U.S. Fish & Wildlife Service

Key Cave National Wildlife Refuge

Lauderdale County, Alabama

Map Sheet 3: Key Cave NWR Grassland/Early Successional Habitat

Key Cave NWR: Grassland and Upland Cropland Objective for Priority Resources of Concern:

Grasshopper Sparrow *(Ammodramus savannarum),* Northern Bobwhite (*Colinus virginianus*), and Loggerhead Shrike *(Lanius ludovicianus)*

(CCP Objectives 1.13, 1.15, 1.16, 1.17, 1.19, 1.26, 2.3, 2.4, 2.6)

Key Cave NWR's 20 grassland management units total over 300 acres, the largest of which is 70 acres. Management activities that would promote early successional habitat and would benefit Grasshopper Sparrows on the Refuge include:

1) Keeping larger grassland management units intact, with minimal wind breaks and interruptions with different habitat types.
2) Carrying out prescribed burns every other year to reduce the build-up of thatch that can inhibit nesting.
3) Additionally, providing a diversity in grassland habitat, with shrubs and thickets, and prescribed burning at various frequencies and intensities will benefit Northern Bobwhite and Loggerhead Shrike populations.

HMP Objective	Response Variables and Assessment Methods
Grassland Restoration Convert 208 acres of cropland on Key Cave NWR to grassland-dominated, early successional habitat (with a goal of 25 to 50 acres per year within Units 1 through 12 (See **Figure 1** and **Table 1.** Criteria for Restoration Priority and **Figure 1 and Table 2**. Tiered Restoration Priority) for grassland-dependent birds, such as the Grasshopper Sparrow, Northern Bobwhite, Dickcissel, and Loggerhead Shrike. 2.A.1. Using a stepwise approach to grassland restoration (**Figure 3 and Figure 4)** , convert 25-50 acres annually, evaluating the timeframe, acres restored, and approach every 2 years and adapting management as needed. 2.A.2. Begin immediately, converting cropland units outlined in Table 2 from the cooperative farming program into grassland habitat. 2.A.3. Annually thereafter, and adapting as indicated by monitoring, target conversion in accordance with the restoration priorities. 2.A.4. Prioritize the units to be restored based on restoration criteria in **Table 2**. 2.A.5. Utilize tools such as the cooperative farming program, grassland initiatives, and partners to assist in restoration. 2.A.6. Incorporate converted units to the prescribed burn program (**Table 3 and Figure 5)**) and other appropriate management regimes to maintain and enhance grassland habitats(and apply Grassland Management Objective.	• Cropland production survey • Bird use of habitats • Annual review for adaptive management
Supplemental Wildlife Food In Units 1, 4, or 12, continue to annually provide minimal supplemental wildlife food sources (e.g., sunflowers) on no greater than 60 acres at Key Cave NWR to support shared Service and Alabama Department of Conservation and Natural Resources (ADCNR) goals and objectives for foraging northern bobwhites and the National Bobwhite Conservation Initiative; foraging mourning doves; and wildlife-dependent public use opportunities, including wildlife observation, wildlife photography, and hunting. 2.B.1. For the remaining 60 acres of supplemental wildlife food sources, use no to minimal inputs of fertilizers and pesticides and maintain borders along field edges with fifty-foot-wide native grass strips. 2.B.2 Work with the ADCNR to determine the most feasible delivery of supplemental wildlife food sources, including evaluating the use of Service staff and/or an agreement with the State. 2.B.3 Continue to maintain Best Management Practices and implement soil conservation practices to protect Key Cave NWR resources, including the cave and aquifer system.	• Cropland production survey • Bird use of habitats • Annual review for adaptive management
Grassland Management On an annual basis at Key Cave NWR, manage 30% to 50% of the grassland-dominated, early successional habitat (**Table 2 and Figure 2**) for the listed desired conditions for grassland-dependent birds, such as Grasshopper Sparrow, Northern Bobwhite and Loggerhead Shrike. 2.C.1. Provide patches of grassland 75 acres or larger comprised of at least 30 percent native warm-season bunch grasses, such as big bluestem (*Andropogon gerardii),* little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorghastrum nutans*), sideoats gramma (*Bouteloua curtipendula*), switchgrass (*Panicum virgatum*), and eastern gamagrass (*Tripsacum dactyloides*), and 40 percent forbs, such as partridge pea (*Chamaecrista fasciculata*) and beggarweed (*Desmodium incanum*) in Units 0400, 1100, 0500, 0103, 1201, 0901, 0802, 0803, 0805, 0806 and 0600 2.C.2. Provide up to 30 percent scattered patches of woody cover (ten feet wide or wider in diameter), including thorny shrubs, such as chickasaw plum (*Prunus angustifolia*) and sumac (*Rhus spp.)* in Units 0300, 0201, 0202, 0203, 0102, 1100, 1201, 1300, 1007, 1002, 0904, 0804, 0801, 0702, and 0701.	• Percentages of woody cover, native warm season grass, and forbs • Bird composition and relative abundance • Habitat Use Assessment • Vegetation monitoring and analysis • Grassland bird surveys • Habitat and Harvest surveys

Grassland and Upland Cropland Compartments on Key Cave National Wildlife Refuge

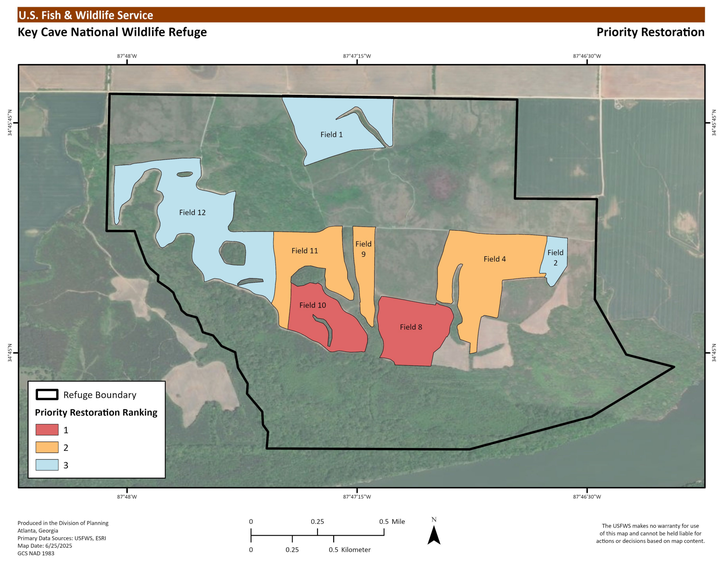

Figure 1. Restoration of current croplands on Key Cave NWR prioritized based on Table 1 Criteria and Table 2.

Figure 2. Current grassland habitat units on Key Cave NWR.

Table 1. Criteria used to convert current croplands into grassland habitat on Key Cave NWR.

Criteria for Restoration Priority (See Figures 1 and Table 2)

- Connectivity to cave, aquifer, and sinkholes
- Fields in recharge zone
- Management logistics: 1) Grassland connectivity; 2) Fields adjacent to grassland habitat;, and 3) Fields typically used for supplemental wildlife food rank lower in restoration due to hunter access
- Topography
- Groundwater and surface water movement
- Soil type (See Overview Map sheet)

Table 2. Current cropland habitat units, restoration priority, and acreages.

Field	Restoration Priority (Tier)	Acres
Field 10	1	25.3
Field 8	1	30.0
Field 9	2	12.7
Field 4	2	52.3
Field 11	2	30.5
Field 1	3	40.5
Field 12	3	69.0
Field 2	3	7.3
Total		268

Figure 3 .Grassland at Key Cave NWR.

Priority Resources of Concern: Grasshopper Sparrow, Northern Bobwhite, and Loggerhead Shrike

Other benefitting species: Dickcissel (*Spiza americana*), Eastern Meadowlark (*Sturnella magna*), LeConte's Sparrow (*Ammodramus leconteii*), Prairie Warbler (*Setophaga discolor*), and monarch butterfly (*Danaus plexippus*)

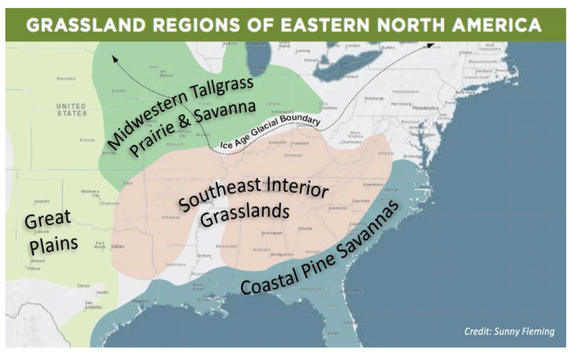

Figure 4. Grassland Regions of Eastern North America (Fleming) where Key Cave National Wildlife Refuge is located in the Southeast Interior Grasslands.

Table 3. Prescribed Fire Units on Key Cave NWR including acreages of each unit and prescribed burn cycle rotations.

UNIT NAME	COVER_TYPE	LANDUSE	ACRES	BURN YEAR CYCLE
0201	SHRUB THICKET	WATERWAY	2.0	1
0203	NWSG	GRASSLAND	14.5	1
0103	NWSG	GRASSLAND	47.3	1
0202	NWSG	GRASSLAND	1.5	1
0102	SHRUB THICKET	WATERWAY	2.3	1
0203	SHRUB THICKET	SHRUB THICKET	0.5	1
OS-N	UPLAND HARDWOODS	OAK SAVANNA	20.9	1
OS-S	UPLAND HARDWOODS	OAK SAVANNA	42.3	1
0400	NWSG	GRASSLAND	8.2	1
1201	NWSG	GRASSLAND	68.4	1
1100	NWSG	GRASSLAND	27.5	1
1100	NWSG	SHALLOW WATER AREA	3.9	1
OS-SE	UPLAND HARDWOODS	OAK SAVANNA	10.2	1
0600	NWSG	GRASSLAND	24.6	1
0500	NWSG	GRASSLAND	6.5	1
1202	NWSG	GRASSLAND	1.3	1
0300	NWSG	GRASSLAND	36.5	2
OS-W	UPLAND HARDWOODS	OAK SAVANNA	2.5	2
1300	NWSG	GRASSLAND	7.2	2
HW-1	UPLAND HARDWOODS	OAK SAVANNA	0.1	2
HW-2	UPLAND HARDWOODS	OAK SAVANNA	0.4	2
HW-3	UPLAND HARDWOODS	OAK SAVANNA	1.3	2
1402	UPLAND HARDWOODS	OAK SAVANNA	0.4	2
1002	NWSG	GRASSLAND	5.0	2
0901	NWSG	GRASSLAND	35.3	2
0701	NWSG	GRASSLAND	13.3	2
1403	UPLAND HARDWOODS	OAK SAVANNA	2.5	2
0904	NWSG	WATERWAY	4.1	2
1004	SHRUB THICKET	SHALLOW WATER AREA	3.8	2
0702	NWSG	WATERWAY	0.4	2
1007	NWSG	WATERWAY	5.8	2
1404	SHRUB THICKET	WATERWAY	0.7	2
0801	NWSG	GRASSLAND	14.1	2
1006	SHRUB THICKET	WATERWAY	0.9	2
1007	SHRUB THICKET	WATERWAY	2.2	2
0904	SHRUB THICKET	WATERWAY	2.2	2
0802	NWSG	GRASSLAND	7.9	2
0803	NWSG	GRASSLAND	6.0	2
0805	NWSG	GRASSLAND	4.8	2
0806	NWSG	GRASSLAND	6.5	2
	TOTAL ACRES		446.1	

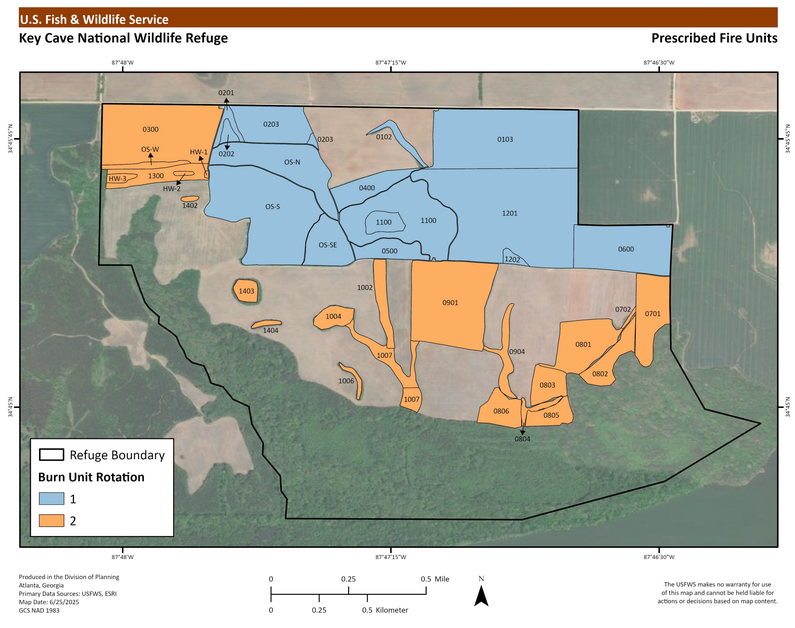

Figure 5. Current prescribed fire units and rotations for management on Key Cave National Wildlife Refuge (see **Table 3**).

Potential and Selected Management Strategies and Tools

Prescribed Fire Management

- ☐ Utilize prescribed fire as a wildfire mitigation tool to manage habitats and/or reduce fuel loads to minimize wildfire risks.
- ☐ Explore opportunities to expand partner efforts, such as with the Alabama Forestry Commission.
- ☐ The prescribed fire program is to be designed to mimic natural fire regimes as much as possible. Fire frequency, intensity, burn season, and spatial pattern should be suited to the specific habitat objectives for each forest habitat classification within the oak savanna to upland mesic forest continuum.
- ☐ Conduct a vigorous prescribed fire program consistent with the highest professional and technological standards.
- ☐ Continually evaluate the prescribed fire program to better meet program objectives by updating prescriptions and monitoring plans, and by integrating newly proven technical and scientific treatments.
- ☐ Ignition shall be in accordance with Service policy as detailed in the Interagency Standards for Fire and Fire Aviation Operations (NFES 2724).
- ☐ No ignition shall occur without an approved prescribed fire plan and concurrence of the Project Leader.
- ☐ Ignition methods shall be selected with due regard for safety and smoke management concerns.
- ☐ In addition to forested habitats, prescribed fire will be used to restore and maintain native warm season grass habitat.

Potential and Selected Management Strategies

Setting back plant succession to improve desirable plant production and seed yield:

- Setting back plant succession is generally attempted every 2-4 years, particularly when undesirable plants comprise > 50% of the unit.
- Fire, mowing, disking, herbicide application or mulching are the primary means of setting back plant succession and woody vegetation.
- Prescribed fire will be the preferred method to set back plant succession.

Reducing nuisance plant competition and increasing grassland plant production:

- Chemical control is a common method in reducing competition of undesirable plants in early successional habitats and the type and amount of approved herbicide used depends on the nuisance plant species and existing beneficial plants. A contracted aerial or ground applicator typically applies the herbicide; however, Refuge staff are acquiring the resources needed to perform some of the applications force account.

Potential and Selected Management Strategies

<u>Conservation Agriculture for Wildlife</u>

Cooperative, Contract, Partners, and Force-Account

- Continue to use the Cooperative farming program requiring the farmer to leave a remain share as wildlife forage until phase-out.
- Contract or staff can be used to provide wildlife forage without having to use a land base as is required for cooperative farming.
- Utilizing partners such as state conservation agencies to fulfil common objectives, is a potential strategy to providing wildlife forage opportunities and hunting opportunities.
- Utilize corn, milo, soybeans, sunflowers and/or millet as forage and within the cooperative farming program.
- Equipment includes wheeled tractors, broadcast seeders, floats, fertilizer spreaders, discs, seed drills, harvesters, grain semi-trucks, sprayers, bush hogs, and various other farming equipment.

Pesticide Treatments

- All chemicals will be approved through the Pesticide Use Proposal process and will follow Integrated Pest Management Policy (569 FW 1).
- Herbicide treatments allow for very selective removal of plant species or groups of species, with little or no damage to crops that are considered desirable or other non-target species. Insecticides and fungicides reduce the impacts of insects and fungal diseases on crops, protecting the crops and increasing the yield potential. Pesticides will be applied according to the directions on the label and used solely for the purpose for which the chemical was designed. A list of permissible herbicides is maintained within the Pesticide Use Permit Database.

Invasive Plant Control: Potential Strategies

The following strategies will be utilized in forest, grassland, and cropland conversion habitat management to control invasive plant species:

- Prior to the initiation of invasive species control efforts, refuge staff must understand the biology of the species to be controlled.
- Prevent introduction of invasive species.
- Eradicate new or small infestations.
- Employ early detection and rapid response actions.
- Prioritize invasive plant control efforts.
- Control or contain large established infestations; eradicate if possible.
- Monitor results and adjust strategies if warranted.
- Potential control methods:
  a) Habitat Manipulation/Mechanical Control
  b) Chemical Control
  c) Biological Control
  d) Prescribed Fire

Nuisance Animal Control: Potential Strategies

- Employ integrated pest management techniques when a species is having a significant impact on an area resulting in major habitat replacement or damaging rare species.
- Determine the need for site-specific control, based on the potential of the nuisance animals to negatively affect wildlife and habitat management objectives on the refuge.
- Monitor results and adjust strategies if warranted
- Potential control methods:
  a) Trapping/shooting- This could be accomplished by staff, partners or contract.