

Appendix C. Cooperative Farming Compatibility Determination for Key Cave National Wildlife Refuge Compatibility Determination

Key Cave National Wildlife Refuge, Cooperative Farming

Refuge Use Category

Agriculture, Aquaculture, and Silviculture

Refuge Use Types

Farming (Cooperative)

Refuge

Key Cave National Wildlife Refuge (NWR, refuge)

Refuge Purposes and Establishing and Acquisition Authorities

Key Cave NWR was established in 1997 under the authority of the Fish and Wildlife Act of 1956, the Endangered Species Act of 1973, and the National Wildlife Refuge Administration Act of 1966, to ensure that the biological integrity of Key Cave, Collier Cave, Collier Bone Cave, and their common aquifer remains intact:

“... to conserve fish, wildlife, and plants, including those which are listed as endangered species or threatened species...” 16 United States Code (USC) §1534 (Endangered Species Act of 1973)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 USC §742f(a)(4) (National Wildlife Refuge Administration Act of 1966)

“... 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) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (Refuge System) 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 (Pub. L. 105-57; 111 Stat. 1252).

Description of Use

Is this an existing use?

Yes. Cooperative farming has occurred on the refuge since establishment. Cooperative farming on Key Cave NWR was most recently found compatible in a 2018 determination for the Wheeler NWR Complex (USFWS 2018). This use was evaluated separately for Key Cave NWR in association with objectives and strategies within the Spatial Habitat and Species Plan and associated Environmental Assessment (SHSP/EA) and to provide a more comprehensive and robust evaluation of short and long term effects regarding the establishing authorities and purposes of this refuge.

This use was evaluated with the support of the Service's Programmatic Environmental Assessment for Use of Genetically Engineered Agricultural Crops (GECs) for Natural Resource Management on National Wildlife Refuges in the Southeastern United States / Finding of No Significant Impact (PEA/FONSI, USFWS 2020) that gave the Service the flexibility to consider the use of GECs and non-GECs in rotation, as appropriate and guided by the overall Refuge System purposes; refuge goals and objectives; and other policy, guidance, and decision documents.

What is the use?

Cooperative farming is an economic use whereby a refuge contracts with a non-Service entity to provide agricultural services, especially mechanically disturbing the soil and artificially introducing seeds or other plant parts periodically to produce stands of plants for use primarily as food by wildlife, domestic animals, or humans. It is a habitat management tool used by refuges to meet specific habitat and wildlife management goals and objectives, such as providing high energy foods for migratory bird and other wildlife species. This use may include pesticide and fertilizer use and water management. The cooperative farmer

(cooperator) produces and harvests crops on the refuge; in exchange, the refuge receives specified shares unharvested for wildlife management purposes.

Is the use a priority public use?

No

Where will the use be conducted?

Farming on 208 acres of existing croplands on Key Cave NWR will be converted with those 208 acres being restored to grassland. To serve landscape and refuge management goals and objectives, supplemental wildlife food (e.g., sunflowers) will be supplied on the remaining 60 acres that were formerly in agriculture production to support foraging Northern Bobwhites (*Colinus virginianus*) and the National Bobwhite Conservation Initiative; foraging Mourning Doves (*Zenaida macroura*); and wildlife-dependent public use opportunities, including wildlife observation, photography, and hunting.

The Key Cave NWR SHSP/EA revised the objectives related to cooperative farming as listed (see Key Cave NWR SHSP Mapsheet 3 Early Succession Habitat). To date, 360 acres of agricultural fields have been converted to NWSG to benefit grassland bird species, and approximately 112 additional acres have been converted to hardwood forests to promote wildlife diversity.

When will the use be conducted?

Cooperative farming activities (e.g., field-prep, planting, and harvesting) generally occur during daylight hours between March 15 and November 15. In accordance with the SHSP/EA, the use will be phased out with the conversion of 208 acres of croplands to grasslands.

How will the use be conducted?

The Refuge Manager or designee administers the refuge's cooperative farming program, including preparing farming contracts, meeting with the cooperator, verifying crop plantings, and negotiating any necessary addendums. Cooperator selection and associated determination of cost or shares follow relevant national Service policy (620 FW 2) and Southeast Region-specific guidance for farming, as well as other applicable laws and policies. The program is managed under a Cooperative Agricultural Agreement (CAA), which can be issued for up to five years. An Annual Work Plan, including such details as areas to be withheld from

farming for management actions (e.g., restoration and invasive species management), as well as rent share, crops to be planted, location and acres of each crop, and approved pesticides, is established with the cooperator prior to each planting season. The Service retains a 20-25% share which is usually in sunflowers, corn or soybeans and will be no more than 60 acres per year for supplemental wildlife food.

The cooperator is responsible for all equipment, fuel, seed, fertilizer, chemicals, and labor necessary to produce the crop. The cooperator is required to perform soil tests to determine nutrient needs (for fertilizer and lime applications) per the Alabama Cooperative Extension Service. The cooperator assumes responsibility for all associated costs for the crops grown. Modifications to the original farming agreement may occur throughout the farming season; written addendums must be agreed upon and signed by both the cooperator and Refuge Manager or designee.

The Service considers the use of U.S. Environmental Protection Agency (EPA)-approved pesticides, along with mechanical treatment of plant pests, to protect crops. The Federal Insecticide, Fungicide, and Rodenticide Act (7 USC §136 et seq.) provides for Federal regulation of pesticide distribution, sale, and use. All pesticides distributed or sold in the United States must be registered (licensed) by EPA. Pesticides are generally used on Service farmland due to expected pest densities or when pest densities reach economic threshold levels and generally include pre-planting burndown in conservation tillage operations, pre-emergence treatments to prevent dormant pests from becoming established, and post-emergence treatments.

Through the Service's Pesticide Use Proposal (PUP) process (569 FW 1), the Service analyzes all pesticides used on the refuge and approves only those that will not have undue negative impacts to non-target plants, fish, and wildlife resources under the proposed application methods. Intra-Service Section 7 Endangered Species Act Consultations are also completed on all proposed applications of pesticides. Application of pesticides must follow the Service Integrated Pest Management policy (569 FW 1), the Department of Interior's Pesticide Use policy (517 DM 1), and restrictions imposed by EPA.

The refuge also follows Best Management Practices (BMPs) from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Alabama Cooperative Extension Service, and Regional policy, in addition to label restrictions imposed by EPA, to reduce any negative effects to non-

target species, including bats, pollinators, and threatened and endangered species. The BMPs include establishing minimum forested or grass buffers between all farm fields and adjacent wetlands and streams and restriction of a pesticide to one application per field. In almost all cases, Service pesticide use restrictions are more restrictive than the EPA-approved pesticide label restrictions. A list of Service-approved pesticides and associated BMPs accompanies the CAA.

Recently, the Service clarified four tiers of analysis to support National Environmental Policy Act compliance related to the use of pesticides on units of the Refuge System to support refuge purposes, goals, and objectives:

- Pesticide-specific analysis by the EPA;
- Pesticide-specific analysis through the Service's PUP System;
- General pesticide analysis for a specific refuge, group of refuges, or refuge complex through an EA/Finding of No Significant Impact or Environmental Impact Statement/Record of Decision; and
- General pesticide analysis through a periodic Environmental Action Statement (EAS) that documents the pesticide use and treatment planned for a specific refuge, group of refuges, or refuge complex.

In June 2020, the Service issued a decision to allow the use of GECs on NWRs in Department of the Interior Regions 2 and 4 for natural resource management in agricultural practices to cultivate supplemental foods for wildlife, manage invasive species, and provide opportunities for wildlife-dependent public recreation, such as wildlife observation (USFWS 2020).

The use of GECs will be part of an Integrated Pest Management (IPM) approach that combines biological, cultural, physical/mechanical, and chemical tools to manage pests, weeds, and invasive species in a way that minimizes economic, health, and environmental risks (USFWS 2020). The IPM approach combines pest, weed, and invasive species biology, environmental information, and available technology to prevent unacceptable levels of damage through the most economical means while posing the least possible risk to people, property, resources, and the environment.

The underlying philosophy of IPM is that pest, weed, and invasive species control is most effective when a range of measures is deployed in a manner that diminishes the likelihood that the pest, weed or invasive species will become resistant to the measures. The IPM approach allows the use of a system to

combat weeds and pests that minimizes the use of pesticides; increases conservation practices; and strives to decrease any effects to air, water, or soil quality. The integration and use of GECs with other IPM practices allow the Service to be more effective in supporting refuge purposes, goals, and objectives. Both GECs and non-GECs could be used in rotation, as appropriate and guided by the overall refuge purposes; refuge management goals and objectives; and other policies, guidance, and decision documents.

The Service's Southeast Region uses a tiered analysis to determine whether a GEC can be used on a refuge based on the following:

- U.S. Department of Agriculture, Animal and Plant Health Inspection Service's specific NEPA analysis and de-regulation or exemption of the GEC;
- the Southeast Region's programmatic NEPA analysis of GEC use (GEC PEA, USFWS 2020);
- NEPA analysis of farming on the specific refuge; and
- analysis of related essentialness of GEC use on the specific refuge.

Why is this use being proposed or reevaluated?

In 2018, a combined cooperative farming compatibility determination for Wheeler and Key Cave NWRs found the cooperative farming use compatible (USFWS 2018). This current compatibility determination evaluated the cooperative farming program in regard to the establishing authorities and purposes of only Key Cave NWR. This compatibility determination replaces the 2018 compatibility determination for Key Cave NWR. (Note: The 2018 cooperative farming compatibility determination will remain in place as it pertains to Wheeler NWR.)

Key Cave NWR was established to protect the biological integrity of Key Cave, Collier Cave, Collier Bone Cave, and their common aquifer; continuing farming on Key Cave NWR was a management decision made in 1996 during the acquisition process of the property because farming was identified as a key issue with local residents during public scoping. The Service's opinion at that time was that the best path for community relations was to allow farming on the property as it was a historical use, provided benefits to resident and migratory wildlife, and maintained the area in an early successional stage. During public scoping, however, refuge staff shared the Service's vision to eventually transition agricultural fields to either grasslands or hardwood forests to protect the Key

Cave recharge area as designated critical habitat for the Alabama cavefish as well as important habitat for the gray bat, Indiana bat, and other cave-dependent species. Based on the 1996 LPP/EA/FONSI (USFWS 1996) and 2007 CCP/EA/FONSI (USFWS 2007), the refuge now proposes in the SHSP to convert the remaining 208 acres of croplands to native grasslands on the refuge and retain no more than 60 acres in supplemental wildlife food for dove and bobwhite quail and provide wildlife-dependent recreation (Section A and B).

Although the current SHSP outlines the phase out of croplands and the restoration of grasslands, cooperative farming at the refuge has helped maintain the cropland areas in an early successional stage to facilitate restoration at some point in the future. Cooperative farming is a management tool that places little financial burden on the refuge while providing management of invasive species, edge habitat and food for resident and migratory wildlife, and hunting and other public use opportunities. The farming program at Key Cave NWR has also limited the spread of undesirable, invasive plant species (e.g., Chinese privet [*Ligustrum sinense*], honey locust [*Gleditsia triacanthos*], and smooth sumac [*Rhus glabra*]) and kept lands open for future habitat management possibilities on the property. The crops provide high energy food sources for migratory bird and other wildlife species. Hunting and wildlife observation opportunities exist in and around the agricultural fields. Public hunting opportunities also are provided by four state Wildlife Management Areas within an hour of the refuge.

Availability of Resources

The analysis of cost for administering and managing this use includes only the incremental increase above general operational costs that we can show as being directly caused by the proposed use.

Administration — Proposal development is required by planning and refuge staff. Refuge staff develop the description of the refuge's cooperative farming program and criteria for cooperator selection (620 FW 2). After a cooperator is selected, staff develop the CCA and Annual Work Plan, prepare the PUPs for approval, provide a list of approved pesticides to the cooperator, submit pesticide use reports, and validate the cooperator's crop reports. Administration of the cooperative farming program consists of approximately 148 staff hours annually. The annual breakdown of the required staff hours is as listed.

- Prepare, advertise, and select cooperator — 20 hours every 5 years
- Prepare PUPs and associated Section 7 Intra-Service Endangered Species Act (Section 7) Consultation — 40 hours annually

- Conduct annual planning and develop CAA and Annual Work Plan — 40 hours annually
- Meet with cooperator — 16 hours annually
- Gather, review, and report pesticide use — 16 hours annually
- Conduct general administrative tasks — 16 hours annually

Maintenance — Maintenance costs include personnel and equipment for maintaining roads for farm field access. Refuge equipment, such as grader, tractors with mowers, and support vehicles, are already present on the refuge.

Monitoring — Refuge staff spend about 16 hours annually monitoring the farming program to ensure compatibility and compliance with the CAA.

Staff hours/costs invested into the cooperative farming program are expected to decrease as cooperative farming is phased out. However, intensive amounts of staff hours/costs (not quantified here) will be invested into cropland conversion to grassland habitat.

Table 1. Costs to Administer and Manage Cooperative Farming on Key Cave National Wildlife Refuge.

Category and Itemization	One-Time Expenses	Recurring, Annual Expenses
Proposal development, including National Environmental Policy Act documents	\$40,000	0
Administration—preparing plans and meeting with cooperative farmers	0	\$9,000
Maintenance—including mowing and maintaining farm field access	0	\$1,000
Monitoring—ensuring compliance with refuge cooperative farming agreements	0	\$1,000
Total one-time expenses	\$40,000	0
Total recurring, annual expenses	0	\$11,000
Offsetting revenue	0	0
Total expenses	\$40,000	\$11,000

The refuge can cover the costs to administer the use safely and properly within current and projected staffing and budgets.

Anticipated Impacts of the Use

Potential impacts of a proposed use on the refuge's purposes and the Refuge System mission

As farming on 208 acres of existing croplands on Key Cave NWR will be phased out with those 208 acres being restored to grassland, the Service GEC PEA provided a thorough evaluation and analysis of the use GECs on NWRs in the Southeast in order to meet wildlife management objectives and achieve the specific goals of a NWR's CCPs, HMP, and other national and international conservation initiatives. In addition, the GEC PEA also evaluated policies governing these uses on NWRs, such as the Service's BIDEH Policy (USFWS 2006a), the Department of the Interior's Pesticide Use Policy (517 DM 1), and the Service's IPM Policy (569 FW 1)).

Multiple NEPA analyses and decision documents address the direct, indirect, short-term, long-term, and cumulative impacts associated with cooperative farming on Key Cave NWR, as listed.

- 2007 Wheeler NWR Complex CCP/EA/FONSI and Endangered Species Act (ESA) Section 7 Biological Evaluation (BE) (USFWS 2007a, 2007b)
- 2025 Key Cave NWRSHSP/EA (USFWS 2025)
- The Service's Genetically Engineered Crops/PEA/FONSI (USFWS 2020) described and analyzed the use of GECs on refuges within U.S. Department of the Interior (Interior) Unified Regions 2 and 4 (IR2&4), which included Key Cave NWR.
- Annual Key Cave NWR PUPs and ESA Section 7 Evaluations

The analyses of impacts associated with the cooperative farming use from these documents are incorporated herein by reference; only summary impacts are provided here. As outlined above, the use was previously analyzed, found to not have significant impacts, and found compatible. Environmental conditions and the use have not changed substantially since the use was evaluated and approved.

The GEC PEA and FONSI (USFWS 2020), and the EA and FONSI for the CCP for the Refuge (USFWS 2007a & b) and this action's EA will serve the third tier listed above for the use of GECs on the Refuge Complex to help meet refuge purposes, goals, and objectives. The GEC PEA FONSI concluded that the use of GECs

presented no significant impacts to the physical, biological, and socio-cultural environments. Environmental conditions and impacts as described in the above referenced EAs and FONSI have not changed substantially since those analyses; these documents are incorporated herein by reference.

Supporting refuge management goals and objectives and maintaining the croplands in an early successional stage to facilitate future restoration, the cooperative farming use has been employed by the Service on the refuge for 20 years. To date, no significant short-term, long-term, or cumulative adverse impacts have been documented on Key Cave NWR from the cooperative farming use, including on wildlife and aquatic species, threatened and endangered species and other special status species, habitat and vegetation (including vegetation of special management concern), hydrology, geology, and soils, air quality, water quality, and refuge management and operations.

Short-term impacts

Field preparation and planting cause both beneficial and adverse short-term wildlife impacts, including mortality to small animals and birds from machinery (Erb and Jones 2011, Tews et al. 2013, Deák et al. 2021) and temporary disturbance from the noise and movement of farming equipment. Literature suggests that mammals and birds alter their movements short-term but return to normal activity within a couple of days after limited noise disturbance (Bowles 1995). Mammals and birds also habituate more rapidly to mechanical noise, such as farm equipment, than to direct human activity, such as hunting and wildlife observation (Gabrielsen and Smith 1995). Spring disking alters the wildlife use pattern by temporarily displacing wildlife until vegetative covers regenerate; however, once crops mature, they provide food and cover for wildlife.

Impacts to threatened and endangered species, especially the Alabama cavefish, on the refuge may occur from decreased water quality and disturbance. Because of the juxtaposition of the cropland habitat and agriculture operations on the refuge within the Key Cave recharge area, several evaluations of groundwater quality in Key Cave have been conducted to determine the effect of runoff and groundwater infiltration of nutrients and pesticides from the farming activities. No significant impacts have been identified from these studies (Tuttle and Siebert 2005, Ponta et al. 2018). Noise and movement of farming equipment may disturb bats using Key Cave. The cave is of special concern because it is a priority one maternity cave for the federally endangered gray bat. Disturbance from late May through mid-July at maternity caves is especially detrimental

(Brady et al. 1982). The refuge will continue to monitor water quality, disturbance, and other possible effects of the cooperative farming program to ensure protection of the threatened and endangered species.

Farming operations cause soil disturbance during field preparation (from mowing, disking, and herbicide application) and planting. Conventional tillage practices cause soil erosion, soil compaction, and reduction in crop residue, which results in decreased air and water quality and inhibits growth of vegetation (Towery and Werblow 2010). The airborne dust from wind erosion is a public health hazard and depletes the nutrient-rich topsoil (Towery and Werblow 2010). Both runoff and wind erosion carry sediments, nutrients, and pesticides to water sources, disrupting natural ecological systems. According to Towery and Werblow (2010), sediment clouds the water, reducing light penetration and reducing photosynthesis of submerged plants and algae. It can also clog the gills of aquatic organisms. Pesticides in streams and rivers can disrupt local plants, fish, macroinvertebrates, and other organisms. To minimize negative impacts, cooperators use all farming conservation practices including no-till and in some circumstances cover crop as standard practices as practical and in consultation with the Alabama Cooperative Extension Service. Compared to conventional tillage, no-till farming can reduce soil erosion by 90% or more, thereby reducing negative impacts to soil, water, and air quality (Towery and Werblow 2010).

Negative impacts from fertilizers and pesticides are minimized by following Service policy, BMPs, and EPA guidelines as to types, amounts, and timing of applications. Cooperators will be encouraged to first assess pest problems and consider mechanical and cultural techniques prior to the application of chemical techniques to control pests. Pest species economic threshold levels, as determined by the Alabama Cooperative Extension Service, must be achieved prior to pesticide applications. Only pesticides approved through the Service's PUP process will be used. The minimum effective volume of pesticide will be applied in accordance with label directions and BMPs to minimize drift, runoff, and percolation of pesticides into the environment. During application, care is taken to apply the product only in the target area to reduce the chance of negative effects on nontarget species, including pollinators and threatened and endangered species. Pesticides are applied when wind conditions do not facilitate drift to non-target plants or animals and are applied in the quantities and under weather conditions that do not promote runoff. To further prevent pesticide runoff from entering surface waters, a minimum of a 50-foot buffer of

vegetation is required between farm fields and bodies of water. The buffer also protects water quality by trapping sediments.

During field preparation and planting, visitors may be disturbed and wildlife observation may be negligibly, negatively affected by the absence of wildlife early in the farming season. Wildlife observation and hunting improves as white-tailed deer, mourning doves, bobwhite quail and other wildlife are attracted upon germination and maturation of the crops.

Cooperative farming limits the spread of invasive plant species and maintains the land such that restoration to grassland or forests will be more feasible during the conversion of cropland to grassland and other habitats.

Long-term impacts

Long-term impacts of farming include degradation of soil, water, and air through erosion from conventional tillage and use of fertilizers and pesticides that can pollute water resources through runoff and groundwater infiltration and percolation. The refuge minimizes these risks by encouraging conservation tillage methods, such as no-till, and restricting and carefully monitoring the use of fertilizers and pesticides. Nutrient-rich soil organic matter and greater aggregation of soil particles results from no-till farming, and soil may become more resistant to erosion (Towery and Werblow 2010).

To minimize adverse impacts of fertilizers and pesticides, types and amounts of additives are restricted to only those necessary for crop production. Only pesticides approved through the Service's PUP process may be used, applications are limited to the minimum amount necessary, and post-emergent pesticides will not be used unless crop scouting indicates pest density is at or beyond the economic threshold level. The use of GECs will reduce the quantity and types of pesticides needed, increase the use of conservation tillage, and protect water resources and biodiversity (USFWS 2020).

Croplands occupy what might otherwise be native plant communities on Key Cave NWR. The Service's goal is to transition the agricultural fields to grassland habitat to protect the recharge area of Key Cave and benefit the threatened and endangered species using the cave as well as promote biodiversity (USFWS 2007). Until the Service can convert these fields to grasslands, cooperative farming provides a means of controlling the spread of invasive plant species and maintaining the fields in an early successional state to support future habitat restoration.

Considering cumulative impacts, the refuge farming acreage accounts for less than 1 percent of the 11,520 acres of land farmed in the aquifer recharge area of Key Cave. The refuge strives to serve as a model to local farmers in using agricultural conservation practices, such as no-till field preparation, minimal pesticide application, and BMPs to protect water resources.

The refuge will continue to monitor water quality, wildlife populations, and habitats, especially those of threatened and endangered species, to ensure that significant adverse impacts do not threaten refuge resources.

Public Review and Comment

The Service sent scoping letters to the state of Alabama and 15 Native American Tribes on December 9, 2022, to request engagement on the SHSP, including this compatibility determination. Follow up letters were provided to the state and Tribes and public notice in 2025 to request review and comment on the Draft EA and SHSP (see the SHSP/EA for additional information regarding public involvement, which is incorporated herein by reference). This compatibility determination was made available for public review and comment with the associated SHSP/EA for 45 days. The document was made available on the Key Cave NWR website (<https://www.fws.gov/refuge/key-cave>). This ensured that refuge neighbors and visitors are aware of the compatibility determination and provide ample opportunity for those interested to provide comments.

Public notice was also provided to request public review and comment on the EA and SHSP. Public notice included a Public Information Bulletin and documents posted on the refuge's website, published on June 30th, 2025 for 45 days. Public comments were received by the Service during the public review and comment period from 3 members of the public, and 4 NGOs. All substantive comments received during the public review and comment period were reviewed by the Service in development of a final decision and included in the EA.

Determination

Is the use compatible?

Yes

Stipulations Necessary to Ensure Compatibility

Administered through the CAA and Annual Work Plan, the cooperative farming program is compatible on Key Cave NWR with the listed stipulations.

1. The program will adhere to the Cooperative Agricultural Use Policy (620 FW 2). Cooperators are subject to Service policy and regulations regarding all aspects of the farming program.
2. No farming activities will begin prior to finalization of the Annual Work Plan. Unless specified in the CAA or Annual Work Plan, working of ground in the spring (e.g., liming, fertilizing, and spraying) will not be allowed prior to March 1. Fall plowing will not be allowed after October 15 unless approved by the Refuge Manager.
3. Corn seed with any treatments will not be planted prior to April 1.
4. All operations on refuge are to be carried out in accordance with BMPs and soil conservation practices.
5. Fifty-foot (50') vegetative buffer strips are maintained around all fields and water bodies.
6. A minimum 5-foot grass buffer strip along both sides of roads will not be planted to crops by the cooperator. Unimproved roads along field edges will not be planted as well. No compensation will be provided to the cooperator when planted crops are destroyed in these areas.
7. The cooperator will provide all inputs needed to plant and properly grow the designated crops. Key Cave NWR's current share is 20% for soybeans, corn, wheat, and sunflowers. Shares may increase to as high as 25% of all crops during the 5-year period of the CAA. Crop type and location of refuge shares will be determined prior to harvest, not prior to planting. The location of the government's share can be changed at any time prior to harvest should the refuge's priorities change or like treatment of crops appear to have not occurred.
8. Twenty (20) percent of the crop (sunflowers) will remain standing or a suitable in-kind services agreement will be established to account for the 20% refuge share.
9. Pesticide use is restricted to the minimum necessary amount. Post-emergent pesticides will not be used unless crop scouting indicates pest density is at or beyond the economic threshold level. The cooperator will not be permitted to use any herbicide or insecticide that is not on the Key Cave NWR list of approved pesticides. The cooperator shall comply with all product label

instructions on all pesticides and fertilizers used. All pesticide use will be documented (i.e., chemical, application dates, number of applications, quantities per application per acre) by the cooperator and reported in writing to the Refuge Manager by December 1.

10. Soil tests will be conducted on a routine basis (3 years recommended). It is the cooperator's responsibility to provide the Refuge Manager with soil test results for each field farmed and apply the necessary nutrients as recommended. Manure, chicken litter, and similar materials cannot be used on the refuge. Fertilizers not listed on a PUP will not be used on the refuge.
11. The cooperator shall notify Key Cave NWR at least 36 hours before any proposed application of fertilizer or pesticide should refuge staff want to conduct a site visit.
12. The cooperator will provide all requested information (such as annual pesticide use, fields where soil tests were taken, fields where lime was applied and the amount, and annual crop yields) by dates specified in the CAA and Annual Work Plan.
13. Cooperators must adhere to verbal and written requirements to conserve endangered, threatened, rare, and species of special concern, including plants, fish and other wildlife.
14. Fields will not be burned without prior approval of the refuge manager. Requests to burn fields must be made at least 120 days prior to anticipated burning. Fields will be burned by refuge personnel only as per the Key Cave NWR Prescribed Fire Plan.
15. Farm equipment will not be stored on the refuge except during periods of use.
16. Cooperator will not permit the draining or dumping of any materials (e.g., chemical cans, bags, oil cans, seed bags, litter and associated farming debris) and will remove such materials from the refuge at the end of the day.
17. Firearms are permitted only when legal for on-going refuge hunts and when used while engaged in approved hunting activities.
18. Access through refuge gates will be for farming business only. The cooperator will lock refuge gates at the completion of farming activities or at the completion of the workday.
19. Cooperator will not remove any woody vegetation from the refuge without submitting a detailed, written request and obtaining approval of the Refuge Manager.
20. Either the Refuge Manager or cooperator may end the CAA with a minimum 45-

day notice prior to the beginning of the corn planting season. The cooperator will be permitted to harvest any of his crop shares that they have planted prior to the notice. The cooperator agrees to provide all of the shares and services owed to the refuge, even if this requires planting and cultivating more crops after the 45-day notice by either party has ended.

21. No changes will be made to this CAA without Refuge Manager approval. All changes will require a written addendum which will be signed and dated by the cooperator and Refuge Manager. A final addendum for corn or soybeans and wheat is required after the final situation for these crops has been determined.
22. The Refuge Manager maintains the ultimate authority to make final decisions regarding all matters pertaining to the CAA.

Justification

The stipulations outlined above will help ensure that the use is compatible at Key Cave NWR. Cooperative farming, as outlined in this compatibility determination, will not conflict with the current national policy to maintain the biological diversity, integrity, and environmental health of the refuge. Based on available science and best professional judgement, the Service has determined that cooperative farming on Key Cave NWR, as described in this compatibility determination, will not materially interfere with or detract from the fulfillment of the Refuge System mission or the purpose of the refuge.

The mission of the National Wildlife Refuge System (Refuge System) 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 (Pub. L. 105-57; 111 Stat. 1252).

Cooperative farming is a management tool used on Key Cave NWR to 1) maintain open habitat during the transition from cropland to grassland habitat; 2) provide food and edge habitat for a diversity of resident and migratory wildlife, especially grassland-dependent species; 3) contribute to the Northern Bobwhite Conservation Initiative (Dimmick et al. 2002); 4) uphold farming and land use commitments between the Service and the community established during acquisition; 5) serve as a management model of responsible and sustainable farming practices to other farmers and conservation land owners in the Key Cave recharge zone; and 6) support public hunting. Further, the cooperative farming use helps maintain the croplands in an early successional stage to support future restoration to grasslands.

The Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3) specifically addresses farming on refuges, as listed.

601 FW 3.15(B)—Our habitat management plans call for the appropriate management strategies that mimic historic conditions while still accomplishing refuge objectives... Farming, haying, logging, livestock grazing, and other extractive activities are permissible habitat management practices only when prescribed in plans to meet wildlife or habitat management objectives, and only when more natural methods, such as fire or grazing by native herbivores, cannot meet refuge goals and objectives.

601 FW 3.15(C)—We do not allow refuge uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative for accomplishing refuge purpose(s).

In addition, this policy provides guidance on biological integrity, diversity, and environmental health in a landscape context, as listed.

601 FW 3.7(C)—In pursuit of refuge purposes, individual refuges may at times compromise elements of biological integrity, diversity, and environmental health at the refuge scale in support of those components at larger landscape scales. When evaluating the appropriate management direction for refuges, refuge managers will consider their refuges' contribution to biological integrity, diversity and environmental health at multiple landscape scales.

The Service acknowledges that the cooperative farming program may adversely influence some aspects of biological integrity, diversity, and environmental health on the refuge. We minimize these impacts using BMPs.

For Key Cave NWR, croplands provide various wildlife species on the refuge with a supplemental forage source both during and following the growing season. Mourning doves (*Zenaida macroura*), Short-eared Owls (*Asio otus*), Northern Harriers (*Circus hudsonius*), and Bobwhite Quail (*Colinus virginianus*) use the agricultural fields.

Providing quality recreational hunting opportunities, where compatible, is one of the six priority public uses identified in the National Wildlife Refuge System Improvement Act. The cooperative farming program contributes to this priority use. The state of Alabama manages Key Cave NWR's hunt program in conjunction

with the adjacent 4,685-acre Seven Mile Island Wildlife Management Area. Expanding hunting opportunities on Key Cave NWR has been encouraged and supported by the Alabama Department of Conservation and Natural Resources.

Signature of Determination

DREW WIRWA Digitally signed by DREW
WIRWA
Date: 2025.09.25 12:02:46 -05'00'

Refuge Manager Signature and Date

Signature of Concurrence

Assistant Regional Director Signature and Date

Mandatory Reevaluation Date

2035

Literature Cited/References

Bowles, A. E. 1995. Responses of wildlife to noise. In R. L. Knight and K. J. Gutzwiller, editors. *Wildlife and recreationists: coexistence through management and research* (pp. 109-156). Island Press, Washington D.C., USA.

https://www.academia.edu/16799312/Wildlife_and_Recreationists_Coexistence_through_Management_and_Research

Brady, J. T., T. H. Kunz, M. D. Tuttle, and D. E. Wilson. 1982. Gray bat recovery plan. U.S. Fish and Wildlife Service, Denver, CO.

Deák, G., K. Katona, and Z. Biró. 2021. Exploring the use of a carcass detection dog to assess mowing mortality in Hungary. *Journal of Vertebrate Biology*, 69(3): 20089.1-9. <https://bioone.org/journals/journal-of-vertebrate-biology/volume-69/issue-3/jvb.20089/Exploring-the-use-of-a-carcass-detection-dog-to-assess/10.25225/jvb.20089.full>

Dimmick, R. W., M. J. Gudlin, and D. F. McKenzie. 2002. The northern bobwhite conservation initiative. Miscellaneous publication of the Southeastern Association of Fish and Wildlife Agencies, SC. 96 pp.

https://www.acjv.org/documents/Northern_Bobwhite_Plan.pdf

Erb, L., and M. T. Jones. 2011. Can turtle mortality be reduced in managed fields? *Northeastern Naturalist*, 18(4): 89–496.pp.

<https://www.jstor.org/stable/41429234?seq=1>

Gabrielsen, G. W., and E. N. Smith. 1995. Physiological Responses of Wildlife to Disturbance. In R. L. Knight and K. J. Gutzwiller, editors. *Wildlife and recreationists: coexistence through management and research* (pp. 95-107). Island Press, Washington D.C., USA.

https://www.academia.edu/16799312/Wildlife_and_Recreationists_Coexistence_through_Management_and_Research

Klümper, W., and M. Qaim. 2014. A meta-analysis of the impacts of genetically modified crops. *PLoS ONE* 9(11): e111629.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111629>

Ponta, G. M., S. W. McGregor, and S. C. Jones. 2018. Hydrogeological assessment for key cave, Lauderdale County, Alabama Open-file report 1811 Geological Survey of Alabama. Tuscaloosa, AL.

Tews, J., D. G. Bert, and P. Mineau. 2013. Estimated mortality of selected migratory bird species from mowing and other mechanical operations in Canadian agriculture. *Avian Conservation and Ecology*, 8(2): 8.

<https://www.ace-eco.org/vol8/iss2/art8/>

Towery, D., and S. Werblow. 2010. Facilitating conservation farming practices and enhancing environmental sustainability with agricultural biotechnology. Conservation Technology Information Center, West Lafayette, IN.

<https://www.yumpu.com/en/document/view/39280772/facilitating-conservation-farming-practices-and-enhancing->

Tuttle, P. L., and S. Siebert. 2005. Environmental Contaminants Program On-Refuge Investigation Interim Report. Key Cave National Wildlife Refuge. U.S. Fish and Wildlife Service. Atlanta, GA. 3 pp.

U.S. Fish and Wildlife Service. 1996a. Final Environmental Assessment and Land Protection Plan, Proposed Establishment of Key Cave National Wildlife Refuge,

Lauderdale County, Alabama. Southeast Region, U.S. Fish and Wildlife Service, U.S. Department of the Interior. April 1996. Atlanta, GA.

U.S. Fish and Wildlife Service. 2007a. Draft Comprehensive Conservation Plan and Environmental Assessment for Wheeler National Wildlife Refuge Complex. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region. Atlanta, Georgia. 365 pp.

U.S. Fish and Wildlife Service. 2007b. Wheeler National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region. Atlanta, GA. 375 pp. <https://ecos.fws.gov/ServCat/DownloadFile/1443?Reference=1468>

U.S. Fish and Wildlife Service. 2018. Compatibility Determination for Cooperative Farming on Wheeler National Wildlife Refuge Complex. Atlanta, GA. 21 pp.

U.S. Fish and Wildlife Service. 2020. Programmatic Environmental Assessment for Use of Genetically Engineered Agricultural Crops for Natural Resource Management on National Wildlife Refuges in the Southeastern United States. Atlanta, GA. <https://iris.fws.gov/APPS/ServCat/DownloadFile/171732>

U.S. Fish and Wildlife Service. 2022. Part 569 FW 1: Pest Management—Integrated Pest Management. Fish and Wildlife Manual. Division of Natural Resources and Conservation Planning. <https://www.fws.gov/policy/569fw1.html>

U.S. Fish and Wildlife Service. 2025. Key Cave National Wildlife Refuge Spatial Habitat and Species Plan – Supplemental Document and Environmental Assessment. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region. Atlanta, GA.