

Recovery Outline for the Key ring-necked Snake (*Diadophis punctatus acricus*)



Figure 1: Key ring-necked snake. Photo Credit: Kevin Enge

Species Common Name: Key ring-necked snake

Species Scientific Name: *Diadophis punctatus acricus*

ESA Listing Status: E; August 20, 2026; 91 FR 45697

Lead Region: Southeast Region; Atlanta, Georgia

Cooperating Region(s): N/A

Lead Office: Florida Ecological Services Field Office; 352-448-9151

Cooperating Office(s): N/A

Lead Contact: Samantha Hermann

Species Range: Florida

PURPOSE AND DISCLAIMER

The recovery outline is a succinct document that presents a preliminary recovery strategy and actions to direct a newly listed species' recovery efforts until a recovery plan is completed. Recommendations in the recovery outline are non-binding and are intended to guide (not require) regulatory (e.g., section 7 consultations and section 10 permitting) and conservation actions to be implemented by the Service and our external partners.

This document lays out a preliminary course of action for the survival and recovery of the Key ring-necked snake. Formal public participation for recovery planning will be invited upon the release of the draft recovery plan. However, we will consider any new information or comments that members of the public offer in response to this outline during the recovery planning process. For more information on Federal recovery efforts for the Key ring-necked snake, or to provide additional comments, interested parties may contact the lead field office for this subspecies at the above address and telephone number.

1. BACKGROUND

Successful recovery will require collaboration among the U.S. Fish and Wildlife Service (Service), federal and state agencies, Tribes, nongovernment organizations, and the public. This outline summarizes the subspecies needs and identifies preliminary actions that can support conservation efforts while the recovery plan is developed.

The final rule listing the Key ring-necked snake (*Diadophis punctatus acricus*) was published in the Federal Register on July 21, 2026, with an effective date of August 20, 2026 (91 FR 45697). The following sections include a summary of the biology, life history, and ecology of the subspecies. A complete discussion of the subspecies' morphology, taxonomy, distribution, phenology, reproduction, life span, demographic trends, and habitat needs can be found in the Species Status Assessment for the Key ring-necked snake (Service 2023). An electronic copy of the assessment report is available on the ECOS species webpage for Key ring-necked snake (<https://iris.fws.gov/APPS/ServCat/DownloadFile/223071>).

Important Information Gaps and Treatment of Uncertainties

We have identified several areas where little or no information on the Key ring-necked snake life history, demographics, threats, and distribution exists. Additional data in the following areas may provide knowledge to understand and improve the subspecies' resiliency, redundancy, and representation efforts:

- Population structure, demographics, and long-term trends.
- Lifespan, survivorship by age class, growth rates, and age at sexual maturity.
- Reproductive biology (clutch size, frequency, success rates, nesting microhabitat).
- Environmental factors influencing population density, including diet and habitat conditions.
- Spatial ecology (occupancy, home ranges, dispersal, and connectivity).
- subspecies response to environmental stressors such as saltwater inundation, shifting rainfall and temperature patterns, and storm events.

Although several uncertainties are expected to influence the Key ring-necked snake recovery, the following issues strongly contribute to recovery uncertainty:

- The biotic or abiotic processes influencing population viability (recruitment, survivorship, persistence) and how these processes differ across the range are unknown.
- Lack of long-term management and survey efforts that are key to sustaining optimal habitat quality and population monitoring that informs recovery efforts.

Limiting Ecological Traits

Due to the relative rarity of the Key ring-necked snake and its cryptic nature, many aspects of the life history of this subspecies, as well as information on population status and trends, are poorly known. The Key ring-necked snake is assumed to be like other *Diadophis* species (e.g., southern ring-necked) which prey upon small insects, snakes, lizards (anoles, geckos), slugs, amphibians (frogs, tadpoles), and earthworms (Ernst and Ernst 2003, p. 96; FWC 2013, p. 2). We do not know what the prey-related requirements (abundance, variety, range, etc.) are to sustain a viable population. Key ring-necked snakes require refugia to escape and hide from predators and regulate body temperature. Currently, we have no specific information on the exact requirement needs for suitable refugia. It appears this subspecies is restricted to areas near permanent freshwater sources (Lazell 1989, pp. 134, 136). Refugia in pine rocklands and rockland hammock are likely provided by holes and crevices in the limestone, piles of rock rubble and pockets of organic matter accumulating in solution holes and shallow depressions in the oolitic limestone (Enge et al. 2003, p. 28).

Threats

The Key ring-necked snake populations are affected by a variety of factors including habitat alteration through development, fire suppression, rise in sea level, saltwater intrusion, shifts in seasonal patterns of rainfall and temperature, and storm events. To a lesser known degree, the subspecies also faces threats from disease, invasive species, and predation. Habitat alterations is the most significant threat as any remaining suitable habitat for the Key ring-necked snake is extremely vulnerable to development if unprotected. In addition, fire suppression has had considerable negative impacts on pine rocklands communities. Without fire, pine rocklands often transitions into rockland hammocks. Lack of management in these habitats leads to invasive and nuisance species significantly altering the macro and micro habitats the snakes depend upon. The rise in sea level and saltwater intrusion can directly impact the habitat availability for the subspecies. The result is that freshwater-dependent flora and fauna, which comprise much of the island's biota, will disappear. Over time, vegetation succession will result in mangrove dominance on the remaining land and more expansive estuaries across much of the islands. The multitude and severity of threats impacting the Key ring-necked snake are at both the individual and population level.

Current Biological Status

Overview

The Key ring-necked snake (*Diadophis punctatus acricus*) is one of the smallest subspecies of the family Dipsadidae. It is found on seven islands in the lower Florida Keys: Key West, Big Pine Key, Little Torch Key, Middle Torch Key, No Name Key, Cudjoe Key and Stock Island (Auth and Scott 1996, p. 33; Florida Fish and Wildlife Conservation Commission [FWC] 2011, p. 3; 2013, p.1; Mays and Enge 2016, p. 11, 13; J. Mays, personal communication, February 4, 2020). Within this limited range, the Key ring-necked snake is found in pine rocklands, rockland hammocks and limestone outcroppings.

3 Rs: For the purposes of the SSA, we assessed the Key ring-necked snake's condition in each of the known occupied Keys across the range of the subspecies (Service 2023).

Resiliency: resiliency is the ability to withstand stochastic disturbances and is measured by fecundity, survival, abundance of suitable habitat and population size. Generally, larger areas of suitable habitat support greater resiliency than smaller areas. In addition, resiliency is reflected by the quality of the above referenced factors, as well as genetic diversity, population abundance and demography.

Due to the cryptic nature of the Key ring-necked snake and very limited research, there is virtually no information concerning the population structure and demographics exhibited by this subspecies. In addition, no information exists on the abundance (number of individuals) or growth rate of these populations. Therefore, the health and resiliency of these populations is uncertain. That said, persistence of populations at historical locations suggests the presence of some resilient populations on the Keys.

Redundancy: Redundancy describes the ability of a species to withstand catastrophic events. High redundancy is multiple resilient populations across the species ecological settings and across the species' range. This distribution minimizes the potential loss of species from catastrophic events. Distributed populations offer better redundancy than if the populations all occur in very close proximity and are vulnerable to similar threats at the same intensity or timing. Because of the Key ring-necked snake's limited geographic range, similar threats are experienced with similar timing and intensity across the entire range. For example, the entire subspecies may be vulnerable to the effects of a hurricane passing over the lower Florida Keys. Consequently, the redundancy is low for the subspecies.

Representation: describes a species' ability to adapt to changing environmental conditions and is measured by the breadth of genetic and environmental diversity within and among its populations. This diversity, also referred to as adaptive diversity, reflects a species' evolutionary flexibility and determines how well it can respond to environmental change.

In 2019, Hoffman conducted a study examining whether phylogenetic data supported the existing taxonomic classification of the Key ring-necked snake. Prior to this work, it was unclear whether genetically distinct populations existed across the seven Florida Keys where the subspecies occurs (Key West, Big Pine Key, Little Torch Key, Middle Torch Key, No Name Key, Cudjoe Key, and Stock Island). The study found that the genetic data aligned with previous assessments, supporting continued recognition of the Key ring-necked snake as a subspecies of the ring-necked snake rather than a separate species.

The Key ring-necked snake occupies a narrow geographic and ecological range, with little variation in habitat types across its distribution. Suitable habitat is limited, patchily distributed, and increasingly threatened in the Florida Keys. The subspecies does not occur across multiple ecosystems or have access to a broader range of environmental conditions in which adaptation might occur.

As a result, the Key ring-necked snake has a narrow breadth of genetic and environmental diversity within and among populations. Consequently, both historically and currently, the subspecies exhibit a naturally low level of representation.

Conservation Actions to Date

Most conservation actions for the subspecies have occurred indirectly through Section 7 consultation and conservation of habitat through other listed species found within the pine rocklands and rockland hammocks. The Key ring-necked snake has been State threatened since 2019 and offered the State protections (Florida Administrative Register 2019). Targeted survey efforts for the subspecies are necessary to document basic life-history information to inform population viability analyses and estimate population trends over time to prioritize conservation actions.

2. PRELIMINARY RECOVERY PROGRAM

Recovery Priority Number

Number: 6C

Rationale: The Key ring-necked snake is assigned a recovery priority number of 6, indicating that the subspecies faces a high degree of threat and has a low recovery potential. The degree of threat is considered high because of the multitude and complexity of the threats including development, fire suppression, increasing sea levels, saltwater intrusion, shifts in seasonal patterns of rainfall and temperatures, and storm impacts. These threats combined with the limited distributional range of the subspecies amplify the impacts of the threats to the overall populations. There is a low potential for recovery as the threats affecting the subspecies occur at a severity and scale (landscape-level) that is difficult to reduce, remove, or mitigate to the level that will meaningfully contribute to subspecies' recovery. Local habitat and conservation actions may benefit populations but would not necessarily mitigate wide population impacts. Captive breeding efforts to augment wild populations, or other intensive management actions, may be feasible if deemed necessary in the future.

Preliminary Recovery Strategy

The ultimate goal of the recovery efforts is to ensure the long-term viability of the Key ring-necked snake in the wild by implementing conservation actions that result in sufficiently large self-sustaining populations that occur throughout the subspecies range, such that protections afforded by the Endangered Species Act are no longer required. Due to the cryptic nature of the subspecies, we rely on a target geographic distribution and the strong correlation to habitat availability and quality to maintain viable populations into the future. The interim recovery actions include the development and implementation of a Key ring-necked snake monitoring plan. The Service will work with partners to establish monitoring and reporting protocols to obtain a better understanding of population demographics and provide insight into life-history characteristics (e.g., reproduction, survivorship) and habitat needs and conditions. New and continued partnerships with County, State, and Federal agencies and non-governmental organizations will be needed to protect habitat integrity and quality of pine rocklands and

rockland hammocks, as well as encourage and support community-based stewardship planning and actions. Recovery actions (not in priority order) may include:

Preliminary Recovery Actions

- Develop monitoring plan to evaluate Key ring-necked snake populations and habitat quality throughout its range.
- Partner with the state and local governments to protect suitable habitat in perpetuity, focusing on those adjacent to freshwater sources and providing habitat connectivity.
 - a) Work with Monroe County Land Authority to prioritize acquisition of conservation land in suitable key ring-necked snake habitats.
- Work on the data gaps that impact recovery potential.
 - a) Use the best available genetic techniques to assess effective population sizes, inbreeding depression, and connectivity of suitable habitat.
- Facilitate improved habitat quality across the subspecies range.
 - a) Create best management practices and conservation measures to implement during the environmental review process.
 - b) Reduce soil compaction during the rainy season when the snakes are likely most active.
 - c) Leave leaf and woody debris in place as microhabitat and refugia.
 - d) Remove and control nonnative species that negatively impact the habitat.
 - e) Establish and support a fire regime that improves the habitat quality.
- Minimize habitat destruction
 - a) Avoid development and fire breaks in and around intact pine rocklands.
 - b) Work with Monroe County Conservation Land Stewardship Program to prioritize and emphasize implementation of BMPs.
- Implement Service-approved captive propagation and reintroduction plans, if necessary, to supplement current populations or establish populations in areas of extirpation within the suitable habitat of the subspecies.
 - a) Monitor supplemented and reintroduced individuals to determine efficacy of augmentation and reintroduction efforts.
- Develop educational materials about the Key ring-necked snake and its habitat.
 - a) post signage at appropriate pine rockland habitats to inform the public and generate public support for recovery actions.
 - b) Partner with outreach initiatives that support pine rockland habitats and the species within them.

3. RECOVERY PRE-PLANNING CONSIDERATIONS

We will prepare a Recovery Plan for the Key ring-necked snake informed by the Species Status Assessment report (Service 2023) and the best scientific data available. The Recovery Plan will include objective and measurable criteria that, when met, will ensure the conservation of the subspecies. Recovery criteria will address all meaningful threats to the subspecies and estimate the time and cost to achieve recovery. The Florida Ecological Services Field Office will lead the recovery planning effort.

Service policy states that a draft recovery plan will be completed within 18 months and a final plan available within two and half years of listing. A completed draft Recovery Plan is expected

to be available by February 2027, and the final Recovery Plan is expected to be available by February 2028.

During the recovery planning process, we will seek input, comments, and review from multiple stakeholders in Florida, including State conservation agencies, species experts, research universities, and conservation organizations.

Signed: **BRADLY POTTER** Digitally signed by BRADLY
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Date: 2026.09.28 12:23:56 -04'00'

Date: _____

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