



United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
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April 24, 2007

Colonel Paul L. Grosskruger
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Federal Activity Code: 41420-2007-FA-1459
Service Consultation Code: 41420-2007-F-0836
Corps Application No.: SAJ-2005-10147 IP-JPF
Application Date: August 26, 2006
Formal Consultation Initiation Date: April 3, 2007
Applicant: Yeager Development Company
Project: Willowbrook Development
County: Polk

Dear Colonel Grosskruger:

This document transmits the Fish and Wildlife Service's (Service) biological opinion for the proposed "Willowbrook Development" project site in Polk County, Florida, and its effects on the threatened bluetail mole skink (*Eumeces egregius lividus*) and the threatened sand skink (*Neoseps reynoldsi*) in accordance with Section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

This biological opinion is based on information provided by the applicant's consultant (Modica and Associates, Incorporated); electronic mail (e-mail) messages; telephone conversations; and other sources of information. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

Consultation History

On December 15, 2004, Modica and Associates, Incorporated submitted a request for site inspection for the Willowbrook project site to the Service. The letter documented the results of pedestrian surveys conducted by the consultant in May 2004.

On January 6, 2005, Service biologists, accompanied by the consultant, conducted a site inspection of the Willowbrook project site.

On January 14, 2005, the consultant transmitted a map to the Service depicting the areas in which sand skink tracks had been observed during pedestrian surveys, and requested guidance from the Service regarding delineation of occupied sand skink habitat.



On January 20, 2005, a Service biologist transmitted a fax to the consultant indicating the occupied habitat that the Service would require if a coverboard survey was not to be conducted.

On May 18, 2006, the consultant submitted for review by the Service a document containing the sand skink survey results and the proposed compensation for the incidental take of sand skinks and bluetail mole skinks within the Willowbrook project site.

On August 28, 2006, the U.S. Army Corps of Engineers (Corps) issued a letter in response to the application for this project. By the same correspondence the Corps requested the Service initiation of section 7 consultation on a “may affect” determination for the threatened sand skink and bluetail mole skink and a “may affect, but not likely to adversely affect” determination for the bald eagle (*Haliaeetus leucocephalus*) and the wood stork (*Mycteria americana*).

On October 18, 2006, the Service issued an initiation of formal consultation letter. By the same correspondence, the Service concurred with the Corps’ determination for the bald eagle and wood stork.

On April 3, 2007, the applicant submitted all the information needed to initiate formal consultation on the impacts of this project on the threatened sand and bluetail mole skinks.

The Service has received all information pertinent to these species and concurs with the Corps determination that the project “may affect,” and is likely to adversely affect the threatened sand skink and bluetail mole skink. As of April 3, 2007, we received all information necessary for initiation of formal consultation on the sand skink and bluetail mole skink for this project as required in the regulations governing interagency consultation (50 CFR 402.14). The Service is providing this biological opinion in conclusion of formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed Action

The Willowbrook project (Project) is a 333-acre Planned Unit Development (PUD) located south of Lucerne Park Road (State Road 544) and north of Buckeye Loop Road, with Lake Fannie on the eastern property boundary and Lake Smart and Willowbrook Golf Course on the western property boundary. The Project lies within the City of Winter Haven, in Sections 10, 11 and 15, Township, 28 South, Range 26 East in Polk County, Florida (Figure 1). The applicant proposes to construct a single-family and multi-family residential development with commercial outparcels and associated infrastructure. The development will provide housing and limited commercial services for the growing population in this area of Polk County.

The 333-acre project site is comprised of approximately 225.32 acres of uplands and 107.68 acres of wetlands. The uplands on the site consist of 119.64 acres of improved pasture, 10.64 acres of

fallow citrus, 86.81 acres of a xeric oak community, and 8.23 acres of a mixed hardwood and conifer community. The wetlands are composed of 86.36 acres of mixed forested wetlands and 21.32 acres of freshwater marshes and wetland scrub communities, each associated with Lakes Smart, Fannie and Buckeye (Figure 2). The project will result in impacts to 2.59 acres of wetlands and surface waters. To compensate for wetland impacts, the applicant proposes to create 7.20-acres of forested wetlands on-site.

The proposed project will impact 8.59 acres of occupied sand skink habitat. To minimize the adverse effects of the action to skinks, the applicant has proposed to purchase and preserve 17.18 acres of occupied skink habitat from the Morgan Lake Wales Preserve in Polk County, Florida (refer to Figure 4). The compensation represents a 2:1 ratio of acres compensated for each acre of occupied habitat impacted. The Morgan Lake Wales Preserve consists of approximately 487 acres of rolling xeric oak habitat on fine sands that is typical of the Lake Wales Ridge, and supports listed species that are endemic to the region, including sand skinks, bluetail mole skinks, and Florida scrub-jays (*Aphelocoma coerulescens*). The site consists primarily of Tavares Fine Sand, and varies in elevation from 55 feet to 100 feet National Geodetic Vertical Datum (NGVD).

The Morgan Lake Wales Preserve is located adjacent to the Arbuckle Tract (10,717 acres) of the Lake Wales Ridge State Forest (LWRSF) to the south, and the Blue Jordan Swamp (1,300 acres) that has just been purchased by the State of Florida directly to the east. These lands are adjacent to the Lake Arbuckle State Park (4,300 acres) and the Avon Park Air Force Range (106,210 acres) located generally to the east and southeast. The Walk-in-the-Water Tract of the LWRSF adds another 5,959 acres of publicly owned land approximately two miles north of the Preserve, and this area is adjoined on the northwest by The Nature Conservancy owned and managed Tiger Creek Preserve that comprises another 4,778 acres of preserved natural areas. Management of these public and private lands is coordinated among the agencies and organizations to meet regional goals for preservation of the endemic oak scrub and wildlife communities that are unique to the Lake Wales Ridge Region (Region). The Morgan Lake Wales Preserve Management Plan (Management Plan) specifically incorporates provisions of established management goals, policies and practices for the adjacent public lands, and it is anticipated that full implementation of this Management Plan will contribute significantly to mutual conservation efforts that are being employed within the Region.

The Region in which the Morgan Lake Wales Preserve is located is known for its unique associations of plant and animal communities, many of which are endemic to the Region. The purpose for establishing the Morgan Lake Wales Preserve is to conserve these on-site communities and habitats and to manage them in perpetuity for sand skinks, bluetail mole skinks, Florida scrub-jays, gopher tortoises (*Gopherus polyphemus*), and other commensal species, including the Florida mouse (*Peromyscus floridanus*), eastern indigo snake (*Drymarchon couperi*), Florida gopher frog (*Rana capito*), and other indigenous wildlife species. The Morgan Lake Wales Preserve has been established and Conservation Rights secured which will be assigned to the Florida Fish and Wildlife Conservation Commission (FWC) on a permit by permit basis, until such time as the entire Preserve has been assigned to the FWC. Such assignment of acreages shall be provided as mitigation to offset the loss of habitat for the sand skink, bluetail

mole skink, Florida scrub-jay, gopher tortoise and its commensals, in accordance with the conditions of individual permits that may be issued by the FWC and/or Biological Opinions issued by the Service as a result of a Section 7 or Section 10 consultation under the Act.

A Management Plan (Plan) has been prepared for the Morgan Lake Wales Preserve. A Conservation Easement (in a form acceptable by FWC) was recorded on July 24, 2006, and a Mitigation Trust Fund Agreement to Demonstrate Perpetual Management Financial Assurance was executed on August 22, 2006 to assure financial support for dedication and management of the Morgan Lake Wales Preserve in perpetuity. The Plan, other required documents, and written concurrence with establishment of the Morgan Lake Wales Preserve were provided by the FWC on May 26, 2006 (Figure 5).

Action Area – Sand Skink and Bluetail Mole Skink

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The project will result in the construction of a residential development and associated commercial amenity. The presence of a residential development and associated commercial amenity may result in a variety of indirect and cumulative effects in the project area. The increase in the local human population resulting from the project will likely stimulate further development in the project area (*e.g.*, road widening and construction of new roadways to accommodate the increase in local traffic; construction of related facilities such as grocery stores, gas stations, etc.); and increase the loss of skink habitat in the project area. Consequently, existing skink habitat in the project area is threatened by development. However, the extent of the project's effects to surrounding lands is difficult to discern. Due to the fragmented configuration and extent of the potentially suitable sand skink habitat present on the "Willowbrook Development" project site, the Service has established a skink action area for this project that includes the proposed impacts to 8.59 acres of occupied skink habitat and the 17.18 acres of skink habitat to be purchased and preserved/managed as part of the Morgan Lake Wales Preserve in Polk County, Florida. The Service believes an action area of this size is sufficiently large to capture the indirect and cumulative effects resulting from the proposed residential development.

Use of Best Scientific and Commercial Information by the Service

The Service will use the most current and up-to-date scientific and commercial information available. The nature of the scientific process dictates that information is constantly changing and improving as new studies are completed. The scientific method is an iterative process that builds on previous information. As the Service becomes aware of new information, we will ensure it is fully considered in our decisions, evaluations, reviews, and analyses as it relates to the base of scientific knowledge and any publications cited in our documents.

South Florida Multi-Species Recovery Plan (MSRP)

The MSRP (Service 1999) was designed to be a living document with the flexibility to accommodate changes identified through ongoing and planned research and be compatible with

adaptive management strategies. These principles are set forth in both the transmittal letter from the Secretary of the Interior and in the document itself. As predicted, this is what indeed occurred in the intervening years since the MSRP was published. The Service uses the MSRP in the context it still presents useful information when taken in conjunction with all the new scientific information developed subsequent to its publication.

Species/Critical Habitat Description

Sand Skink

The sand skink is a small, fossorial lizard that 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, and Polk Putnam Counties (Christman 1988). Principal populations occur on the Lake Wales (LWR) and Winter Haven Ridges (WHR) in Highlands, Lake, and Polk Counties (Christman 1992a; Mushinsky and McCoy 1991; P. Moler, FWC, personal communication 1998). The sand skink is uncommon on the Mount Dora Ridge (MDR), including sites within the Ocala National Forest (Christman 1970, 1992a). 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, four on the WHR and seven on the MDR. 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 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 42662). No critical habitat has been designated for the sand skink.

Recent morphological (Griffith et al. 2000) and molecular studies (Schmitz et al. 2004, Brandley et al. 2005) have demonstrated that the scincid lizard genus *Eumeces*, Weigmann (1834) is paraphyletic and that *Plestiodon*, Dumeril and Bibron (1839) has nomenclatural priority for the American species formally referred to as *Eumeces*, except for those now placed in the genus *Mesoscincus* (Smith 2005). Molecular analysis of ribosomal RNA gene sequences also show that "*Eumeces*" *egregius* and *Neoseps reynoldsi* are closely related sister species (Schmitz et al. 2004, Brandley et al. 2005). Schmitz et al. (2004) suggested that the amount of genetic differentiation between the two species (5 percent) is similar to other species of North American skinks and that *Neoseps*, Stejneger (1910) should be synonymised. They argue that sand skinks are a striking example of morphological adaptation for burrowing, where the rate of morpho-ecological change exceeds phylogenetic change.

The sand skink is believed to have evolved on the central LWR and radiated from there (Branch et al. 2003). Analysis of mitochondrial DNA (mt DNA) indicates that 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 MDR (Branch et al. 2003). Under the conventional molecular clock, the 4.5% divergence in sand skinks between these two ridges would represent about a 2-million-year separation; the absence of haplotype diversity on the MDR would suggest that

this population was founded by only a few individuals or severely reduced by genetic drift of a small population (Branch et al. 2003).

The sand skink 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 sand skink is widespread in native xeric uplands with excessively well-drained soils (Service 2002), principally on the ridges listed above at elevations greater than 25 m above mean sea level. Various authors have attempted to characterize optimal sand skink habitat (Telford 1959, Campbell and Christman 1982, Christman 1978, 1992, Service 1993), but McCoy et al. (1999) have argued these notions are “educated guesswork” (Bergman et al. 1993) with little empirical basis. 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 40 m into scrubby flatwoods or 20 m into pine flatwoods (Sutton 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 used in the literature (Telford 1959, 1962; Christman 1992; Service 1993) to identify good habitat: root-free, grass-free, patchy bare areas, bare areas with lichens, bare areas with litter, scattered scrubs, open canopy and 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 125 individuals/ha to 650/ha (Sutton 1996). However, knowledgeable researchers (“experts”), 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).

Collazos (1998), Hill (1999) and Mushinsky et al. (2001) used grids of pitfall traps and coverboards to quantify the relationship between sand skink density and a suite of environmental variables. These authors 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 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.

The trap-out enclosure surveys of Sutton et al. (1999) and Christman (2005) provide evidence hot fires may negatively affect sand skink densities and the species continues to occupy scrub with a closed canopy and thick humus layer, although at lower densities. Also, recent coverboard surveys conducted by permit applicants have shown sand skinks may occupy both actively managed lands such as citrus groves and pine plantations and old field communities (Service files), particularly if these sites are adjacent to patches of native habitat that can serve as a source population for recolonization.

Bluetail mole skink

The bluetail 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 bluetail 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 bluetail mole skink as threatened under the Act in 1987 (52 FR 42662). No critical habitat has been designated for the bluetail mole skink.

Mount (1965) described *Eumeces egregius lividus* 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) limited the range of bluetail mole skinks to these two counties, but later added Osceola County to the range, based on the collection of a single bluetailed juvenile just north of the Polk County line on the LWR (Christman 1992, FNAI records). Analysis of mitochondrial DNA (Branch et al. 2003) supports Mount's (1965) hypotheses that bluetail mole skinks from the lower LWR represents 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). 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 bluetail 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 1992b; 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 1992b).

A variety of xeric upland communities provide habitat for the bluetail 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, bluetail 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). Bluetail mole skinks tend to be clumped in distribution with variable densities that may approach 25 adults per acre (Christman 1992b). The distribution of bluetail mole skinks appears to be closely linked to the distribution of surface litter and, in turn, suitable microhabitat sites.

Life History

Sand skink

The sand skink is highly adapted for life in the sand. It spends the majority of its time below the surface where it burrows 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 (*Prorethodes* 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 between 28°C-31°C in open sand (Andrews 1994). During the hottest parts of the day, sand skinks move under shrubs to maintain their preferred body temperatures (Andrews 1994) 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 (ABS), but in May at Ocala National Forest. 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. Sand skinks lay two eggs typically in May or early June (Ashton 2005) under logs or debris, approximately 55 days after mating (Telford 1959). The eggs hatch from June through July. 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 can live at least to 10 years of age (Meneken et al. 2005). Most sand skinks move less than 40 m between captures, but some move over 140m 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).

Bluetail mole skink

Bluetail mole skinks are typically found under leaves, logs, palmetto fronds, and other ground debris 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 bluetail mole skink are primarily at the soil surface or at shallow depths to 2 inches (Service 1993), 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 bluetail 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 1978a).

Population Dynamics

The Service has little information on the population dynamics of sand and bluetail mole skinks within their extant ranges. The skinks' diminutive size and secretive habits make their study difficult. As noted above, sand skinks can reach densities of up to 650 individuals/ha (263/ac) in high quality habitat, particularly on the LWR. Delayed maturity (2 years), a small clutch size (2 eggs) of relatively large eggs, low frequency of reproduction and a long lifespan in sand skinks are life-history traits that also characterize a number of other fossorial lizards that occur in high densities (Ashton 2005). Such character traits may reflect high intra-specific competition and/or predation (Ashton 2005). In contrast, bluetail 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, 1992b; Mushinsky and McCoy 1995). Mount (1963) noted peninsula mole skinks also are patchily distributed and mostly occurred on xeric sites greater than 100 ac (40 ha) in size. Early maturity (1 year in laboratory) and a large clutch size (maximum = 9 eggs) of relatively small eggs (Mount 1963) suggest that the population dynamics of mole skinks are different from sand skinks.

Status and Distribution

Sand skink

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 42662). 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 (Florida Department of Natural Resources 1991, Kautz 1993). Xeric uplands remaining on private lands are especially vulnerable to destruction because of increasing residential and agricultural pressures.

Range-wide trends

Except for a few locations where intensive research has been conducted, limited information about the presence or abundance of sand skinks exists. An extensive 1992 survey in Ocala National Forest (ONF) failed to capture any sand skinks despite placement of traps near historical locations and the capture of a number of other fossorial reptiles. Telford (1992) cited the ephemeral nature of early successional scrub habitats due to dynamic successional changes as an important confounding factor in the evaluation of the sand skink's present status in the Ocala National Forest. However, 24 sand skinks were collected later from ONF 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 status or trends of sand skinks at these or other sites.

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. This increase 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 thought. Of the known locations, 50 (38 percent) occur on public lands or private lands placed under conservation easement, and offer habitat protection. It is likely that continued residential and agricultural development of xeric upland habitat in central Florida has destroyed or degraded habitat containing sand skinks. Approximately 60 to 90 percent of xeric upland communities historically used by sand skinks on the LWR are estimated to have been lost due to development (Christman 1988, Christman and Judd 1990, Kautz 1993, Center for Plant Conservation 1995). More recently, Turner et al. (2006) calculated 12.9 percent of this habitat remains.

Protection of the sand skink from further habitat loss and degradation provides the most important means of ensuring its continued existence. Existing protection of occupied skink habitat consists primarily of private preserves such as Archbold Biological Station, Hendry Ranch, Tiger Creek Preserve, and Saddle Blanket Lakes Scrub Preserve, coupled with publicly owned lands such as Lake Arbuckle State Park and State Forest, Lake Louisa State Park, and Highlands Hammock State Park (Service 1993). 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 (Turner et al. 2006).

It is likely a substantial sand skink population is present on existing private and public conservation lands on the LWR. As of 2003, about 21,597 acres (8,740 ha) of Florida scrub and high pine on the LWR have been protected, which represents almost half of the remaining xeric habitat on this ancient ridge, but only 6.3% of its estimated historic extent (Turner et al. 2006). Sand skinks are present on sites that total 87.4% of the currently protected xeric acreage (Turner et al. 2006), but many of the other conserved sites have not been surveyed adequately. Fourteen trap-out enclosures at seven protected sites with a known burn history on the LWR in Polk and Highlands Counties contained a minimum of 85 sand skinks for a mean density of

152 individuals/ha (61/ac) and one enclosure set in dry flatwoods yielded none (Christman 2005). Fourteen of these sites had burned in the last eight years and the one “rosemary bald” that has not burned for 37 years had 275 sand skinks/ha (110/ac). Five similar enclosures set on unburned xeric sites in Orange and Osceola Counties averaged 385 sand skinks/ha (155/ac) (Sutton 1996). K. Ashton (Personal communication, 2006) sampled skinks with pitfall traps on 12 rosemary scrub sites in Highlands County. Sand skinks were significantly less common in recently burned rosemary scrub, with abundance increasing with time since last fire. Fewer bluetail mole skinks were captured by K. Ashton, but the relationship was similar. Meshaka and Lane (2002) found that both species persisted on a sandhill at ABS that remained unburned for 67 years (1927-1994). The relative abundance of sand skinks decreased over time, but bluetail mole skinks did not.

Recovery of the sand skink also may require rehabilitation of suitable but unoccupied habitat or restoration of potentially suitable habitat. Because sand skinks do not readily disperse, 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).

Bluetail Mole Skink

Reason for listing

The historic and anticipated future modification and destruction of xeric upland communities in central Florida were primary considerations in listing the bluetail mole skink as threatened under the Act in 1987 (52 FR 42662). As stated previously, 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 bluetail mole skink. Campbell and Christman (1982) characterized bluetail 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 bluetail mole skinks and other scrub endemics (Myers 1990).

Range-wide trends

At the time of Federal listing, there were 20 locality records for the bluetail 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. 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 bluetail 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). Bluetail 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 currently is 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 1992b). 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 bluetail mole skinks, including protected sites.

A range-wide survey of the bluetail mole skink was conducted in 2004-2005 at the study sites listed above by Christman (2005). Only two bluetail mole skinks were observed in the enclosures (mean density = 3.3/ha, 1.3/ac) relative to at least 85 sand skinks (ratio = 1:41). However, the enclosure sample size was small (total area = 0.6 ha, 0.24 ac). Christman (1992) suggested that only one bluetail mole skink is encountered for every 20 sand skinks. Other range-wide pitfall trap data on the LWR revealed a bluetail 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 bluetail mole skinks increased with sampling effort.

The protection and recovery of bluetail mole skinks will require that habitat loss be stopped and that unoccupied but potentially suitable habitat be restored. The existing protection of the bluetail 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 bluetail mole skink include the Service's Lake Wales Ridge National Wildlife Refuge, and the State of Florida's Conservation and Recreation Lands (CARL) Lake Wales Ridge Ecosystem Project (Service 1993).

Summary

In summary, little information is available to adequately assess the status and population dynamics of the sand and bluetail mole skinks. Both species are endemic to central Florida and are habitat specialists that rely on early successional xeric scrub habitat for their 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). However, the sand skink is relatively widespread in remaining xeric uplands. Furthermore, the implementation of favorable management practices can create and maintain suitable habitat conditions for both sand and bluetail 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 1998, South Florida Water Management District 1998). The Service has also acquired portions of several small tracts totaling 800 acres as a component of the LWR National Wildlife Refuge. Finally, private organizations, such as The Nature Conservancy and Archbold Biological Station have bought and currently manage xeric uplands within the LWR.

ENVIRONMENTAL BASELINE – SAND SKINK AND BLUETAIL MOLE SKINK

Status of the Species Within the Action Area

Approximately 8.59 acres of sand skink occupied habitat has been identified on the Willowbrook Development Project site (Figure 3). Occupied habitat delineated for this site consists primarily of fragmented patches of open sand scattered throughout the improved pasture cover type, which is dominated by bahiagrass. Occupied areas were delineated by the environmental consultant for this project utilizing a Global Positioning System. A site inspection was also conducted with Service biologists to review the delineated habitat areas. The approved habitat delineations are represented on Figure 2.

Factors Affecting the Species' Environment Within the Action Area

Sand skinks and bluetail mole skinks are vulnerable within the action area due to habitat loss resulting from the intense development pressures related to central Florida's burgeoning human population. From 2004 to 2010, Florida's population is expected to increase 12.2 percent from 17.5 million to 19.7 million (an increase of 366,000 people per year, or 1,000 people per day [Clouser and Cothran 2005]). Accordingly, it is extremely likely remaining unprotected skink habitats in the project area will be converted to residential subdivisions, golf courses, and shopping centers.

Remaining skink habitats are also threatened by degradation resulting from fire exclusion and lack of management. Xeric habitats favored by skinks 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. Furthermore, implementing prescribed burns in areas adjacent to residential areas is difficult due to safety concerns and objections of local residents. The Service is unaware of any recent fires within the action area. Xeric habitats lacking periodic fire or management become overgrown and less suitable to skinks. Over time, skinks will diminish in abundance and eventually may be extirpated. All potentially suitable skink habitat on the "Willowbrook Development" portion of the action area is comprised of isolated and fragmented habitat within improved pastures that are not likely to provide viable habitat for federally listed skinks in the long term given existing agricultural activities and local government approvals for future development in this area. The remaining occupied skink habitat in the action area associated with the Morgan Lake Wales Preserve would benefit greatly from burning, roller chopping, or other suitable types of management. Mechanical treatments, such as roller chopping, are not the preferred method for management of skink habitat because the use of heavy equipment could potentially crush and kill skinks, adversely affect suitable skink habitat by depositing vegetative

debris into bare areas, and compact soils over time. However, mechanical management of skink habitat can be employed if the use of fire is not feasible.

EFFECTS OF THE ACTION – SAND SKINK AND BLUETAIL MOLE SKINK

Factors to be considered

This project site contains potentially suitable skink habitat and is located within the geographic range of the sand skink and bluetail 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 the proposed construction footprint. The project will be constructed in phases. The time required to complete construction of the project is not known. The disturbance associated with the project will be permanent and will result in a loss of remnant habitat currently available to the skinks.

Beneficial Effects – Approximately 17.18 acres of occupied skink habitat located on the Morgan Lake Wales Preserve will be preserved and managed in perpetuity as part of the Management Plan developed for this regionally significant mitigation site. The Morgan Lake Wales Preserve consists of approximately 487 acres located on the Lake Wales Ridge. The purpose for establishing the Morgan Lake Wales Preserve is to conserve these on-site communities and habitats and to manage them in perpetuity for sand skinks, bluetail mole skinks, Florida scrub-jays, gopher tortoises, and other commensal species, including the Florida mouse, eastern indigo snake, Florida gopher frog, and other indigenous wildlife species. The Morgan Lake Wales Preserve has been established and Conservation Rights secured which will be assigned to the FWC on a permit by permit basis, until such time as the entire Preserve has been assigned to the FWC. Such assignment of acreages shall be provided as mitigation to offset the development-related loss of habitat for the sand skink, bluetail mole skink, Florida scrub-jay, gopher tortoise and its commensals, in accordance with the conditions of individual permits that may be issued by the FWC and/or Biological Opinions issued by the Service as a result of a Section 7 or Section 10 consultation under the Act.

A Management Plan has been prepared for the Morgan Lake Wales Preserve and approved by the FWC. A Conservation Easement (in a form acceptable by FWC) has been recorded, and a Mitigation Trust Fund Agreement to Demonstrate Perpetual Management Financial Assurance has been executed and accepted by the FWC to assure financial support for dedication and management of the Morgan Lake Wales Preserve in perpetuity. The FWC provided written approval and concurrence with establishment of the Morgan Lake Wales Preserve on May 26, 2006. The placement of occupied habitat under conservation easement and its proposed management is consistent with the Service's Draft Species Guidelines for Endangered Species – Sand Skink and Bluetail Mole Skink (Service 2002). The preserve areas will provide conservation benefits for skinks and promote their long-term persistence.

Direct Effects - Direct effects are those effects caused by the proposed action, at the time of construction, and are reasonably certain to occur. The direct effects this project will have on sand skinks and bluetail mole skinks within the action area are discussed below.

The construction of the project will result in the direct loss of 8.59 acres of occupied skink habitat. Incidental mortality of skinks due to land clearing and construction activities may also occur. Mechanical preparation of the proposed project 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 and/or prescribed fires 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. The Service considers this project, as proposed, to represent a threat of disturbance to skinks. In addition, the project will 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 proposed by The Yeager Development Company is expected to directly affect 8.59 acres of potentially suitable habitat and result in the incidental mortality of sand skinks in the action area.

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 actions include road construction to and from the proposed development. Interdependent actions are not expected to result from the project.

Indirect Effects - Indirect effects are those effects that result from the proposed action, and are reasonably certain to occur. The indirect effects this project will have on skinks within the action area are discussed below.

The construction of the proposed residential development and associated commercial amenity will increase the human population in the action area. The increase in the local human population resulting from the project may stimulate further development in the project area such as, road widening and construction of new roadways to accommodate the increase in local traffic and construction of service related facilities (*e.g.*, grocery stores, gas stations, etc.) on privately owned lands in the project vicinity. Such development would result in the conversion of skink habitat to buildings, parking lots, roadways, and other areas unsuitable as skink habitat. The habitat loss resulting from these projects will continue to fragment habitat in the action area and further reduce the geographic range of the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Anticipated future county actions in the action area that will adversely affect skink habitat include the issuance of county building permits. Permits to construct single-family homes and commercial buildings within the action area are required by Polk County. Many of the

construction projects impacting skink habitat in the action area will require both a county building permit and a Corps permit, and will require consultation under section 7 of the Act.

A small proportion of construction projects requiring county building permits will not impact wetlands and will not require a permit from the Corps. In general, these projects will not have a Federal nexus requiring consultation with the Service under the Act. However, applicants obtaining county building permits are not absolved from the prohibition of take of listed species under the Act. Section 10 of the Act provides a means for permitting the incidental take of listed species associated with non Federal actions such as county building permits. Issuance of an incidental take permit under Section 10 of the Act requires the applicant to prepare a Habitat Conservation Plan (HCP), acceptable to the Service, describing how impacts to the species will be minimized and compensated for to the greatest extent practicable. An acceptable HCP for a non Federal action affecting federally listed skinks would generally require conservation measures that include the enhancement, restoration, or preservation of skink habitat. We note that Polk County has been working with the Service to inform us of development projects occurring within the county that may not have a federal nexus. We further understand that Polk County is making an effort to inform potential applicants for county permits of their obligations under the Act. The Service has considered cumulative effects within the action area for the sand skink and bluetail mole skink, and based on the above discussion, we have not identified any additional cumulative effects beyond those already discussed in the Environmental Baseline.

CONCLUSION

After reviewing the current status of the sand skink and the bluetail 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 that the project as proposed, is not likely to jeopardize the continued existence of the sand skink or bluetail mole skink. Critical habitat for the sand skink and bluetail mole skink has not been designated. Therefore, critical habitat will not be affected.

Construction of the project will result in the permanent loss of 8.59 acres of sand skink and bluetail mole skink occupied habitat. However, the loss of this habitat is offset by purchase of appropriate off-site mitigation from the Morgan Lake Wales Preserve and is not expected to appreciably affect the overall survival and recovery of the sand skink or bluetail mole skink.

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 such taking is in compliance with the terms and conditions of this incidental take statement.

The terms and conditions described below are nondiscretionary and must be undertaken by the Corps so they become binding conditions of any grant or permit issued to The Yeager Development Company, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require The Yeager Development Company, to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or The Yeager Development Company, must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

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, and based on our review; incidental take is anticipated for 8.59 acres of skink-occupied habitat due to the construction of a new residential development. The Service anticipates incidental take of sand skinks and bluetail mole skinks will be difficult to detect and quantify for the following reasons: skink density varies considerably within and between apparently suitable habitat patches; density dependent mechanisms are currently unknown and may be due to territorial requirements, micro habitats, and other unknown environmental influences; individuals have a small body size and spend the majority of their time underground; and finding a dead or impaired specimen is unlikely. Bluetail mole skinks have not been located onsite; however, this species is usually found in habitats occupied by sand skinks within the Lake Wales Ridge, and a reliable survey technique to detect bluetail mole skinks is not currently available. However, incidental take of sand skinks and bluetail mole skinks can be anticipated within the 8.59 acres of occupied skink habitat located in the project footprint due to land clearing and construction activities associated with the project. Therefore, the Service believes all individuals occurring within this 5.59 acre portion of the project footprint will be incidentally taken. The incidental take is expected to be in the form of harm, injury, or death due to construction activities and/or habitat loss, or disturbance.

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the species. 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.

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 believes the following reasonable and prudent measures are necessary and appropriate to reduce take and to minimize the direct and indirect effects of the proposed project on the sand skink and bluetail mole skink:

1. Notify the Service of any unauthorized take of sand skinks or bluetail mole skinks.
2. Minimize adverse effects of habitat loss and fragmentation to sand skinks and bluetail mole skinks by implementing an appropriate habitat management plan.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures:

1. As a condition of the permit for the project, the Corps will require the applicant to purchase 17.18 acres of sand skink and bluetail mole skink occupied habitat located within the Morgan Lake Wales Preserve (Figure 4) for enhancement, management and preservation in perpetuity.
2. As a condition of the permit, the Corps will require management of the 17.18 acres of sand skink and bluetail mole skink preserves in perpetuity. The management will consist of prescribed burns and mechanical management. The long-term management responsibility for the 17.18 acres of preserved occupied skink habitat will be in accordance with documents pertaining to establishment and management of the Morgan Lake Wales Preserve as referenced in the Proposed Action.
3. As a condition of the permit, the Corps will require the applicant to provide a copy of the recorded Mitigation Trust Fund Agreement to assure financial support for dedication and management of the Morgan Lake Wales Preserve in perpetuity. Signed copies of these documents shall be provided to the Service within 30 days of issuance of the permit.
4. As a condition of the permit, 17.18 acres of preserved skink habitat within the Morgan Lake Wales Preserve, with Conservation Rights for those acres, will be assigned to the FWC within 60 days of issuance of the permit.

5. As a condition of the permit, a detailed monitoring report for all preserve sites will be provided to the Service every five years. The monitoring report will include a discussion of the effectiveness of each management treatment (fire and/or mechanical), unit response to treatment, and responses of skinks to changing habitat conditions.
6. Upon locating a dead sand skink or bluetail mole skink specimen, initial notification must be made to the nearest Service Law Enforcement Office (Mr. Edward Lewis; Fish and Wildlife Service; 1- (239) 561-8148. Secondary notification should be made to the FWC; South Region, 3900 Drane Field Road; Lakeland, Florida, 33811-1299; 1-800-282-8002. Care must be taken in handling any dead specimens of proposed or listed species found in the project area to preserve the specimen or its remains in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the Act. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure the terms and conditions are appropriate and effective.

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 Act listed species or critical habitat, to help implement recovery plans, or to develop information.

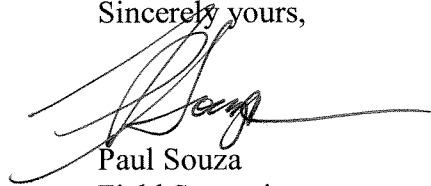
- Place any additional sand skink habitat on the Project Site, not needed for construction of the project, under conservation easement.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the Willowbrook Development project. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect Act listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the Act listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat is 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 reinitiation.

Thank you for your cooperation and effort in protecting fish and wildlife resources. If you have any questions regarding this project, please contact Al Begazo at 772-562-3909, extension 234.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Paul Souza', with a long horizontal flourish extending to the right.

Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc:

Corps, Tampa, Florida (John Fellows)

District, Orlando, Florida

FWC, Vero Beach, Florida

Service, Atlanta, Georgia (Noreen Walsh) electronic copy only

Service, Vero Beach, Florida (Marilyn Knight) electronic copy only

LITERATURE CITED

- Andrews R.M. 1994. Activity and thermal biology of the sand-swimming skink *Neoseps reynoldsi*: Diel and seasonal patterns. *Copeia* 1: 91-99.
- Ashton, K.G. 2005. Life history of a fossorial lizard, *Neoseps reynoldsi*. *Journal of Herpetology* 39(3): 389-395.
- Ashton, K.G. and S.R. Telford, Jr. 2006. Monthly and daily activity of a fossorial lizard, *Neoseps reynoldsi*. *Southeastern Naturalist* 5(1): 175-183.
- Branch, L.C., A.M. Clark, P.E. Moler, and B.W. Bowen. 2003. Fragmented landscapes, habitat specificity, and conservation genetics of three lizards in Florida scrub. *Conservation Genetics* 4: 199-212.
- Brandley, M.C., A. Schmitz, and T.W. Reeder. 2005. Partitioned Bayesian analysis, partition choice and phylogenetic relationships of scincid lizards. *Systemic Biology* 54(3):373-390.
- Burgman, M.A., S. Ferson, and H.R. Akcakaya. 1993. Risk assessment in conservation biology. Chapman and Hall. London.
- Campbell, H.W. and S.P. Christman. 1982. The herpetological components of Florida sandhill and sand pine scrub associations. Pp. 163-171 In: N.J. Scott, ed. *Herpetological communities: A symposium of the Society for the Study of Amphibians and Reptiles and the Herpetologist's League, August, 1977*. U.S. Fish and Wildlife Service, Wildlife Research Report No. 13.
- Center for Plant Conservation. 1995. An action plan to conserve the native plants of Florida. Missouri Botanical Garden; St. Louis, Missouri.
- Christman, S.P. 1970. The possible evolutionary history of two Florida skinks. *Quarterly Journal of the Florida Academy of Science* 33(4): 291-293.
- Christman, S.P. 1978a. Threatened: sand skink, *Neoseps reynoldsi* (Stejneger). Pages 40-41 in R.W. McDiarmid, ed. *Rare and endangered biota of Florida. Volume 3: amphibians and reptiles*. University Press of Florida; Gainesville, Florida.
- Christman, S.P. 1978b. Threatened: bluetailed mole skink, *Eumeces egregius lividus* (Mount). Pages 38-40 in R.W. McDiarmid, ed. *Rare and endangered biota of Florida. Volume 3: amphibians and reptiles*. University Press of Florida; Gainesville, Florida.
- Christman, S.P. 1988. Endemism and Florida's interior sand pine scrub. Final project report no. GFC-84-010, Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

- Christman, S.P. 1992a. Threatened: sand skink, *Neoseps reynoldsi* (Stejneger). Pages 135-140 in P.E. Moler, ed. Rare and endangered biota of Florida. University Press of Florida; Gainesville, Florida.
- Christman, S.P. 1992b. Threatened: bluetailed mole skink, *Eumeces egregius lividus* (Mount). Pages 117-122 in P.E. Moler, ed. Rare and endangered biota of Florida. University Press of Florida; Gainesville, Florida.
- Christman, S.P. 2005. Densities of *Neoseps reynoldsi* on the Lake Wales Ridge. Final Report, Part 1. Cooperative Agreement No. 401813J035 between U.S. Dept. of Interior, Fish and Wildlife Service and Steven P. Christman, Ph.D.
- Christman, S.R. and W.S. Judd. 1990. Notes on plants endemic to Florida scrub. Florida Scientist 53(1): 52-73.
- Collazos, A. 1998. Microhabitat selection in *Neoseps reynoldsi*: The Florida sand swimming skink. Master's Thesis. University of South Florida, Tampa.
- Cooper, B.W. 1965. Notes on the life history of the lizard, *Neoseps reynoldsi* Stejneger. Journal of the Florida Academy of Sciences. Pp. 235-238.
- Greer, A.E. 2002. The loss of the external ear opening in scincid lizards. Journal of Herpetology 36(4): 544-555.
- Griffith, H., A. Ngo, and R.W. Murphy. 2000. A cladistic evaluation of the cosmopolitan genus *Eumeces* Weigmann (Reptila, Squamata, Scincidae). Russian Journal of Herpetology 7(1): 1-16.
- Hill, K. 1999. Responses of released populations of the sand skink, *Neoseps reynoldsi*, to scrub habitat translocation in Central Florida. Master's Thesis. University of South Florida, Tampa.
- Florida Department of Environmental Protection. 1998. Conservation and Recreation Lands 1998 annual report. Tallahassee, Florida.
- Florida Department of Natural Resources. 1991. Annual report of the Conservation and Recreation Lands Program. Tallahassee, Florida.
- Kautz, R.S. 1993. Trends in Florida wildlife habitat 1936-1987. Florida Scientist 56(1): 7-24.
- Meneken, B.M., A.C.S. Knipps, J.N. Layne, and K.G. Ashton. 2005. *Neoseps reynoldsi*. Longevity. Herpetological Review 36: 180-181.
- Meshaka Jr., W.E., and J.N. Layne. 2002. Herpetofauna of a long unburned sandhill in south-central Florida. Florida Scientist 65(1): 35-50.

- Moler, P.E. 1998. Comments on draft species account. January 9.
- Mount, R.H. 1963. The natural history of the red-tailed skink, *Eumeces egregius* (Baird). *American Midland Naturalist* 70: 356-385.
- Mount, R.H. 1965. Variation and systemics of the scincoid lizard, *Eumeces egregius*(Baird) *Bulletin of the Florida State Museum. University of Florida; Gainesville, Florida.* Vol. 9(5): 183-213.
- Mushinky, H.R. and E.D. McCoy. 1999. Studies of the sand skink (*Neoseps reynoldsi*) in Central Florida. Final Report, prepared for: Walt Disney Imagineering, Kissimmee, Florida.
- Mushinsky, H.R. and E.D. McCoy. 1991. Vertebrate species compositions of selected scrub islands on the Lake Wales Ridge of central Florida. Final report no. GFC-87-149. Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program; Tallahassee, Florida.
- Mushinsky, H.R. and E.D. McCoy. 1995. Vertebrate species compositions of selected scrub islands on the Lake Wales Ridge of Central Florida. Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program; Tallahassee, Florida.
- Mushinsky, H.R., E.D. McCoy, K. Gianopulos, K. Penney, and C. Meyer. 2001. Biology of the threatened sand skink of restored scrub habitat and their responses to land management practices. Final report to the Disney Wildlife Conservation Fund.
- Myers, R.L. 1990. Scrub and high pine. Pages 150-193 *in* R.L. Myers and J.J. Ewel, eds. *Ecosystems of Florida.* University Presses of Florida; Gainesville, Florida.
- Myers, C.W. and S.R. Telford, Jr. 1965. Food of *Neoseps*, the Florida sand skink. *Quarterly Journal of the Florida Academy of Science.* 28: 190-194.
- Reid, D.T., K.G. Ashton, and K.R. Zamudio. 2004. Characterization of microsatellite markers in the threatened sand skink (*Neoseps reynoldsi*). *Molecular Ecology Notes* 4: 691-693.
- Schmitz, A., P. Mausfeld, and D. Embert. 2004. Molecular studies on the genus *Eumeces* Weigmann, 1834: Phylogenetic relationships and taxonomic implications. *Hamadryad* 28(1 & 2): 73-89.
- Smith, C.R. 1982. Food resource partitioning of fossorial Florida reptiles. Pages 173-178 *in* N.J. Scott, ed. *Herpetological communities: A symposium of the Society for the Study of Amphibians and Reptiles and the Herpetologist's League, August, 1977.* U.S. Fish and Wildlife Service, Wildlife Research Report No. 13.

- Smith, H.M. 2005. Plestiodon: A replacement name for most members of the genus Eumeces in North America. *Journal of Kansas Herpetology* 14: 15-16.
- South Florida Water Management District. 1998. Save Our Rivers 1998 land acquisition and management plan. West Palm Beach, Florida.
- Stout, I.J. and D.T. Corey. 1995. Effects of patch-corridor configurations on nongame birds, mammals, and herptiles in longleaf pine-turkey oak sandhill communities. Nongame Project Report No. RFP-86-003, Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.
- Sutton, P.E. 1996. A mark and recapture study of the Florida Sand skink *Neoseps reynoldsi* and a comparison of sand skink sampling methods. Master's thesis, University of South Florida; Tampa, Florida.
- Sutton, P.E., H.R. Mushinsky, and E.D. McCoy. 1999. Comparing the use of pitfall drift fences and cover boards for sampling the threatened sand skink (*Neoseps reynoldsi*). *Herpetological Review* 30(3): 149-151.
- Telford, S.R., Jr. 1959. A study of the sand skink, *Neoseps reynoldsi*. *Copeia* 1959 (2):100-119.
- Telford, S.R. 1962. New locality records for the sand skink, *Neoseps reynoldsi* Stejneger. *Copeia* 1959: 110-119.
- Telford, S.R., Jr. 1992. Factors affecting the distribution of *Neoseps reynoldsi*, the sand skink, in Ocala National Forest. Report to U.S. Department of Agriculture, Forest Service; Atlanta, Georgia.
- Telford, S.R., Jr. 1996. Multi-Species recovery team meeting. February 28, 1996. U.S. Fish and Wildlife Service. 1992. Draft environmental assessment and land protection plan: Proposed establishment of Lake Wales Ridge National Wildlife Refuge. Department of the Interior, U.S. Fish and Wildlife Service; Atlanta, Georgia.
- Turner W.R., D.S. Wilcove, and H.M. Swain. 2006. State of the Scrub: Conservation progress, management responsibilities, and land acquisition priorities for imperiled species of Florida's Lake Wales Ridge. Archbold Biological Station.
- U.S. Fish and Wildlife Service. 1993. Final environmental assessment and land protection plan: Proposed establishment of Lake Wales Ridge National Wildlife Refuge. Department of the Interior, U.S. Fish and Wildlife Service; Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 1993. Recovery plan for the sand skink and the bluetailed mole skink. Atlanta, Georgia.

- U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 2002. Draft Species Guidelines for Endangered Species – Sand Skink and Bluetail Mole Skink. Fish and Wildlife, South Florida Ecological Services Office; Vero Beach, Florida.
- Webb, S.D. 1990. Historical biogeography. Pages 70-102 *in* Meyers, R.L. and J.J. Ewel, eds. Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

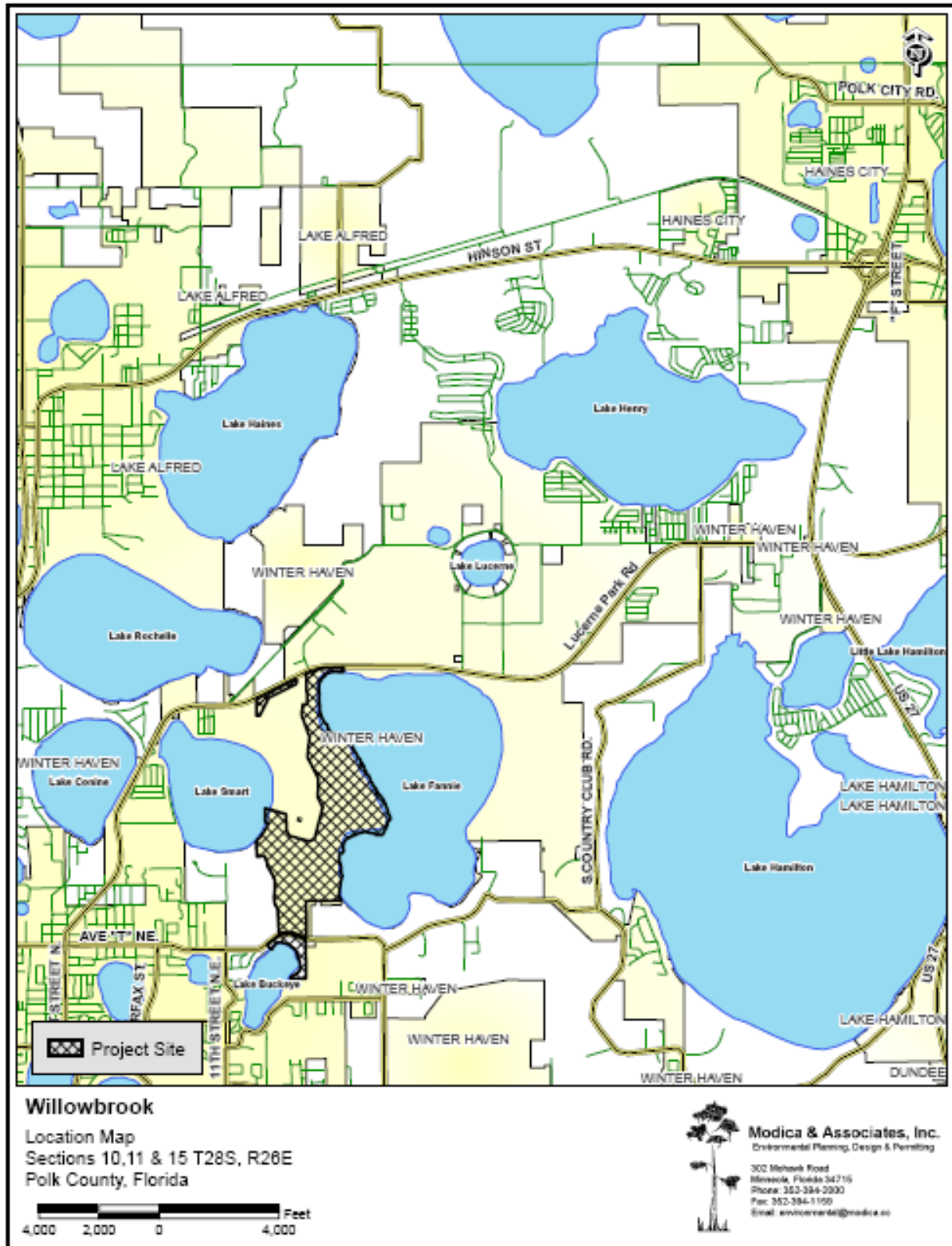


Figure 1. Map showing the location of the Willowbrook Development project site.

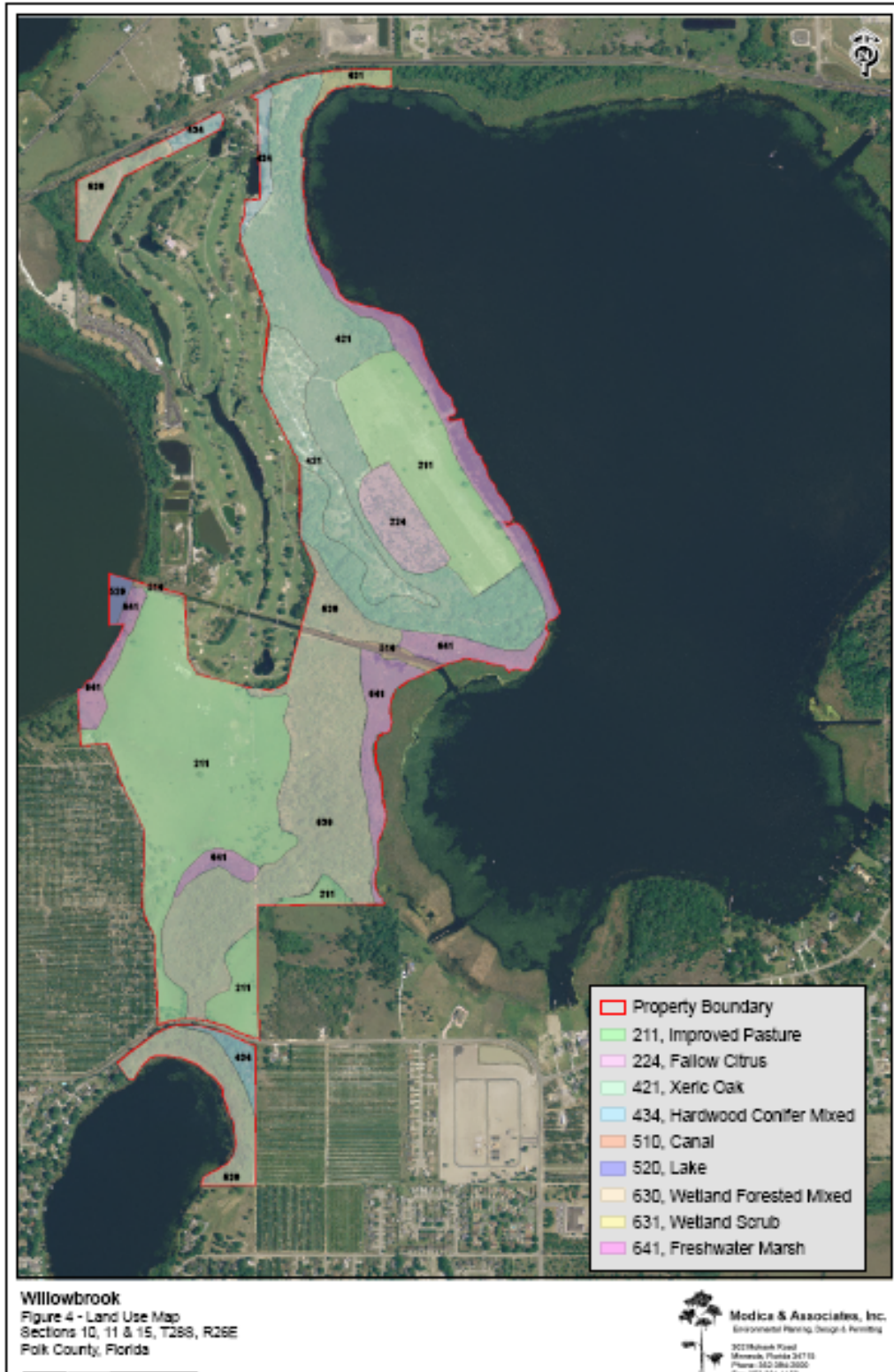


Figure 2. Map showing the habitat composition on the project parcel.



Figure 3. Map showing the skink occupied habitat and the location of the bald eagle nest.

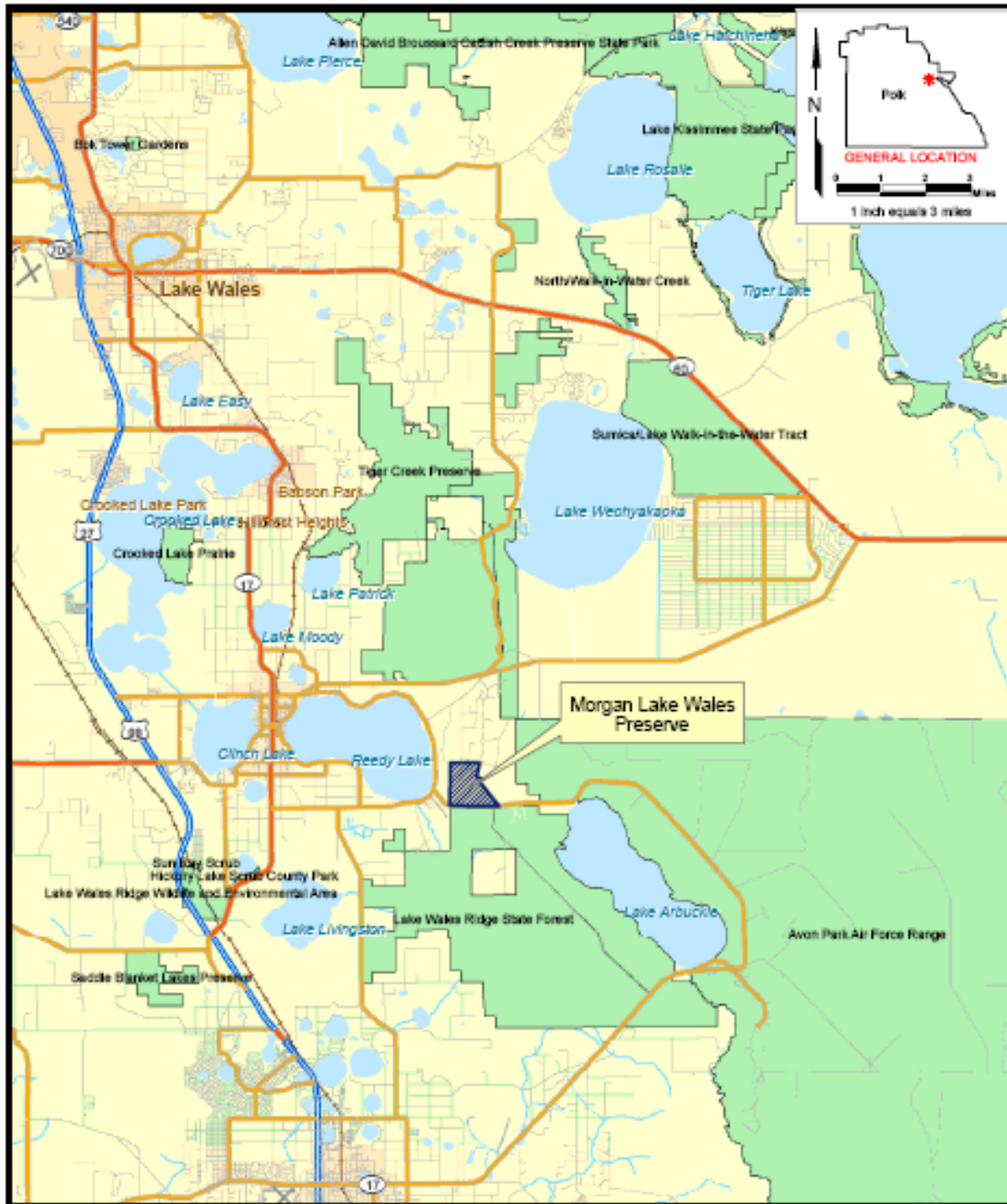


Figure 4. Map showing the location of the Lake Wales Preserve in Polk County.

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION



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May 26, 2006

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BDA

Mr. Tom H. Logan, Vice-President
Breedlove, Dennis & Associates
320 W. Canton Avenue
Winter Park, FL 32789

Dear Mr. Logan:

Florida Fish and Wildlife Conservation Commission (FWC) staff have reviewed Mr. Mike Dennis' January 24, 2006 letter describing the establishment of the Morgan Lake Wales Preserve (Preserve) for the management and conservation of certain species and its intended use as mitigation for impacts to those species. We concur that the letter accurately sets forth our understanding regarding the establishment and use of the Preserve, provided the following:

- 1) The Preserve is managed as specified in the document entitled "Morgan Lake Wales Preserve Management Plan," dated April 14, 2006.
- 2) The first permit application requesting use of a portion of the Preserve as off-site mitigation includes an acceptable conservation easement conveying appropriate rights for specific acreages from the owner or current easement holder to the FWC. This conservation easement must be amendable so that appropriate rights to additional acreage of the Preserve can be conveyed to the FWC as conditions of future permits using the Preserve as off-site mitigation.
- 3) The first permit application requesting use of a portion of the Preserve as off-site mitigation includes an acceptable funding assurance document establishing a trust fund to ensure funding for management of the Preserve is available should it be needed in the unlikely scenario where the owner or CHM, LLC does not manage the Preserve as they are obligated to do so.

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Figure 5. Written concurrence with FWC for the establishment of the Morgan Lake Wales Preserve.

Mr. Tom H. Logan
May 26, 2006
Page 2

We look forward to working with you and the Morgan family to ensure that the Preserve remains a valuable part of our efforts to manage and conserve Florida's wildlife.

Sincerely,



Elsa M. Haubold, Ph.D.
Leader
Species Conservation Planning Section

EMH/BJG/bg

cc: Thomas Eason
Michael Yaun
Dan Sullivan
Angela Williams

HSC\SCP\Morgan Lake Wales Preserve concurrence.doc

Figure 5. Written concurrence with FWC for the establishment of the Morgan Lake Wales Preserve.