United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
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JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:
FWS Log No. 04EF1000-2014-F-0319

February 25, 2016

James Martin
Chief, Gas Branch 3
Federal Energy Regulatory Commission
Office of Energy Projects
888 First Street, NE
Washington, DC 20426

RE: Southeast Market Pipeline- Transcontinental Gas Pipeline Company, LCC- Hillabee Expansion (Docket No. CP15-16-000) and Sabal Trail Transmission, LCC (Docket No. CP15-17-000) Projects

Dear Mr. Martin:

This letter transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion for the construction and operation of Transco's Hillabee Expansion (43.5 miles) and Sabal Trail (516.2 miles) pipeline projects and its effects on listed species per section 7 of the Endangered Species Act of 1973, as amended in 1998 (Act) (87 Stat. 884; 16 U.S.C. 1531 et seq.). These two projects are included in the Federal Energy Regulatory Commissions' (FERC) Environmental Impact Statement (EIS) for the Southeast Market Pipeline (SMP) along with the Florida Southeast Connector, which will be consulted on by the Service's South Florida Field Office. This consultation was coordinated with the field offices in Alabama, Georgia, and Florida. The request for formal consultation for the eastern indigo snake (*Drymarchon corais couperi*), Florida sand skink (*Plestiodon reynoldsi*), blue-tailed mole skink (*Eumeces egregius*), Florida scrub-jay (*Aphelocoma coerulescens*) , and longspurred mint (*Dicerandra cornutissima*) was received on October 1, 2015, with a biological assessment of the proposed action.

The Alabama Field Office (AFO) of the U.S. Fish and Wildlife Service reviewed approximately 86 miles of proposed pipeline construction for the Sabal Trail pipeline project and 44 miles of pipeline construction for the Hillabee Expansion Project. Surveys were requested for all federally listed species and recommended for all candidate and petitioned species that may be found in the project area, if suitable habitat was present. Sabal Trail Transmission, LLC provided a copy of the survey results to the AFO for the Sabal Trail Project and the AFO accepts the results of the Federal and State listed species survey report dated (Revised) June 29, 2015. The applicant's consultants, Cardno ENTRIX, provided copies of the survey results to the AFO for the Hillabee Expansion Project and the AFO accepts the results of the Federal and State listed species survey reports dated May 1, 2014, August 24, 2015, and November 6, 2015.

The Sabal Trail pipeline project consists of 516.2 miles of mainline pipeline that will begin in Alabama, cross through Georgia, and terminate in Florida. Approximately 157 miles of the new

pipeline and one compressor station would be constructed in the Georgia portion of the project. The project would occur in the nine following counties in Georgia: Stewart; Webster; Lee; Terrell; Dougherty; Mitchell; Colquitt; Brooks; and Lowndes. Approximately eighty percent of pipeline construction will occur within existing right-of-ways. Surveys were conducted for all federally and state listed species, as well as petitioned species in Georgia, in 2014 and 2015 in areas of suitable habitat along the path of the proposed project. Details on species surveyed for, survey results, protocols, and minimization efforts can be found in the EIS at www.ferc.gov using the elibrary link, docket number CP15-16. Survey results have shown one federally-listed species may be adversely affected during construction of this project, the eastern indigo snake (*Drymachon couperi*). The Jacksonville, Florida, Ecological Services Field Office is the lead Service office for this project and will be working with FERC to ensure their obligations under the Act are met concerning potential impacts to the eastern indigo snake.

The attached Biological Opinion is based on the biological assessment submitted to the Service by FERC for the Sabal Trail project. The Service determined that there would be no adverse effects to federally listed species within the Transco Hillabee Expansion project. It is our opinion that the Sabal Trail project, as described in the biological assessment, will "likely to adversely affect" the eastern indigo snake, sand skink, blue tail mole skink, Florida scrub-jay, and longspurred mint, but will not result in jeopardy of any of these species. The Service has not designated or proposed critical habitat for any of these species; therefore, our Biological Opinion does not analyze adverse modification to critical habitat.

The FERC provided a determination of "not likely to adversely affect" for the species listed in Table 1. The Service concurs with the final determination of effects for species that may occur within the action area or adjacent to the project. The following subsections detail the rationale for the determination, if surveys were conducted, and any proposed conservation measures that minimize the probability of incidental take. Because we concur with the determinations, the species located in Table 1 as "not likely to be adversely affected" will not be discussed further in the enclosed Biological Opinion.

Table 1. Affected Species (C=Candidate; E=Endangered; T=Threatened; SA=Similarity of Appearance); NLAA = "Not Likely to Adversely Affect", LAA = "Likely to Adversely Affect"

Common Name	Federal Status	Critical Habitat	Affects	Lead Service Office For Contact Info
Eastern indigo snake (*Drymarchon corais couperi*)	T		LAA	North Florida
Gopher tortoise (*Gopherus polyphemus*)	C		NLAA	North Florida
Frosted flatwoods salamander (*Ambystoma cingulate*)	T	X	NLAA	North Florida
Striped newt (*Notophthalmas perstriatus*)	C		NLAA	North Florida
Florida sand skink (*Neoseps reynoldsi*)	T		LAA	North Florida
American alligator (*Alligator mississippiensis*)	T/SA		NLAA	North Florida
Blue-tailed mole skink (*Eumeces egregius lividus*)	T		LAA	North Florida
Audubon's crested caracara (*Polyborus plancus audubonii*)	T		NLAA	North Florida
Florida scrub-jay (*Aphelocoma coerulescens*)	T		LAA	North Florida
Wood stork (*Mycteria americana*)	T		NLAA	North Florida
Florida panther (*Puma concolor coryi*)	E		NLAA	North Florida
Northern long-eared bat (*Myotis septentroinalis*)	T		NLAA	Alabama
Indiana bat (*Myotis sodalist*)	E		NLAA	Alabama
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	T	X	NLAA	North Florida
Fat three-ridge (*Amblema neislerii*)	E	X	NLAA	Georgia
Fine-lined pocketbook (*Hamiota altilis*)	T	X	NLAA	Alabama
Gulf moccasinshell (*Medionidus penicillatus*)	E	X	NLAA	Georgia
Oval pigtoe (*Pleurobema pyriforme*)	E	X	NLAA	AL/GA/FL
Purple bankclimber (*Elliptoideus sloatianus*)	T	X	NLAA	Georgia
Shinyrayed pocketbook (*Lampsilis subangulata*)	E	X	NLAA	Georgia
Southern clubshell (*Pleurobema decisum*)	E	X	NLAA	Alabama
Blue shiner (*Cyprinella caerulea*)	T		NLAA	Alabama
Longspurred mint (*Dicerandra cornutissima*)	E		LAA	North Florida

The Service appreciates the coordination and cooperation of the FERC. If you have any questions about the attached Biological Opinion, please feel free to contact Annie Dziergowski, of my staff at (904)731-3089.

Sincerely,

Jay B. Herrington
Field Supervisor

BIOLOGICAL OPINION

A Biological Opinion is a document that includes the Service's analysis of whether the proposed action, Sabal Trail Transmission, LLC pipeline project (Sabal Trail project), is likely to jeopardize the continued existence of eastern indigo snake (*Drymarchon corais couperi*), Floirda sand skink (*Plestiodon reynoldsi*), blue-tailed mole skink (*Eumeces egregius*), Florida scrub-jay (*Aphelocoma coerulescens*) , and longspurred mint (*Dicerandra cornutissima*). "To jeopardize the continued existence of a listed species" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species (50 CFR §402.02). Because critical habitat has not been designated for these species, this Biological Opinion will not discuss critical habitat or analyze adverse modification.

CONSULTATION HISTORY

The biological assessment sent to the Service has a complete consultation history for the Sabal Trail project. The summary presented below highlights our early coordination and discussions about federally listed species, which is the focus of the action agency's request for Formal Consultation. The Service provided technical guidance the survey methods.

The following list is presented in reverse chronological order, starting with the most recent coordination with the Service.

2016 February 2, FERC issues Certificate Order

2016 January, The Service provided a draft biological opinion to Sabal Trail and FERC for their review.

2015 December 1, FERC sends the Service the Final EIS and BA. The EIS does include impacts to listed species and will require formal consultation on Sabal Trail with the Service.

2015 October 10, The Service provided comments to FERC regarding the DEIS.

2015 October1, FERC sends letter requesting consultation with the Service on the SMP.

2015 September 11, FERC provided the Service with the DEIS and BA for our review and comments.

2015 August 3, Consultants provide revised species reports on Sabal Trail based on 2014 and 2015 survey results to be included in the DEIS and BA.

2015 February (various dates), Consultants provide interim report for the Sand Skink Documented Habitat Analysis and follow up discussions regarding data

2014 December 23, The Service provides letter to FERC that we have no comments on the NOI for the SMP.

2014 November 21, Consultants provided updated resource reports including species surveys.

2014 September 19, The consultants for Sabal Trail sent email requesting sand skink data from the North and South Florida Field Offices regarding past consultation and research to conduct analysis of habitats where sank skinks are being detected.

2014 September 18, The Service provided letter to FERC declining our agency becoming a cooperating agency on the SMP.

2014 August/September, The applicants for all project within the SMP provided the Service a draft Migratory Bird Conservation Plan for our review and concurrence.

2014 August 19, FERC send letter to Service requesting our agency be a cooperating agency on the EIS for SMP.

2014 August 12, Meeting between North and South Florida Field Offices with Sabal Trail, Florida Southeast Connector, and their consultants to discuss temporary and permanent impacts to sand skink along the proposed pipeline project.

2014 July 3, Consultants send the Service Florida scrub-jay Habitat Evaluation and Survey results.

2014 June 15, Sabal Trail provides Service with draft resource reports, including listed species surveys, for our review.

2014 May 1, FERC conference call to discuss updates to Sabal Trail proposed pipeline project.

2014 April/May, Sabal Trail consultants emails regarding occurrence of sand skinks along the Sabal Trail proposed pipeline.

2014 February 19, The Service had a conference call with FERC and other state and federal agencies to discuss any concerns over the initial review of the proposed pipeline projects.

2014 February 18, FERC published the Notice of Intent to prepare the EIS for the SMP project with includes Sabal Trail.

2013 December 10, The Service meet with FERC to discuss the proposed pipeline project and any potential resource issues regarding federally listed species.

2013 December 4, The Service was provided a copy the initial draft resource reports that included a general project description and a species list.

2013 November 4, The Service meet with Sabal Trail and their consultants, Cardno ENTRIX, to discuss federally listed species within the proposed pipeline project.

2013 October 29, The Service received a letter from Sabal Trail initiating early review under FERCs pre-filling process.

2013 September 16, The Service was contacted and sent general information from Sabal Trail's consultants regarding the proposed pipeline project.

DESCRIPTION OF PROPOSED ACTION

Sabal Trail Transmission, LLC has filed an application with the FERC in the fall of 2014 pursuant to section 7 of the Natural Gas Act (NGA) seeking Certificates of Public Convenience and Necessity (Certificates) to construct, own, operate, and maintain interstate natural gas transmission pipelines and related facilities. The FERC is the federal agency responsible for authorizing interstate natural gas transmission facilities under the NGA, and is the lead federal agency responsible for preparing the EIS.

The Sabal Trail project would involve constructing and operating about 516.2 miles of pipeline and associated facilities (access roads, staging areas, and aboveground facilities (compressor stations), including: 481.6 miles of 36-inch-diameter Mainline pipeline in Alabama, Georgia, and Florida; 13.1 miles of 36-inch-diameter lateral pipeline (the Hunters Creek Line(HCL)) in Florida; 21.5 miles of 24-inch-diameter lateral pipeline (the Citrus County Line (CCL)) in Florida; and five new natural gas-fired compressor stations. Sabal Trail would also construct and operate the Central Florida Hub at the termination of the Mainline in Osceola County, Florida. Sabal Trail's facilities would be constructed in three phases between 2016 and 2021, with the second and third phases involving only additional compression facilities. The Sabal Trail project would provide up to 1.0 Bcf/d of firm transportation service upon completion.

Sabal Trail will use a 100-foot-wide construction right-of-way to construct the proposed Mainline route and HCL, and a 90-foot-wide construction right-of-way to construct the CCL. Additional temporary workspace outside of the 100 and 90-foot-wide construction right-of-way will also be used where additional spacing is required to safely cross infrastructure, utilities, and other sensitive environmental areas. This right-of-way would be reduced as necessary through sensitive areas such as wetlands, waterbodies, and residential lands. Constructing the Sabal Trail project would require the temporary use of about 5,984.2 acres of land. Within these sensitive areas when necessary horizontal directional drilling (HDD) will be implemented. HDD involves drilling a hole under the waterbody (or other sensitive feature) and installing a pre-fabricated pipe segment through the hole. Sabal Trail proposes to use the HDD method at 17 sensitive areas.

Sabal Trail pipeline routes will be collocated with existing rights-of-way or previously disturbed corridors for approximately 306.7 miles (59 percent) of the total pipeline length. The remaining approximately 209.5 miles (41 percent) of the pipeline route would deviate from these rights-of-ways and corridors. Of the area affected by pipeline construction, approximately 416.3 acres (7 percent) would overlap with existing easements. Following construction, Sabal Trail will retain a 50-foot-wide permanent right-of-way to operate the pipeline facilities. The permanent right-of-way would require about 2,832.3 acres of land. Of this area, about 64.6 acres would be within previously disturbed, maintained, operational easements. Routine vegetation mowing or clearing over the 50-foot-wide permanent easement in uplands will not be done more frequently than every 3 years. However to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10 foot corridor in an herbaceous state.

FERC and Sabal, in coordination with many state and federal agencies, assessed the proposed action and potential effects on listed species. The Service reviewed the project construction area and species' survey guidelines to address listed species within the action area. A total of 22 federally listed species were surveyed for to determine if Sabal Trail would impact any of these species. Sabal Trail conducted species-specific surveys for all of these species within suitable habitat of the proposed limits of construction in 2014 and again in 2015. Surveys did find the presence or assumed presence of eastern indigo snake, Florida sand skink, blue-tailed mole skink, Florida scrub-jays, and longspurred mint within the construction area.

Based on survey results, FERC has determined Sabal Trail "may affect and is likely to adversely affect" the eastern indigo snake, Florida sand skink, blue-tailed mole skink, Florida scrub-jay, and longspurred mint. The Service concurs with this determination and finds that the project will result

in adverse effects on these federally listed species and their habitats. It should also be noted that the federally listed species in Alabama and Georgia were found to be "not adversely impacted" and will not require further consultation.

Action area

The action area is defined as all areas to be directly or indirectly affected by the Federal action and not merely the immediate area involved in the action. The Service has established an action area for this project that includes all lands in Alabama, Georgia, and Florida within the pipeline project's 100-foot construction right-of-way, additional temporary workspaces, aboveground facilities (including compressor stations), staging areas, and access roads. Therefore, we conclude that the action area as described above is sufficient to capture the direct, indirect, and cumulative effects resulting from the proposed project.

Conservation Measures

Conservation measures are actions to benefit or promote the recovery of a listed species that are included by the Federal agency as an integral part of the proposed action. These actions are taken by the Federal agency or applicant and serve to avoid, minimize, or compensate for project effects on the listed species.

General Conservation Measures

- All temporary access roads and staging areas will be restored to their pre-construction conditions.
- The Applicants would separate topsoil from subsoil in residential and agricultural areas (cultivated or rotated croplands, hayfields, and managed pastures), or as requested by landowner or land managing agency. The Applicants would segregate at least the top 12 inches of topsoil where 12 or more inches of topsoil is present. In soils with less than 12 inches of topsoil, the Applicants would segregate the entire topsoil layer. During backfilling, subsoil would be returned to the trench first. Topsoil would follow such that spoil would be returned to its original horizon.
- Collocate the pipeline facilities with existing rights-of-way to minimize vegetation clearing and habitat fragmentation.
- Limit the construction and operational right-of-way widths to the minimum necessary.
- Implement the 2014 Migratory Bird Conservation Plan to minimize impacts on migratory birds.
- Install trench ramps at regular intervals to provide wildlife exits and placing gaps in the temporary trench spoil piles and pipe stringing to allow wildlife to migrate through the construction corridor.
- Implement an invasive species management plan to minimize and control the spread of noxious and invasive species.
- Restore preconstruction topography in uplands, wetlands, and waterbodies to the greatest extent practicable.
- Allow previously cleared areas where the Florida sand skink and the Florida scrub jay was documented within the 100-foot-wide construction right-of-way to revegetate naturally to eventually restore habitat characteristics, including native grasses, shrubs, and trees.

- The FERC Upland Erosion Control, Revegetation, and Maintenance Plan allows "Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency to maintain the 10-foot corridor in an herbaceous state." The FERC Wetland and Waterbody Construction and Mitigation Procedures state "Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands and waterbody riparian area measured 25 feet back from the high water mark. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routing vegetation mowing or clearing in wetland that are between HDD entry and exit points." Vegetation mowing or clearing will be prohibited during the bird nesting season (generally April 15 to August 1 in Alabama and Georgia, and March 1 to August 31 in Florida).

Conservation Measures for Eastern Indigo Snake

- The Applicant will implement the Standard Protection Measures for the Eastern Indigo Snake (FWS, 2013) to further minimize or avoid impacts on this species, which includes the following measures:
- Prevent the discharge of hydrostatic test water to locations where tortoise burrows are located adjacent to the construction right-of-way.
- Place informational posters identical to those recommended by the FWS at strategic locations along the project right-of-way, proposed access roads, and in construction offices.
- Conduct meetings lead by a designated agent prior to construction to educate project personnel on the informational posters and how to properly report the identification of a live, injured, or dead indigos within the right-of-way.
- Maintain and replace all posters and education materials as necessary throughout the duration of the project; and electronically submit a post construction monitoring report to the FWS within 60 days of project completion.
- If a dead, injured, or sick animal species as addressed in this Biological Opinion is found in the project area, contact the appropriate Service's Ecological Services Office.

In addition, in order to minimize incidental take of eastern indigo snakes through injury or mortality during construction, Sabal Trail proposes that certain agents be authorized to capture, handle, remove any indigo snake from the construction right-of-way and other workspaces, and immediately release them unharmed into adjacent suitable habitat. This conservation measure would most likely be employed during the excavation of gopher tortoise (*Gopherus polyphemus*) burrows (to prevent indigos from entering another burrow or other refugia in the workspace) or when an open pipeline trench is present (to remove indigos from harm's way). In the event that a clutch of eastern indigo snake eggs is discovered while searching the apron of tortoise burrows for tortoise eggs, the snake eggs would be removed without rotation, placed in moist sand, and taken to the Orianne Center for Indigo Conservation (OCIC) for incubation and captive rearing to benefit the OCIC eastern indigo snake reintroduction program. Agents authorized to temporarily handle eastern

indigo snakes and their eggs for this purpose would be limited to the following qualified personnel: Biological Monitors, FWC-approved Gopher Tortoise Authorized Agents and their designated Assistants, and Environmental Inspectors.

Conservation Measures for Florida sand skink and blue-tailed mole skink

The Service defines temporary impacts as "anywhere habitat will eventually be returned to its existing state, with soils returned to a non-compacted (swimmable) state and, the upper soil horizon (top 4"-6" where skinks may be present) replaced to the position from which it was excavate" (see Additional Skink Conservation Measures below).

- To offset temporary habitat impacts and potential injury and harm to skinks, Sabal Trail proposes to purchase credits from an approved Florida sand skink conservation bank prior to the initiation of construction in known or presumed occupied Florida sand skink habitat. It is reasonable to expect sand skink to be present in close proximity to occupied areas where surface soil, land use, and land cover are identical and there are no physical barriers to skink movement. Based on discussion with FWS staff, Sabal Trail proposes to purchase 5.1 acre-credits for the proposed temporary impacts on the 25.5 acres of occupied skink habitat (a 0.20:1 mitigation ratio).
- In native xeric habitats the applicant will clear the untrenched areas using vegetation mulching equipment such as hydroaxe (minimizing soil disturbance and allowing for the resprouting of scrub vegetation), ensuring the natural restoration of native xeric vegetation.
- The trenched area will be allowed to revegetate naturally with no planting of exotic, sod-forming grasses that may prohibit skink occupation. Because no exotic, sod-forming grasses will be planted in human-altered, occupied skink habitat, these areas should return to their former state.
- The mean generation time of Florida Sand Skinks is about four years. Thus, any injury or harm to individuals in the populations should be replaced by natural recruitment relatively quickly following construction.
- Limit the disturbance of soil to only what would be required to establish the pipeline trench, e.g. surface movement of construction equipment, clearing trench area, excavating trench and placing spoils alongside, backfilling the trench after laying pipe, and grading the trench and spoil storage areas to original contours.
- Prevent mulching and the discharge of hydrostatic test water to occupied or presumed occupied skink habitats.
- With the exception of proposed non-compacted access roads, the top 4 to 6 inches of the topsoil (A soil horizon) over the trench line within the six occupied skink sites would be removed and placed at the edge of the nonworking side of the construction right-of-way immediately adjacent to other suitable habitat (present at all six occupied sites), allowing skinks to emigrate to this habitat. The trench spoil would be stockpiled immediately adjacent to the segregated topsoil; its height should form a temporary barrier and minimize skink movement towards the trench. Following pipeline installation, the segregated soils would be returned to the trench line.
- Post-construction vegetation maintenance of the 50-foot permanent right-of-way would be limited to mowing with a rubber-tired bush-hog once every three years, if required, between the months of August and February when skinks are less active.

- Conduct post-construction pedestrian surveys for sand skink on a subsample of 25% of known, previously occupied areas (only) for Sabal Trail. A maximum of three pedestrian surveys would be conducted at least two weeks apart in the spring survey window for Florida sand skinks (March 1-May 15; USFWS 2013) until sand skinks are either observed or for up to three years following pipeline construction in the selected areas.

Conservation Measures for Florida scrub-jay

- FERC recommended in the EIS that Sabal Trail avoid construction within occupied scrub-jay habitat during the nesting season (March 1 to June 30), unless preconstruction surveys confirm that scrub-jays are not nesting within the project area during this time frame (March 1 to June 30) or Sabal Trail receives written confirmation from the Federal Energy Regulatory Commission ("Commission") that construction activities can occur within this time frame.
- In Territories 2 to 5, soil disturbance would be limited to those areas required to excavate the pipeline trench and facilities associated with pipeline protection. Pipeline markers with test leads may be placed along the portion of the pipeline that parallels existing electric transmission lines.
- Scrub vegetation would be cleared with equipment such as a hydroaxe to minimize soil disturbance and to allow the resprouting and natural recruitment of scrub vegetation. This clearing practice would also be implemented within 100 meters of territory boundary if the adjacent habitat is suitable for scrub-jays.
- Trench spoil would be temporarily stockpiled on the non-working side of the construction workspace.
- Territories would be allowed to revegetate naturally with no planting of exotic, sodforming grasses.
- Post-construction vegetation maintenance would be limited to mowing with a rubber-tired bush-hog once every three years , if required, during the months of August through February.

Conservation Measures for longspurred mint

- Sabal Trail would place safety fence along the eastern edge of the construction right-of-way to separate the 0.02 acres of longspurred mint habitat that occurs in the construction work area from the 6.29 acres of the existing longspurred mint population found within the adjacent electric transmission line corridor prior to commencing construction activities in order to reduce disturbance to the existing populations. Signs indicating an environmental sensitive area would be placed with the safety fence.
- In comments provided by the Applicant to the Draft Environmental Impact Statement, Sabal Trail noted that the area disturbed by the installation of the pipeline will provide the type of habitat preferred by the longspurred mint and will reasonably result in the expansion of the longspurred mint population in this area of the project. Thus, no other mitigative measures were necessary

STATUS OF SPECIES

Eastern Indigo Snake

In addition to the assessment below, a 5-year review was completed in 2008 resulting in no change to the species designation (Service 2008a). The 5-year review builds upon the detailed information in the MSRP for this species and is located at http://www.fws.gov/southeast/5yearReviews/5yearreviews/easternindigofinal.pdf

Species description

The eastern indigo snake is the largest non-venomous snake in North America, obtaining lengths of up to 8.5 ft (2.6 meters) (Moler 1992). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (the central 3 to 5 scale rows are lightly keeled in adult males) in 17 scale rows at mid-body. Its anal plate is undivided. In the Florida Keys, adult indigo snakes seem to have less red on their faces or throats compared to most mainland specimens (Lazell 1989). Several researchers have informally suggested that Lower Keys indigo snakes may differ from mainland snakes in ways other than color. Critical habitat has not been designated for this species.

Life history

In south-central Florida, limited information on the reproductive cycle suggests that eastern indigo snake breeding extends from June to January, egg laying occurs from April to July, and hatching occurs from mid-summer to early fall (Layne and Steiner 1996). Young hatch approximately 3 months after egg-laying and there is no evidence of parental care. Eastern indigo snakes in captivity take 3 to 4 years to reach sexual maturity (Speake et al. 1987). Female eastern indigo snakes can store sperm and delay fertilization of eggs. There is a single record of a captive eastern indigo snake laying five eggs (at least one of which was fertile) after being isolated for more than 4 years (Carson 1945). However, there have been several recent reports of parthogenetic reproduction by virginal snakes. Hence, sperm storage may not have been involved in Carson's (1945) example (Moler 1998). There is no information on the eastern indigo snake lifespan in the wild, although one captive individual lived 25 years, 11 months (Shaw 1959).

Eastern indigo snakes are active and spend a great deal of time foraging and searching for mates. They are one of the few snake species that are active during the day and rest at night. The eastern indigo snake is a generalized predator and will eat any vertebrate small enough to be overpowered. They swallow their prey alive. Food items include fish, frogs, toads, snakes (venomous, as well as non-venomous), lizards, turtles, turtle eggs, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983).

Population dynamics

Eastern indigo snakes need a mosaic of habitats to complete their annual life cycle. Over most of its range, the eastern indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes also use some agricultural lands (such as citrus) and various types of wetlands (Service 1999). A study in southern Georgia found that interspersion of tortoise-inhabited sandhills and wetlands improve habitat

quality for the eastern indigo snake (Landers and Speake 1980; Service 2004b). Eastern indigo snakes shelter in gopher tortoise burrows, hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs (Lawler 1977; Moler 1985a; Layne and Steiner 1996). Throughout peninsular Florida, this species may be found in all terrestrial habitats which have not experienced high density urban development. They are especially common in the hydric hammocks throughout this region (Service 1999). In central and coastal Florida, eastern indigo snakes are mainly found within many of the State's high, sandy ridges. In extreme south Florida (*i.e.*, the Everglades and Florida Keys), eastern indigo snakes are found in tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats (Steiner et al. 1983; Service 1999). Underground refugia used by this species include natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and in the crevices of rock-lined ditch walls (Layne and Steiner 1996). It is thought that they prefer hammocks and pine forests since most observations occur there and use of these areas is disproportionate compared to the relatively small total area of these habitats (Steiner et al. 1983). Observations over the last 50 years made by maintenance workers in citrus groves in east-central Florida indicate that eastern indigo snakes are occasionally observed on the ground in the tree rows and more frequently near the canals, roads, and wet ditches (Zeigler 2006). In the sugar cane fields at the A-1 Reservoir Project site in the Everglades Agriculture Area, eastern indigo snakes have been observed (including one mortality) during earthmoving and other construction-related activities.

Eastern indigo snakes range over large areas and use various habitats throughout the year, with most activity occurring in the summer and fall (Smith 1987; Moler 1985a). Adult males have larger home ranges than adult females and juveniles; their ranges average 554 acres, decreasing to 390 acres in the summer (Moler 1985b). In contrast, a gravid female may use from 3.5 to 106 acres (Smith 1987). In Florida, home ranges for females and males range from 5 to 371 acres and 4 to 805 acres, respectively (Smith 2003). At ABS, average home range size for females was determined to be 47 acres and overlapping male home ranges to be 185 acres (Layne and Steiner 1996).

Status and distribution

The eastern indigo snake was listed as threatened on January 31, 1978, (43 FR 4028), due to population declines caused by habitat loss, over-collecting for the domestic and international pet trade, and mortality caused by rattlesnake collectors who gas gopher tortoise burrows to collect snakes. The indigo snake (*Drymarchon corais*) ranges from the southeastern United States to northern Argentina (Conant and Collins 1998). This species has eight recognized subspecies, two of which occur in the United States: the eastern indigo and the Texas indigo (*D. c. erebennus*). In the United States, the eastern indigo snake historically occurred throughout Florida and in the coastal plain of Georgia and has been recorded in Alabama and Mississippi (Diemer and Speake 1983; Moler 1985b). It may have occurred in southern South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of the eastern indigo snake (Lawler 1977). The eastern indigo snake occurs throughout most of Florida and is absent only from the Dry Tortugas and Marquesas Keys, and regions of north Florida where cold temperatures and deeper clay soils exist (Cox and Kautz 2000).

Effective law enforcement has reduced pressure on the species from the pet trade. However, because of its relatively large home range, the eastern indigo snake is vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985a). The primary threat to the eastern

indigo snake is habitat loss due to development and fragmentation. In the interface areas between urban and native habitats, residential housing is also a threat because it increases the likelihood of snakes being killed by property owners and domestic pets. Extensive tracts of undeveloped land are important for maintaining eastern indigo snakes. In citrus groves, eastern indigo snake mortality occurs from vehicular traffic and management techniques such as pesticide usage, lawn mowers, and heavy equipment usage (Zeigler 2006). Within the 2000 to 2005 timeframe, since the spread of citrus canker, Zeigler (2006) reported seeing at least 12 dead eastern indigo snakes that were killed by heavy equipment operators in the act of clearing infected trees.

To protect and manage this species for recovery, Breininger et al. (2004) concluded that the greatest eastern indigo snake conservation benefit would be accrued by conserving snake populations in the largest upland systems that connect to other large reserves while keeping edge to area ratios low. Management of these lands should be directed towards maintaining and enhancing the diversity of plant and animal assemblages within these properties. Where these goals are achieved, eastern indigo snakes will directly benefit because of improved habitat conditions. Land managers should be encouraged to utilize fire as a tool to maintain biodiversity in fire-dependent ecosystems.

Sand Skinks

The most recent status review of the sand skink is in the 5-year review for this species (Service 2007 c). The Multi-Species Recovery Plan (Service 1999) is incorporated by reference and can be used to obtain more detailed information about this species.

Sand Skinks were listed as threatened under the Act in 1987 (52 FR 42658). A primary consideration for the listing of the species was the modification and destruction of xeric upland communities in central Florida. By some estimates, as much as 90 percent of the scrub ecosystem has already been lost to residential development and the conversion to agriculture, primarily citrus groves (Kautz 1993; Turner et al. 2006).

Species Description

The sand skink is a small, fossorial lizard that reaches a maximum length of about 5 inches. The tail makes up about half the total body length. The body is shiny and usually gray to grayish-white in color, although the body color may occasionally be light tan. Hatchlings have a wide black band located along each side from the tip of the tail to the snout. This band is reduced in adults and may only occur from the eye to snout on some individuals (Telford 1959). Sand skinks contain a variety of morphological adaptations for a fossorial lifestyle. The legs are vestigial and practically nonfunctional; the eyes are greatly reduced, the external ear openings are reduced or absent (Greer 2002), the snout is wedge-shaped, and the lower jaw is countersunk.

The taxonomic classification of the sand skink has been reevaluated since it was listed as *Neoseps reynoldsi* in 1987 (52 FR 42658), and the commonly accepted scientific name for the sand skink is now *Plestiodon reynoldsi* (Brandley et al. 2005; Smith 2005). A detailed description of the recent taxonomic review can be found in Service (2007c). The Service continues to use the scientific name as published in the final listing rule (52 FR 42658).

Genetics and Evolutionary History

The sand skink evolved and radiated on the central Lake Wales Ridge (Branch et al. 2003). Analysis of mitochondrial DNA indicates populations of the sand skink are highly structured with most of the genetic variation partitioned among four lineages: three subpopulations on the Lake Wales Ridge characterized by high haplotype diversity and a single, unique haplotype detected only on the Mount Dora Ridge (Branch et al. 2003). Under the conventional molecular clock, the 4.5 percent divergence in sand skinks from these two ridges would represent about a 2-million year separation. The absence of haplotype diversity on the Mount Dora Ridge would suggest this population was founded by only a few individuals or severely reduced by genetic drift of a small population (Branch et al. 2003).

Distribution, Habitat, and Abundance

The sand skink occurs on the sandy ridges of interior central Florida from Marion County south to Highlands County. The extant range of the sand skink includes Highlands, Lake, Marion, Orange, Osceola, Polk, and Putnam Counties (Christman 1988; Telford 1998). Principal populations occur on the Lake Wales Ridge and Winter Haven Ridges in Highlands, Lake, and Polk Counties (Christman 1992a; Mushinsky and McCoy 1991). One of largest of these ridges, the Lake Wales Ridge, located in southern Florida, encompasses approximately 517,303 acres (Weekley et al. 2008). The sand skink was once thought to be uncommon on the Mount Dora Ridge, with sites documented within the Ocala National Forest (Christman 1970; 1992a). However, recent surveys associated with Sabal Trails are documenting sand skinks in various locations on the Mount Dora Ridge (Cardn ENTRIX 2015).

The sand skink is widespread in native xeric uplands with excessively well-drained soils (Service 2012), principally on the ridges listed above at elevations greater than 82 feet above mean sea level. Commonly occupied native habitats include Florida scrub, including sand pine scrub, xeric oak scrub, rosemary scrub and scrubby flatwoods, as well as high pine communities that include sandhill, longleaf pine/turkey oak, turkey oak barrens and xeric hammock (see habitat descriptions in Myers 1990 and Service 1999). Coverboard transects extended from scrub or high pine (sandhill) through scrubby flatwoods to pine flatwoods revealed that sand skinks left more tracks in scrub than the other three habitats and did not penetrate further than 130 feet into scrubby flatwoods or 65 feet into pine flatwoods (Sutton et al. 1999).

Various authors have attempted to characterize optimal sand skink habitat (Telford 1959; 1962; Christman 1978a; 1992a; Campbell and Christman 1982). Literature descriptions of scrub characteristics have not proven very useful to predict sand skink abundance, but expert opinion was more successful (McCoy et al. 1999). McCoy et al. (1999) used trap-out enclosures to measure sand skink densities at seven scrub sites and attempted to rank each area individually based on eight visual characteristics to identify good habitat: (1) root-free, (2) grass-free, (3) patchy bare areas, (4) bare areas with lichens, (5) bare areas with litter, (6) scattered scrubs, (7) open canopy, and (8) sunny exposure. None of the individual literature descriptions of optimal habitat (or any combination thereof) accurately predicted the rank order of actual sand skink abundance at these sites, which ranged in density from 52 to 270 individuals per acre (Sutton 1996). However, knowledgeable researchers, especially as a group, appear to be able to visually sort out the environmental variables important to sand skinks, but had difficulty translating their perceptions into a set of rules that others could use to identify optimal sand skink habitat (McCoy et al. 1999).

Multiple studies (Collazos 1998; Hill 1999; Mushinsky and McCoy 1999; Gianopulos 2001; Mushinsky et al. 2001) have determined the relationship between sand skink density and a suite of environmental variables. These studies have found that sand skink relative density was positively correlated with low canopy cover, percent bare ground, amount of loose sand and large sand particle size, but negatively correlated with understory vegetation height, litter cover, small sand particle size, soil moisture, soil temperature, and soil composition. In an unburned sandhill site at Archbold Biological Station, Meshaka and Lane (2002) captured significantly more sand skinks in pitfall traps set in openings without shrubs than at sites with moderate to heavy shrub density. Telford (1959) suggested scattered debris and litter provided moisture that was important to support an abundant food supply and nesting sites for sand skinks. Cooper (1953) noted the species was most commonly collected under rotting logs, and Christman (1992b) suggested they nest in these locations. Christman (2005) found that skinks continue to occupy scrub with a closed canopy and thick humus layer, although at lower densities. Recent surveys have also shown sand skinks may occupy both actively managed lands, such as citrus groves and pine plantations, and old-field communities (Pike et al. 2007), if these sites are adjacent to patches of native habitat that can serve as a source population for recolonization.

Experimental studies have been conducted to investigate the effects of management techniques, such as mechanical treatment and prescribed burning, on sand skink abundance. Several studies found a decrease in relative abundance of skinks immediately following both mechanical and burning treatments (Mushinsky and McCoy 1999; Gianopulos 2001; Gianopulos et al. 2001; Mushinsky et al. 2001; Sutton et al. 1999). Gianopulos (2001) and Gianopulos et al. (2001) reported a significant increase in skink captures in mechanical treatment plots over the 5-year period following the treatment. However, a clear increase in skink numbers following a burn was not observed (Navratil 1999; Gianopulos et al. 2001; Mushinsky et al. 2001).

For prescribed fire, Christman (2005) conducted trap surveys at sites with a known burn history on the Lake Wales Ridge in Polk and Highlands Counties and did not observe a strong correlation between skink density and number of years since the site was burned. Mushinsky et al. (2001) noted that significantly larger skinks were captured in burned plots, indicating that more insect prey may have been available from decaying logs or that older skinks inhabited these sites. In the long-term, management techniques can influence species genetics. Recent genetic studies found that fire frequency may influence genetic diversity. The study reported that infrequent fire may be beneficial to the species, but a more frequent fire regime fire could reduce genetic diversity (Schrey et al. 2011).

Habitat size may be a factor in maintaining viable skink populations. Pike et al. (2006) monitored sand skinks and quantified vegetation change in six areas from 5 to 69 acres that were restored to a more natural state using fire and canopy thinning, and set aside for conservation in residential areas. This study documented a severe decline in occupancy and relative density of sand skinks and hypothesized that indirect impacts from surrounding development, such as changes in soil hydrology, may have caused the decline. Hydrologic changes in the soil may have occurred as a result of the construction of retention ponds or run-off from neighborhoods that caused a rise in the groundwater level (Pike et al. 2006). The population decline of skinks noted may have been caused by prescribed burning used to restore these sites (Mushinsky in Service 2007).

Life History

The sand skink is usually found below the soil surface burrowing through loose sand in search of food, shelter, and mates. Sand skinks feed on a variety of hard and soft-bodied arthropods that occur below the ground surface. The diet consists largely of beetle larvae and termites (*Prorhinotermes* spp.). Spiders, larval ant lions, lepidopteran larvae, roaches, and adult beetles are also eaten (Myers and Telford 1965; Smith 1982).

Sand skinks are most active during the morning and evening in spring and at mid-day in winter, the times when body temperatures can easily be maintained at a preferred level between 82 and 88 degrees Fahrenheit in open sand (Andrews 1994). During the hottest parts of the day, sand skinks move under shrubs to maintain their preferred body temperatures in order to remain active near the surface. With respect to season, Telford (1959) reported skinks most active from early March through early May, whereas Sutton (1996) found skinks most active from mid-February to late April. Based on monthly sampling of pitfall traps, Ashton and Telford (2006) found that captures peaked in March at Archbold Biological Station, but in May at Ocala National Forest. All of these authors suggested the spring activity peak was associated with mating. At Archbold Biological Station, Ashton and Telford (2006) noted a secondary peak in August that corresponded with the emergence of hatchling sand skinks.

Telford (1959) assumed that sand skinks become sexually mature during the first year following hatching, at a size of 1.78 inches snout-vent length. He suspected that most of the breeders in his study were in their second year and measured between 1.78 and 2.24 inches snout-vent length. However, Ashton (2005) determined that sand skinks become sexually mature between 19 and 23 months of age and have a single mating period each year from February through May. Sand skinks first reproduce at two years of age, and females produce a single clutch in a season, although some individuals reproduce biennially or less frequently (Ashton 2005). Sand skinks lay 2 to 4 eggs under logs or debris in May or early June (Ashton 2005; Mushinsky in Service 2007a), approximately 55 days after mating (Telford 1959). The eggs hatch from June through July. Sand skinks can live at least to 10 years of age (Meneken et al. 2005). Gianopulos (2001) found that the sex ratio of sand skinks did not differ significantly from 1:1, which is consistent with the findings of Sutton (1996).

Most sand skinks moved a median distance of 84 ft between captures, with a few moving over 460 feet in 2 weeks (Mushinsky et al. 2001). Similarly, other studies found that skinks sampled within 82 ft of each other shared greater genetic similarity compared to those further away suggesting their limited dispersal ability may explain the relatively high degree of genetic structure within and among sand skink populations (Branch et al. 2003; Reid et al. 2004).

Analysis of blood and fecal samples obtained from 20 sand skinks in Ocala National Forest demonstrated that no blood parasites were present, and only normal protistan and helminth symbiotes were observed, with no evidence of effect on survival of individuals or the population (Telford 1998). Similarly, a species of nematode (*Parapharyngodon ocalaensis*) was collected from the intestinal tracts of 22 sand skinks (Bursey and Telford 2003). It is not known to be a threat to the species. In a subsequent paper, Telford and Bursey (2003) found three species of endoparasites in 45 sand skinks from Ocala National Forest.

Population Dynamics

The population dynamics of sand skinks within their extant ranges are not well known because the skinks' small size and secretive habits make their study difficult. Sand skinks are known to exhibit life-history traits that are also found in a number of other fossorial lizard species, such as: delayed maturity, a small clutch size of relatively large eggs, low frequency of reproduction, and a long lifespan (Ashton 2005). Such character traits may have resulted from intraspecific competition or predation.

The current status of the sand skink throughout its geographic range is unclear because recent comprehensive, rangewide surveys have not been conducted. At the time of Federal listing in 1987, Florida Natural Area Inventory (FNAI) had recorded 31 known sites for the sand skink. By 2015, the Service had approximately 285 occurrence records with an increase in occurrence reports from Marion, Lake, and Orange Counties. The incidental observation data was compiled from a variety of sources by the Service (Service 2015). This increase is largely the result of more intensive sampling of scrub habitats in recent years and does not imply this species is more widespread than initially supposed. Nonetheless, except for a few locations where intensive research has been conducted, limited information about the presence or abundance of sand skinks exists throughout the range.

In the northern portion of the range, at least three persistent populations are under federal jurisdiction in the Ocala National Forest on the Mount. Dora Ridge (Telford 1998, Service 2007a). Sand skinks have been collected for genetic analysis in both ridges (Branch et al. 2003) and population studies have been conducted at Archbold and in Ocala National Forest (Ashton and Telford 2006). Additional studies have provided presence/absence information that has been used to determine the extant range of the species (Mushinsky and McCoy 1991; Stout and Corey 1995). However, few long-term monitoring efforts have been undertaken to evaluate the population size, or population trends, of sand skinks at these sites, on remaining scrub habitat on private lands, or rangewide.

Approximately 85 percent of xeric upland communities historically used by sand skinks on the Lake Wales Ridge are estimated to have been lost due to development (Turner et al. 2006, Service 2007c). It is likely that continued residential and agricultural development of xeric upland habitat in central Florida has destroyed or degraded habitat containing sand skinks. Protection of the sand skink from further habitat loss and degradation provides the most important means of ensuring its continued existence. Of the 73 locations examined by Turner et al. (2006) on which sand skinks were reported, 39 are protected and, as of 2004, 27 were managed. Current efforts to expand the system of protected xeric upland communities on the Lake Wales Ridge, coupled with implementation of effective land management practices in both ridges, represent a likely opportunity for assuring the sand skink's survival.

It is possible that existing private and public conservation lands on the Lake Wales Ridge may provide significant suitable habitat for sand skinks. Over the last 20 years, the State of Florida has acquired xeric upland habitat through the Florida Forever program and its predecessors (Florida Department of Environmental Protection 2008). Combined, these land acquisition programs have protected almost 25,000 acres of xeric uplands (Turner et al. 2006). The Service has also acquired portions of several tracts totaling 1,800 acres as a component of the Lake Wales Ridge National Wildlife Refuge (Service 1993a).

Table 3. is a GIS desktop analysis with the acres of the FNAI protected lands within two of the ridge systems, Mount Dora and Lake Wales, that have suitable soils and elevation. Our analysis queried the Natural Resources Conservation Service soil database for well-drained, sandy soils (Apopka, Archbold, Astatula, Candler, Daytona, Duette, Kendrick, Lake, Orsino, Paola, Pomello, Satellite, St. Lucie and Tavares soils (Service 2011), and clipped out soils that occurred in elevations at 82 ft or higher. This desktop analysis is a rough estimate of potential habitat on two major ridges but has not been ground-truthed or surveyed.

NAME	Total Acres	Potential Sand Skink Habitat Acres: Elevation 82 feet and Skink Soils	Total Acres of Protected Lands within Ridge	Potential Sand Skink habitat under Protection within Ridge
Mount Dora Ridge	267,718	183,614	123,628	101,854
Lake Wales Ridge	514,522	271,253	61,148	20,718

Source: Geographic Information System (GIS) desktop analysis Service 2015.
GIS Sources: Ridges: FDEP, FNAI: Protection Lands, Soils: U.S. Department of Agriculture, Natural Resources Conservation Service, Elevation: U.S. Geological Services

Recent studies estimated the current geographic distribution and total population size of sand skinks on public and privately owned conservation lands on the Lake Wales Ridge. The study found approximately 29,513 acres of suitable habitat on conservation lands on the Lake Wales Ridge. Total population size was estimated using mean density from 55 enclosure traps and applying the mean density across the public and privately owned conservation lands. During the spring time prior to reproduction, total skink population was estimated at 2.16 million individuals (95% confidence interval = 1.72 – 2.60 million) (Mushinsky et. al 2011b). Although this estimated population assumes average density across all protected, suitable habitats in the Lake Wales Ridge, it demonstrates the amount protected and occupied sand skink habitat will assist recovery and reduce the risk of extirpation.

Because sand skinks have low dispersal abilities, introductions into restored or created unoccupied habitat in the Mount Dora or other ridges may be necessary. Sand skinks relocated to two former citrus groves in Orange County have persisted for at least 5 years (Hill 1999; Mushinsky et al. 2001). Comparisons of persistence, recruitment, and survival were used to determine translocation success of sand skinks on two restored scrub sites for 6 years following relocation (Mushinsky et al. 2001; Penney 2001; Penney et al. 2001). One site established a self-sustaining population, while the other did not. It was determined that site location, habitat suitability, and initial propagule size were the factors affecting success; researchers concluded that the chances of long-term survival may improve when habitat is restored, and skinks are introduced to sites close to intact scrub, rather than to isolated sites (Mushinsky et al. 2001; Penney 2001).

Blue-tailed Mole Skink

The following discussion is summarized from the MSRP (Service 1999) and the 5-year status review (Service 2007b), as well as from recent research publications and monitoring reports. A complete blue-tailed mole skink life history discussion may be found in the MSRP.

Species description

The mole skink (*Eumeces egregius*) is a small, fossorial lizard that occupies xeric upland habitats of Florida, Alabama, and Georgia (Mount 1963). Five subspecies have been described (Mount 1965), but only the blue-tailed mole skink (*Eumeces egregius lividus*) is federally listed. It requires open, sandy patches interspersed with sclerophyllous vegetation (Service 1999). The historic and anticipated future modification and destruction of xeric upland communities in central Florida were primary considerations in listing the blue-tailed mole skink as threatened under the Act in 1987 (52 FR 42662). No critical habitat has been designated for the blue-tailed mole skink.

Mount (1965) described the blue-tailed mole skink largely on the basis of a bright blue tail in juveniles and restricted this subspecies to the southern LWR in Polk and Highlands Counties. Christman (1978b) limited the range of blue-tailed mole skinks to these two counties, but later added Osceola County to the range, based on the collection of a single juvenile of the subspecies just north of the Polk County line on the LWR (Christman 1992a, FNAI records). Analysis of mtDNA (Branch et al. 2003) supports Mount's (1965) hypotheses that blue-tailed mole skinks from the lower LWR represent the ancestral stock with radiation from there. Genetic analysis also indicates high population structure with limited dispersal in mole skinks among sandy habitats (Branch et al. 2003).

The blue-tailed mole skink reaches a maximum length of about 5 inches, and the tail makes up about half the body length. The body is shiny, and brownish to pink in color, with lighter paired dorsolateral stripes diverging posteriorly (Christman 1978b). Males develop a colorful orange pattern on the sides of the body during breeding season. Juveniles usually have a blue tail (Christman 1992; P. Moler, FWC, personal communication 1998). Regenerated tails and the tails of older individuals are typically pinkish. The legs are somewhat reduced in size and used only for surface locomotion and not for "swimming" through the sand (Christman 1992a).

A variety of xeric upland communities provide habitat for the blue-tailed mole skink, including rosemary and oak-dominated scrub, turkey oak barrens, high pine, and xeric hammocks. Areas with few plant roots, open canopies, scattered shrub vegetation, and patches of bare, loose sand provide optimal habitats (Christman 1988, 1992a). Within these habitat types, blue-tailed mole skinks are typically found under leaves, logs, palmetto fronds, and other ground debris. Shaded areas presumably provide suitable microhabitat conditions for thermoregulation, egg incubation, and foraging (Mount 1963). Blue-tailed mole skinks tend to be clumped in distribution with variable densities that may approach 25 adults per acre (Christman 1992a). The distribution of blue-tailed mole skinks appears to be closely linked to the distribution of surface litter and, in turn, suitable microhabitat sites.

Specific physical structures of habitat that sustain sand skink populations, and likely blue-tailed mole skink populations as well, include a well-defined leaf litter layer on the ground surface and shade from either a tree canopy or a shrub layer, but not both. Leaf litter likely provides important skink foraging opportunities. Shade provided by a tree canopy or a shrub layer likely helps skinks regulate body temperature to prevent overheating. However, having both a tree canopy and a shrub layer appears to be detrimental to skinks (McCoy 2011, University of South Florida, personal communication).

Either natural fires started by lightning or prescribed burns are necessary to maintain habitat in natural scrub ecosystems. However, if fire occurs too frequently, leaf litter might not build up sufficiently to support skink populations. At ABS, sand skinks appear to be most abundant after 10 years of leaf litter development. The ideal fire frequency to maintain optimal leaf litter development for skinks likely varies by site and other environmental conditions (Mushinsky 2011, University of South Florida, personal communication).

Life history

Sand skinks and blue-tailed mole skinks generally partition rather than compete with one another for resources. Sand skinks are primarily fossorial; they move or "swim" below the surface of the ground in sandy soils and take prey below the surface. Blue-tailed mole skinks are semi-fossorial; they hunt primarily at the soil surface or at shallow depths to 2 inches and consume mostly terrestrial arthropods (Smith 1977, Service 1993a). Foraging activities usually occur during the morning or evening. Roaches, crickets, and spiders make up the bulk of the diet (Mount 1963). Their diet is more generalized than that of the fossorial sand skink, which probably reflects their tendency to feed at the surface (Smith 1982). Like sand skinks, mole skinks show an activity peak in spring (Mount 1963, Smith 1982). The reproductive biology of the blue-tailed mole skink is poorly known. Reproduction is presumably very much like that of the peninsula mole skink, *E. e. onocrepis*, where mating occurs in the fall or winter. In the peninsula mole skink, two to nine eggs are laid in a shallow nest cavity less than 12 inches below the surface. The eggs incubate for 31 to 51 days, during which time the female tends the nest. Individuals probably become reproductively active at 1 year of age (Mount 1963; Christman 1978b). No data are available on blue-tailed mole skink home ranges or dispersal.

Population dynamics

The Service has little information on the population dynamics of blue-tailed mole skinks within their extant ranges. The skinks' diminutive size and secretive habits make their study difficult. Blue-tailed mole skinks often seem absent or rare on the same LWR study sites where sand skinks are common, and when present, are patchily distributed (Christman 1988, 1992a; Mushinsky and McCoy 1995). Mount (1963) noted peninsula mole skinks also are patchily distributed and mostly occurred on xeric sites greater than 100 acres (40 ha) in size. Early maturity (1 year in laboratory) and a large clutch size (maximum = nine eggs) of relatively small eggs (Mount 1963) suggest the population dynamics of mole skinks are different from sand skinks.

Status and distribution

The historic and anticipated future modification and destruction of xeric upland communities in central Florida were primary considerations in listing the blue-tailed mole skink as threatened under the Act in 1987 (52 FR 42662). Almost 90 percent of the xeric upland communities on the LWR have already been lost because of habitat destruction and degradation due to residential development and conversion to agriculture, primarily citrus groves (Turner et al. 2006). Remaining xeric habitat on private lands is especially vulnerable because projections of future human population growth suggest additional demands for residential development within the range of the blue-tailed mole skink. Campbell and Christman (1982) characterized blue-tailed mole skinks as colonizers of a patchy, early successional, or disturbed habitat type, which occurs throughout the sandhill, sand pine scrub, and xeric hammock vegetative associations as a result of biological or catastrophic factors. Susceptibility of mature sand pine to windthrow may be an important factor in

maintaining bare, sandy microhabitats required by blue-tailed mole skinks and other scrub endemics (Myers 1990).

At the time of Federal listing, there were 20 locality records for the blue-tailed mole skink. Currently, 43 sites are known. The increase in locality records is largely the result of more intensive sampling of scrub habitats in recent years and does not imply that this species is more widespread than originally supposed. Of the known locations, only 13 occur on public land or on private land protected under conservation easement. Turner et al. (2006) suggested blue-tailed mole skinks may be under-represented in the reserve network of protected public lands, but could not determine if their absence is a result of exclusion or sampling effort. It is likely continued residential and agricultural development of xeric upland habitat in central Florida has destroyed or degraded extensive tracts of habitat containing the blue-tailed mole skink. Estimates of habitat loss range from 60 to 90 percent, depending on the xeric community type (Christman 1988; Christman and Judd 1990; Kautz 1993; Center for Plant Conservation 1995). Blue-tailed mole skinks are known to be present on sites which total 52.4 percent of the 21,597 acres (8,740 ha) of Florida scrub and high pine that is currently protected (Turner et al. 2006). However, the extent of potential habitat that is actually occupied is unknown, as is their total population size. As noted above, this species appears to be patchily distributed, even in occupied habitat (Mount 1963; Christman 1992). Unlike sand skinks, their tracks cannot be easily detected in the sand, and most of the extant scrub sites on the LWR have not been adequately surveyed for blue-tailed mole skinks, including protected sites.

A density study of blue-tailed mole and sand skinks was conducted in 2004-2005 by Christman (2005). Only two blue-tailed mole skinks were observed in the enclosures (mean density = 3.3 per ha, 1.3 per acre) relative to at least 84 sand skinks (ratio = 1:41). Christman (1992a) suggested only 1 blue-tailed mole skink is encountered for every 20 sand skinks. Other range-wide pitfall trap data on the LWR revealed a blue-tailed mole skink to sand skink ratio of 1:1.89 based on 54 total skinks captured in six trap arrays (Christman 1988), 1:4.3 based on 332 total skinks in 58 trap arrays (Mushinsky and McCoy 1991), and 1:2.7 based on 49 total skinks in 31,640 pitfall trap-days (Meshaka and Lane 2002). Mushinsky and McCoy (1991) confirmed that detection rates for blue-tailed mole skinks increased with sampling effort.

The protection and recovery of blue-tailed mole skinks will require habitat loss be stopped and unoccupied but potentially suitable habitat be restored. The existing protection of the blue-tailed mole skink includes a number of private and public preserves within the LWR. Current efforts to expand the system of protected xeric upland habitats on the LWR, in concert with implementation of aggressive land management practices, represent the most likely opportunity for securing the future of this species. Comprehensive land acquisitions that protect areas occupied by the blue-tailed mole skink include the Service's Lake Wales Ridge National Wildlife Refuge, (LWRNWR) and the State of Florida's Conservation and Recreation Lands (CARL) LWR Ecosystem Project (Service 1993a).

In summary, little information is available to adequately assess the status and population dynamics of the blue-tailed mole skink. This subspecies is endemic to central Florida and is a habitat specialist that relies on early successional xeric scrub habitat for its continuing existence. Estimates of habitat loss range from 60 to 90 percent, depending on the xeric community type (Christman 1988, Christman and Judd 1990, Kautz 1993, Center for Plant Conservation 1995). Furthermore, the implementation of favorable management practices can create and maintain suitable habitat conditions for both sand and blue-tailed mole skinks, as well as other xeric upland-dependent species. A number of actions over the last 20 years have resulted in conservation

benefits to xeric uplands within the extant range of both species. The State of Florida has acquired xeric upland habitat through the CARL, Save Our Rivers, and other P-2000 acquisition programs. Combined, these land acquisition programs have protected 10,000 acres of xeric uplands (Florida Department of Environmental Protection [FDEP] 1998; South Florida Water Management District [District] 1998). The Service has also acquired portions of several small tracts totaling 800 acres as a component of the LWRNWR. Finally, private organizations, such as TNC and ABS have bought and currently manage xeric uplands within the LWR.

Florida Scrub-jay

In addition to the assessment below, a 5-year review was completed in 2007 resulting in no change to the species designation (Service 2007a). The 5-year review builds upon the detailed information in the MSRP for this species and is located at http://www.fws.gov/southeast/5yearReviews/5yearreviews/Florida-scrub-jay.pdf

Species description

Florida scrub-jays are about 25 to 30 cm (10 to 12 inches) long and weigh about 85 grams (3 ounces). They are similar in size and shape to blue jays (*Cyanocitta cristata*), but differ significantly in coloration (Woolfenden and Fitzpatrick 1996a; Service 1990). Unlike the blue jay, the Florida scrub-jay lacks a crest. It also lacks the conspicuous white-tipped wing and tail feathers, black barring, and bridle of the blue jay. The Florida scrub-jay's head, nape, wings, and tail are pale blue, and its body is pale gray on its back and belly. Its throat and upper breast are lightly striped and bordered by a pale blue-gray "bib" (Woolfenden and Fitzpatrick 1996a). Florida scrub-jay sexes are not distinguishable by plumage (Woolfenden and Fitzpatrick 1984), and males, on the average are only slightly larger than females (Woolfenden 1978). The sexes may be identified by a distinct "hiccup" call made only by females (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1986). Florida scrub-jays that are less than about 5 months of age are easily distinguishable from adults; their plumage is smoky gray on the head and back, and they lack the blue crown and nape of adults. Molting occurs between early June and late November and peaks between mid-July and late September (Bancroft and Woolfenden 1982). During late summer and early fall, when the first basic molt is nearly done, fledgling Florida scrub-jays may be indistinguishable from adults in the field (Woolfenden and Fitzpatrick 1984). The wide variety of vocalizations of Florida scrub-jays is described in Woolfenden and Fitzpatrick (1996b).

Scrub-jays are in the order Passeriformes and the family Corvidae. They have been called a "superspecies complex" and described in four groups that differ in geographic distribution within the United States and Mexico: *Aphelocoma californica*, from southwestern Washington through Baja California; *A. insularis*, on Santa Cruz in the Channel Islands, California; *A. woodhousii*, from southeastern Oregon and the Rocky Mountains and Great Plains to Oaxaca, Mexico; and *A. coerulescens* in peninsular Florida (American Ornithologists' Union [AOU] 1983). Other jays of the same genus include the Mexican jay or gray-breasted jay (*A. ultramarina*) and the unicolored jay (*A. unicolor*) of Central America and southwest North America (Woolfenden and Fitzpatrick 1996b).

The Florida scrub-jay, which was originally named *Corvus coerulescens* by Bosc in 1795, was transferred to the genus *Aphelocoma* in 1851 by Cabanis. In 1858, Baird made *coerulescens* the type species for the genus, and it has been considered a subspecies (*A. c. coerulescens*) for the past several decades (AOU 1957). It recently regained recognition as a full species (Florida scrub-jay,

Aphelocoma coerulescens) from the AOU (AOU 1995) because of genetic, morphological, and behavioral differences from other members of this group: the western scrub-jay (*A. californica*) and the island scrub-jay (*A. insularis*). This species account references the full species name, *A. coerulescens*, as listed in the Federal Register (Service 1987a). The group name is retained for species in this complex; however, it is now hyphenated to "scrub-jay" (AOU 1995). Critical habitat has not been designated for the Florida scrub-jay.

Life history

The Florida scrub-jay has specific habitat needs. It is endemic to peninsular Florida's ancient dune ecosystems or scrubs, which occur on well-drained to excessively well-drained sandy soils (Laessle 1958; Laessle 1968; Myers 1990). This relict oak-dominated scrub, or xeric oak scrub, is essential habitat to the Florida scrub-jay. This community type is adapted to nutrient-poor soils, periodic drought, and frequent fires (Abrahamson 1984a and 1984b). Xeric oak scrub on the Lake Wales Ridge (LWR) is predominantly made up of four species of stunted, low-growing oaks: sand live oak (*Quercus geminata*), Chapman oak (*Q. chapmanii*), myrtle oak (*Q. myrtifolia*), and scrub oak (*Q. inopina*) (Myers 1990). In optimal habitat for Florida scrub-jays on the LWR, these oaks are 1 to 3 meters (3 to 10 ft) high, interspersed with 10 to 50 percent unvegetated, sandy openings, and a sand pine (*Pinus clausa*) canopy of less than 20 percent (Woolfenden and Fitzpatrick 1991). Other trees and dense herbaceous vegetation is rare. Vegetation noted along with the oaks includes saw palmetto (*Serenoa repens*) and scrub palmetto (*Sabal etonia*), as well as woody shrubs such as Florida rosemary (*Ceratiola ericoides*) and rusty lyonia (*Lyonia ferruginea*).

Florida scrub-jays occupy areas with less scrub oak cover and fewer openings on the Merritt Island/Cape Canaveral Complex and in southwest Florida than typical of xeric oak scrub habitat on the LWR (Schmalzer and Hinkle 1992; Breininger et al. 1995; Thaxton and Hingtgen 1996). The predominant communities here are oak scrub and scrubby flatwoods. Scrubby flatwoods differ from scrub by having a sparse canopy of slash pine (*Pinus elliotii*); sand pines are rare. Shrub species mentioned above are common, except for scrub oak and scrub palmetto, which are restricted to the LWR. Runner oak (*Q. minima*), turkey oak (*Q. laevis*), bluejack oak (*Q. incana*), and longleaf pine (*Pinus palustris*) also have been reported. Kennedy Space Center, in Brevard County, supports one of the largest contiguous populations of Florida scrub-jays. Studies conducted there give good descriptions of this habitat type (Schmalzer and Hinkle 1992).

Optimal Florida scrub-jay habitat occurs as patches with the following attributes: (1) 10 to 50 percent of the oak scrub made up of bare sand or sparse herbaceous vegetation; (2) greater than 50 percent of the shrub layer made up of scrub oaks; (3) a mosaic of oak scrubs that occur in optimal height (1 to 3 meters) and shorter; (4) less than 15 percent canopy cover; and (5) greater than 300 meters (984 feet) from a forest (Breininger et al. 1998). Much potential Florida scrub-jay habitat occurs as patches of oak scrub within a matrix of little-used habitat of saw palmetto and herbaceous swale marshes (Breininger et al. 1991; Breininger et al.1995). These native matrix habitats supply prey for Florida scrub-jays and habitat for other species of conservation concern. The flammability of native matrix habitats is important for spreading fires into oak scrub (Breininger et al. 1995, Breininger et al. 2002). Degradation or replacement of native matrix habitats with habitat fragments and industrial areas attract predators of Florida scrub-jays, such as fish crows (*Corvus ossifragus*), that are rare in most regularly burned native matrix habitats (Breininger and Schmalzer 1990; Woolfenden and Fitzpatrick 1991). Matrix habitats often develop into woodlands and forests when there is a disruption of fire regimes. These woodlands and forests

are not suitable for Florida scrub-jays, decrease the habitat suitability of nearby scrub, attract predators, and further disrupt fire patterns.

Florida scrub-jays have a social structure that involves cooperative breeding, a trait that the other North American species of scrub-jays do not show (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). Florida scrub-jays live in families ranging from two birds (a single mated pair) to extended families of eight adults (Woolfenden and Fitzpatrick 1984) and one to four juveniles. Fledgling Florida scrub-jays stay with the breeding pair in their natal territory as "helpers," forming a closely-knit, cooperative family group. Pre-breeding numbers are generally reduced to either a pair with no helpers or families of three or four individuals (a pair plus one or two helpers) (Woolfenden and Fitzpatrick 1996a).

Florida scrub-jays have a well-developed intrafamilial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and, finally, female helpers (Woolfenden and Fitzpatrick 1977; Woolfenden and Fitzpatrick 1984). Helpers take part in sentinel duties (Woolfenden and Fitzpatrick 1984; McGowan and Woolfenden 1989), territorial defense (Woolfenden and Fitzpatrick 1984), predator-mobbing, and the feeding of both nestlings (Stallcup and Woolfenden 1978) and fledglings (Woolfenden and Fitzpatrick 1984; McGowan and Woolfenden 1990). The well-developed sentinel system involves having one individual occupying an exposed perch watching for predators or territory intruders. When a predator is seen, the sentinel Florida scrub-jay gives a distinctive warning call (McGowan and Woolfenden 1989; McGowan and Woolfenden 1990), and all family members seek cover in dense shrub vegetation (Fitzpatrick et al. 1991).

Florida scrub-jay pairs occupy year-round, multipurpose territories (Woolfenden and Fitzpatrick 1978; Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). Territory size averages 22 to 25 acres (Woolfenden and Fitzpatrick 1990; Fitzpatrick et al. 1991), with a minimum size of about 12 acres (Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). The availability of territories is a limiting factor for Florida scrub-jay populations (Woolfenden and Fitzpatrick 1984). Because of this limitation, nonbreeding adult males may stay at the natal territory as helpers for up to 6 years, waiting for either a mate or territory to become available (Woolfenden and Fitzpatrick 1984). Florida scrub-jays may become breeders in several ways: (1) by replacing a lost breeder on a non-natal territory (Woolfenden and Fitzpatrick 1984); (2) through "territorial budding," where a helper male becomes a breeder in a segment of its natal territory (Woolfenden and Fitzpatrick 1978); (3) by inheriting a natal territory following the death of a breeder; (4) by establishing a new territory between existing territories (Woolfenden and Fitzpatrick 1984); or (5) through "adoption" of an unrelated helper by a neighboring family followed by resident mate replacement (Woolfenden and Fitzpatrick 1984). Territories also can be created by restoring habitat through effective habitat management efforts in areas that are overgrown (Thaxton and Hingtgen 1994).

To become a breeder, a Florida scrub-jay must find a territory and a mate. Evidence presented by Woolfenden and Fitzpatrick (1984) suggests that Florida scrub-jays are monogamous. The pair retains ownership and sole breeding privileges in its particular territory year after year. Courtship to form the pair is lengthy and ritualized and involves posturing and vocalizations made by the male to the female (Woolfenden and Fitzpatrick 1996b). Copulation between the pair is generally out of sight of other Florida scrub-jays (Woolfenden and Fitzpatrick 1984). These authors also reported never observing copulation between unpaired scrub-jays or courtship behavior between a female and a scrub-jay other than her mate. Age at first breeding in the scrub-jay varies from 1 to 7 years,

although most individuals become breeders between 2 and 4 years of age (Fitzpatrick and Woolfenden 1988). Persistent breeding populations of Florida scrub-jays exist only where there are scrub oaks in sufficient quantity and form to provide an ample winter acorn supply, cover from predators, and nest sites during the spring (Woolfenden and Fitzpatrick 1996b).

Florida scrub-jay nests are typically constructed in shrubby oaks, at a height of 1 to 2 meters (1.6 to 8.2 ft) (Woolfenden 1974). Sand live oak and scrub oak are the preferred shrubs on the LWR (Woolfenden and Fitzpatrick 1996b), and myrtle oak is favored on the Atlantic Coastal Ridge (Toland 1991) and southern Gulf coast. In suburban areas, Florida scrub-jays nest in the same evergreen oak species as well as in introduced or exotic trees; however, they build their nests in a significantly higher position in these oaks than when in natural scrub habitat (Bowman et al. 1996). Florida scrub-jay nests are an open cup, about 7 to 8 inches outside diameter and 3 to 4 inches inside diameter. The outer basket is bulky and built of course twigs from oaks and other vegetation, and the inside is lined with tightly wound palmetto or cabbage palm (*Sabal palmetto*) fibers. There is no foreign material as may be present in a blue jay nest (Woolfenden and Fitzpatrick 1996b).

Nesting is synchronous, normally occurring from 1 March through 30 June (Woolfenden and Fitzpatrick 1984). On the Atlantic Coastal Ridge and southern Gulf coast, nesting may be protracted through the end of July. In suburban habitats, nesting is consistently started earlier (March) than in natural scrub habitat (Fleischer 1996), although the reason for this is unknown.

Clutch size ranges from one to five eggs, but is typically three or four eggs (Woolfenden and Fitzpatrick 1990). Clutch size is generally larger in suburban habitats, and the birds try to rear more broods per year (Fleischer 1996). Double brooding by as much as 20 percent has been documented on the Atlantic Coastal Ridge and in suburban habitat within the southern Gulf coast, compared to about 2 percent on the LWR. Florida scrub-jay eggs measure 1.1 x 0.8 inches (length x breadth) (Woolfenden and Fitzpatrick 1996b), and coloration "varies from pea green to pale glaucous green… blotched and spotted with irregularly shaped markings of cinnamon rufous and vinaceous cinnamon, these being generally heaviest about the larger end" (Bendire 1895). Eggs are incubated for 17 to 19 days (Woolfenden 1974), and fledging occurs 15 to 21 days after hatching (Woolfenden 1978). Only the breeding female incubates and broods eggs and nestlings (Woolfenden and Fitzpatrick 1984). Average production of young is two fledglings per pair, per year (Woolfenden and Fitzpatrick 1990; Fitzpatrick et al. 1991), and the presence of helpers improves fledging success (Woolfenden and Fitzpatrick 1990; Mumme 1992). Annual productivity must average at least two young fledged per pair for a population of Florida scrub-jays to support long-term stability (Fitzpatrick et al. 1991).

Fledglings depend upon adults for food for about 10 weeks, during which time they are fed by both breeders and helpers (Woolfenden 1975; McGowan and Woolfenden 1990). Survival of Florida scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub, while annual survival of both adult males and females averages around 80 percent (Woolfenden and Fitzpatrick 1996b). Data from Archbold Biological Station (ABS), however, suggest survival and reproductive success of Florida scrub-jays in suboptimal habitat is lower (Woolfenden and Fitzpatrick 1991). These data help explain why local populations inhabiting unburned, late successional habitats become extirpated. Similarly, data from Indian River County show mean annual productivity declines significantly in suburban areas where Toland (1991) reported productivity averaged 2.2 young fledged per pair in contiguous optimal scrub, 1.8 young fledged per pair in fragmented

moderately-developed scrub, and 1.2 young per pair fledged in very fragmented suboptimal scrub. The longest observed lifespan of a Florida scrub-jay is 15.5 years at ABS in Highlands County (Woolfenden and Fitzpatrick 1996b).

Florida scrub-jays are nonmigratory and permanently territorial. Juveniles stay in their natal territory for up to 6 years before dispersing to become breeders (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1986). Once Florida scrub-jays pair and become breeders, generally within two territories of their natal area, they stay on their breeding territory until death. In suitable habitat, fewer than 5 percent of Florida scrub-jays disperse more than 5 miles (Stith et al. 1996). All documented long-distance dispersals have been in unsuitable habitat such as woodland, pasture, or suburban plantations. Florida scrub-jay dispersal behavior is affected by the intervening land uses. Protected scrub habitats will most effectively sustain Florida scrub-jay populations if they are located within surrounding habitat types that can be used and traversed by Florida scrub-jays. Brushy pastures, scrubby corridors along railway and road rights-of-way, and open burned flatwoods offer links for colonization among scrub-jay populations. Stith et al. (1996) believe a dispersal distance of 5 miles is close to the biological maximum for Florida scrub-jays.

Florida scrub-jays forage mostly on or near the ground, often along the edges of natural or man-made openings. They visually search for food by hopping or running along the ground beneath the scrub or by jumping from shrub to shrub. Insects, particularly orthopterans (*e.g.*, locusts, crickets, grasshoppers, beetles) and lepidopteran (*e.g.*, butterfly and moth) larvae, form most of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Small vertebrates are eaten when encountered, including frogs and toads (*Hyla femoralis*, *H. squirella,* rarely *Bufo quercicus,* and unidentified tadpoles, lizards (*Anolis carolinensis*, *Chemidophorus sexlineatus*, *Sceloporus woodi*, *Eumeces inexpectatus*, *Neoseps reynoldsi*, *Ophisaurus compressus*, *O. ventralis*), small snakes (*Thamnophus sauritus*, *Opheodrys aestivus*, *Diadophis punctatus*), small rodents (cotton rat [*Sigmodon hispidus*], *Peromyscus polionotus*, black rat [*Rattus rattus*] young), downy chicks of the bobwhite (*Colinus virginianus*), and fledgling common yellowthroat (*Geothlypis trichas*). In suburban areas, Florida scrub-jays will accept supplemental foods once the scrub-jays have learned about them (Woolfenden and Fitzpatrick 1984).

Acorns are the principal plant food (Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). From August to November each year, Florida scrub-jays may harvest and cache 6,500 to 8,000 oak (*Quercus* spp.) acorns throughout their territory. Acorns are typically buried beneath the surface of bare sand patches in the scrub during fall, and retrieved and consumed year-round, though most are consumed in fall and winter (DeGange et al. 1989). On the Atlantic Coastal Ridge, acorns are often cached in pine trees, either in forks of branches, in distal pine boughs, under bark, or on epiphytic plants, between 1 to 30 ft in height. Other small nuts, fruits, and seeds also are eaten (Woolfenden and Fitzpatrick 1984).

Many Florida scrub-jays occur in habitat conditions where their long-term persistence is doubtful, although their persistence in these areas can occur for many years (Swain et al. 1995; Stith et al. 1996; Root 1998; Breininger et al. 2002). A primary cause for Florida scrub-jay decline is poor demographic success associated with reductions in fire frequency (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1991; Schaub et al. 1992; Stith et al. 1996; Breininger et al. 1999). The reduction in fire frequency is associated with increases in shrub height, decreases in

open space, increases in tree densities, and the replacement of scrub and marshes by forests (Duncan and Breininger 1998; Schmalzer and Boyle 1998; Duncan et al. 1999). These habitat trajectories result in declines in habitat use and demographic success (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1991). As a result, mean family size declines, and eventually the number of breeding pairs can decline by 50 percent every 5 to 10 years (Woolfenden and Fitzpatrick 1991; Breininger et al. 1999; Breininger et al. 2002).

Population dynamics

Stith (1999) utilized a spatially explicit individual-based population model developed specifically for the Florida scrub-jay to complete a metapopulation viability analysis of the species. The species' range was divided into 21 metapopulations demographically isolated from each other. Metapopulations are defined as collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (Hanski and Gilpin 1991). A series of simulations were run for each of the 21 metapopulations based on different scenarios of reserve design ranging from the minimal configuration consisting of only currently protected patches of scrub (no acquisition option) to the maximum configuration, where all remaining significant scrub patches were acquired for protection (complete acquisition option) (Stith 1999). The assumption was made that all areas that were protected were also restored and properly managed.

Results from Stith's (1999) simulation model included estimates of extinction, quasi-extinction (the probability of a Florida scrub-jay metapopulation falling below 10 pairs), and percent population decline. These were then used to rank the different statewide metapopulations by vulnerability. The model predicted five metapopulations (Northeast Lake, Martin, Merritt Island, Ocala National Forest [ONF], and LWR) have low risk of quasi-extinction. Two of the five (Martin and Northeast Lake), however, experienced significant population declines under the "no acquisition" option; the probability for survival of both of these metapopulations could be improved with more acquisitions.

Eleven of the remaining 21 metapopulations were shown to be highly vulnerable to quasi-extinction if no more habitats were acquired (Central Brevard, North Brevard, Central Charlotte, Northwest Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and West Volusia). The model predicted the risk of quasi-extinction would be greatly reduced for 7 of the 11 metapopulations (Central Brevard, North Brevard, Central Charlotte, Northwest Charlotte, Levy, St. Lucie, and West Volusia) by acquiring all or most of the remaining scrub habitat. The model predicted the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit if more acquisitions were made.

Stith (1999) classified two metapopulations (South Brevard and Sarasota) as moderately vulnerable with a moderate potential for improvement; they both had one or more fairly stable populations of Florida scrub-jays under protection, but the model predicted population declines. The rest of the metapopulations could collapse without further acquisitions, making the protected populations there vulnerable to epidemics or other catastrophes.

Three of the metapopulations evaluated by Stith (1999) (Flagler, Central Lake, and South Palm Beach) were classified as highly vulnerable to quasi-extinction and had low potential for improvement, since little or no habitat is available to acquire or restore.

Status and distribution

The Florida scrub-jay was federally listed as threatened in 1987 primarily because of habitat fragmentation, degradation, and loss (Service 1987). Historically, oak scrub occurred as numerous isolated patches in peninsular Florida. These patches were concentrated along both the Atlantic and Gulf coasts and on the central ridges of the peninsula (Davis 1967). Probably until as recently as the 1950s, Florida scrub-jay populations occurred in the scrub habitats of 39 of the 40 counties south of, and including Levy, Gilchrist, Alachua, Clay, and Duval Counties. Historically, most of these counties would have contained hundreds or even thousands of breeding pairs (Fitzpatrick et al. 1994a 1994b). Only the southernmost county, Monroe, lacked Florida scrub-jays (Woolfenden and Fitzpatrick 1996a). Although Florida scrub-jay numbers probably began to decline when European settlement began in Florida (Cox 1987), the decline was first noted in the literature by Byrd (1928). After 40 years of personal observation of the Etonia scrub (now known as Ocala National Forest), Webber (1935) observed many changes to the previously-undisturbed scrub habitat found there, noting that "The advent of man has created a new environmental complex."

A State-wide Florida scrub-jay census was last conducted in 1992 and 1993, at which time there were an estimated 4,000 pairs of Florida scrub-jays left in Florida (Fitzpatrick et al. 1994). At that time, the Florida scrub-jay was considered extirpated in 10 counties (Alachua, Broward, Clay, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and were considered functionally extinct in an additional 5 counties (Flagler, Hardee, Levy, Orange, and Putnam), where 10 or fewer pairs remained. Recent information indicates there are at least 12 to 14 breeding pairs of Florida scrub-jays located within Levy County, higher than previously thought, and there is at least one breeding pair of Florida scrub-jays remaining in Clay County. A Florida scrub-jay has been documented in St. Johns County as recently as 2003. Populations are close to becoming extirpated in Gulf coast counties (from Levy south to Collier) (Woolfenden and Fitzpatrick 1996a). In 1992-1993, population numbers in 21 of the counties were below 30 or fewer breeding pairs (Fitzpatrick et al. 1994). Based on the amount of destroyed scrub habitat, Florida scrub-jay population loss along the LWR is 80 percent or more since pre-European settlement (Fitzpatrick et al. 1991). Since the early 1980s, Fitzpatrick et al. (1994) estimated in the northern third of the species' range, the Florida scrub-jay has declined somewhere between 25 and 50 percent. The species may have declined by as much as 25 to 50 percent in the last decade alone (Stith et al. 1996).

On protected lands, Florida scrub-jays have continued to decline due to inadequate habitat management (Stith 1999). However, over the last several years, steps to reverse this decline have occurred, and management of scrub habitat is continuing in many areas of Florida (Hastie and Eckl 1999; Stith 1999; TNC 2001; Turner et al. 2006). Fitzpatrick et al. (1994) indicated that fire suppression at Cape Canaveral and Cape Canaveral Naval Air Station threatens the viability of this core population of scrub-jays. Furthermore, they stated that current forestry practices on ONF are likely to contribute to the continued decline of scrub-jays in this core area. Scrub-jays occurring on private land also face continued threats due to habitat degradation, fragmentation, and loss.

Longspurred Mint

In addition to the assessment below, a 5-year review was completed in 2008 resulting in no change to the species designation (Service 2008b). The 5-year review builds upon the

detailed information in the Recovery Plan for Three Florida Mints (1987b) and is located at http://www.fws.gov/southeast/5yearReviews/5yearreviews/LongspurredMint.pdf

Species/critical habitat description

Dicerandra is a genus of seven species in the mint family (Lamiacea or Labiatae). Four species are annuals and three are shrubby, with woody bases and non-woody flowering shoots. Each has a strong minty odor. The three shrubby species are endangered. *D. cornutissima* grow to 1.6 ft tall and have sharply bent corollas with dark reddish- purple spots. This species has purple-rose flowers with geniculate floral tube in whorls on elongated flowering stems (Wunderlin 1980). Although this species has been confused with the related *D. fructescens,* this species is easily distinguished by its narrow leaves, purple-rose corolla, style with few hairs or naked, and anther appendage usually over 1mm long. Flowering occurs in September and October.
No critical habitat has been designated for Longspurred mint.

Life history

D. cornutissima is endemic to sand pine scrub habitat that can best be described as scrub composed of overstory of older mature sand pine (*Pinus clausa*), with an open to thick understory of sand live oak (*Quercus geminate)*, Chapman's oak (*Q. chapmanii)*, myrtle oak (*Q. myrtifolia)*, saw palmetto (*Serenoa repens)*, scrub palmetto (*Sabal etonia)*, Florida rosemary (*Ceratiola ericoides)*, and the state listed *Garberia heterophylla* (Herring 2005). The ground cover component of this habitat is composed of patchy occurrences of lichens (*Cladina evansii, Cladina subtenuis,* and *Cladonia leporine),* as well as grasses such as wiregrass (*Aristida stricta),* arrowfeather threeawn (*Aristida purpurescens*), and sandy field beaksedge (*Rhynchospora megalocarpa). D. cornutissima* grows well in open, sandy patches usually along roadside edges. Although *D. cornutissima* occurs in a fire-adapted habitat, the timing of fires related to the plants survivorship and reproduction is not known (Herring 2005).

At the Cross Florida Greenway (CFG), *D. cornutissima* mostly occurs within sand pine-dominated scrub that has a mosaic of sandhill throughout the site (Herring 2005). The overstory is open, consisting of mostly sand pine, but longleaf pines are occasionally found. Fire suppression in the sandhill has led to an invasion of sand pine, but prescribed burning of this area needs to be conducted carefully, since response of *D. cornutissima* is unknown (Herring 2005). Menges (1992) found that a similar species, *D. frutescens*, a short-lived perennial is killed by fire and re-establishes vigorously from seed. Weekley (2006) notes its close relative *D. christmanii* is also killed by fire and re-establishes from seed. There has recently been research (K. Holsinger, University of Connecticut, unpublished data, 2008) to show that longer intervals of fire (more than 12 years) may be optimum for these species. Therefore, research on the similar *D. frutescens,* which grows in yellow sand scrub at ABS on the LWR, should be considered to elucidate the effects of fire on *Dicerandra* species and help refine prescribed burning activities (A. Johnson, FNAI, personal communication, 2008).

Further east on the CFG, along the Interstate 75 right-of-way, and Marion Oaks and Ocala Waterway Estates subdivisions, *D. cornutissima* occurs along roadside edges, its preferred habitat (Herring 2005). Care must be taken along these edges to not move dirt, mow, and establish fire lines with heavy equipment (Herring 2005). There are plans at CFG to manage the scrub habitat using mechanical means to open the habitat and reduce the sand pine. Due to the close proximity of Interstate 75 to this site, prescribed burning is extremely difficult. The Office of Greenways and

Trails recently completed a management plan for CFG that has goals and objectives to protect, enhance, and increase *D. cornutissima* found on the site (FDEP 2007).

Population dynamics

D. cornutissima was originally found in Marion and Sumter Counties. Currently *D. cornutissima* is only known to occur at four sites in Marion County: CFG, along the Interstate 75 right-of-way, Marion Oaks subdivision, and Ocala Waterways Estates subdivision. A survey of the historic locations of *D. cornutissima* in Sumter County was conducted in 1984 and no plants were found (Wunderlin 1984). FNAI has a record of *D. cornutissima* south of Marion Oaks along a powerline in Sumter County in 1988. The site along the powerline was discovered after the recovery plan was written in 1987. The recovery plan states there was no suitable habitat left at the sites surveyed in 1984 in Sumter County, although suitable habitat may still exist between Sumter County and southern Marion County. (Service 1987b; Wunderlin 1984). Other FNAI records include plants on private lands in Marion County near Rainbow Lakes Estates in 1993 and along SR 200 (Bahia Oaks development) in 1991 (FNAI 1996a). No surveys of these sites have occurred since the early 1990s. Adjacent protected lands (Ross Prairie State Forest, Halpata Tastanaki Preserve, and Potts Preserve) have been surveyed the past 5 years but no *D. cornutissima* have been located in suitable habitat at these locations (A. Johnson, FNAI, personnel communication, 2008).

Monitoring of *D. cornutissima* has occurred as recently as 2008 at the CFG and the Interstate 75 right-of-way. At CFG over 14,000 plants were found and along the Interstate 75 right-of-way 731 plants have been documented. The two sites on private lands in Marion County (Marion Oaks and Ocala Waterway Estates subdivisions) have had periodic surveys but no long-term monitoring has occurred.

In 1975, *D. cornutissima* was first documented along the Cross Florida Barge Canal (now CFG) in sand pine scrub (Florida Game and Fresh Water Fish Commission 1976). This area at CFG was thought to have been extirpated in 1981; however, surveys in 1988 on the CFG Canal lands found six additional areas of *D. cornutissima* including the one area previously recorded in 1975 (Johnson 1988). In 1991, the Canal Authority transferred the land to the CFG. FNAI was then contracted to conduct a biological inventory in which they found four areas with this species where it had previously been found during the 1975 and 1988 surveys (Knight et al. 1991).

From 2001 to 2005, CFG again funded FNAI to conduct exotic and rare plant surveys at on their properties mentioned above, which included looking for areas with *D. cornutissima*. Five areas were located; three were historic areas already recorded with FNAI (Herring 2005).

Most recently (2007 to 2008), FNAI was contracted by CFG to perform a natural community mapping survey of the CFG. Also included in the mapping survey of natural communities were rare and exotic species surveys. Since the 2001-2005 surveys, the CFG had acquired additional land and *D. cornutissima* was found to occur at some of those new acquisitions. In particular, additional *D. cornutissima* were documented within Marion County, north and west of the Interstate 75 CFG Landbridge within a tract called "the triangle." *D. cornutissima* follows the western boundary of the CFG triangle along both sides of a firebreak that serves as an ecotone between the CFG scrub and what was (or currently is) the Ocala Waterway Estates subdivision. *D. cornutissima* also follows an east/west southern boundary of the triangle scattered along an open and deep, white, sandy road that borders sandhill. The eastern edge of the triangle borders the western side of Interstate 75 where additional *D. cornutissima* occur.

Since the first *D. cornutissima* survey of the CFG Canal (1975) to the present survey of the CFG (FDEP 2008), many *D. cornutissima* have been documented on this site. The majority of *D. cornutissima* at the CFG occurs west of Interstate 75 in the canal diggings along an east/west road within sandhill and scrub habitats. As described in the preceding paragraphs, *D. cornutissima* was also recently documented occurring along a north/south and southern boundary road of the triangle tract in primarily scrub habitat. East of Interstate 75, *D. cornutissima* has only been located in a few localities. Historically, before the habitat centering around what is now Interstate 75 in Marion County was urbanized (pre-interstate, Barge Canal, and housing subdivisions), the land was unfragmented and *D. cornutissima* probably occurred naturally throughout the scrub and sandhill in openings. Perhaps there was only one area of *D. cornutissima,* a huge and unfragmented occurrence. Today, it might be correct to consider *D. cornutissima* occurs in Marion County as a single area that has been fragmented from the Barge Canal diggings and associated roads, housing subdivisions, and Interstate 75. An estimate of the current number of *D. cornutissima* individuals on the CFG is approximately 14,222 plants (Herring, FNAI, personal communication, 2008).

In 1995, *D. cornutissima* was inadvertently impacted by construction of stormwater swales associated with road widening along Interstate 75 in Marion County. To mitigate these impacts, the FDOT agreed to leave sod off the new swale backslopes and investigate techniques to restore this species in suitable areas along Interstate 75. FDOT conducted a small study with three test plots in one of the excavated backslopes. One plot was sown with collected *D. cornutissima* seeds, one plot was planted with nursery-grown seedlings, and one plot was left unplanted. Both of the planted plots achieved high seedling survival (although germination rates were low), and more *D. cornutissima* grew in these plots than in the unplanted plot. However, because of the small numbers of plants and the lack of replicates to test the variables among the plots, it was not possible to determine if active planting is superior to passive recruitment. Many new plants were informally observed growing in the un-sodded backslopes outside the test plots, and in 2005, surveys located additional plants outside the test plots along both the west and east sides of Interstate 75 in Marion County (Herring 2005). The successful seedling survival in the planted plots holds promise for re-establishing extirpated populations in areas where habitat has been restored.

During the 2005 FNAI survey, a total of 731 *D. cornutissima* plants were documented on the Marion County, FDOT Interstate 75 right-of-way with 344 plants occurring along the west side and 387 plants recorded on the east side of the interstate. Some of the *D. cornutissima* along the west side of Interstate 75 have spread under the CFG boundary fence where there are openings in the thick scrub there.

Dicerandra cornutissima was also historically located north and south of the CFG in the Marion Oaks subdivision and Ocala Waterway Estates subdivisions. Although the 1987 recovery plan documented several thousand plants at both sites (Service 1987b), no recent surveys have been conducted. There were two general areas within Marion Oaks where *D. cornutissima* were found, the northern end along County Road 484 and the southern end near the Sumter County line. Habitat loss from an increase in development has occurred at these sites in recent years, so additional surveys should be conducted to determine if these areas are still occupied and to what extent. Historic records show that *D. cornutissima* also was found at Rainbow Lakes Estates (1993) and along SR 200 near the Bahia Oaks development (1991) in Marion County, as well as, south of Marion Oaks along a powerline in Sumter County (1988). Surveys are needed to determine if these areas are still occupied by *D. cornutissima.*

Status and distribution

When listed in 1985, *D. cornutissima* was only found at four locations, along Interstate Interstate 75, CFG Canal, and two residential subdivisions (Ocala Waterway Estates and Marion Oaks). *D. cornutissima* still occurs at these sites. Within Marion Oaks subdivision, this species was found along the northern end near County Road 484 and southern end (about 4 miles south) near the Sumter County line. In 1938 and 1946, *D. cornutissima* was found in northern Sumter County 7 miles south of the Marion Oaks Subdivision. In 1984, no suitable habitat was found at these sites when surveyed (Wunderlin 1984). Other historic locations include areas south of Marion Oaks along a powerline in Sumter County (1988), near Rainbow Lakes Estates (1993) in Marion County, and along SR 200 near the Bahia Oaks development (1991) in Marion County. Only the site near Rainbow Lakes Estates appears to still have suitable habitat (A. Johnson, FNAI, personal communication, 2008). However, surveys are needed to determine if these areas are still occupied by *D. cornutissima.*

Dicerandra cornutissima was originally found along the right-of-way of the CFB Canal in 1975 (FWC 1976). This population was thought to have been extirpated in 1981; however, Johnson located it in 1988 at several other locations along the CFB Canal. In 1991, after the CFB Canal Project was abandoned, the property was acquired by the State of Florida and leased to the FDEP and is now managed by the Office of Greenways and Trails. A biological inventory of CFG was conducted in 1991, which located the same areas with *D. cornutissima* during the 1975 and 1988 surveys of CFG (Knight et al. 1991). Surveys conducted by FNAI from 2001 to present have located this species along additional roads and the old barge canal right-of-way (Herring 2005).

Along the Interstate 75 right-of-way, *D. cornutissima* is currently being managed by FDOT. FDOT has managed these sites by avoiding mowing in areas occupied by this species as well as eradicating invasive cogon grass at many of the sites where *D. cornutissima* occurs along Interstate 75. The densest populations of *D. cornutissima* appeared in the viewsheds of several billboards and along the fence lines after the impacts from the roadside construction occurred. The vegetation in the billboard viewsheds appeared to be maintained at a few feet in height, possibly by bush-hogging every few years, and the fence lines were disked by FDOT every
few years. Shortly thereafter, the billboards were removed and the viewsheds are no longer maintained, and disking along the fence line was discontinued. The density of *D. cornutissima* appears to have decreased in both the former viewsheds and along the fence lines (Stephen Tonjes, FDOT, personal communication, 2008).

In 1987, two large tracts of privately owned land that make up the Marion Oaks and Ocala Waterway Estates subdivisions contained the largest populations of several thousand plants each (Service 1987b). During the late 1980s and early 1990s, both subdivisions were more or less abandoned; however, development has begun to increase in both of these areas. *D. cornutissima* was found historically along the road rights-of-way in the sand pine scrub in these subdivisions. The current distribution of this species is unknown at these sites.

ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem within the action area. The environmental baseline does not include the effects of the action under review in this Biological Opinion.

Status of the species within the action area

Sand Skinks and Blue-tailed mole skink

Skinks were not directly observed during general wildlife and habitat surveys in 2014; however, the characteristic sinusoidal tracks of skinks were detected in Lake, Polk, and Osceola Counties, Florida. Between March 10 and May 8, 2015, at the request of the FWS, Sabal Trail conducted coverboard surveys to confirm skink presence/absence. The coverboard surveys were completed in all suitable skink habitats using approved survey protocols developed in conjunction with the FWS. Based on the cover board surveys and the pedestrian surveys that were completed in 2104 and 2015, skinks were confirmed present at two sparse grass/pasture habitat sites and assumed present in four additional native xeric habitats. It was reasonable to expect sand skink to be present in close proximity to occupied areas where surface soil, land use, and land cover are identical and there are no physical barriers to skink movement. Based on the current configuration of the project's construction workspace, 25.5 acres of known or presumed occupied skink habitat would be impacted by the project.

Sabal Trail conducted habitat analysis for the sand skink (Sabal Trail Interim report, February 2015) throughout the range of the species based on past surveys, suitable soils, and habitat conditions to determine the extent of areas that needed to be surveyed. Through this analysis it was determined that sand skinks are dependent on suitable soils that are "swimmable". Even when suitable soils are present if the habitat type has been human-altered such as road, buildings, or areas containing sod-forming grasses, such as bahia, St. Augustine, and cogon, this created "unswimmable" soils that skinks will avoid. Native xeric had the highest occupancy rate (92.29% of sites surveyed) of any habitat type and was the most frequently surveyed. It was also found that sand skink population source controls the probability of recolonization of previously disturbed sites and that future occupancy of connected sites is tightly linked to habitat quality. Intensively disturbed sites such as active citrus sites are mostly unoccupied even if a nearby sand skink source population is available. In human-altered landscapes with "swimmable" soils, Florida sand skinks recolonize a substantial portion of such sites once the disturbance is relaxed or discontinued if the site is connected to native xeric habitat (Sabal Trail report, May 2015)

Construction corridors for Sabal Trail in occupied sand skink habitat will be narrow, 100 feet in width. We have confirmed through field reviews and GIS analysis that in no case will the entirety of the occupied sand skink habitat (known or presumed) be cleared during construction, i.e., in all locations of sand skink habitat disturbance adjacent/abutting sand skink habitat is present and will remain post-construction to serve as potential sources for recolonization. Sand skinks presence was confirmed in 93% of 1,216 native xeric habitat sampling locations, and native xeric is the dominant occupied (known or presumed) habitat and will provide a source for recolonization (Sabal Trail

Interim Report, February 2015). Sabal Trail provided the Service a document- Reasonable Assurance That Florida Sand Skinks Will Occupy The Southeast Market Pipelines Construction Corridor Following Construction (May 2015) that provided several examples where the consultant documented that after the habitat had been altered, recolonization occurred.

Sabal Trail has provided the Service with reasonable assurance to support a determination that, as a result of various proposed pre- and post-construction impact conservation measures, sand skinks either will not be temporarily extirpated from the pipeline corridor following construction or will recolonize the corridor from adjacent occupied habitat once construction is completed.

Sabal Trail will conduct post-construction pedestrian surveys for sand skinks on a subsample of 25% of known, previously occupied areas (only). A maximum of three pedestrian surveys would be conducted at least two weeks apart in the spring survey window for Florida sand skink (March 1-May 15; USFWS 2013) until sand skink are either observed or for up to three years following pipeline construction in the selected areas. Survey areas will be selected to only include areas where sand skinks were detected during pre-construction surveys. Surveys will be limited to the 50-foot permanent easement area for each project and will include both the trenched pipeline area and the surrounding easement area. In the event that sand skinks are detected, no further surveys of that site will be conducted. Survey area selection will be based on ease of access, landowner approvals, and counts of sand skink trails from pre-construction surveys. Survey area selection may change from year-to-year if landowner access is denied or if the landowner converts the habitat to a condition unsuitable for sand skink. No surveys will be conducted in active citrus, as this habitat type is subject to continual disturbance independent of pipeline activities

Based on survey results, FERC has determined the proposed portions of the Sabal Trail pipeline "may affect and is likely to adversely affect" the sand skink. The Service concurs with this determination and finds that the project will result in adverse effects to the federally listed sand skink and its habitat. The project's effects on the sand skink will be discussed in the Effects of the Action.

Eastern indigo snake

The FWC Fish and Wildlife Research Institute indicates potential habitat for the indigo occurs in southern Lake County near the Green Swamp and Richloam Wildlife Management Area, southwestern Marion County near the Ross Prairie Ecosystem (including Halpata Tastanaki Preserve), Gilchrist County near Dry Prairie Hammock, southern Suwannee County near the Suwannee River, and western Hamilton County near the Withlacoochee River. Because indigos often inhabit gopher tortoise burrows, the indigo may be present in all areas that have been identified as gopher tortoise habitat. Sabal Trail did not conduct species-specific surveys for the indigo, but biologists observed one live adult indigo and collected one confirmed adult indigo shed from a second location within the project area during general habitat surveys. Both observations were associated with native upland habitats containing gopher tortoise burrows in areas associated with the Ross Prairie Ecosystem. Following submittal of the August 2015 listed species report, an additional adult indigo snake was observed by Sabal Trail near the Suwannee River in Gilchrist County.

Based on survey results, FERC has determined the proposed portions of the Sabal Trail pipeline "may affect and is likely to adversely affect" the eastern indigo snake. The Service concurs with this determination and finds that the project will result in adverse effects to the federally listed sand skink and its habitat. The project's effects on the sand skink will be discussed in the Effects of the Action.

Florida scrub-jay

Sabal Trail completed Florida scrub-jay surveys in 2014 and 2015 in accordance with the Comprehensive Listed Species Survey Protocol Document developed in conjunction with and approved by the FWS. Seven scrub-jay territories were identified in Citrus, Marion, and Sumter Counties, Florida. In Territory 1, two adult scrub-jays were observed and responded to calls during 2014 surveys while defending a territory associated with a utility corridor and active blueberry farm. Sabal Trail resurveyed Territory 1 in June 2015. Surveyors observed that the previously occupied territory within Sabal Trail's proposed construction workspace had been mechanically cleared and the scrub to the south of the existing utility corridor had been disturbed. Scrub-jays did not respond to two separate playback call events within the right-of-way or to playback calls south of the existing utility corridor. Due to habitat loss and alteration, scrub-jays are no longer present at Territory 1.

In Marion County, two scrub-jay territories consisting of scrub habitat were observed near Marion Oaks during 2014 surveys. Territory 2 is approximately 28 acres in size (0.6 acre within the proposed construction workspace) and consists of two adults and one subadult. Territory 3 is approximately 15 acres in size (0.2 acre within the construction workspace) and consists of four adults and two yearlings. The majority of both territories are south of the proposed pipeline workspace.

In Sumter County, four scrub-jay territories were identified in close proximity to one another within and adjacent to a maintained electric transmission line corridor. Territory 4 is approximately 76 acres in size (11 acres within the proposed construction workspace) and consists of two adults and a juvenile. Territory 5 is approximately 65 acres in size (8.5 acres within the proposed construction workspace) and consists of two adults, two helpers, and a juvenile. Each of these families utilizes low scrub oak in the utility corridor as its primary and nesting habitat and the adjacent overgrown shrub as refuge from predators.

Surveys in 2014 identified Territories 6 and 7, which consisted of degraded scrub habitat and contained families of at least two adults. Territories 6 and 7 were resurveyed on two occasions in 2015. During the first survey event, 4 adults arrived from the east of the territories and did not exhibit territorial responses to playback calls, which indicate the territories may no longer be utilized by scrub-jays. On the second survey event, the degraded scrub habitat was cleared and the area converted to agricultural use. Due to habitat loss, scrub-jays are no longer present at Territories 6 and 7.

Based on survey results, FERC has determined the proposed portions of Sabal Trail "may affect and is likely to adversely affect" the Florida scrub-jay. The Service concurs with this determination and finds that the project will result in adverse effects to the federally listed Florida scrub jay and its habitat. The project's effects on the Florida scrub jay will be discussed in the Effects of the Action.

Longspurred mint

Sabal Trail surveyed appropriate habitats for the longspurred mint in Marion County in late September through October 2014 during the preferred flowering period. Surveys in June 2015 were conducted by expert botanists that were approved by FWS to complete surveys outside the survey window for the species. Habitat was not surveyed if it appeared to be managed for fire exclusion and exhibited dense, closed canopy, was converted to pasture with dense grass cover, or was converted to pine plantation or citrus grove. Groupings of longspurred mint were identified between Mainline MPs 398 and 405.

Based on survey results, FERC has determined the proposed portions of the Sabal Trail pipeline "may affect and is likely to adversely affect" the longspurred mint. The Service concurs with this determination and finds that the project will result in adverse effects to the federally listed plant and its habitat. The project's effects on the longspurred mint will be discussed in the Effects of the Action.

Factors affecting species' environment within the action area

The habitats surrounding the action area are threatened by degradation resulting from fire exclusion, lack of management, and residential development. As mentioned in the previous section, some suitable habitat is interspersed within the residential and compacted pastureland. Xeric habitats require periodic fire to maintain optimal habitat values such as patches of bare sand and low shrub architecture. The need to protect agricultural, residential, and commercial development has resulted in the suppression of wildfires. Xeric habitats lacking periodic fire or management become overgrown and less suitable to the species addressed above. Over time, these species will diminish in abundance and eventually may be extirpated. Sabal Trail has no mechanism to perpetuate land management practices beyond their right-of-way, so the maintenance of scrub habitat suitability surrounding the action area will be the responsibility of individual property owners.

Climate Change

The Intergovernmental Panel on Climate Change (IPCC) concluded that warming of the climate system is unequivocal (IPCC 2007a). Numerous long-term changes have been observed including changes in arctic temperatures and ice, and widespread changes in precipitation amounts, ocean salinity, wind patterns, and aspects of extreme weather including droughts, heavy precipitation, heat waves, and the intensity of tropical cyclones (IPCC 2007b). While continued change is certain, the magnitude and rate of change is unknown in many cases.

Climatic changes in Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008). Based on current predictions, global warming will be a particular challenge for endangered, threatened, and other "at risk" species. However, it is difficult to estimate, with any degree of precision, how these species will be affected by climate change. Although, these species occur on high sandy ridges, they may be sensitive to changes in rainfall patterns or changes in seasonal temperatures. The Service will use Strategic Habitat Conservation Planning, an adaptive science-driven process that begins with explicit population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006b).

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and/or critical habitat and its interrelated and interdependent activities on federally listed Florida sand skink, blue-tailed mole skink, eastern indigo snake, Florida scrub-jay, and longspurred mint and their habitat. The Service has evaluated the identified temporary construction activities in the context of how the individual actions have the potential to produce adverse effects to the covered species – at the individual, population, and landscape scales. The Service believes that, as implemented, the Conservation Measures will result in ameliorating, minimizing, or eliminating potential adverse effects. The use of specific Conservation Measures focusing on design, timing, method of operation of machinery, and the natural revegetation of the action areas is expected to significantly reduce the potential adverse effects from construction activities. However, even with the implementation of the Conservation Measures, some remaining adverse effects will occur to the covered species as described below.

Direct effects

Direct effects are those effects that are caused by the proposed action, at the time of construction, are primarily habitat based, and are reasonably certain to occur. Direct effects include: the permanent and temporary loss of habitat for the covered species and a reduction in the geographic distribution of their habitat.

Interrelated and interdependent actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

Indirect effects

Indirect effects are those effects that result from the proposed action, are later in time, and are reasonably certain to occur.

Beneficial effects

Beneficial effects are those effects of the proposed action that are completely positive, without any adverse effects to the listed species or its critical habitat. The proposed action will be temporary in nature and will allow for habitat restoration once the proposed project is complete.

Factors to be considered

Physical Disturbance (Including Noise)

All of the covered conservation measures, either directly or indirectly, have the potential to produce some additional level of physical disturbance because they involve the physical presence of humans and/or associated equipment, vehicles or machinery. Further, future periodic disturbances have the potential to occur as maintenance actions for the implemented practices that may be needed over their operational life. Although effects are not quantitatively known the literature suggests some

form of physical effects from presence and/or associated noise will create a disturbance response to individuals of each of the covered species.

The net effect of the physical disturbance including sustained sources of noise may be a localized reduction of survival or productivity, avoidance of otherwise suitable habitat, and/or reduction of breeding frequency. These effects are expected to rarely occur and are not expected to produce substantial changes in species distribution and abundance. However, some small level of mortality is likely, since detection of those individuals while the habitat is disturbed is highly unlikely.

Temporary Soil Disturbance and Vegetation Removal

Temporary soil disturbance and vegetation removal are expected from the implementation of pipeline construction activities. This disturbance may result in loss and/or temporary change in habitat conditions for the covered species. Sources of the disturbance would include use of equipment (tractors, and other machinery) as well as practices that involve manipulation of vegetation (e.g., hydroaxe or other mechanical means to remove vegetation). The installation of the pipeline could result in soil surface disturbance and/or compaction. The ground disturbance may involve minor surface disturbance such as tracked vehicles or tires. Common potential adverse effects identified by the Service include short-term degradation of habitat conditions and the potential for increased habitat fragmentation if the scale of the disturbance is large enough and there's the potential to create opportunities for colonization of these disturbed sites by invasive plants.

Temporary adverse effects on individuals can include increased levels of stress hormones, increased recesses during incubation (*i.e.*, may increase detection by predators and predation risk), or disturbance/flushing of young. If these risks are realized, individual fitness is reduced and may have population-level effects if disturbance is over a broad enough spatial or temporal scale.

Permanent Removal/loss of Suitable Habitat

This adverse effect is a result of permanent removal of habitat conditions and specific vegetative loss caused by pipeline construction or the expectation that, once implemented, permanent degradation of habitat conditions for any of the covered species will have resulted.

The primary adverse effect is the permanent loss of habitat that can lead to a subsequent decline in populations of the covered species. However, any permanent loss of habitat is expected to be small in scale and will not substantially affect population trends or result in quantifiable additional habitat fragmentation effects.

Increased Potential of Accidental Mortality to Individuals

Several construction activities were identified as potentially causing mortality or injury to individuals of listed species. These include accidental mortality from collisions with vehicles or, in the case of plants, loss of individual plants due to crushing or as a result of vegetative manipulation.

Analyses for effects of the action on specific species

Blue-tailed Mole Skink and Florida sand skink

Direct Effects- Skinks that may be present within the construction workspaces or within areas that are maintained during operation of the pipeline could be injured or killed by construction activities, such as vegetation clearing and removal, debris piling (soil stock piling), potential burning, construction, restoration, and equipment traffic along the right-of-way and access roads. Mechanical preparation of the Sabal Trail site can crush or injure individual skinks and skink eggs, and destroy or degrade occupied and potential habitat and foraging areas. In addition, any clearing activities may adversely affect skinks by causing them to leave the area and possibly miss foraging and mating opportunities. Individual skinks fleeing the area may be more vulnerable to predation.

Sand skinks may respond to the commencement of construction activities by attempting to flee the project site to avoid the disturbance. However, because skinks are not highly agile, they may not be able to successfully flee the project site before they are affected by construction activities. As such, skinks may be crushed by construction vehicles or entombed during earth moving, contouring and trenching activities associated with the construction of the proposed pipeline.

Occupied habitats would be temporarily lost during construction and pipeline maintenance activities and would not be suitable for use until restoration is complete. Additionally, if the pipeline right-of-way is restored to full vegetation cover, suitable swimmable soil conditions may render the habitat useless and create a barrier for skink movement.

Indirect Effects- Indirect effects are those effects that result from the proposed action, are later in time, and are reasonably certain to occur. Unintentional yet often unavoidable indirect effects of a maintaining the proposed pipeline is increased incidences of vehicle wildlife collision resulting in road kill. The project should not cause fragmentation of skink habitat within thee skink home ranges since there will not be any permanent loss of habitat and any habitat temporarily impacted will be returned to the original condition and allowed to naturally revegetate.

Eastern indigo snake

Direct Effects- Construction and maintenance activities would temporarily displace indigos from suitable foraging, burrowing, resting, or wintering habitat. Because indigos use a variety of habitats, construction and maintenance of the pipeline should result in a minimal loss of habitat, and is not expected to result in long-term or cumulative loss of habitat. Construction and operational activities are not expected to result in a noticeable loss of prey species for the indigo. Wherever possible, Sabal Trail would temporarily exclude gopher tortoises from the construction workspace and allow them to return to the right-of-way once construction and restoration is complete.

Direct mortality of indigos may occur from vehicle or equipment strikes or if snakes become trapped in an open trench. Indigo are a mobile species and in most instances, would be capable of avoiding approaching vehicles and/or equipment. However, indigo fatalities from vehicle strikes are common. In addition, some individuals will be captured and handled, which is anticipated to cause short-term stress. Efforts will be made to handle them for the least amount of time possible and to release them unharmed in the nearest available suitable habitat to minimize stress. Feeding,

sheltering, and reproduction could be interrupted as a result of capture; however, these behaviors are expected to return to normal following release.

Indirect Effects- Indirect impacts on indigos adjacent to the construction or maintenance workspaces may occur from pedestrian, equipment, and vehicular traffic, as well as vibration from these activities. Although construction personnel would be advised to avoid snakes through informational posters and pamphlets, the operation of equipment in brushy, grassy, or otherwise vegetated areas may disturb snakes that are not readily visible. Construction and restoration of the project is proposed to occur year-round, and activities would generally occur during daylight hours when indigos are active.

Florida Scrub-jay

Direct Effects- Potential effects from the project on scrub-jays could include loss of active nests, eggs, and/or fledglings if the project were constructed during the nesting season (typically March 1 to June 30) and displacement of individuals from otherwise suitable foraging habitats along the project. Construction activities could also disrupt nesting activities adjacent to the proposed construction workspace.

Indirect Effects- These would include the permanent loss of scrub habitat from maintenance clearing along the permanent pipeline right-of-way. While some low woody growth may be allowed in the permanent right-of-way, nesting habitat would be permanently lost. Additionally, scrub habitat in the temporary construction workspace may not be suitable for use by Florida scrub-jays for a number of years after initial right-of-way restoration is complete.

Longspurred Mint

Direct Effects- Construction and operation of the pipeline would directly impact small portions of the populations that were identified during surveys; however, maintenance of the pipeline right-of-way may create additional suitable habitat for the species. Sabal Trail would place safety fence along the eastern edge of the construction right-of-way along the largest area of existing plant population prior to commencing construction activities in order to reduce disturbance to populations adjacent to the right-of-way. Signs indicating an environmental sensitive area would be placed with the safety fence.

Indirect Effects- The habitat in the temporary construction workspace may be suitable for use by longspurred mint for a number of years after initial right-of-way restoration is complete. The FERC Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) specifies that "Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be done more frequently than every three years. However, to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. Since the current population is found in an adjacent existing maintained electric transmission line right-of-way, the limited vegetation mowing or clearing allowed by the FERC Plan should provide a suitable habitat for this species.

Analyses for effects of the action

To minimize potential impacts to covered species and scrub habitat, the applicant coordinated with the Service to avoid high-quality scrub habitat during the project planning for the proposed pipeline. To minimize the population effects for the loss of the covered species and their habitats, the applicant proposed conservation measures addressed earlier as a part of the proposed action. We expect the majority of incidental take will be in the form of death, injury, or temporary harassment (via displacement) during Conservation Measures implementation. For some Conservation Measures, a portion of incidental take is expected over the life of the proposed pipeline. The scale of the effect will be landscape specific, but will most likely involve mortality of some members of the species covered in this Opinion.

Indirect effects will be minimized by implementing the Conservation Measures proposed by Sabal Trail.

We know that there are areas within the proposed pipeline that are occupied by the covered species. Eastern indigo snakes have been observed in Marion County and Gilchrist counties within the proposed pipeline. Seven Florida scrub-jay families' territories were detected within the proposed pipeline. Only a portion of four territories will be temporarily impacted during initial clearing of the proposed pipeline project. The habitat is currently overgrown scrub and after construction will be allowed to revegetate and provide open patches more suitable for scrub-jays. It is difficult to quantify abundance of the sand skink and blue-tailed mole skink due to the cryptic nature of the species and survey methodology. Therefore, the actual number of skinks that currently occupy the site are unknown. The Service has determined that the acres of occupied scrub habitat are a quantifiable proxy for the jeopardy analysis and allows the Service to quantify and monitor take of the species. Results of the surveys suggest that federally listed sand skinks occur within 25.5 acres of Sabal Trail. Based on estimated acres of protected lands that manage for sand skinks and scrub species, the proposed loss of occupied habitat is insignificant amount, less than .04% (assuming 29,511 acres, Mushinsky et al 2011). The Service acknowelges that this may be a conservative estimate because of limited range-wide data regarding sand skink population size at all protected sites in the remaining scrub habitat. Based on the best available information, the Service has determined that the loss would not jeopardize the recovery or continued existence of the covered species.

CUMULATIVE EFFECTS

The Service defines "cumulative effects" considered in this Biological Opinion as the effects of future State, Tribal, local, or private actions (*i.e.,* non-Federal actions) reasonably certain to occur in the action area. Our definition of cumulative effects does not include future Federal actions unrelated to the proposed action because these actions require separate consultation pursuant to section 7 of the Act. Cumulative effects are considered in regard to the risk of the proposed action having an effect that would jeopardize the recovery and continued existence of the species. Any take resulting from cumulative effects would be addressed by the Service through the ESA's section 10 process.

The Service does not know of any future projects that would occur within the action area at this time.

CONCLUSION

After reviewing the current status, environmental baseline for the action area, effects of the proposed action, and cumulative effects to the covered species, it is the Service's Biological Opinion that the proposed action is not likely to jeopardize the continued existence of these species. We base this decision on the following:

1. Implementing the proposed conservation measures will limit the amount of "take" to these species.
2. While the project shall result in a reduction of available scrub habitat, sufficient suitable habitat is currently protected in other areas of the ranges of these species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Harm" is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking, that is incidental to and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Section 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plants and candidate species. However, limited protection of listed plants from take is provided to the extent the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulations, or in the course of any violation of a State criminal trespass law. If this project is on private land and the landowner is not the project proponent, in addition to landowner permission, a Florida Department of Agriculture and Consumer Services permit for plants may be needed. To determine if such a permit is necessary or to apply for this permit, contact:

Florida Department of Agriculture and Consumer Services
Florida Division of Forestry
Plant Conservation
3125 Conner Boulevard
Tallahassee, Florida 32399-1650
Telephone: 850-414-8293
Fax: 850-921-6724

AMOUNT OR EXTENT OF TAKE

Blue-tailed mole skink and Florida sand skink

The Service has reviewed the biological information for this species, the information presented by the applicant, and other available information relevant to this action. The Service anticipates incidental take of sand skinks in the form of harm (*i.e.,* mortality and habitat loss). Construction activities associated with the project may wound or kill skinks, and result in the loss 25.5 acres of sand skink habitat. The Service finds the actual number of sand skinks incidentally taken by the action will be difficult to quantify for the following reasons: 1) individuals have a small body size and spend the majority of their time underground, making the detection of a dead or impaired specimens unlikely; and 2) a commercially practicable and suitable survey method has not been developed to accurately estimate skink density, thus the number of skinks currently occurring in the project footprint is not well known. The Service finds that all sand skinks occurring within the 25.5 acres of skink habitat on the project site will be taken incidental to the action.

Eastern indigo snake

The Service anticipates incidental take of eastern indigo snakes will be difficult to detect and quantify for the following reasons: wide-ranging distribution; a patchy distribution within suitable habitat; limited detectability due to use of burrows or holes for shelter; there is likely unoccupied suitable habitat; juveniles have limited detectability due to their affinity for thick vegetation; and the use of cryptic sheltering areas that may be temporarily established during construction (*e.g.*, brush piles, equipment stockpiles, and dirt mounds). The lack of practical methods to survey, in conjunction with wide-ranging activity and use of a variety of habitat types makes it difficult to determine the exact number of eastern indigo snakes that will be incidentally taken.

The Service anticipates that incidental take may occur throughout the entire project area (481.6 acres) in the form of harm or harass during project construction activities. Incidental take related to the project may occur in the action area, particularly from construction traffic within the project area. Since the construction of project is temporary and the habitat will be restored the entire range of one male or female eastern indigo snake will not be impacted. Based on best available science and implementation of the conservation measures the Service is authorizing incidental take in the form of injury or mortality of no more than two eastern indigo snakes and no more than ten eastern indigo snakes in the form of capture and harassment as associated with the relocation of the eastern indigo snake from the construction work area during construction of the pipeline and no more than four eastern indigo snake egg clutches. If additional eastern indigo snakes are taken during the construction of the project then our office should be contacted and reinitiation may be needed.

Florida scrub-jay

The Service has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action. The Service anticipates incidental take of scrub-jays in the form of harm (*i.e.,* mortality and habitat loss). Based on our review, incidental take is anticipated to include 20.3± acres of scrub-jay habitat occupied by four (4) families consisting of three (3) to four (4) individuals in each family. However, the loss of the habitat within the territories will be temporary and naturally revegetate providing sandy open areas and suitable habitat.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined this level of anticipated take is not likely to result in jeopardy to the covered species. Critical habitat has not been designated for any of these species and therefore, will not be affected.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the take of the covered species.

1) FERC and Sabal Trail shall ensure the level of incidental take anticipated in this Biological Opinion is commensurate with the analysis contained herein.

The conservation measures proposed by the applicant and as described as a part of the project description are considered binding measures and shall be implemented for the exemption in section 7(o)(2) to apply. In the event that a sick, injured, or dead species is found, the Service has provided the following procedures to be used to handle or dispose of any individuals taken.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FERC and Sabal Trail must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1.1 The construction of the pipeline project will be clearly delineated prior to ground disturbance to ensure that take is not exceeded within the known occupied areas for all covered species. Habitat acres were used as a proxy to quantify take, and if, during the course of this action, this level of take is exceeded; such take would represent new information requiring reinitiating of the proposed action.

1.2 Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured skinks, or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

1.3 Disposition of Sick, Injured, or Dead Specimens-To ensure that upon locating a dead, injured, or sick threatened or endangered species, initial notification must be made to the nearest Service Law Enforcement Office: U.S. Fish and Wildlife Service; 9549 Koger Boulevard, Suite 111; St. Petersburg, Florida 33702; 727-570-5398. Secondary notification should be made to the Florida

Fish and Wildlife Conservation Commission: South Region; 3900 Drane Field Road; Lakeland, Florida; 33811-1299; 1-800-282-8002.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service is recommending the removal of any plastic netting found along the right-of-way. Plastic netting should not be used in the future because it does not degrade over time and can entrap and kill many species of wildlife.

REINITIATION NOTICE

This concludes formal consultation on Sabal Trail pipeline project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (see below); (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; (3) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

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