FINAL ENVIRONMENTAL ASSESSMENT

Release of Captive-Reared Florida Grasshopper Sparrows to the Florida Dry Prairie

April 22, 2019

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

Florida grasshopper sparrow (*Ammodramus savannarum floridanus*; FGSP) populations have been in sharp decline despite intensive management and research efforts (Figure 1). Habitat loss, alteration of hydrology and fire regimes, and possibly poor health have played a role in the decline. Implementation of Recovery Plan actions have been led by the U.S. Fish and Wildlife Service (Service) and the Florida Fish and Wildlife Conservation Commission (FWC), with input, guidance, and active participation by the Florida Grasshopper Sparrow Working Group, The working group was established in 2002 to coordinate habitat management and survey and monitoring efforts on public lands with FGSPs. Since then, it has grown into a public-private partnership that includes researchers and academics, FGSP biologists and land managers, captive breeding practitioners and zoos, state and Federal government staff, NGO conservation groups, and conservation journalists.[1]

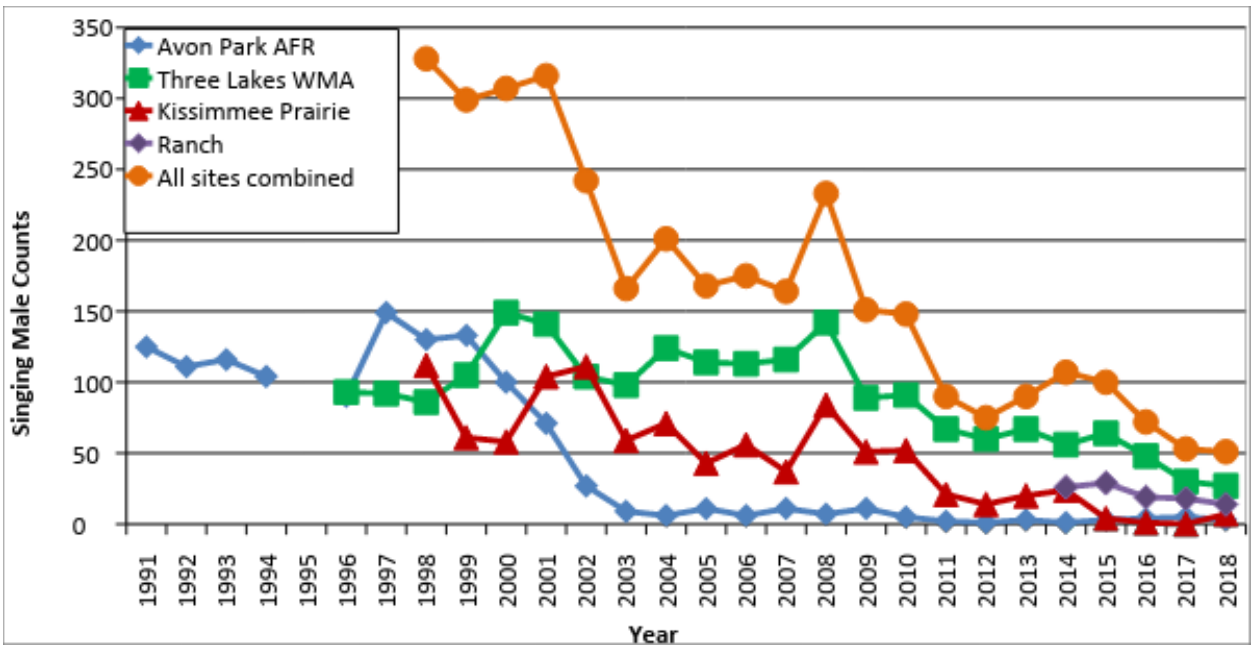

Figure 1. The population trend for the Florida grasshopper sparrow since monitoring began.

As breeding pairs reached critically low numbers in 2015, the Service began a captive-breeding program to augment the wild population via captive-reared birds. Since that time, the program has developed and solidified protocols that have resulted in increased breeding success, especially with parent-reared captive-bred birds. Given the success of captive breeding with

[1] [1] The FGSP Working Group is represented by members from the following: Service, FWC, Florida Department of Environmental Protection, U.S. Department of Defense – Avon Park Air Force Range, Brevard County Government, University of Florida, University of Central Florida, University of Maryland Baltimore County, Clemson University, Florida Atlantic University, University of Georgia, Archbold Biological Research Station, Tall Timbers Research Station, Lowry Park Zoo, Santa Fe Teaching Zoo, Brevard Zoo, Florida Audubon, Conservation InSight, White Oak Conservation, Rare Species Conservatory Foundation, and Into Nature Films.

FGSP, the Service and the FWC with input and feedback of the FGSP Working Group, are proposing to release captive-reared FGSP back onto the Florida dry prairie to supplement the wild population. Releases are just one of a suite of actions identified in the *Florida Grasshopper Sparrow 5-Year Strategic Vision* (Vision; Service and FWC 2019), which outlines the agencies' 5-year plan to grow the wild population through habitat management, wild population management, and captive rearing and release, while continuing to identify management actions that can reverse the population decline and reduce and eventually eliminate the need for future captive rearing. The goal of the reintroduction program is to supplement the wild population to halt the decline and prevent extinction in the wild.

The historic range of the FGSP is not known with certainty, but there are records from Collier, Miami-Dade, DeSoto, Glades, Hendry, Highlands, Polk, Okeechobee, and Osceola counties (Figure 2) (Service 1999); however, some of these records were not determined for subspecies (Howell 1932). At present, the range of the FGSP is generally restricted to dry prairie habitats at three management units under public ownership – Avon Park Air Force Range, Kissimmee Prairie Preserve State Park, Three Lakes Wildlife Management Area (TLWMA) – and semi-improved pasture habitat at two known private ranches. Populations have declined to historic lows at all known sites, and as of 2018, only 23 wild breeding pairs were documented at sites where FGSP are being monitored (FWC, unpublished data).

The FGSP population is at a record low and is at high risk of extinction due to environmental, demographic, and genetic stochasticity, as well as natural catastrophic events (Shaffer 1981). Low population densities can lead to inbreeding and loss of genetic diversity, biased sex ratios, difficulty locating mates, and increased susceptibility to diseases (Dale 2001, Redford et al. 2011). Small and isolated populations may experience severe declines or extirpation, especially when coupled with events such as flooding, reduced food availability, and/or reduced reproductive success, (Caughley and Gunn 1996).

In response to the severe population decline, the Service, in 2015, initiated a captive propagation program with the goal of ultimately releasing captive-reared FGSP to supplement the wild population. At the end of the 2018 breeding season, there were 81 FGSP in captivity, and the Service and FWC are aiming to release at least 53 captive-reared females to the wild as early as 2019. This number was selected based on the assumption that, using recent annual survival rates, at least 15 percent of the released individuals would be recruited into the breeding population; thus, stabilizing the wild population at a minimum of 23 breeding females (Service and FWC 2019).

1.2 Purpose

The proposed action is the release of captive-reared FGSP to supplement the wild population for the purpose of arresting the decline, stabilizing and potentially increasing the wild population. This proposed action supports the recovery efforts for the species and the ultimate goal of down listing or delisting the species. The purpose of this environmental assessment is to evaluate the available alternatives for releasing FGSP to satisfy the Service's goal, and determine whether that alternative would result in a significant impact to the human environment.

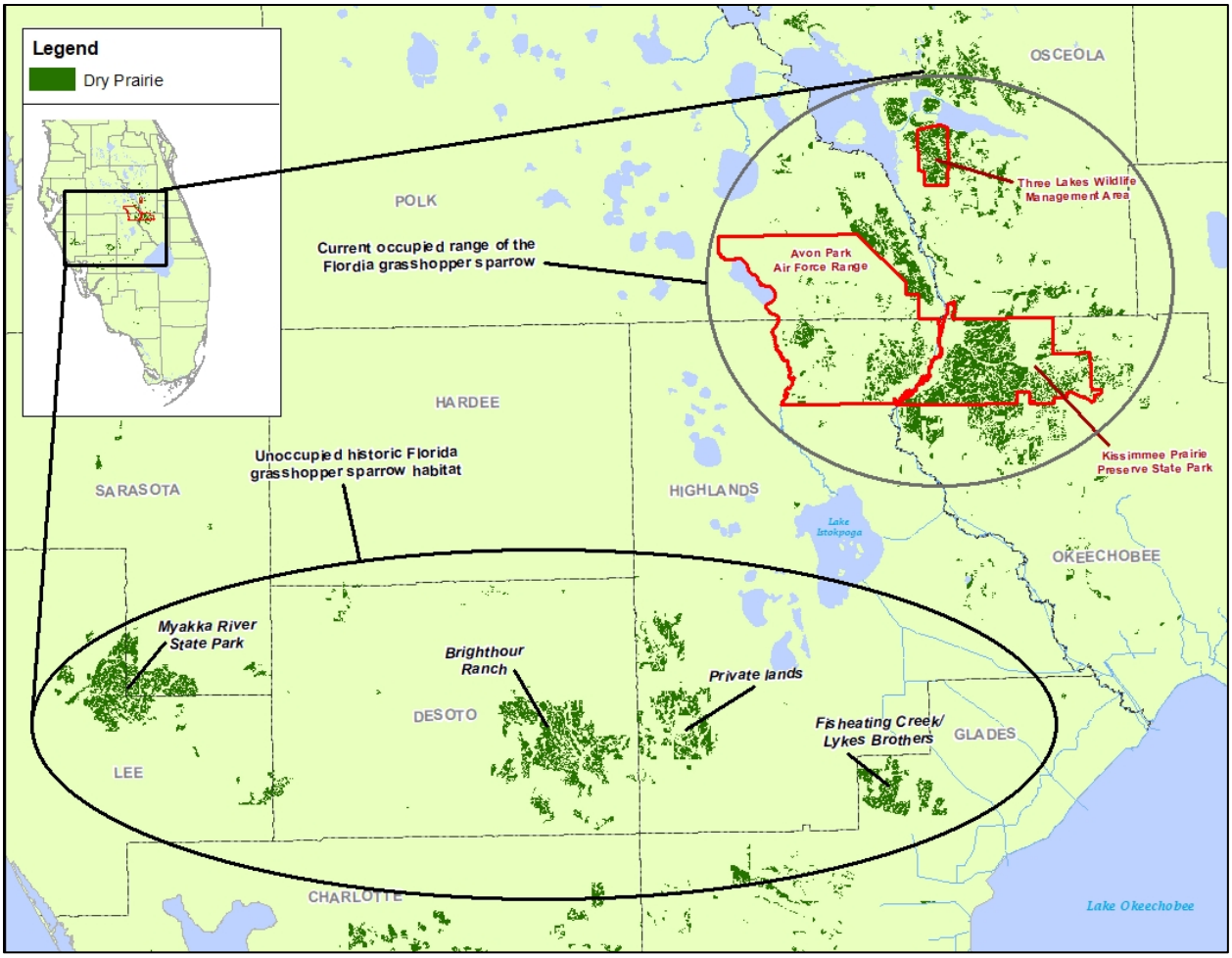

Figure 2. Current occupied extant range and unoccupied historic range of the Florida grasshopper sparrow, as well as the extent and distribution of the remnant native Florida dry prairie habitat.

1.3 Need

Management actions have been successful in increasing nest productivity, but the population continues to decline (Figure 1). Nest protection from predators in the wild have boosted the rate of fledging success of wild nests from 0.11 in 2013 and 2014 – prior to the initiation of nest protection measures – to 0.57 in 2018 (Hewett Ragheb and Miller 2014, Hewett Ragheb et al 2018). From 2017 to 2018, the apparent first-year survival rate was 43 percent and 20 percent at TLWMA and a private ranch, respectively (FGSP Working Group 2018, unpublished data). Despite these efforts, without further intervention through release of captive-reared FGSP, we predict the wild population would be expected to go extinct in less than a decade.

The proposed action is needed to halt the decline to prevent extinction and allow for additional time to discover and implement long-term management solutions to recover the species.

1.4 Decision to be Made

The Service must decide whether to release FGSP, and if so, which alternative would best accomplish that objective. The Service must determine whether that alternative would result in a significant impact to the human environment, thereby requiring an Environmental Impact Statement, or if a Finding of No Significant Impact (FONSI) is appropriate.

2.0 ALTERNATIVES

This section first presents the range of alternatives considered and then briefly discusses the alternatives considered but not studied in detail. It then describes the status of the FGSP under the No Action Alternative; if there is no release of captive-reared FGSP (Alternative 1). Alternative 2 is to release FGSP into the current extant range. Alternative 3 is to release FGSP into the historic unoccupied range. Alternative 4 is to release FGSP into extant range after additional pathogen identification and testing has been completed.

2.1 Alternatives Considered

(1) No action; (2) release FGSP into the current extant range (3) release FGSP into the historic unoccupied range, (4) to release FGSP into extant range after additional pathogen identification and testing has been completed.

2.1.1 Alternatives Considered but Not Studied in Detail

Alternative 3 is to *release captive-reared FGSP into the historic unoccupied range*. The historic range of FGSP that is not currently occupied is limited to a few larger remnant tracks of dry prairie habitat in Sarasota County (Myakka River State Park), Desoto County (Bright Hour Ranch), Glades County (Fisheating Creek/Lykes Brothers property), and Highlands County (private lands) (Figure 2). The suitable habitat on private lands between the 4 monitored sub-populations is considered, for the purposes of this assessment, to be part of the current range because birds are known to travel between the 4 monitored populations on public and private lands (monitored and unmonitored), as documented through color band re-sighting.

The remainder of the historic range has been largely converted to other land uses or has overgrown dry prairie and semi-improved pasture, which requires more intensive habitat management in order to provide appropriate conditions for FGSP. Much of the remaining historic dry prairie habitat has seen a loss of fire and a change in hydrology, which has allowed trees to mature and shrubs to exceed heights of four feet (ft), making it unsuitable to support FGSP. Landowners interested in supporting releases of FGSP on their property would need to implement complete tree removal in the grasslands, biennial roller chopping to reduce shrubs, and prescribed burning on a two to three-year rotation to maintain grassland diversity. This land management/restoration would need to occur prior to any releases. This greatly increases the cost, time, and coordination to implement the releases and therefore, was not considered a viable alternative at this juncture of the program.

Finally, we posit that under the current management regime that the habitat supporting the extant population is of sufficient quantity and quality to support enough additional FGSP to fulfill the objectives of this action.

2.2 Alternatives Studied in Detail

2.2.1 Implementation Techniques Common to All Alternatives

The optimum methodology of releasing FGSP is still being developed. The Vision (Service and FWC 2019) outlines the adaptive management approach of releasing FGSP and provides additional details beyond what is summarized below.

Husbandry practices in captivity and on-prairie. FGSP breeding pairs are housed in outdoor enclosures and fed a diet of wax worms, meal worms, crickets, seed mix, greens, wild swept insects, and natural forage on native insects and plant matter. Husbandry practices have made minor adjustments to improve the overall health of the birds based on early observations. For example, mosquito screening has been placed at White Oak Conservation (WOC) to address mosquitos that were swarming at the enclosures and insects are dusted with vitamins to address a vitamin A deficiency. At Rare Species Conservatory Foundation (RSCF), nestlings were collected at age 4 days and hand-reared to ensure that young successfully reached independence after multiple young died from complications with coccidiosis. In response to the coccidiosis observed at both captive facilities, FGSP are treated for coccidia with a coccidiostat. At WOC insects are dusted with ESB, 1.5-2mg per bird/day and at RSCF the water is treated with Toltrazuril (0.01ml, 0.25mg) (Pantacox, Pantex Holland, 25 mg/ml solution).

The following protocols can be found in Appendix B of the Vision (Service and FWC 2019). All captive-reared birds are color-banded as nestlings when 5 days old. During this handling period they are weighed, vaccinated for West Nile/ Eastern and Western Equine Encephalomyelitis virus, and a buccal swab is collected for genetic sexing. Once juveniles reach nutritional independence (30-40 days post-hatch) they are separated from their parents and undergo their first health screening examination. Preventative health measures such as frequent observation, routine blood draws, and vaccination are conducted year-round so that sick animals can be identified and treated quickly.

While in the field aviary, FGSP will be provided with ample seed (including seeds native to the prairie), insects (crickets and waxworms), water, and shelter from severe rain. They will be monitored by local staff twice a day during daylight hours and field cameras may be used at the feeding stations inside the aviary to monitor behavior, census the flock, and possibly detect any injury or illness.

Pre-release health screen. All FGSP identified for potential release will undergo a pre-release health screening *ex situ* (Vision, Appendix C) prior to being cleared for transfer and release. The health screen includes a full physical examination and collection of blood. The physical examination will evaluate the overall activity and strength of the bird, feather condition, integument and external structures, eyes and surrounding structures, and pectoral muscling. The blood smear evaluation will estimate the white blood count and evaluate differential and morphology, examine red blood cell morphology, and hemoparasite presence and quantitation

(bacterium, apicomplexan, hemoflagellate or microfilaria). The examination will also include an oral swab and fecal examination. Following examination, the examining veterinarian will make a judgement on the overall health of each bird, based on the pre-release physical examination and supportive diagnostics recorded on the FGSP Examination Form and make a recommendation to the Service and FWC on the disposition of the individual.

On prairie release sites/aviaries. Release sites will be selected in relatively remote areas, away from public access, in dry portions of habitat that are unlikely to be easily flooded during a heavy rain event. The on-prairie aviary must be constructed in a manner that excludes predators, including snakes and rodents; thus, it is expected that in most cases, a pre-construction controlled burn will be implemented prior to construction to increase detection and eliminate predators from the area. Once constructed, the aviary must have suitable cover and may require replanting with native vegetation.

Aviaries must be sufficiently large to allow birds to retain flight strength and health. At a density of approximately 60 square ft per bird, WOC has successfully maintained healthy FGSP without treatment for coccidia during the winter; therefore, this density will be used unless additional information becomes available to suggest a better design. The current on-prairie aviary design is 20 ft x 60 ft x 8 ft with keeper access, and is constructed with aluminum woven wire (0.187 opening) screen to prevent damage by rodents or other predators (Figure 3). It is built on a footer set 12 inches into the ground to prevent predators from burrowing in. Wooden structures can also be built to provide artificial shelter from weather. When possible the structure will be built to be temporary or moveable to another identified location.

Age at release. Captive-reared birds will be released as both independent juveniles and as second-year adults within an adaptive framework to test the survival and recruitment probabilities of these two developmental stages (Vision, Appendix B). Birds may also be considered for release based on their genetic value to the captive flock. Other release techniques may be considered (*e.g*., family group releases) in an adaptive management framework.

Acclimation with pre-release observation. FGSP will be held on-prairie to allow the birds to acclimate to the new environment and to observe for any physical or behavioral queues that indicate the bird is not a good candidate for release. Birds deemed not suitable for release will be returned to captivity. Acclimation periods have been selected to minimize stress and subsequent poor health (*e.g*., the potential for build-up of shed oocysts from coccidian-infected birds, which have been identified as a concern for FGSP in captivity) by minimizing the time that release birds are housed in the on-prairie aviaries. Parent-reared FGSP will spend a minimum of two nights in a field aviary prior to release to allow for adjustment to radio transmitter harnesses, recovery from human handling, and recovery from transport (Vision, Appendix B). Hand-reared birds, which are anticipated to need a longer acclimation period, will be held for four to seven nights, at the discretion of husbandry staff. Shorter acclimation periods within this time frame or direct release of parent-reared birds may occur, if warranted, to mitigate risks to the birds (*e.g.,* to eliminate intraspecific aggression from males). This type of

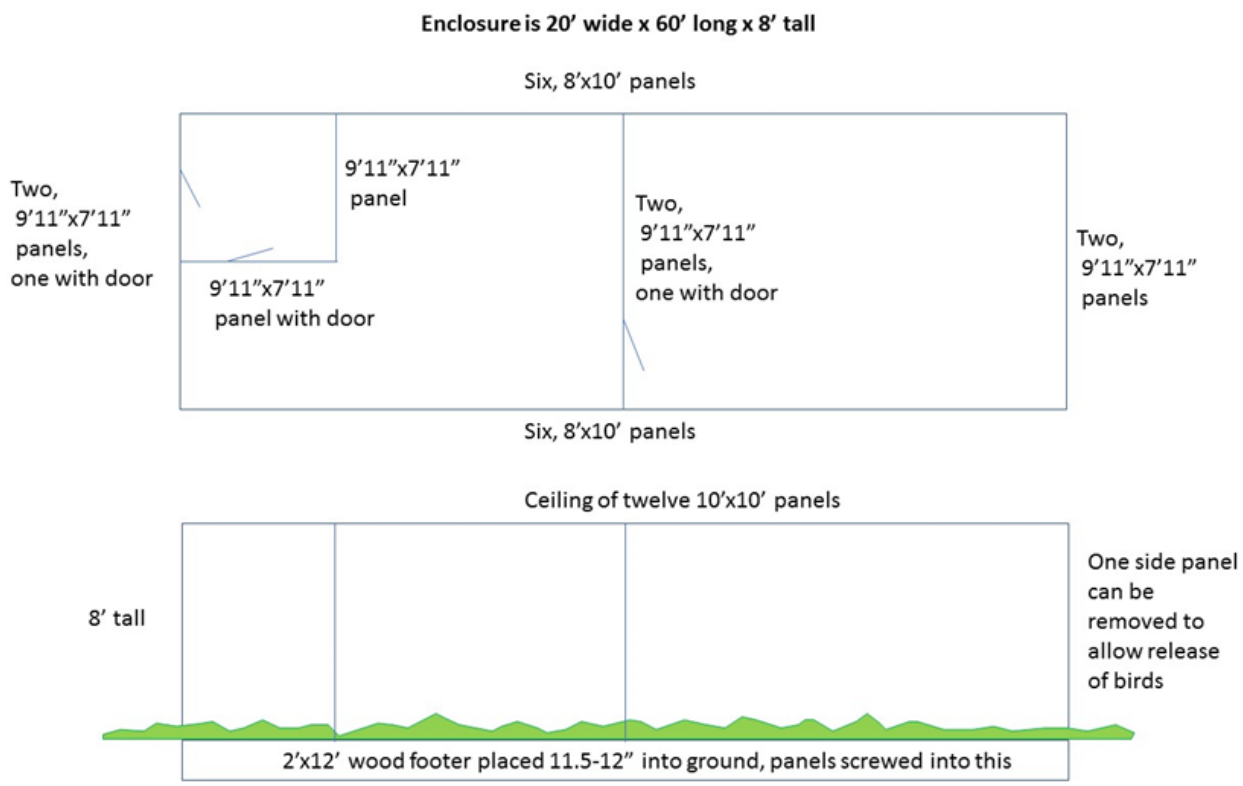

Figure 3. Current on-prairie release aviary design.

release is not preferred and expected to be rare. Adjustments to the length of field acclimation period will be made based on observations of birds pre- and post-release.

Post-release monitoring. Monitoring of released birds via telemetry will be conducted to provide additional information as to the fate of each individual. Should release birds die, every effort will be made to collect the carcass and evaluate it to determine cause of death. The program will be managed adaptively should any disease-related or other patterns of mortality be observed post-release, up to and including termination of the releases.

2.2.1 Alternative 1 - *No action*

The Service would not release FGSP to the dry prairie of Florida. Under this alternative, the wild population would be left to recover without supplementation. Given the ongoing population trends, we predict the FGSP would to go extinct within a decade. Landowners would continue managing the habitat on their respective management units consistent with current practices. The Service and FWC would work with partners to phase out the captive breeding program and possibly establish zoological populations of FGSP for potential future research and recovery needs.

2.2.2 Alternative 2 – *Release into current extant range – Preferred alternative*

The Service and FWC would release birds as described in the Vision using the protocols outlined above. The first releases would occur at TLWMA, with the intent to release birds at other sites as soon as feasible. TLWMA was selected for the first year of release trials because it has: 1) the largest extant FGSP population, suggesting conditions may be more suitable for survival or reproduction, 2) an existing grid of fire lines, which is amenable to systematic radio-telemetry tracking using an all-terrain vehicle, 3) year-round staff, funding, and equipment are available for post-release monitoring, 4) no additional authorizations are necessary, and 5) no military activities, private permissions, or seasonal high-water levels that would make areas inaccessible during key monitoring periods. In addition, the larger resident population is anticipated to promote post-release retention via conspecific attraction or pairing with wild birds. A single release location was selected to allow for an initial evaluation of transport, acclimation, release, and post-monitoring techniques without adding a site effect.

2.2.3 Alternative 4 - *Release into extant range after additional pathogen identification and testing has been completed*

The Service and FWC would release birds as described in the Vision and outlined above; however, releases would not begin until all pathogens that have been observed to contribute to mortality or morbidity in the captive population have also been documented in the wild population of either FGSP or other resident or migratory birds on the prairie. Under this alternative, ongoing collection of biological samples from both the captive and wild populations would continue until the agencies have explored all pathogens of concern as determined by the FGSP Health Team. It is possible that this screening process would uncover additional pathogens, possibly undescribed, with unknown effects. Diagnostic testing would continue until the primary priority pathogens (as identified by the Health Team) identified in captivity have been confirmed in the wild population. We have no way to determine how long this process may take.

Currently, biological screening includes collection of blood and fecal samples. The Service and FWC would work with the FGSP Health Team to identify appropriate means to process and test samples depending on the particular pathogen in question. At a minimum, given the current state of knowledge, no birds would be released until the coccidian known to contribute to mortality at RSCF, was confirmed in the wild via polymerase chain reaction (PCR) testing—and whether the coccidian that contributed to mortality at WOC is the same as that at RSCF or in the wild.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Location

The following describes the current extant occupied and historic unoccupied range of the FGSP (Figure 2) in Highlands, Oceola, Okeechobee, and Polk County.

3.2 Physical Characteristics and Land Use

The current extant and unoccupied historic range of the FGSP consists of a mixture of dry prairie and semi-improved pasture. These lands are relatively treeless and flat with poorly-drained soils and a history of frequent fires (Service 1999). Much of the unoccupied historic range of the FGSP has been converted to land uses that are not compatible with the FGSPs' habitat needs. These uses include sod farming, citrus orchards, row cropping, and intense grazing on improved pasture. The occupied native dry prairie habitat is maintained and managed through frequent burning (lightning-caused or prescribed) on a 1 to 3-year rotation and by roller-chopping, as needed. The occupied semi-improved pasture is maintained through a variation of burning, mowing, roller-chopping, and prescribed grazing (Hendricks 2018, unpublished report).

The current occupied range of the FGSP (Figure 2) is located mainly on public lands that are managed for the FGSP and for public use. Public uses include hunting, fishing, hiking, camping, stargazing, horseback riding, and wildlife viewing. The unoccupied range of the FGSP (Figure 2) is located mainly on private lands with the exception of the dry prairie habitat within Myakka River State Park.

3.3 Biological Environment

3.3.1 Vegetation

The extant and historic range of the FGSP consists of a mixture of native Florida dry prairie and semi-improved pasture. Florida dry prairie is an endemic vegetation community dominated by bluestem grasses (*Andropogon glomeratus* var. *glaucopsises* and *Schizachyrium stoloniferum*), wiregrass (*Aristida stricta* var. *beyrichiana*), scattered, stunted saw palmetto (*Serenoa repens*), and low-growing dwarf live oak (*Quercus minima*) (Service 1999). Other common shrubs and herbs include gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), shiny blueberry (*Vaccinium myrsinites*), netted pawpaw (*Asimina reticulata*), Atlantic St. John's wort (*Hypericum reductum*), dwarf wax myrtle (*Myrica cerifera* var. *pumila*), bottlebrush threeawn (*Aristida spiciformis*), hemlock witchgrass (*Dichanthelium portoricense*), broomsedge bluestem (*Andropogon virginicus*), lopsided indiangrass (*Sorghastrum secundum*), and cypress witchgrass (*Dichanthelium ensifolium*) (Orzell and Bridges 2006). The typical dry prairie has a mixture of upland and wetland plants, with the most conspicuous indicator of this mixture being the co-occurrence of runner oak and Elliott's yelloweyed grass (*Xyris elliottii*) (Service 1999).

Semi-improved pasture used by FGSP is characterized by a mixture of non-native pasture grasses such as Bahiagrass (*Paspalum notatum*) and common carpetgrass (*Axonopus fissifolius*) and native grasses such as broomsedge bluestem, purple bluestem (*A. glomeratus* var. *glaucopsis*), creeping bluestem (*Schizachyrium stoloniferum*), and blue maidencane (*Amphicarpum muhlenbergianum*) (Hendricks 2018, unpublished report). Shrubs including saw palmetto and wax myrtle are scattered throughout the relatively treeless landscape. With proper habitat management cattle grazing has been shown to be compatible with FGSP presence. FGSP have not been shown to use residential or urban landscapes.

3.3.2 Wildlife

Florida dry prairie is inhabited by several rare bird species including FGSP, Florida burrowing owl (*Athene cunicularia floridana*), Audubon's crested caracara (*Caracara cheriway*), white-tailed kite (*Elanus leucurus*), wood stork (*Mycteria americana*), and Florida sandhill crane (*Grus canadensis pratensis*) (Service 1999, Florida Natural Areas Inventory [FNAI] 2010). The dry prairie is also occupied by many species of breeding and migrant birds. Breeding birds include mottled duck (*Anas fulvigula*), common nighthawk (*Chordeiles minor*), red-winged blackbird (*Agelaius phoeniceus*), Bachman's sparrow, common yellowthroat (*Geothlypis trichas*), eastern towhee (*Pipilo erythrophthalmus*) and eastern meadowlark (*Sturnella magna)* (Service 1999). Species that migrate into the central Florida area and overwinter within dry prairie include the savannah sparrow (*Passerculus sandwichensis*), swamp sparrow (*Melospiza georgiana*), Henslow's sparrow (*A. henslowii*), as well as the eastern race of grasshopper sparrow (*A. s. pratensis*). In addition, a variety of avian predators, including northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and other hawk species (*Accipiter* spp.) migrate into central Florida.

One rare species of snake, the eastern indigo snake (*Drymarchon couperi*), and one species of tortoise, the gopher tortoise (*Gopherus polyphemus*) occurs within the dry prairie region (Service 1999). Other herpetofauna of the dry prairie include common species such as Florida box turtle *(Terrapene carolina bauri*), glass lizards (*Ophisaurus* spp.), ground skink (*Scincella lateralis*), Florida ribbon snake (*Thamnophis sauritus sackenii*), Florida banded water snake (*Nerodia fasciata*), black racer (*Coluber constrictor priapus*), and rough green snake (*Opheodrys aestivus*) (Service 1999). Amphibians including oak toad (*Bufo quercicus*), southern cricket frog (*Acris gryllus gryllus*), and pine woods tree frog (*Hyla femoralis*) are also abundant in dry prairies (Service 1999).

One rare species of bat, Florida bonneted bat (*Eumops floridanus*) occurs within the dry prairie region. Other common mammals include eastern cottontail (*Sylvilagus floridanus*), hispid cotton rat (*Sigmodon hispidus*), oldfield mouse (*Peromyscus polionotus*), spotted skunk (*Spilogale putorius*), and bobcat (*Lynx rufus floridanus*) (Service 1999).

3.3.3 Disease

There is some existing evidence regarding potential disease threats – parasites and pathogens that have been found in free-ranging FGSPs include ectoparasites (ticks, feather lice, and feather mites), helminths (*Mediorhynchus papillosum*), microfilaria (*Aproctella* sp.), fecal coccidia (*Isospora* sp.), hemoparasites (*Plasmodium* sp., *Leucocytozoon* sp., and *Trypanosoma* sp.), tick-borne hemobacteria (*Ehrlichia chaffeensis* and *Rickettsia aeschlimannii*; the latter found only from the gut of ticks that fed on FGSP), and mycobacteriosis (*Mycobacterium avium*; Noss et al. 2008). However, since there have been limited attempts to evaluate and identify the suite of diseases present on the Florida dry prairie or within the many avian species that occupy or migrate through this habitat, this list likely is not comprehensive. We have limited documented evidence of these parasites/pathogens causing mortality in wild birds on the prairie.

When captive breeding was initiated, the founding birds were brought to RSCF (2015) and WOC (2016) from the extant wild populations at TLWMA and a private ranch. Both of these facilities implement biosecurity practices to reduce the likelihood of introducing a novel pathogen to the captive birds. Despite these practices, during the first year of captivity, examination of FGSP mortalities uncovered husbandry issues and diseases of concern including eastern equine encephalitis, extra-intestinal coccidiosis (due to at least four genotypes of *Isospora*), and coelomic filariasis (*Aproctella* sp.). Changes in husbandry practices led to a significant reduction in disease, and no disease-related deaths were reported in 2018. In 2019, two adult male birds at RSCF died from coccidia infection.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Alternative 1 - *No action*

Alternative 1 would not reintroduce FGSP to the wild. Under this alternative, the wild population would not be supplemented and naturally occurring population trends would continue without the benefit of adding additional birds to the landscape to halt or reverse the declining trend. The majority of recovery activities would focus on ongoing land management and the population would continue to be monitored. We anticipate that land managers would continue to manage the habitat consistent with current practices and pursuant to their responsibilities and authorities. Nest protection would likely continue for some extent of time. Considering current population trends, the FGSP would likely be extinct in less than a decade.

When Alternative 1 is considered, that of no action, we note that there are hazards and uncertainties related to the release of FGSP and any species. However, given the precarious state of the wild population, a decision not to release captive-reared individuals in an attempt to halt the decline would potentially be hazardous to survival of the species in the wild. The option of no action is unacceptable when the mandate of the Endangered Species Act, to protect and recover endangered species, is considered. The most compelling reason for not delaying the releases is the precipitous decline of the wild population and potential for extinction within a decade. Releasing captive-reared FGSP to the wild has become a recovery priority.

4.2 Alternative 2 - *Release into current range* – Preferred alternative

4.2.1 Physical Environment and Land Use

Establishing the proposed release site and any future release sites are not expected to have any effects to the physical environment or land uses. Implementation of Alternative 2 is expected to have no effect to the physical environment or land uses.

4.2.2 Biological Environment

4.2.2.1 Vegetation

With the exception of limited areas impacted by construction and use of on-prairie aviary (release enclosure), no detectable effects on vegetation within the release area is expected as a result of implementation of Alternative 2. The on-prairie aviary is constructed to be temporary and can be removed at the end of the release/recovery effort. There are no other expected effects to vegetation throughout the extant range as a result of the implementation of Alternative 2.

4.2.2.2 Threatened, Endangered, and Candidate Species

Alternative 2 is expected to have beneficial effects to the FGSP and is in alignment with recovery planning. Alternative 2 has the added benefit of implementing releases when a population still exists to release birds to, which is anticipated to increase the retention of the captive-reared birds to the release site and improve recruitment into the wild population. Releasing captive-reared FGSP into the wild has the potential beneficial effect of increasing genetic variability and effective population size, as well as improving productivity of the wild FGSP population.

Releasing captive-reared birds to areas currently occupied by FGSP could result in temporary stress or behavioral changes of resident birds, and disruption of social structure. Resident birds could also be temporarily or permanently displaced by released birds. However, released individuals are more likely to be displaced by resident birds because residents have established territories and release birds will be exploring the new environment. Birds will be released at times when natural recruitment would be expected into the population (immigration at the start of breeding season, and recruitment following fledgling). In doing so we intend to minimize any unwanted stress to the resident population. Sufficient food, unoccupied suitable habitat, and other resources exist on the prairie to support the addition of birds to the extant population.

Alternative 2 is expected to have no effect on other listed or candidate species with an overlapping range including the Audubon's crested caracara, eastern indigo snake, wood stork, Florida bonneted bat, or gopher tortoise. Alternative 2 will have no effect on designated critical habitat.

4.2.2.3 Other Wildlife Species

Release of captive-reared FGSP has the potential to impact avian species on the prairie protected under the Migratory Bird Treaty Act. FGSP are non-migratory residents of Florida dry prairie. Similar to what is described above (section 4.2.2.2) other avian residents of the prairie could be disturbed by the addition of the captive-reared sparrows. However, based on the timing, anticipated behavior of the release birds, and availability of resources, any effect is expected to be negligible. The potential for captive-reared FGSP to introduce a disease that may adversely affect other residents of the prairie or migratory birds is discussed below (section 4.2.2.4).

As described above (section 2.2.1) release aviaries were constructed to exclude predators. However, once released it is expected that a subset of the birds released will likely be killed by some predator on the prairie that is known to prey on the wild population. At this time, there are no plans to control predators at the release sites.

4.2.2.4 Disease

Because we documented pathogens in captive birds that likely contributed to mortality, prior to conducting any releases the Service and FWC conducted a structured Disease Risk Analysis (DRA) workshop with the International Union for Conservation of Nature/ Species Survival Commission Conservation Planning Specialist Group (IUCN/SSC) to evaluate the risk of releasing captive-reared sparrows to the wild. Due to the timing needs of the program, a Rapid Risk Assessment Protocol was followed for this workshop. This method does not include the development of a full risk model, but is aimed at combining existing data and expert opinion into a structured decision making process in an attempt to reach consensus, or at least gauge the level of risk tolerance, around important decision points in support of management and policy decision making. The workshop focused on filarial nematodes and coccidian protozoa because these pathogens have been associated with multiple mortalities in captivity (IUCN CPSG 2019). In addition, we solicited expert opinion from additional researchers not involved in the FGSP Working Group and provided their contributions to participants for consideration prior to the DRA.

The experts among the workshop participants did not reach a consensus on the level of risk from the pathogens, in part because of uncertainties in the data and information assembled for this analysis. Some participants felt strongly that it is not appropriate to release any captive birds to the wild until all pathogens found to contribute to mortality have been fully described and documented to occur in wild birds. However, using a weight of evidence approach based on the DRA results, literature review, and discussions with experts, the Service and FWC concluded that the risk of releasing captive-reared sparrows to the wild was acceptably low because the pathogens document in captivity are likely already present in the wild population. The conclusion was reached in part because 1) PCR analysis revealed that short gene region sequences from wild and captive *Aproctella* (filarial nematodes) samples were an exact match, suggesting that the filarid in the captive population was likely the same as that identified in the wild; and, 2) coccidia are common pathogens in the birds, and biosecurity protocols currently in place among captive rearing facilities greatly reduces the likelihood of introducing and maintaining a novel pathogen in captivity.

Another pathway considered for pathogen introduction includes wild birds perching on enclosures. The FGSP's native prairie is used by thousands of migratory and wintering bird species every year, so it has never been isolated from disease outside its immediate geography, and the captive facilities are exposed to the same migratory and wintering species of birds as the prairie. The DRA report was subsequently peer reviewed by four independent persons identified through the Service's Science Applications Division. Independent peer review captured the variation of opinions in the DRA workshop, with 3 individuals agreeing that the information supporting the decision to release was sufficient and 1 individual recommending gathering

additional information on the specific pathogens and verification that the pathogens are known to be present in the wild population.

The genus of coccidia identified in FGSP is an *Isospera*, and this genus has been documented in the wild and at both captive breeding facilities. The coccidian at RSCF has been further described through mitochondrial DNA as *I. sparrei* (name pending). This coccidian has yet to be confirmed in the wild or at WOC; testing is ongoing as samples are acquired. However, the director of RSCF asserts that the coccidian present at his facility could have only come from the prairie (wild) based on biosecurity measures (Reillo 2018).

Coccidia is shed from birds through feces and infection can occur through exposure, while the intensity of infection can increase under stress. Coccidia can cause morbidity and mortality in wild birds, although the risk is commonly considered low because of dilution in the wild over greater space. In captivity, the severity of coccidiosis tends to be greater because increased density and stress leads to greater intensity of infection. Birds at both captive facilities are treated for coccidia during the breeding season because of the added stress during this time, which can weaken the bird's immune system and cause them to be more susceptible. Captive birds at WOC are not receiving treatment for coccidia during non-breeding months, and currently none of these birds are exhibiting health problems or mortality related to coccidia.

In summary, there are unknowns related to the species of coccidia that are present in FGSP, however, it is expected that the birds in captivity do not carry any pathogen unique or novel from birds in the wild based on biosecurity measures. While no release is ever risk-free, the environmental and/or health risk impacts to the FGSP or other avian species from the proposed action are not expected to be significant, though we acknowledge that it is possible that an individual released FGSP could die from coccidia or another pathogen following release. Alternative 2 will minimize the likelihood of releasing birds with reduced fitness that may be more susceptible to succumbing to disease from the pathogens through the standard health screen (section 2.2.1; Vision, Appendix C) each individual will receive prior to release. Birds will be closely observed during the on-prairie acclimation period to ensure that there are no physical or behavioral queues suggesting that a bird may not be suitable for release.

Monitoring of released birds via telemetry will provide additional information as to the fate of each individual. Should release birds die, every effort will be made to collect the carcass and evaluate it to determine if the mortality is disease-related. The program will be managed adaptively should any disease-related mortality be observed post-release, up to and including termination of the releases.

4.2.3 Socioeconomic Environment

The area surrounding the potential release site is in a rural setting. Cattle ranching and recreational hunting are the main land uses.

4.2.3.1 Recreational Use, Land Management, and Ranching

The introduction of FGSP to the extant range will not negatively impact the current socioeconomic situation of the area. The primary land use of private lands within the range is farming and ranching, and ranching has been demonstrated to be a compatible land use with the FGSP with appropriate land management. Releases will be restricted to public land and will not negatively affect private landowners' lifestyles or income potential. FGSP currently occupy both the private and public lands within the extant range, and release of additional birds is not expected to increase or change any regulatory requirements on landowners.

4.2.4 Cultural/Paleontological Resources

No adverse effects on existing archaeological resources are expected to result from the release of FGSP on TLWMA. In the event that releases are conducted at any of the other potential release areas, any soil disturbance activities would be screened for possible effects to archaeological resources prior to any actual construction and site location would be adjusted to avoid impacts.

4.3 Alternative 4 - *Release into extant range after additional pathogen identification and testing has been completed*

4.3.1 Physical Environment

The effects to the physical environment under Alternative 4 are expected to be the same as described in Alternative 2; no effect.

4.3.2 Biological Environment

4.3.2.1 Vegetation

The effects to vegetation under Alternative 4 are expected to be the same as described in Alternative 2.

4.3.2.2 Threatened, Endangered, and Candidate Species

If releases occur under Alternative 4 the same beneficial effects to the FGSP could be achieved as described in Alternative 2, which are in alignment with recovery planning. However, the unknown temporal component of Alternative 4 introduces potential negative impacts compared with the Preferred Alternative. Releases under Alternative 4 will be delayed until pathogens found in captive birds have been documented in the wild, and we have no way to reasonably predict how long these analyses will take and what the status of the wild population will be at that time. At best, we expect that the population will be further diminished and it is possible only a remnant population would still exist on TLWMA. At worst, the FGSP may be extinct in the wild. Releases to a remnant population may still be beneficial but we expect they would be

less successful because individuals would be less likely to be retained at the release site and recruit into the wild population. Genetic diversity would likely decline, possibly limiting the ability to recover the species. Furthermore, as the wild population declines, our ability to collect wild samples and confirm pathogen presence also declines and may ultimately prove to be unattainable.

The objective of the FGSP captive program is to augment the wild FGSP population in a manner that stabilizes and grows the wild population while the recovery program identifies additional management actions that can reverse the population decline and reduce and eventually eliminate the need for future captive rearing. Delaying releases would increase the magnitude of the captive effort necessary to keep the wild population from becoming extirpated. Under this alternative it is also possible that no releases would occur until the wild population is extinct or it's low numbers render it functionally extinct. Should this be the case, we anticipate that the methodology for releases identified above and further described in the Vision would be modified.

Alternative 4 is expected to have no effect other listed or candidate species with an overlapping range including the Audubon's crested caracara, eastern indigo snake, Florida bonneted bat, or gopher tortoise. Alternative 4 will have no effect on designated critical habitat.

4.3.2.3 Other Wildlife Species

The effects to other wildlife under Alternative 4 are expected to be the same as described in Alternative 2.

4.3.2.4 Disease

Alternative 4 will not implement any releases until all pathogens of primary concern in the captivity have been documented in the wild. Under this alternative, we anticipate that releases of captive-reared FGSP will have no effect on the wild FGSP population or other species with respect to pathogens. There is a possibility that some pathogen may be overlooked in screening; however, we expect this risk to be di minus.

Under this alternative captive-reared FGSP would still receive the standard health screen described above (section 2.2.1) to ensure that each individual is of optimum health and does not carry a parasite load that might impair their ability to survive upon release. However, because pathogens, including coccidia, are known to cause morbidity and mortality in the wild, it is expected that released individuals could still die from disease.

4.3.3 Socioeconomic Environment

4.3.3.1 Recreational Use, Land Management, and Ranching

The effects to recreational use, land management, and ranching under Alternative 4 are expected to be the same as described in Alternative 2.

4.3.4 Cultural/Paleontological Resources

The effects to cultural/paleontological resources under Alternative 4 are expected to be the same as described in Alternative 2.

5.0 CONSULTATION AND COORDINATION WITH OTHERS

The Service and the FWC consulted with the FGSP Working Group and other outside experts in drafting our Vision document, which identifies release of captive-reared birds as one of the actions necessary to arrest the decline of the FGSP population in the wild. The draft Vision identified the need to conduct a DRA prior to making a decision about releasing captive birds back to the wild. The DRA process was used to assemble existing information and expert opinion to evaluate the risks associated with releasing captive-reared birds to existing wild FGSP populations in 2019. A two-day workshop facilitated by IUCN/SSC was conducted in November 2018. The workshop included about 20 FGSP biologists, captive breeding practitioners (RSCF and WOC), disease researchers (University of Georgia and University of Florida), and veterinarians (WOC, Service, and FWC). Prior to the DRA workshop, the FWC consulted with around a dozen wildlife disease experts, researchers, and wildlife veterinarians regarding disease risks, health screens, and quarantine requirements that should be resolved before releasing any captive-reared FGSP, which is included as an Appendix to the DRA. The DRA was subsequently peer reviewed by four independent reviewers identified by the Service's Science Applications Division.

6.0 COMPLIANCE WITH LAWS, REGULATIONS AND POLICIES

This Environmental Assessment was prepared in accordance with the National Environmental Policy Act of 1969. It is consistent with the policy contained in the Service's manual (550 FW 3), and employs a systematic, interdisciplinary approach. The proposed action involves releasing captive-reared FGSP into the extant wild population. The proposed action has been reviewed for compliance with other Federal and state requirements. Full compliance with relevant laws and regulations will be achieved upon review of this Environmental Assessment and the signing of a FONSI.

The Executive Order 12898 on Environmental Justice issued on February 11, 1994, requires all federal agencies to assess the impacts of federal actions with respect to environmental justice. The Executive Order states, to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high and adverse impacts as a result of a proposed project. The impacts of Alternatives 2 through 4 on human activities in the areas surrounding the release area are expected to be minimal, and so do not represent any disproportionately high and adverse impacts to low-income and minority groups.

7.0 PREPARERS

This Environmental Assessment was prepared by Mary Peterson, Endangered Species Recovery Biologist and Ashleigh Blackford, Supervisory Wildlife Biologist, of the Service's South Florida Ecological Services Office, Vero Beach, Florida, Field Office. Other contributors include Dr. Erin Myers, Private Lands Biologist of the Service's Florida Panther National Wildlife Refuge Office, as well as Craig Faulhaber, Avian Conservation Coordinator and Adrienne Doyle, Avian Conservation Biologist of the FWC's Habitat and Species Conservation Division.

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