United States Department of the Interior

FISH AND WILDLIFE SERVICE
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May 22, 2013

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Service CPA Activity Code:	2012-CPA-0195
Service Consultation Code:	2012-F-0210
Date Received:	October 4, 2012
Consultation Initiation Date:	May 9, 2013
Applicant:	City of Avon Park
Project:	Executive Airport Drainage Project
County:	Highlands

Dear Ms. Baston:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion for the City of Avon Park's proposed Executive Airport Drainage Project and its effects on the threatened blue-tailed mole skink (*Plestiodon egregius lividus* = *Eumeces egregius lividus*) and the threatened sand skink (*Plestiodon reynoldsi* = *Neoseps reynoldsi*). This document is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended in 1998 (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). The project site is located in Highlands County, Florida (Figure 1).

This Biological Opinion is based on information provided in the Federal Emergency Management Agency's (FEMA) letter to the Service dated June 25, 2012; information on the project from the applicant's consultant; and telephone conversations, emails, and other sources of information. A complete administrative record of this consultation is on file at the Service's South Florida Ecological Services Office (SFESO), Vero Beach, Florida.

Consultation History

In a letter dated June 25, 2012, FEMA indicated tracks of the sand skink were observed in a portion of the project footprint of the Executive Airport Drainage Project during cover board surveys conducted by the City of Avon Park's consultant. FEMA determined the Executive Airport Drainage Project "may affect and is not likely to adversely affect" the following federally listed species: the sand skink, the blue-tailed mole skink, the threatened eastern indigo snake (*Drymarchon corais couperi*) and the threatened Florida scrub-jay (*Aphleocoma coerulescens*); FEMA requested the Service concur with this determination.

On July 2, 2012, the Service requested additional information from FEMA via email on the Executive Airport Drainage Project and the cover board surveys conducted at the project site. FEMA replied via email, and provided the additional information requested.

In an email to FEMA dated July 2, 2012, the Service noted the construction activities associated with the project were likely to result in take of the sand skink and the Service could not concur with FEMA's determination that the project "may affect, and is not likely to adversely affect" the sand skink and the blue-tailed mole skink. The Service recommended FEMA change its determination for the sand skink and blue-tailed mole skink to "may affect, likely to adversely affect" and request the Service initiate formal consultation for the project. The Service also requested the City of Avon Park provide a habitat compensation plan that minimized the Executive Airport Drainage Project's adverse effects to the sand skink and blue-tailed mole skink.

In an email to the Service dated October 4, 2012, FEMA changed its determination for the sand skink and the blue-tailed mole skink from "may affect, not likely to adversely affect" to "may affect, likely to adversely affect." FEMA also requested the Service initiate formal consultation for the Executive Airport Drainage Project.

In an email to the Service dated October 30, 2012, the City of Avon Park's consultant indicated the City of Avon Park would acquire 2.14 credits from the Scrub Conservation Bank in Highlands County, Florida, to compensate for the loss of 1.07 acres (ac) (0.43 hectare [ha]) of occupied skink habitat within the Executive Airport Drainage Project footprint.

In a telephone message to the Service on May 9, 2013, the Scrub Conservation Bank indicated the City of Avon Park had acquired 2.14 credits.

As of May 9, 2013, we have received all the information necessary for initiation of formal consultation on threatened skinks for this project as required in the regulations governing interagency consultations (50 CFR § 402.14). The Service is providing this Biological Opinion in conclusion of formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The City of Avon Park has applied to FEMA for a grant to construct drainage and water storage features in and adjacent to the Avon Park Executive Airport. The project includes the construction of: a 10-ac (4-ha) dry detention pond on the Avon Park Executive Airport property, a pumping station, drainage ditches, and an underground pipeline that will convey water from the retention pond to an existing county storm sewer system (Figure 2). The conveyance pipeline will consist of a12-inch (in) diameter PVC pipe buried 4 feet (ft) (1.2 meters [m]) underground. The pipeline will begin at the southeast corner of the retention pond at the edge of the Avon Park Airport, follow existing maintenance roads associated with an operating citrus grove located southeast of the airport, and parallel South Self Avenue until it intersects with West Montsdeoca Road, where it will tie into an existing underground drainage system. The purpose of the project is to provide flood protection for homes and public infrastructure. The project site is located in Highlands County, Florida (Figure 1).

The construction of the project will incidentally result in the destruction of habitat currently occupied by federally listed skinks. Skink surveys based on the Service's guidance were conducted on the project site during April and May 2012. Skinks were estimated to occur within 1.07 ac (0.43 ha) of habitat within the project corridor. Because surveys only provide an estimate of relative abundance, the actual number of skinks that currently occur on the site is not known. Construction activities associated with the Executive Airport Drainage Project will impact 1.07 ac (0.43 ha) of occupied skink habitat within the project site. To minimize the adverse effects of the action to skinks, the applicant has agreed to purchase 2.14 skink credits from the Scrub Conservation Bank in Highlands County, Florida.

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 notes the purpose of the project is to provide flood protection to existing homes and public infrastructure; it is unlikely the project will induce new development in the project area. Consequently, the Service considers the action area for this project as all lands within the project footprint (Figure 1).

STATUS OF THE SPECIES/CRITICAL HABITAT RANGEWIDE

The most recent review of the sand skink and blue-tailed mole skink can be found in the 5-year review (Service 2007a). This review builds on the detailed information in the Multi-Species Recovery Plan (MSRP) (Service 1999) The MSRP is incorporated by reference and can be used to obtain more detailed information about these species.

Sand skink

Species/critical habitat description

The sand skink is a small, fossorial lizard that reaches a maximum length of about 5 in (12.7 centimeters [cm]). 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 (2007a). We continue to use the scientific name as published in the final listing rule (52 FR 42658).

Critical habitat has not been designated for the sand skink.

Genetics and evolutionary history

The sand skink evolved on the central Lake Wales Ridge (LWR) and radiated from there (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 LWR characterized by high haplotype diversity and a single, unique haplotype detected only on the Mount Dora Ridge (MDR) (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 MDR 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 LWR and Winter Haven Ridges (WHR) in Highlands, Lake, and Polk Counties (Christman 1992a; Mushinsky and McCoy 1991). The sand skink is uncommon on the MDR, including sites within the Ocala National Forest (ONF) (Christman 1970; 1992a). Despite intensive sampling efforts in scrub habitat with similar herpetofauna, the sand skink has not been recorded at Avon Park Air Force Range on the Bombing Range Ridge (Branch and Hokit 2000). Although we do not have estimates of acreage for all of the ridges, we do know the largest of these, the LWR, encompasses approximately 517,303 ac (209,300 ha) (Weekley et al. 2008). According to the Florida Natural Areas Inventory (FNAI) database, updated as of September 2006, there were 132 locality records for the sand skink, including 115 localities on the LWR, 7 on the MDR, and 4 on the WHR (Griffin 2007). FNAI also reports four localities for this species west of the MDR in Lake County and two localities between the LWR and the Lake Hendry Ridge.

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 80 ft (24.4 m) above mean sea level. Commonly occupied native habitats include Florida scrub variously described as 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 ft (39.6 m) into scrubby flatwoods or 65 feet (19.8 m) into pine flatwoods (Sutton et al. 1999). Sand skinks also use disturbed habitats such as citrus groves, pine plantations, and old fields, especially when adjacent to existing scrub (Pike et al. 2007; 2008).

Various authors have attempted to characterize optimal sand skink habitat (Telford 1959; 1962; Christman 1978; 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 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 (ABS), 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 (1992a) suggested they nest in these locations. Christman (2005) found 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), particularly 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). Christman (2005) conducted trap surveys at sites with a known burn history on the LWR 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 significantly larger skinks were captured in burned plots, indicating more insect prey may have been available from decaying logs or older skinks inhabited these sites.

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 ac (2 to 27.9 ha) that were restored to a more natural state using fire and canopy thinning, and set aside for conservation in residential areas. Pike et al. (2006) documented a severe decline in occupancy and relative density of sand skinks, and hypothesized 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 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 also have been caused by prescribed burning used to restore these sites (Mushinsky in Service 2007a).

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 captures peaked in March at ABS, but in May at ONF. All of these authors suggested the spring activity peak was associated with mating. At ABS, Ashton and Telford (2006) noted a secondary peak in August that corresponded with the emergence of hatchling sand skinks.

Telford (1959) assumed sand skinks become sexually mature during the first year following hatching, at a size of 1.78 in (4.52 cm) snout-vent length. He suspected most of the breeders in his study were in their second year and measured between 1.78 and 2.24 inches (4.52 and 5.69 cm) snout-vent length. However, Ashton (2005) determined 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 2 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 between two and four eggs, typically 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 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 move less than 130 ft (39.6 m) between captures, but some have been found to move over 460 ft (140.2 m) in 2 weeks (Mushinsky et al. 2001). Limited dispersal ability has been suggested to 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 ONF 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 2002). It is not known to be a threat to the species. In a subsequent paper, Telford and Bursey (2003) found 3 species of endoparasites in 45 sand skinks from ONF.

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, and be indicative of, high intraspecific competition or predation.

Status and distribution

Reason for listing

The modification and destruction of xeric upland communities in central Florida were a primary consideration in listing the sand skink as threatened under the Act in 1987 (52 FR 42658). By some estimates, as much as 90 percent of the scrub ecosystem has already been lost to residential development and conversion to agriculture, primarily citrus groves (Kautz 1993; Turner et al. 2006b). Xeric uplands remaining on private lands are especially vulnerable to destruction because of increasing residential and agricultural pressures. The 5-year review found no justification for change in the threatened status (Service 2007a).

Rangewide trends

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, FNAI had recorded 31 known sites for the sand skink. By September 2006, 132 localities were known by FNAI (Griffin 2007). 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 originally supposed. Nonetheless, except for a few locations where intensive research has been conducted, limited information about the presence or abundance of sand skinks exists. Reptile surveys in a variety of scrub habitats in the ONF did not detect sand skinks (Greenberg et al. 1994). Telford (1998) cited the ephemeral nature of early successional scrub habitats due to dynamic changes as an important confounding factor in the evaluation of the sand skink's present status in the ONF. At least two persistent populations are known from the ONF (Telford 1998), where sand skinks have been collected for genetic analysis (Branch et al. 2003) and population studies (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 LWR are estimated to have been lost due to development (Turner et al. 2006b). It is likely 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. (2006a) 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 LWR, coupled with implementation of effective land management practices, represent the most likely opportunity for assuring the sand skink's survival.

Existing private and public conservation lands on the LWR likely 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 ac (10,120 ha) of xeric uplands (Turner et al. 2006a). The Service has also acquired portions of several tracts totaling 1,800 ac (728.4 ha) as a component of the LWR National Wildlife Refuge (Service 1993). Finally, private organizations, such as The Nature Conservancy and ABS, have acquired and currently manage xeric uplands within the LWR. Recovery of the sand skink may also require rehabilitation of suitable but unoccupied habitat or restoration of potentially suitable habitat.

Because sand skinks have low dispersal abilities, introductions into restored or created unoccupied habitat 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 site location, habitat suitability, and initial propagule size were the factors affecting success; researchers concluded 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

Species/critical habitat 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 as threatened (52 FR 42658). The blue-tailed mole skink reaches a maximum length of about 5 in (12.7 cm), 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 1978). Males develop a colorful orange pattern on the sides of the body during breeding season. Juveniles usually have a blue tail (Christman 1992b). 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 1992b).

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 (1978) also 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 blue-tailed mole skink juvenile just north of the Polk County line on the LWR (Christman 1992b). Analysis of mitochondrial DNA (Branch et al. 2003) supports Mount's (1965) hypotheses that blue-tailed mole skinks from the lower LWR represents the ancestral stock, which radiated from there. Genetic analysis also indicates substantial population variability with limited dispersal in mole skinks among sandy habitats (Branch et al. 2003). Based on conventional estimates of molecular evolutionary clocks, these authors suggest a separation of approximately 4 million years between mole skinks occurring on the two oldest ridges (LWR and MDR), which overlaps the proposed Pliocene origin of scrub habitats (Webb 1990).

The taxonomic classification of the mole skinks has been reevaluated since it was listed as *Eumeces egregius lividus*, and the commonly accepted scientific name for the blue-tailed mole skink is now *Plestiodon egregius lividus* (Brandley et al. 2005; Smith 2005). A detailed description of the recent taxonomic review can be found in Service (2007a). We continue to use the scientific name as published in the final listing rule (52 FR 42658).

Critical habitat has not been designated for the blue-tailed mole skink.

Distribution, habitat and abundance

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; 1992b). 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 (10.12 per ha) (Christman 1992b). The distribution of blue-tailed mole skinks appears to be closely linked to the distribution of surface litter and, in turn, suitable microhabitat sites. Meshaka and Lane (2002) found blue-tailed mole skinks persisted on a sandhill at ABS that remained unburned for 67 years, and the relative abundance of blue-tailed mole skinks did not decrease over time. Campbell and Christman (1982) characterized blue-tailed mole skinks as colonizers of a patchy, early successional, or disturbed habitat, which may occur as a result of natural or anthropogenic 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).

Life history

Blue-tailed mole skinks are typically found in a variety of xeric upland communities, including rosemary and oak-dominated scrub, turkey oak barrens, high pine, and xeric hammocks. Foraging activities of the blue-tailed mole skink occur primarily at or within 2 in (2.54 cm) of the soil

surface (Christman 1992b), usually 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 (*Eumeces egregius onocrepis*) where mating occurs in the fall or winter. In the peninsula mole skink, individuals probably become reproductively active at 1 year of age (Mount 1963; Christman 1978). Two to nine eggs are laid in a shallow nest cavity less than 12 in (30.5 cm) below the surface. The eggs incubate for 31 to 51 days, during which time the female tends the nest. Females have a large clutch size (maximum nine) of relatively small eggs (Mount 1963).

Population dynamics

The population dynamics of the blue-tailed mole skink are not well known because the skinks' diminutive size and secretive habits make their study difficult. The best current method available to detect blue-tailed mole skinks involves the raking of sand and organic liter and intensive searching, or the use of pit-fall traps and drift fences. Because these methods are laborious and time-consuming, they are not well suited for use over large areas. Unfortunately, a reliable and easily-applied detection method, such as coverboard surveys used to detect sand skinks, has not been developed. As such, assessing the status of the blue-tailed mole skink over large areas is problematic.

Blue-tailed mole skinks appear to be far less common than sand skinks. A recent survey of seven protected sites conducted in 2004-2005 by Christman (2005) reported a density of 1.3 individuals per acre (0.53 per ha), compared to 56 sand skinks per acre (22.7 per ha), or a ratio of 1 blue-tailed mole skink for every 42 sand skinks collected. Other studies revealed blue-tailed mole skink to sand skink ratios 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). Christman (1992b) suggested only 1 blue-tailed mole skink is encountered for every 20 sand skinks. Blue-tailed mole skinks often seem rare or absent at the same study sites where sand skinks are common (Christman 1988; 1992b; 2005). Even within suitable habitat, blue-tailed mole skinks are patchily distributed (Mushinsky and McCoy 1991). Mount (1963) noted peninsula mole skinks also are patchily distributed and mostly occurred on xeric sites greater than 100 ac (40.5 ha). Early maturity and a large clutch size suggest the population dynamics of mole skinks are different from sand skinks.

Status and distribution

Reason for listing

The historical 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). As stated previously, almost 85 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. 2006b). 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. The 5-year review found no justification for change in the threatened status (Service 2007a).

Rangewide trends

The current rangewide status of the blue-tailed mole skink is not well known. As discussed above, the small size and secretive nature of the species, and the lack of a reliable and easily-applied survey method, makes it difficult to assess the status of the blue-tailed mole skink. Consequently, recent comprehensive, rangewide surveys have not been conducted. At the time of Federal listing, there were 20 locality records for the blue-tailed mole skink according to FNAI database (Griffin 2007). Currently, 43 records 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 this species is more widespread than originally believed. Of the 23 locations examined by Turner et al. (2006a) on which the blue-tailed mole skink occurs, 13 are protected and, as of 2004, 10 were managed. Blue-tailed mole skinks are known to be present on 52.4 percent of the 21,597 ac (8,741 ha) of Florida scrub and high pine that is currently protected (Turner et al. 2006a). However, the extent of suitable habitat that is actually occupied is unknown, as is their population size. It is likely ongoing 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. Unlike sand skinks, their tracks cannot be easily detected in the sand, and most of the extant scrub, including protected sites, on the LWR has not been adequately surveyed for blue-tailed mole skinks.

Blue-tailed mole skinks seem to be underrepresented in the network of protected public lands (Turner et al. 2006a). The protection and recovery of blue-tailed mole skinks will require that habitat loss be limited to disturbed areas, and that suitable unoccupied habitat be restored. 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.

Analysis of the species likely to be affected

The sand skink and the blue-tailed mole skink are fossorial lizards that occur within sandy soils in the xeric upland habitats of the ridges of central Florida. Habitat loss from anthropogenic activities is greatest threat to listed skinks. Turner et al. (2006b) estimated that almost 85 percent of the xeric upland communities on the LWR have already been lost due to residential development and agricultural conversion. Remaining skink habitat on private lands is especially vulnerable, based on projections of future human population growth and the expected concomitant increase in residential and commercial development.

FEMA has determined the proposed Executive Airport Drainage Project "may affect and is likely to adversely affect" the sand skink and the blue-tailed mole skink. The Service concurs with this determination and finds that the project will result in adverse effects to the federally

listed skinks and their habitat. The project's adverse effects to federally listed skinks will be discussed in the remainder of this Biological Opinion. Critical habitat has not been designated for the sand skink or the blue-tailed mole skink; therefore, it will not be affected.

Additional federally listed species may occur within the project area. FEMA has determined the project "may affect, but is not likely to adversely affect" the eastern indigo snake and the Florida scrub-jay. The eastern indigo snake has not been observed on the project site. During construction, the applicant has agreed to follow the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) to minimize adverse effects to this species. In addition, the Service notes suitable habitat for the Florida scrub-jay does not occur on or near the project footprint. Consequently, the Service concurs with FEMA's determination for the eastern indigo snake and Florida scrub-jay, and these species will not be considered further in this Biological Opinion.

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.

Climate change

Climate change is evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level, according to the Intergovernmental Panel on Climate Change (IPCC) Report (2007). The IPCC Report describes natural ecosystem changes with potential wide-spread effects on organisms from marine mammals to migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the Department of the Interior requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007b).

Climate change at the global level drives changes in weather at the regional level, although weather is also strongly affected by season and by local effects (*e.g.*, elevation, topography, latitude, proximity to the ocean). Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing and distribution), storms (frequency and intensity), and sea level rise. However, the exact magnitude, direction and distribution of these changes at the regional level are not well understood or easy to predict. Seasonal change and local geography make prediction of the effects of climate change at any location variable. Current predictive models offer a wide range of predicted changes.

Prior to the 2007 IPCC Report, Titus and Narayanan (1995) modeled the probability of sea level rise based on global warming. They estimated that the increase in global temperatures could likely raise sea level 6 in (15.2 cm) by 2050 and 13 in (33 cm) by 2100. While these estimates are lower than the estimates described in the IPCC Report (2007), Titus and Narayanan's (1995) modeling efforts developed probability-based projections that can be added to local tide-gauge trends to estimate future sea level at specific locations.

Climatic changes in south Florida could exacerbate current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008). Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2007b).

Status of the species within the action area

As stated previously, the action area is defined as all areas to be directly or indirectly affected by the Federal action, and not just the immediate area involved in the action. For the purposes of this consultation, the action area includes all lands within the project footprint (Figure 1).

Surveys performed in accordance with the Service's *Sand and Bluetail Mole Skink Survey Protocol* (Appendix A in Service 2012, available online at: http://www.fws.gov/verobeach/ReptilesPDFs/20120206_Skink%20CCG_Final.pdf) documented the occurrence of sand skinks within 1.07 ac of suitable habitat within the project site. Blue-tailed mole skinks were not observed on the project site. However, a reliable survey method for blue-tailed mole skinks has not been developed. The entire known geographic range of the blue-tailed mole skink occurs within the known geographic range of the sand skink. Therefore, the Service assumes blue-tailed mole skinks are likely to occur wherever sand skinks occur. The loss of skink habitat is expected to be offset by the restoration, enhancement, and preservation of at least 2.14 ac of skink habitat. This habitat will be provided by FEMA through the purchase of 2.14 credits at the Scrub Conservation Bank in Highlands County, Florida.

Factors affecting species environment within the action area

The action area occurs within the known geographic range of the sand skink and blue-tailed mole skink, and includes the entire project footprint. The project will result in the permanent conversion of skink habitat within the project footprint into a detention pond, and the temporary loss of skink habitat in the project footprint during the installation and burial of the pipeline associated with the project. Some suitable habitat for skinks is expected to persist in the action area following completion of the Executive Airport Drainage Project.

EFFECTS OF THE ACTION

This section analyzes the beneficial, direct, and indirect effects of the proposed action and the effects of any interrelated and independent actions on federally listed skinks and their habitat.

Factors to be considered

The project site contains skink habitat and is located within the geographic range of the sand skink and blue-tailed mole skink. The timing of construction for this project, relative to sensitive periods of the skink's life cycle, is unknown. Skinks are currently found within, and adjacent to, the proposed construction footprint. The project will be constructed in a single, disruptive event and alter native vegetation within the project site. The time required to complete construction of the project is not known, but it is likely the majority of the land clearing will be completed within a few months. The disturbance associated with the project will be permanent within a portion of the project site and will result in a loss of habitat currently available to skinks.

Analyses for effects of the action

The applicant's consultants surveyed the project site to determine the status of sand skinks and blue-tailed mole skinks. Pedestrian and coverboard surveys based on the Service's guidance (Service 2012) were conducted in the spring of 2012. Because sand skinks leave a distinctive sinusoidal (s-shaped) track at the soil surface when they move through the soil, these survey methods can be used to detect the tracks of the sand skink. The survey methods employed can be used to estimate the relative abundance of sand skinks on the project site, and the extent of the project site used by skinks. However, the actual number of skinks that currently occur on the site is not known. As indicated above, blue-tailed mole skinks were not observed on the project site. However, the Service assumes blue-tailed mole skinks are likely to occur wherever sand skinks occur.

Results of the surveys suggest that federally listed skinks occur within 1.07 ac of the project site. To compensate for the loss of skinks and skink habitat, the FDOT has proposed to restore, enhance, and preserve at least 2.14 ac of skink habitat. This habitat will be provided through the purchase of 2.14 credits at a Service-approved conservation bank.

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 not result in beneficial effects to the sand skink or the blue-tailed mole skink.

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 sand skink and the blue-tailed mole skink, and a reduction in the geographic distribution of habitat for the sand skink and the blue-tailed mole skink.

The excavation of the 10-ac dry retention pond site and the construction of drainage ditches and a pumping station will result in the permanent loss of potential skink habitat. The installation of the underground pipeline associated with the project, at the very least, will result in the temporary loss of skink habitat. However, the possibility exists that skinks may recolonize and

utilize the portion of the pipeline footprint post-construction. Following the installation of the pipeline, sod is commonly planted within the pipeline corridor to stabilize the soil. The installation of sod may inhibit skink movement below the soil surface and make the pipeline corridor less desirable or unsuitable as skink habitat. Therefore, it is not known if suitable habitat for skinks will remain in the project footprint following completion of the project. The project will result in the direct loss of 1.07 ac of skink habitat. Incidental mortality of skinks due to land clearing and construction activities may also occur. Construction activities within the project site can crush or injure individual skinks and skink eggs, and destroy or degrade occupied and potential habitat and feeding areas. In addition, construction activities may result in disturbance to skinks by causing them to leave the area and possibly miss foraging and mating opportunities. The project will also add to the continued fragmentation of skink habitat in the region and result in a small reduction of the geographic distribution of these species. Therefore, the project is expected to directly affect skink persistence in the action area.

Indirect effects

Indirect effects are those effects that result from the proposed action, are later in time, and are reasonably certain to occur. The project is not expected to result in indirect effects to sand skinks and blue-tailed mole skinks.

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. Interrelated or interdependent actions are not expected to result from the project.

Species response to the proposed action

Federally listed 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 vagile, 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 Executive Airport Drainage Project.

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. Because the action area is defined as the project footprint only, cumulative effects are not expected to occur.

CONCLUSION

As discussed above, the Service finds that the project may directly result in the mortality or injury of federally listed skinks. In addition, the project will also result in the loss of 1.07 ac of habitat currently used by federally listed skinks, and a reduction in the geographic range of these species. After reviewing the current status of the sand skink and the blue-tailed mole skink, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion the project as proposed is not likely to jeopardize the continued existence of the sand skink or the blue-tailed mole skink. Critical habitat has not been designated for this species and will not be affected.

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." "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. "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. 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.

AMOUNT OR EXTENT OF TAKE

The Service anticipates incidental take of sand skinks and blue-tailed mole 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 of 1.07 ac of occupied skink habitat. The Service finds the number of sand skinks and blue-tailed mole 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 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. Blue-tailed mole skinks have not been documented within the project corridor, but are known to occur in habitats occupied by sand skinks. Since a reliable survey technique to detect blue-tailed mole skinks is not currently available, the Service assumes blue-tailed mole skinks are likely to occur wherever sand skinks occur. The Service finds all sand skinks and blue-tailed mole skinks occurring within the 1.07 ac of skink habitat on the project site will be taken incidental to the action. The Service has determined the anticipated take is not likely to result in jeopardy to federally listed skinks. If, during the course of this action, this level of take

is exceeded, such take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

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 sand skink or blue-tailed mole skink. Critical habitat has not been designated for the sand skink or blue-tailed mole skink and 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. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service notes the City of Avon Park has already minimized take of the sand skink and the blue-tailed mole skink by acquiring 2.14 credits from the Scrub Conservation Bank in Highlands County, Florida. As such, these measures will not be discussed further in this section or within the "Terms and Conditions" section of this Biological Opinion.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, FEMA and the City of Avon Park 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. 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; and

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.

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 not proposing any conservation recommendations at this time.

REINITIATION NOTICE

This concludes formal consultation on the Executive Airport Drainage 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. The amount of incidental take authorized by this consultation may be exceeded should impacts from the proposed project increase or mitigation fail to provide habitat values proposed and analyzed within this biological opinion. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation in the effort to protect fish and wildlife resources. If you have any questions regarding this project, please contact John Wrublik at 772-469-4282.

Sincerely yours,

for Victoria A. Josta

Larry Williams
Field Supervisor
South Florida Ecological Services Office

cc: electronic only
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Figure 1. Map showing location of Executive Airport Drainage Project in Highlands County, Florida.

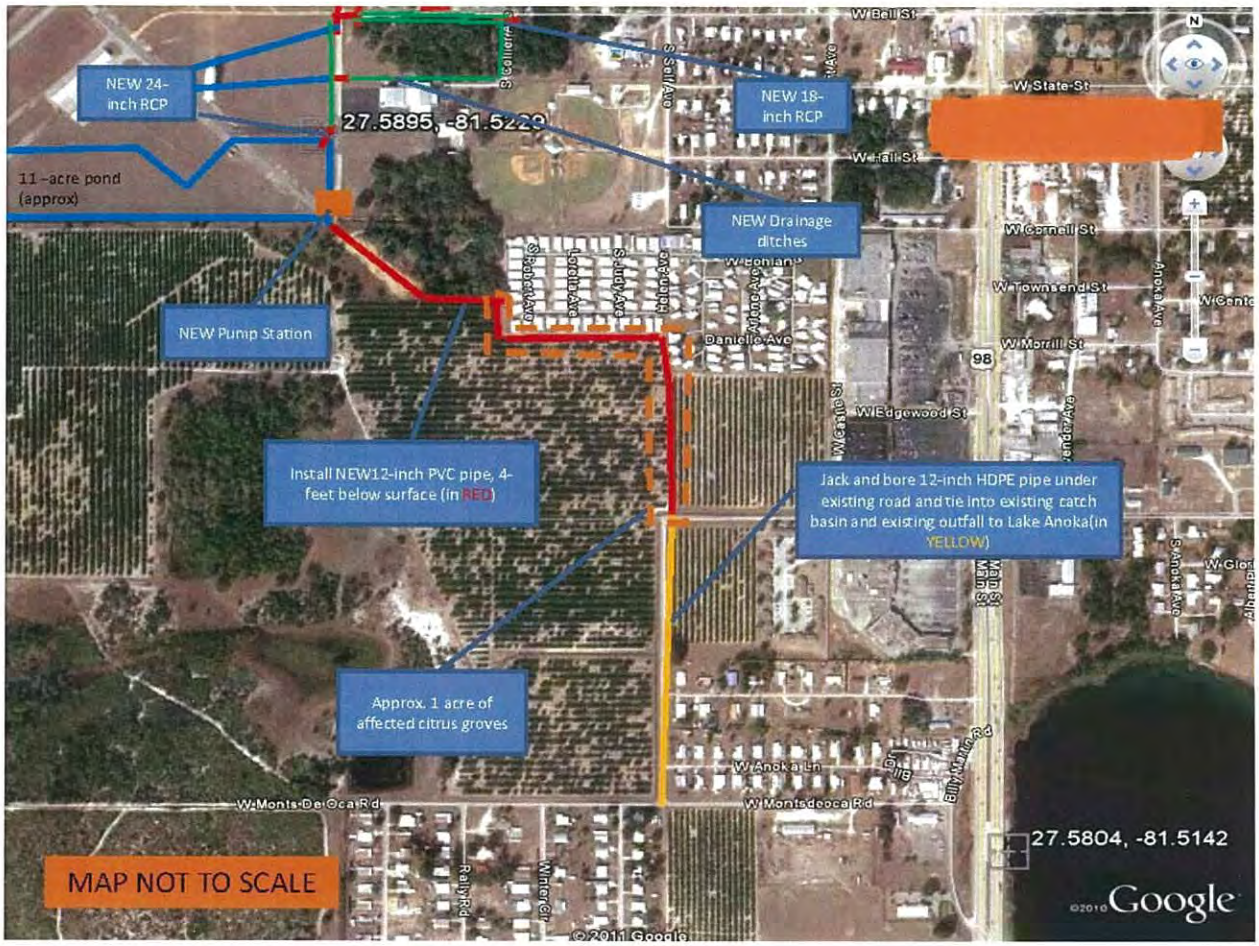

Figure 2. Aerial photograph illustrating Executive Airport Drainage Project features