

Eastern Indigo Snake
Drymarchon couperi

This profile is a short summary of information to introduce the species and does not summarize all available information on the species.

Listing status: USFWS = Threatened
FWC = Threatened

Trend: Specific information about the population size of this species is unknown, although it was originally listed in the 1970s due to population decline during the 1960s-70s. The presumed population trend for this species is declining.

Threats: This species was listed as threatened because of population declines associated with loss of habitat and a lack of land management, over-collection by pet traders, and mortality associated with gassing gopher tortoise burrows to kill rattlesnakes. Currently the most significant factor is thought to be habitat loss, degradation, and fragmentation (USFWS 2007). Conversion of suitable habitat to residential development, commercial development, and incompatible silviculture negatively impact this species. Its large home range compounds these problems. Predation by domestic pets and highway mortality contribute to population reductions. Other factors, though probably less important than habitat loss, may still threaten indigo snake populations. Since becoming a federally threatened species, collecting indigo snakes for pets is less common, but still may be a factor (Moler 1992). Pesticides, particularly rodenticides applied in silvicultural and agricultural settings may affect indigo snakes through bioaccumulation in their prey (USFWS 1999, Speake 1993). Disease has been investigated as a factor in declines (USFWS 2003).

Notes: Kevin Enge (FWC herp research) maintains a list of recent indigo snake publications at [\\fwc.state.fl.us\share\COMMON\IndigoSnake\Publications](http://fwc.state.fl.us/share/COMMON/IndigoSnake/Publications). Located in this folder is a list of conservations lands on which this species has recently been documented. Project Orianna is a privately funded organization that may be conducting work on this species in the near future.

Prioritization information:

PLCP PVA proportion of pops modeled to persist on public lands = N/A

PLCP PVA probability of a 50% decline on public lands = N/A

Millsap biological score = 24.7

Millsap supplemental score = **16**

Legacy population trend = **Declining**

Legacy population status = **Low**

Summary: This species was not included in the original list of focal species; therefore no PLCP analysis was completed. The species, however, triggers three of the other prioritization parameters and is state and federally listed making it a medium to high priority species. Management for a host of other upland species

like gopher tortoise and Red-Cockaded Woodpecker should provide benefits to this species.

Life History: Eastern indigo snakes utilize a mosaic of natural communities throughout the year. They are most commonly associated with scrub, sandhill, and scrubby flatwoods where they occur in or near gopher tortoise burrows. Southern indigo snake populations are less dependent on gopher tortoise burrows for refugia. Pine flatwoods, dry prairie, hardwood hammocks, marsh edges, agricultural fields, and even anthropogenic areas are also used by these snakes (USFWS 1999). In warm months, indigo snakes use a variety of natural areas and have large home ranges (Moler 1992; USFWS 1999). Indigo snakes occupy larger home ranges in the summer than the winter. Home ranges in Georgia ranged from 4.8 ha in the winter to 42.9 ha in late spring/early summer and 97.4 ha in late summer and fall (USFWS 1999). Males have larger home ranges than females. In a recent study of indigo snakes in Georgia, female snakes had home ranges of 35 to 354 ha, while males had home ranges of 240 to 1,530 ha (Hyslop 2007). Information on snakes in Florida indicates adult males have home ranges as high as 224 ha in the summer (Moler 1985b). One indigo snake moved 1.7 km from its winter refuge during the month of March in Florida (Moler 1985b). Because it is such a wide-ranging species, the eastern indigo snake is especially vulnerable to habitat fragmentation that makes travel between suitable habitats difficult.

A habitat requirement of indigo snakes is sufficient refugia. They use these refugia to escape cold and desiccation (USFW 2007). Within the range of the gopher tortoise, tortoise burrows are a favorite refugia for indigo snakes. They are known to use burrows made by cotton rats, land crabs, hollows at bases of trees and stumps, ground litter, trash piles and rock piles lining banks of canals (USFWS 2007). Indigo snakes appear to be tied closely to sandhills and tortoise burrows in northern Florida (Stevenson 2003). In central and south Florida, thermal stress is reduced and they can use other terrestrial habitats, if not heavily impacted by urban development (USFWS 1999). Moler (1985a) indicated indigo snakes commonly use hydric hammocks in central/south Florida, and Kuntz (1977) described pine flatwoods, pine rocklands, and tropical hardwood hammocks as important habitat in south Florida. Burrows and other below ground refugia will still be used by indigo snakes in central/south Florida.

Sexual maturity appears to occur around 3-4 years of age (Hallam et al. 1998). In North Florida, breeding occurs November – April with females laying 4-12 eggs in May-June (Moler 1992). Most hatching of eggs occurs August-September, with yearling activity peaking in April-May (USFWS 1999). Limited data on reproduction in south Florida indicate the breeding season is extended; breeding occurs from June-January, egg deposition is April-July, and hatchlings are born through early fall (USFWS 1999).

An active predator, indigo snakes will eat terrestrial and fossorial vertebrates. In rare cases, these snakes are also known to climb shrubs or trees to capture prey (USFWS 1999). Common food items include fish, frogs, toads, snakes, lizards, turtles, eggs, juvenile gopher tortoises, small alligators, birds, and small mammals (USFWS 1999). Juvenile snakes eat mostly invertebrates.

Preferred Habitat Parameters: No specific information is available, although habitat parameters for gopher tortoises in xeric communities likely are an appropriate indicator of suitable habitat for this species. No information exists on optimal habitat conditions for indigo snakes in other natural communities.

Minimum Habitat Requirement:

From PVA: N/A

From Literature: Preserves of at least 4,000 ha. Assuming a home range of 75 ha for males and 19 ha for females, this allows for 53 males and 210 females (USFWS 1999).

Best Management Practices:

- Use of prescribed fire will create suitable habitat for this species. Winter burns are sometimes recommended over growing-season burns because individuals are actively moving, and could be burned up, during warm weather. Winter burns, however, could potentially increase predation on smaller indigo snakes forced to use pine straw, logs, and other debris for shelter. Paul Moler (FWC) (in Hallam et al. 1998) suggests using prescribed fire in May-June since most snakes will have moved into low-lying areas around this time. Further, this species evolved with a habitat that historically burned, and therefore the benefits of habitat improvement via the burn likely overcome any loss of individuals caused by a burn.
- Frequency of fire should mimic natural fire return intervals for the natural community.
- Thinning of pine plantations or pine flatwoods is beneficial to indigo snakes because it opens the canopy to promote understory development. Timber management should shift towards longer rotations and the establishment of site-appropriate species.
- Low intensity site preparation (i.e., prescribed fire, light mechanical work) should be used over more intensive actions like root raking.
- Stump removal may be damaging to indigo snakes as it removes an alternative refugia for smaller snakes and in areas without gopher tortoises (Moler in Hallam et al. 1998).
- Educate public to avoid wanton destruction of large snakes.

Monitoring Protocol:

- Presence/absence surveys are likely to be most successful in the winter months, when indigo snakes are tied more closely to gopher tortoise burrows. Surveyors can look for snakes outside/near tortoise burrows, identify shed skins and/or snake tracks, or use cameras to peek into burrows.
- Upland snake traps might be useful for distribution and/or density studies, mark-recapture studies, or other actions that require direct identification or handling of individual snakes.

For more information on monitoring see Burgdorf et al 2005 and Stevenson et al 2003.

PVA Summary: N/A

2003 Landcover used for model: N/A

FNAI Natural Communities used:

Xeric Oak Scrub	Hydric Hammock
Sand Pine Scrub	Tropical Hammock
Sandhill	Mesic Hammock
Mesic Flatwoods	Upland Hardwood Forest
Scrubby Flatwoods	Upland Pine Forest
Wet Flatwoods	Pine Rockland
Xeric Hammock	Dry Prairie
Beach Dune	Basin Marsh (edges)
Coastal Strand	Depression Marsh (edges)
Maritime Hammock	

FNAI field guide description of habitat: Broad range of habitats, from scrub and sandhill to wet prairies and mangrove swamps. In northern part of range, often winters in gopher tortoise burrows in sandy uplands but forages in more hydric habitats. Requires very large tracts to survive.

Important Links:

FNAI field guide: http://www.fnai.org/FieldGuide/pdf/Drymarchon_couperi.PDF

Species report in the South Florida Recovery Plan:
<http://www.fws.gov/verobeach/images/pdfLibrary/eisn.pdf>

USFWS species profile including link to 5 year review:
<http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=C026>.

FWC species spotlight: <http://myfwc.com/viewing/species/indigosnake.htm>

Pertinent Documents/Literature:

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- U.S. Fish and Wildlife Service. 2007. Eastern Indigo Snake *Drymarchon couperi* 5-Year Review. Mississippi Ecological Services Office, Jackson, Mississippi. http://ecos.fws.gov/docs/five_year_review/doc1910.pdf