past by other agencies; however accurate data are unavailable at this time. Key Cave NWR does not have any perennial streams that currently flow across the refuge. Before the Service took ownership of the land, several large erosion ditches were present. Complex management installed three shallow water areas and rehabilitated drainage channels to reduce erosion, thus enhancing the water quality for endangered species inhabiting Key Cave. A 38-acre sinkhole lake once held water on the refuge; however it has been dry since September 2000. Numerous sinkholes are found in close proximity to the refuge and are an integral component of groundwater recharge to Key Cave, Collier Cave, and Collier Bone Cave.

In 1990, the Ozark Underground Laboratory conducted a study to determine the underground recharge area for the cave system. The recharge area was divided into four potential risk areas: high hazard, moderately high hazard, moderate hazard, and low hazard (Aley 1990). The refuge resides in the high hazard risk area of the Key Cave aquifer Recharge Zone.

The recharge zone is approximately 16 square miles and is located in karst topology underlain by Tuscumbia limestone. Surface drainage is poor and essentially all runoff water enters the groundwater system by sub-surface drainage. Only a portion of the water in the Key Cave aquifer

passes through Key Cave. The estimated mean annual discharge from the entire Key Cave aquifer is approximately 15 to 20 cubic feet per second (cfs). This flow rate is subject to precipitation events and can fluctuate greatly (Aley 1990). Waters from Pickwick Lake seldom, if ever, flow into Key Cave. Instead, waters from Key Cave discharge into the Lake through Coffee Slough.	

TABLE 2. AFFECTED VISITOR USE AND EXPERIENCE AND ANTICIPATED IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

VISITOR USE AND EXPERIENCE	
AFFECTED RESOURCE	**ANTICIPATED DIRECT AND INDIRECT IMPACTS**

Nearby Wheeler NWR was part of the 2006 Banking on Nature Report summarizing outdoor recreation activity in the Northern Alabama area. Visitor recreation expenditures totaled nearly $12 million, with fishing related expenditures accounting for $5.9 million (49 percent) (Carver and Caudill 2006). Non-consumptive related expenditures totaled $4.7 million and hunting related expenditures totaled $1.4 million (Carver and Caudill 2006) . Non-residents accounted for 55 percent ($6.6 million) of all expenditures (Carver and Caudill 2006).	**Alternative A** As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that time zoning (e.g., establishment of separate use periods) is an effective tool in eliminating conflicts between user groups. Conflicts between hunters and non-consumptive users might occur but would be mitigated by time (only hunting four days each week and non-hunting season). The public would be allowed to harvest additional renewable resources, and the refuge would be promoting a wildlife-oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Key Cave NWR and the National Wildlife Refuge System and public demand for hunting would be met. The public would also have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community. This alternative would also allow the public to enjoy hunting at no or little cost in a region where private land is leased for hunting. This alternative would allow youth the opportunity to experience a wildlife-dependent recreation, instill an appreciation for and understanding of wildlife, the natural world and the environment and promote a land ethic and environmental awareness. **Alternative B:** The public would not have the opportunity to harvest additional renewable resources, participate as fully in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established, have an increased awareness of Key Cave NWR and the National Wildlife Refuge System; nor would the Service be meeting public use demand. Public relations would not be enhanced with the local community.

TABLE 3. AFFECTED CULTURAL RESOURCES AND ANTICIPATED IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

CULTURAL RESOURCES	
AFFECTED RESOURCE	**ANTICIPATED DIRECT AND INDIRECT IMPACTS**

This northern region of Alabama has long been settled and used by humans, in good part because of its mild winters and abundant fish and wildlife resources. Prior to European settlement in the early 1800s, the Tennessee Valley was controlled by Native Americans of the Shawnee, Chickasaw, or Cherokee Tribes (Joiner 1987). Some European families moved into the area prior to the time when the Chickasaws and Cherokees gave up their claims to the area in 1806, but there were not enough settlers in the valley to form a county until 1808. Early settlers found an almost unbroken forest blanket over the valley and it provided the needed building materials to support the development of Madison County, the most populated area in the territory that would later become Alabama. Cultural resource inventories within the Wheeler Complex have been conducted on approximately 15,000 acres at Wheeler NWR (Futato 1979 and Shaw 2000), approximately 10 acres at Sauta Cave NWR, and approximately five acres at Fern Cave NWR. As of this date, no known cultural resource inventories have been conducted at Key Cave NWR. The cultural resource inventories to date revealed four archaeological sites that were deemed of important cultural value on Wheeler NWR (Shaw 2000).	**Alternative A and B:** Under the both alternatives, hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge.

TABLE 4. AFFECTED REFUGE MANAGEMENT AND OPERATIONS AND ANTICIPATED IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

REFUGE MANAGEMENT & OPERATIONS	
AFFECTED RESOURCE	**ANTICIPATED DIRECT AND INDIRECT IMPACTS**
Refuge Administration and Facilities (roads, trails, parking areas, dikes)	**Alternative A**: Additional damage to parking areas and walking trails due to hunter use during wet weather periods might occur. The current hunt program on

	the refuge has shown these impacts to be minimal. There would be some costs associated with law enforcement for a hunting program. These costs should be minimal relative to total refuge operations and would not diminish resources dedicated to other refuge management programs. **Alternative B**: Maintenance or improvement of existing facilities (i.e. parking areas, roads, and trails) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation under both alternatives.

TABLE 5. AFFECTED SOCIOECONOMICS AND ANTICIPATED IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

SOCIOECONOMICS	
AFFECTED ENVIRONMENT	**ANTICIPATED DIRECT AND INDIRECT IMPACTS**
Local and regional economies Lauderdale County forms the northwest corner of Alabama with 100 miles of frontage on the Tennessee River. The earliest economic enterprise was the farming of cotton in the early 1800's. Cotton is still the major crop and agriculture continues to be the dominant land use. Population estimates in Lauderdale County was 92,318 with 132 residents per square mile. This represents a -0.4% population change. The median household income is $43,125 and the poverty rate is 17.3%. The entire state of Alabama on the other hand population estimate is 4,863,300 with 94.4 residents per square mile. This represents a positive population change from 2010-2016 of 1.7%. The median household income in Alabama is $43,623 with a 18.5 % poverty level. (U.S. Census Bureau 2016) Hunting is a traditional form of outdoor recreation for many people in Lauderdale County and for some households, hunting participation provides food at a much cheaper cost.	**Alternative A:** Hunting visitation is anticipated to result in 150 more visits to the refuge. Any associated revenues represent a negligible/minor impact in the context of the Lauderdale County economy dominated by agriculture production. **Alternative B:** There would be no change in expenditures to local and regional economies under the No Action Alternative.

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.	The Service has not identified any potential high and adverse environmental or human health impacts from this proposed action or any of the alternatives. The Service has identified no minority or low income communities within the impact area. Minority or low income communities will not be disproportionately affected by any impacts from this proposed action or any of the alternatives.

Cumulative Impact Analysis:

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

TABLE 6. ANTICIPATED CUMULATIVE IMPACTS OF THE PROPOSED ACTION AND ANY ALTERNATIVES

Other Past, Present, and Reasonably Foreseeable Activity Impacting Affected Environment	Descriptions of Anticipated Cumulative Impacts
Hunting	**Migratory Birds** The U.S. Fish and Wildlife Service, working with partners, annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of 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. Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for

	the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Key Cave NWR is within the Mississippi Flyway. The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, the Service developed a schedule for migratory game bird hunting regulations that is more efficient and will provide dates much earlier than was possible under the old process. This will facilitate planning for the States and all parties interested in migratory bird hunting. Beginning in the summer of 2015, with the development of the 2016–17 hunting seasons, we are using a new schedule for establishing our annual migratory game bird hunting regulations. We will combine the current early- and late-season regulatory actions into a single process, based on predictions derived from long-term biological information and harvest strategies, to establish migratory bird hunting seasons much earlier than the system we have used for many years. Under the new process, we will develop proposed hunting season frameworks for a given year in the fall of the prior year. We will finalize those frameworks a few months later, thereby enabling the State agencies to select and publish their season dates in early summer. This rulemaking is part of that process. Because the Service is required to take abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. 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. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. 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 frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In

	fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. At Key Cave NWR, season length is more restrictive for than the State allows. 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 environmental assessments, the most recent being "Duck Hunting Regulations for 2018–19," with its corresponding May 2018, finding of no significant impact. The programmatic document, as well as the separate environmental assessment, is available on our website at *https://www.fws.gov/birds/index.php*. **Big Game** Deer hunting does not have regional population impacts due to restricted home ranges. The average home range of a male deer in Mississippi is 1,511 ± 571 S.D. hectares. (Mott et al. 1985). Therefore, only local impacts occur. The ADCNR recorded deer harvest rates on Seven-Mile Island WMA, located adjacent to the refuge, and the data suggests hunter interest has decreased over time (Toole, D. personal communication 2017). Harvest and survey data confirm that decades of deer hunting on surrounding public lands have not had a local cumulative adverse effect on the deer population. The average 2018-19 statewide harvest is approximately 84,042 deer. The refuge estimates an additional maximum 25 deer/year would be harvested under the proposed action, representing only 0.0003% of the average annual state harvest. Expansion of hunting this species on 1,060 acres of refuge lands for a very limited deer hunt should not have negative cumulative impacts on the deer herd.
Non-hunted Wildlife	Non-hunted wildlife would include non-hunted migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory bats, butterflies and moths, these species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed. 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, chickadees, etc. The cumulative effects of disturbance to non-hunted migratory birds under the proposed action are expected to be negligible for the following reasons. Hunting season would not coincide with the nesting season. Long-term future impacts that could occur if reproduction was reduced by hunting are therefore not relevant. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users. The cumulative effects of disturbance to non-hunted wildlife under the proposed action are expected to be negligible for the following reasons. Small mammals, including bats, are inactive during winter when hunting season occurs. These species are also 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. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative negative effects on reptile and amphibian populations. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. The refuge has estimated current hunter density on peak days to be no more than 1 hunter per 29.5 acres. During the vast majority of the hunting season, hunter density is much lower (1 hunter/295 acres). Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to parking areas and the harassment or taking of any wildlife other than the game species legal for the season is not permitted. Although ingestion of lead-shot by non-hunted wildlife could be a cumulative impact, it is not likely due to rotation of dove fields and limited hunting pressure at Key Cave NWR. Some species of bats, butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. These species are in torpor or have completely passed through Alabama by peak hunting season in Nov-Jan. Some hunting occurs during September and October when these species are migrating; however, hunter interaction would be commensurate with that of non-consumptive users.
Endangered and Threatened Species	Endangered and threatened species that utilize the refuge are gray bats and Alabama cavefish. A Section 7 Evaluation is being conducted in association with this assessment for opening hunting on Key Cave NWR. As noted above, the endangered species occurring on the refuge are the Alabama cavefish and gray bat, which are both found in Key Cave. The entrance to the cave is fenced to prevent unauthorized entry. The cave entrance is adjacent to the refuge on land managed by the Alabama Department of Conservation and Natural Resources as the Seven Mile Island Wildlife Management Area (WMA). Hunting season occur with no adverse impacts to the endangered species in Key Cave. Proposed hunting will not occur in close proximity to Key Cave, which is used by gray bats at this time. Upon emergence from the cave, bats generally fly

	south, away from the refuge to forage along the Tennessee River. Minimal disturbance to gray bats is expected from hunting. During the majority of the proposed hunting seasons (November - February) gray bats are not using Key Cave and are hibernating in different caves. Disturbance to gray bats from hunting is unlikely, as are disturbances to the Alabama cavefish during any hunting season. Since hunting seasons were initiated during 1998 no known disturbances to these species has occurred as a result of hunting. Refer to the Section 7 Evaluation for the 2019 Sport Hunting on Key Cave NWR for more information.
Other wildlife-dependent recreation facilities (i.e. road and trail development and use)	The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under the proposed action those facilities most utilized by hunters are: parking areas and trails. Maintenance or improvement of existing facilities (i.e. parking areas, roads, and trails) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. Siltation barriers will be used to minimize soil erosion, and all disturbed sites will be restored to as natural a condition as possible. During times when roads are impassable due to flood events or other natural causes those roads, parking areas and trails impacted by the event will be closed to vehicular use.
Wildlife-dependent Recreation	As public use levels expand across time, unanticipated conflicts between user groups may occur. The Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem and provide quality wildlife-dependent recreational opportunities. Experience has proven that time zoning (e.g., establishment of separate use periods, only hunting four days each week) is an effective tool in eliminating conflicts between user groups. The level of recreation use and ground-based disturbance from visitors would be largely concentrated at trails and parking areas. This could have a negative effect on nesting bird populations. However, the hunting season is during fall and winter and not during most birds' nesting period. The opportunities for hunting would continue under the proposed action. Hunting would be used to keep resident wildlife in balance with the habitat's carrying capacity, resulting in long-term positive impacts on wildlife habitat. The refuge would control access under this alternative to minimize wildlife disturbance and habitat degradation, while allowing hunting as a

	compatible wildlife-dependent recreation.
Cultural Resources	Hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge. In fact, hunting meets only one of the two criteria used to identify an "undertaking" that triggers a federal agency's need to comply with Section 106 of the National Historic Preservation Act. These criteria, which are delineated in 36 CFR Part 800, state: 1- an undertaking is any project, activity, or program that can alter the character or use of an archaeological or historic site located within the "area of potential effect;" and 2- the project, activity, or program must also be either funded, sponsored, performed, licensed, or have received assistance from the agency. Consultation with the pertinent State Historic Preservation Office and federally recognized Tribes are, therefore, not required.
Refuge Environment and Community	The refuge expects no sizeable adverse impacts of the proposed action on the refuge environment which consists of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur during hunts; however impacts would be minimal. The refuge would also control access to minimize habitat degradation. The refuge expects impacts to air and water quality to be minimal and only due to refuge visitors' automobile vehicle emissions and run-off on road and trail sides. The effect of these refuge-related activities, as well as other management activities, on overall air and water quality in the region are anticipated to be relatively negligible, compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws. Impacts associated with solitude are expected to be minimal given time zone management techniques, such as only hunting four days each week, used to avoid conflicts among user groups. The refuge would work closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources; however, no indirect or direct impacts are anticipated. The hunts would continue public hunting opportunities and have positive impacts on the general public, nearby residents, and refuge visitors. The refuge expects increased visitation and tourism as the hunt continues bringing in additional revenue to local communities but not a significant increase in overall revenue in any area.
Other Past, Present, Proposed, and	Cumulative effects on the environment result from incremental effects of a proposed action when these are added to other past, present, and

Reasonably Foreseeable Hunts and Anticipated Impacts	reasonably foreseeable future actions. While cumulative effects may result from individually minor actions, they may, viewed as a whole, become substantial over time. The proposed hunt plan has been designed so as to be sustainable through time given relatively stable conditions. Changes in refuge conditions, such as sizeable increases in refuge acreage or public use, are likely to change the anticipated impacts of the current plan and would trigger a new hunt planning and assessment process. The implementation of any of the proposed actions described in this assessment includes actions relating to the refuge hunt program (see 2019 Sport Hunting Plan for Key Cave NWR). These actions would have both direct and indirect effects however; the cumulative effects of these actions are not expected to be substantial. The refuge does not foresee any changes to the proposed action in the way of increasing the intensity of hunting in the future.

Mitigation Measures and Conditions

A. Biological Conflicts

Refer to the Decision Document Package, Section 7 Evaluation.

Hunting is not likely to occur in close proximity to Key Cave (nearest agricultural field is approximately 0.5 kilometers), which in some years could be used by gray bats into mid-October. However, upon emergence from the cave, gray bats generally fly to the Tennessee River to forage and do not forage around the refuge's upland fields. Gray bats are nocturnal; therefore, it is unlikely hunters would encounter these species during legal daylight hunting hours. Hunting on the adjacent Seven-Mile Island WMA has not affected the gray bats in Key Cave, thus no conflicts are anticipated with hunting on the Refuge. Hunting is not anticipated to adversely affect the cave-dwelling Alabama cavefish.

B. Public Use Conflicts

The refuge attracts some non-consumptive users. Hunting will be limited to four days each week, thus providing opportunities for non-consumptive uses during the hunting season and minimizing conflicts between hunters and non-consumptive users.

There are no known conflicts between other groups of consumptive users. The greatest competition for hunting areas occurs during the opening week of dove season. This issue is usually self-regulating.

C. Administrative Conflicts

The labor and funding available to administer this hunt are adequate at the present time. Currently, labor intensive data is not collected during the hunts. Staggered tours of duty by law enforcement personnel minimizes labor shortages.

Monitoring

Annual review of this activity will be conducted to minimize over-harvest of a particular species, assure public safety, assure that wildlife disturbance does not become a factor in critical wildlife use areas, and provide protection of overall refuge resources. Refuge hunting seasons will be set within the season constraints set forth by the State of Alabama. An Environmental Assessment will remain on file at the Complex headquarters as part of the Hunting Plan. Participants are required to obtain a refuge hunting permit and conform to State laws and refuge regulations. Users must observe refuge regulations.

Enforcement of Refuge regulations to protect trust resources and provide for a quality recreational opportunity will occur via regular patrols by refuge law enforcement officers. Additionally, conservation law enforcement officers from the Alabama Division of Wildlife and Freshwater Fisheries will patrol the refuge and assist Service officers when needed.
The hunting program will cost approximately $25,000 annually, which includes cost for publishing the hunting permits, conducting law enforcement patrols, and maintaining parking lots. Participation in the hunting program is estimated to be between 30 and 100 visitors annually. No offsetting revenues for hunting are collected.

List of Sources, Agencies and Persons Consulted:

The Refuge reviewed the operations and regulations for the neighboring Seven-Mile Island WMA to find consistency where possible. The Refuge first reached out to the State on June 19, 2017, to discuss this Hunt Plan. We worked with the local State biologist and conservation officers early in the development of the plan. On February, 7, 2019, we asked for review by the ADCNR State office to help adjust our plan to align, where possible, with State management goals. We specifically asked the State if we could continue to include the Refuge in the State hunt registration program to ensure consistency and reduce operation costs. The State office reviewed and concurred with the Refuge specific regulations and provided the Refuge a letter of concurrence from the ADCNR Wildlife Section Chief on February 12, 2019. We have continued to consult and coordinate on specific aspects of the Hunt Plan. The State is in agreement with the Refuge's Hunt Plan, as it will help meet State objectives.

Wheeler NWR Complex and Seven-Mile Island WMA will continue to work together to ensure quality, safe, and enjoyable recreational hunting opportunities. Hunter participation and harvest data are collected by the State and law enforcement officers from both Wheeler NWR Complex and ADCNR work together to patrol Key Cave NWR, safeguarding hunters, visitors, and both game and nongame species.

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