



*Sand Skink and Blue-tailed Mole Skink
Biology and Survey Protocol*



U.S. Fish and Wildlife Service

Kissimmee, Florida

February 23, 2011



U.S. Fish and Wildlife Service

About the species

Sand skink
(*Neoseps reynoldsi*)



Blue-tailed mole skink
(*Eumeces egregius lividus*)



U.S. Fish and Wildlife Service

About the species







U.S. Fish and Wildlife Service

Species threats

Major Threats

- **Habitat loss, fragmentation, & changes in land use**
- **Improper habitat management**
- **Competition from non-native & invasive plant species**
- **Loss of genetic diversity**



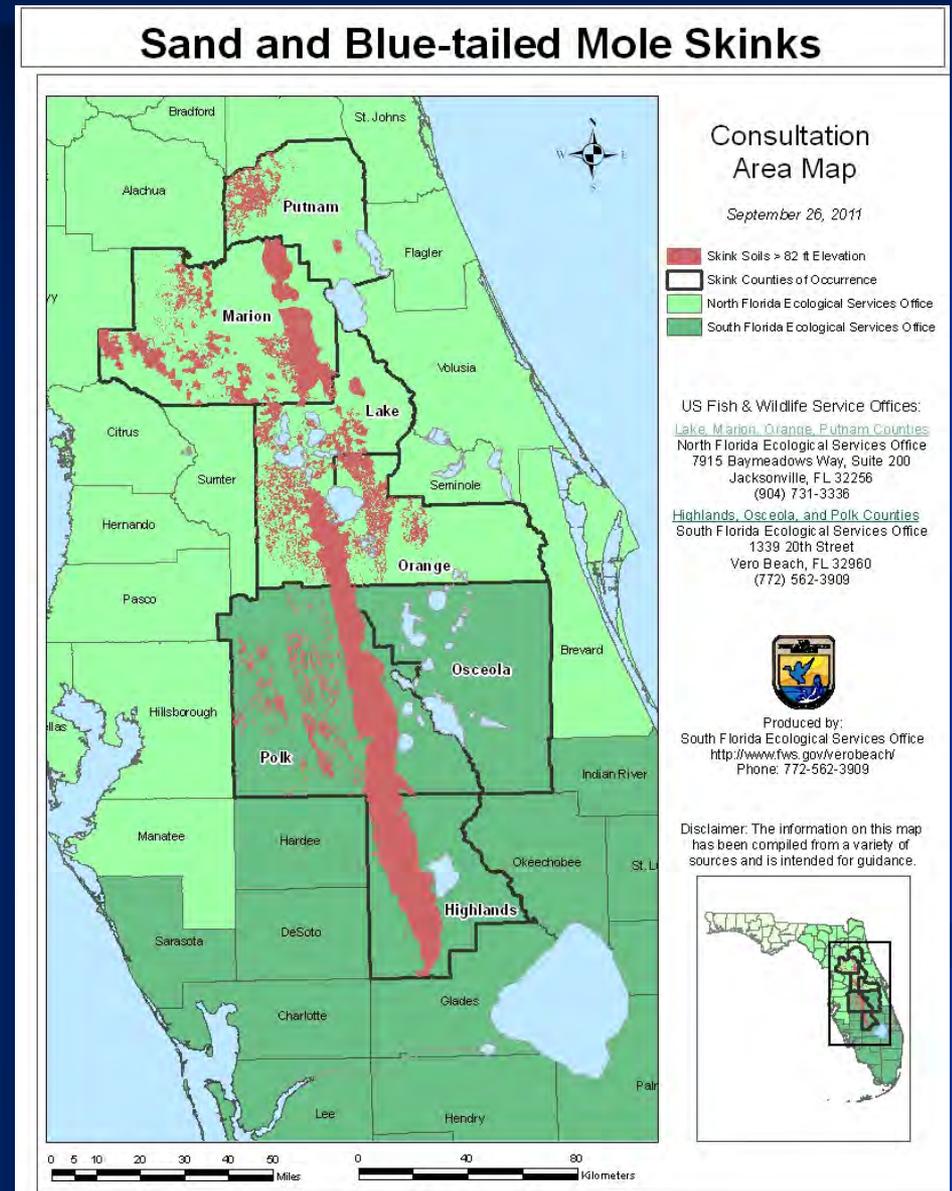


U.S. Fish and Wildlife Service

Where they occur

	Sand skink	Blue-tailed mole skink
Putnam	✓	
Marion	✓	
Lake	✓	
Orange	✓	
Osceola	✓	✓
Polk	✓	✓
Highlands	✓	✓

- Primarily ≥ 82 feet along the FL central ridges (although some records to 70 ft.)
- Excessively drained, well-drained, moderately well-drained sandy soils
- 20 specific soil types





U.S. Fish and Wildlife Service

Habitat



Communities Typically Supported By Suitable Soils



- **Xeric uplands with open canopies, scattered shrubby vegetation, patches of bare sand, appropriate soil moisture**
- **Natural communities: scrub, sandhill, xeric hammock**
- **Altered or degraded communities: overgrown scrub, pine plantation, citrus grove, old field, pasture**





U.S. Fish and Wildlife Service

Habitat- Scrub



Photo by Steve Christman



U.S. Fish and Wildlife Service

Habitat- Rosemary Scrub



Photo by Reed Bowman



U.S. Fish and Wildlife Service

Habitat- Turkey Oak



Photo by Steve Christman



U.S. Fish and Wildlife Service

Habitat- Scrubby Flatwoods



Photo by Steve Christman



U.S. Fish and Wildlife Service

Habitat- Sandhill





U.S. Fish and Wildlife Service

Species Diet





U.S. Fish and Wildlife Service

Activity Patterns



Sand skinks can remain active throughout the year, but peak activity periods occur in spring (March-May) with a smaller peak during fall (October-November):

- **Spring (March-May):** Corresponds with breeding season when individuals are moving more in search of mates
- **Fall (October-November):** Corresponds to increase in numbers of individuals due to emergence of hatchlings



U.S. Fish and Wildlife Service

New scientific data

Sand Skink Dispersal

Penney thesis (May 2001): Reported one sand skink moved 240 meters (780 feet)

2011 USF study (3-4 yrs of data) in scrubby flatwoods

- **55 of 101 skinks moved**
- **Mean distance moved= 550 m (1,800 ft)**
- **Longest distance moved= 8 km (~ 5 miles)**



Where suitable soils are contiguous and no barriers to movement (lakes, pavement, etc.)



U.S. Fish and Wildlife Service

New scientific data

Sand Skink Genetic Information

Schrey et al. 2011, published in Molecular Ecology

- **Significant spatial component to genetic differences**
- **Genetic differentiation positively correlated with geographic distance in long unburned units**
- **Individuals rarely disperse > 1-2 km (0.6-1.2 miles)**
- **Corroborates mark-recapture data**



Incorporating the Science into a Revised Skink Survey Protocol

Sand and Bluetail Mole Skinks

Survey Protocol South Florida

Two types of surveys are recommended for determining if skinks are present. The pedestrian survey, which is the least labor intensive protocol, is a meandering walking survey through suitable habitat and can determine presence, but not absence of skinks. The coverboard survey is more labor intensive, season specific, and required to support a final determination that skinks are presumed absent.

Pedestrian Survey

A pedestrian survey can be conducted year-round and is used to determine the presence of skinks. This survey should be conducted throughout all suitable skink habitats, focusing on bare sand patches within the survey area. Sand skinks leave distinctive "S" shaped tracks in bare sand (Fig. 1) that can be detected under appropriate environmental conditions (dry and windless). As such they are used as indicators of skink presence as they overlap in distribution with the bluetail mole skink and have the same conservation measures. Surveys should be avoided during periods when tracks are not likely to be observed, including after rainfall (tracks may wash out), when the soil is moist (tracks not left), or during excessively windy conditions (tracks obliterated). If uncertain whether tracks are made by skinks photodocument the tracks and provide in the survey report.

If the results of pedestrian surveys successfully detect skink tracks on any portion of the property, presence of skinks is confirmed. If the survey does not locate skink tracks a more intensive coverboard survey must be undertaken to reach a presumed absence conclusion.

Coverboard Survey

A coverboard survey can be used to detect the presence of skinks. Coverboards should be placed within suitable habitat at a minimum density of 100 coverboards per hectare (40 per acre). Coverboards should be placed in areas of bare sand or sparse vegetation adjacent to leaf litter or other detritus, ensuring full contact of the coverboard with the soil surface. Carefully rake or grade the soil to ensure full contact of the coverboard with the soil surface. Placement of soil from surrounding areas may be necessary under some coverboards where stems or roots preclude full contact of the coverboard with the soil surface. If insulation board is used as the coverboards, a shovel full of sand may need to be placed on top to prevent movement due to wind. The xeric scrub habitat where skinks are found is also home to many rare, federally listed plants. While setting up coverboard surveys, minimize impacts to the plant community. Record the geographic coordinates of all coverboard locations.

Coverboards should be 61 cm by 61 cm (2 ft by 2 ft) in dimension and may be constructed of 1.2 cm (0.5 in) or greater thickness plywood, masonite, rigid insulation board (without metallic sheathing), or other rigid material of the same dimensions.

June 17, 2004

Skink Survey Protocol October 17, 2011

The U.S. Fish and Wildlife Service (Service) provides this revised skink survey protocol for all counties in Florida in which the sand skink (*Neoseps roynoldsi*) and blue-tailed (bluetail) mole skink (*Eumeces egregius lividus*) occur based on the 5-year status review of the two species (Service 2007) and our assessment of skink surveys to date. The purpose of this recommended survey protocol is to standardize survey and data collection procedures among project proponents to ensure consistent and comparable information that may improve our knowledge of the species' occurrence and habitat use over space and time. The current guidance will be updated as new information becomes available.

The three most important factors in determining the presence of skinks are location, elevation, and suitable soils. Sand skinks occur on sandy ridges of interior central Florida. The extant range of the sand skink includes Highlands, Lake, Marion, Orange, Osceola, Polk, and Putnam Counties (Christman 1988; Telford 1998). Principal populations occur on the Lake Wales Ridge, Winter Haven Ridge, and Mount Dora Ridge (Christman 1970; Christman 1992; Mushinsky and McCoy 1995). Blue-tailed mole skinks are only known to occur on the Lake Wales Ridge in Highlands, Osceola, and Polk Counties (Mount 1965; Christman 1978). Both skink species are found in this geographic area typically at elevations 82 feet (ft) (25 meters [m]) above sea level or higher (Florida Natural Areas Inventory 2007). A reference map depicting the consultation area can be found along with this protocol on our webpage (www.fws.gov/verobeach). Sand skinks are more numerous, broadly distributed, and easily detected than blue-tailed mole skinks. As such, sand skinks will be used as a proxy for both species in the counties in which they co-occur (See Skink Conservation Guidance for additional information).

Within appropriate geographic area and elevation, skinks are found in excessively drained, well-drained, and moderately well-drained sandy soils. Suitable soil types include: Apopka, Arredondo, Archbold, Astatula, Candler, Daytona, Duette, Florahome, Gainesville, Hague, Kendrick, Lake, Millhopper, Orsino, Paola, Pomello, Satellite, St. Lucie, Tavares, and Zuber. These soil types typically support scrub, sandhill, or xeric hammock natural communities, although they may be degraded by human impacts to overgrown scrub, pine plantation, citrus grove, old field, or pasture. Skinks have been found in all these degraded conditions where soil types are suitable regardless of vegetative cover (Pike et al. 2008a). Thus, habitat condition is not important in determining whether a site is occupied by skinks. If a site has suitable soils at the appropriate elevation within the counties where skinks are known to occur, there is a likelihood of presence, and potential effects to skinks should be considered.

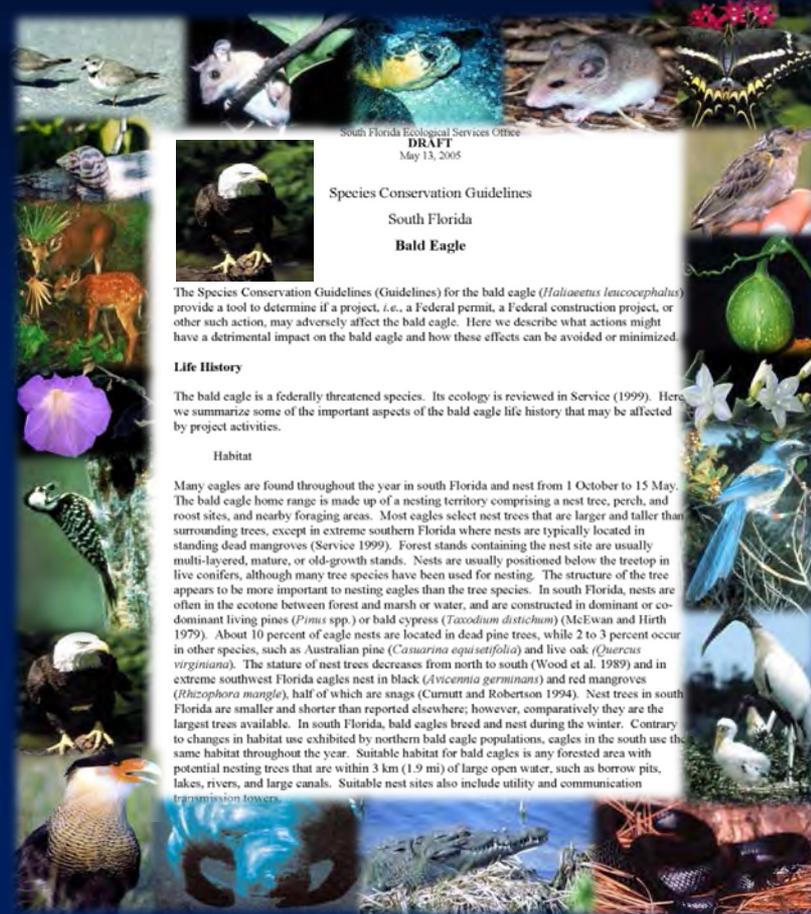
When the location, elevation, and soil type are suitable and the proposed action may disturb the soils on-site, then either: (1) a skink survey is necessary to determine if the site is occupied or (2) presence may be assumed by the applicant and the appropriate avoidance, minimization, mitigation, or conservation measures should be implemented.

If presence of the species is not assumed, then skink surveys are needed. A two-tiered approach is used to survey for presence of skinks. A visual pedestrian survey to detect skink tracks should



U.S. Fish and Wildlife Service

2004 Survey Protocol



- SFESO developed Standard Local Operating Procedures for Endangered Species (SLOPES)
- Guides for 27 species or groups of species (including sand skinks & blue-tailed mole skinks)
- Skink survey recommendations based on habitat type
- Lacked dispersal information to help interpret results



U.S. Fish and Wildlife Service

Scientific data



- **Best information available on skink dispersal then: 2001 USF Thesis, reported one sand skink moved 240 m (780 ft)**
- **Continuing conversations with skink experts relayed the importance of soil type over vegetative cover type for determining where skinks occur**



U.S. Fish and Wildlife Service

Protocol revisions



- **Released revised survey protocol in April 2011**
 - ❖ **Removal of two counties with no skink records**
 - ❖ **Improvements to survey design**
 - ❖ **Based on soil type rather than vegetation**
 - ❖ **Inclusion of 240-m buffer around observations**

- **Received feedback from concerned citizens- highlighted need for complete Guide to accompany protocol**

- **About same time, received more information on skink biology**

- **As a result, initiated additional revisions**

- **Current revisions include the removal of the buffer from the protocol and addition of a revised Guide incorporating new dispersal data**



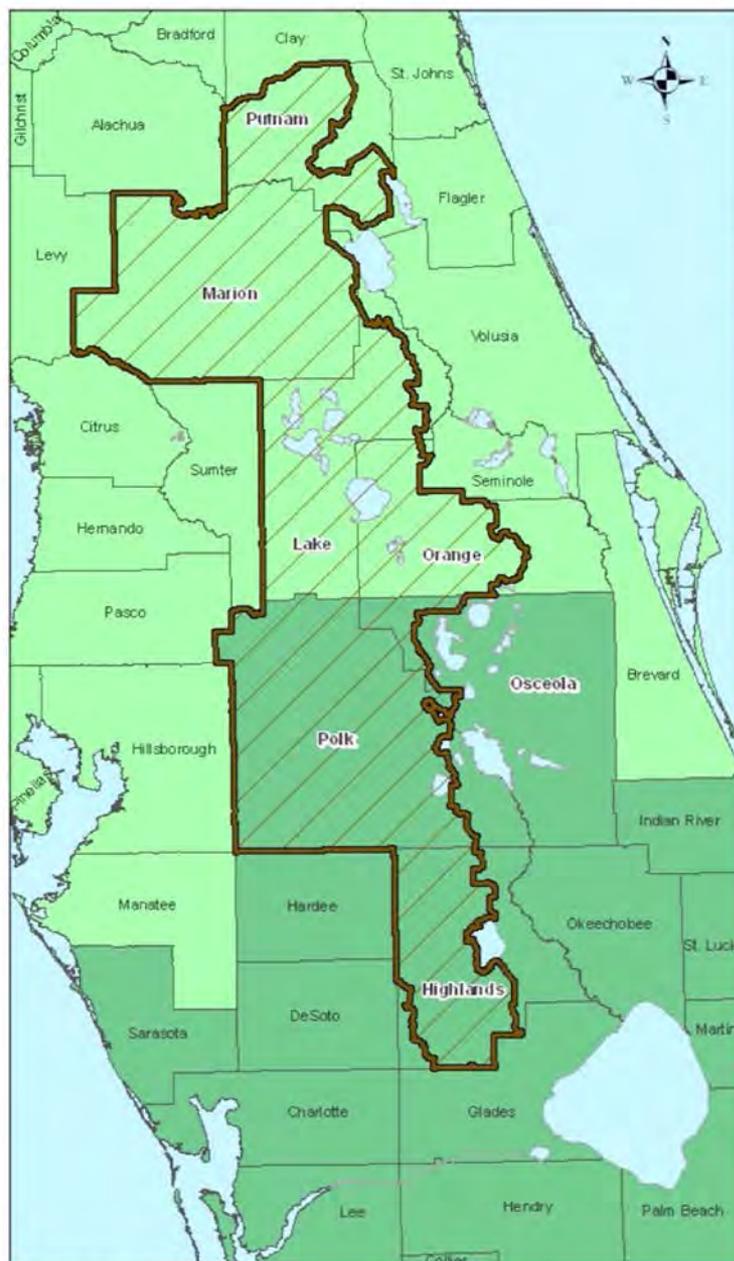
U.S. Fish and Wildlife Service

Important Factors in Determining Presence of Skinks

- Location (County=Highlands, Lake, Marion, Orange, Osceola, Polk, Putnam)
- Elevation (≥ 82 feet above MSL)
- Suitable Soils (Apopka, Arredondo, Archbold, Astatula, Candler, Daytona, Duette, Florahome, Gainesville, Hague, Kendrick, Lake, Millhopper, Orsino, Paola, Pomello, Satellite, St. Lucie, Tavares, and Zuber)



Sand and Blue-tailed Mole Skinks



Consultation Area Map

September 26, 2011

- Skink Consultation Area
- North Florida Service Area
- South Florida Service Area

US Fish & Wildlife Service Offices:
Lake, Marion, Orange, Putnam Counties
North Florida Ecological Services Office
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256
(904) 731-3336

Highlands, Osceola, and Polk Counties
South Florida Ecological Services Office
1339 20th Street
Vero Beach, FL 32960
(772) 562-3909



Produced by:
South Florida Ecological Services Office
<http://www.fws.gov/verobeach/>
Phone: 772-562-3909

Disclaimer: The information on this map has been compiled from a variety of sources and is intended for guidance.



0 5 10 20 30 40 50 Miles
0 40 80 Kilometers



U.S. Fish and Wildlife Service

When Is A Survey Needed?



When the location, elevation, and soil type are suitable and the proposed action may disturb the soils on-site, then either:

1. A skink survey is necessary to determine if the site is occupied or...
2. Presence may be assumed by the applicant and the appropriate avoidance, minimization, mitigation, or conservation measures should be implemented.



U.S. Fish and Wildlife Service

Skink Survey

A two-tiered approach is used to survey for presence of skinks...



Tier 1: Visual Pedestrian Survey



Tier 2: Coverboard Survey



U.S. Fish and Wildlife Service

Skink Survey



Visual Pedestrian Surveys...

- are used to detect skink tracks (“S”-shaped tracks)
- can be performed at any time of year, but tracks are most detectable in spring (March-May) & fall (Oct.-Nov.)

Protocol Specifics

- Survey all open, exposed sandy areas on the property
- Record and map the survey route(s)
- Provide photo-documentation of skink sign

* If the site is determined to be fully occupied by the pedestrian survey, then a coverboard survey is not needed



U.S. Fish and Wildlife Service

Skink Survey

Coverboard Surveys

- are needed if the pedestrian survey is negative on some or all portions of the site

Protocol Specifics

- Contact Service prior to initiating
- Survey period is from March 1-May 15
- Conduct surveys when survey conditions are suitable for detecting skinks (*i.e.*, soil is not compacted as a result of rainfall, etc.)
- Acclimate boards for 7 days prior to first sampling event
- The latest date that boards may be deployed and survey could be completed within the survey window is April 17





U.S. Fish and Wildlife Service

Skink Survey



Placement of Coverboards

- Disperse boards (2 ft x 2 ft x 1/2 in) regularly across suitable soils at a minimum of 40/acre
- Ensure full contact with soil surface (may require raking soil, filling in with soil, removing soil, or removing vegetation)
- Soil under board must be deep enough to allow skinks to move through it (≥ 5 cm [2 inches])



U.S. Fish and Wildlife Service

Skink Survey

Coverboard Surveys, *cont'd*



- Check coverboards a minimum of 4 times over 4 consecutive weeks within survey period (lift boards and check for tracks and/or skinks at least once per week)
- Smooth soil surface after checking each board
- Look for and record tracks in sandy patches between coverboard locations



U.S. Fish and Wildlife Service

Skink Survey



Coverboard Surveys, *cont'd*

- Once tracks or skinks are detected in an area, the survey can be concluded in that specific area
- If skink sign is not detected in an area, coverboards must continue to be checked a minimum of 4 times over 4 consecutive weeks
- Do not leave coverboards in the field between sampling seasons
- Provide a detailed survey report



U.S. Fish and Wildlife Service

Skink Survey Report



Components of the Survey Report

1. Project description of the action (*incl.* site-specific habitat and vegetative descriptions, habitat structure [*i.e.*, the extent of canopy, understory, ground cover, etc.], and fire history, etc.)
2. Soil map over a topographical map or aerial photograph of the project area (*incl.* path of the pedestrian surveys, coverboard locations, locations of skinks and skink sign)
3. Photo-documentation of skink tracks



U.S. Fish and Wildlife Service

Skink Survey Report



Components of the Survey Report, *cont'd*

4. Field data sheets that include:
 - A. Survey dates with starting and ending times of all surveys conducted and personnel conducting surveys;
 - B. Weather conditions during all surveys, including average temperature, wind speed and direction, visibility, and precipitation;
 - C. Total number of skink tracks observed; and
 - D. All skink observations.



U.S. Fish and Wildlife Service

Skink Survey Report



Components of the Survey Report, *cont'd*

5. The following ArcGIS layer files in shapefile format that include accurate metadata (the preferred projection is Florida Albers NAD83 in meters):
 - A. Project boundary;
 - B. GPS locations of survey routes;
 - C. Coverboard locations; and
 - D. Skink and skink track/sign locations.



U.S. Fish and Wildlife Service

Key points



Take Home Points on Survey Protocol Revisions

- There is no specific buffer distance around positive skink sign to be used to determine skink occupancy
- The Service will take into consideration the new scientific data on dispersal distance when negotiating projects
- Survey design recommendations have been improved
- Elements of protocol are now based on soil type rather than vegetative cover
- Two counties (Hardee and Glades) have been removed from the consultation area



U.S. Fish and Wildlife Service

For Additional Information...

The revised skink protocol is available as Appendix A of the *Sand Skink and Blue-tailed Mole Skink Conservation and Consultation Guide* on the U.S. Fish and Wildlife Service's South Florida Ecological Service's website:

<http://www.fws.gov/verobeach/20120207UpdatedSkinkGuidance.html>



Still Have Questions?

Email: skink_guide@fws.gov

or

Leave message: (772) 469-4255