

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Nesogenes rotensis* (No common name)

**Current Classification:** Endangered

**Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 83(88):20088-20092.

**Lead Region/Field Office:** Interior Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai'i

**Name of Reviewer(s):**

Tyler Willsey, Fish and Wildlife Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Conservation and Restoration Team Manager, PIFWO

**Methodology used to complete this 5-year review:**

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS). The review was based on the recovery plan for two plants from Rota (*Nesogenes rotensis* and *Osmoxylon mariannense*) (USFWS 2007), as well as a review of current, available information since the last 5-year review for *Nesogenes rotensis* (USFWS 2012). The evaluation by Tyler Willsey, Fish and Wildlife Biologist, was reviewed by the Plant Recovery Coordinator and Conservation and Restoration Team Manager.

**Background:**

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species ([http://ecos.fws.gov/tess\\_public](http://ecos.fws.gov/tess_public)).

**Review Analysis:**

Please refer to the previous 5-year review for *Nesogenes rotensis* published on May 23, 2017 (available at [https://ecos.fws.gov/docs/five\\_year\\_review/doc5126.pdf](https://ecos.fws.gov/docs/five_year_review/doc5126.pdf)) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species biological status has come to light since listing to warrant a change in the Federal listing status of *Nesogenes rotensis* as endangered.

*Nesogenes rotensis* is a low-growing, perennial herbaceous plant known to occur on rough limestone karst substrates in coastal locations on the island of Rota in the Commonwealth of the Northern Marianas Islands (CNMI). This species has not been recorded elsewhere, and is understood to be endemic to Rota.

#### New Status Information:

- *Nesogenes rotensis* has been recognized to undergo considerable annual dieback of their above-ground portions (USFWS 2012). Since the time of listing (2004) the species has been documented at two locations, the Poña Point Fishing Cliff along the south coast of the island, and Puntan Fina Atkos at the island's northeast tip.
- In addition to the two above-described locations where the species has been confirmed, in the late 1970s or early 1980s *Nesogenes rotensis* was also observed at two other locations along the east coast of the island. These locations (Puntan As Fani and Puntan Haiña) were reported to be similar to Poña Point and Puntan Fina Atkos, in terms of similar coastal vegetation on exposed limestone karst (Estanislao Taisacan, pers. comm. 2016). The Puntan As Fani and Puntan Haiña populations have not been observed recently.

Only the southern population of Poña Point has been repeatedly surveyed and documented, providing some record of the species' status. In January 2017, the population at Poña Point was surveyed by CNMI DLNR. A total of 403 individuals were recorded, distributed in three discrete patches; among these, 152 individuals were observed to be flowering and/or fruiting. (Lainie Berry, CNMI Department of Lands and Natural Resources, pers. comm. 2017). Those observed at Poña Point were growing in close association with *Scaevola taccada*, *Bikkia tetrandra*, and *Cassytha filiformis*.

- There have been no observations made at the Puntan Fina Atkos population since 2005. Surveys of the area by CNMI DFW and USFWS staff did not detect any individuals in 2016 (Lainie Berry, CNMI Department of Lands and Natural Resources, pers. comm. 2016).

The current status for *Nesogenes rotensis* is provided in Table 1 below.

#### New Threats:

- Threats to the species (Table 2) continue, including potential habitat degradation through invasive plant species, typhoons and potential climate change effects, and inadequacy of existing regulatory mechanisms.
- There are no new threats to this species other than what has already been reported.

#### New management actions:

- In the spring of 2016, James Manglona of CNMI Forestry was able to successfully germinate *Nesogenes rotensis* seeds, in a sandy soil bed at the Rota Forestry nursery. Germination required approximately five months. The persistence and ultimate longevity of these seedlings is yet unknown. (James Manglona, CNMI Forestry, pers. comm. 2016).
- Efforts to propagate the species have been ongoing since 2016. Propagation activities include seed collection, propagation trials (including with potential host

plant species), outplanting in suitable habitat at Poña Point, and initial monitoring were attempted.

- As of June 2020, Rota Forestry had no nursery stock or outplantings to report (James Bamba, CNMI Department of Lands and Natural Resources, pers. comm. 2020).

**Table 1. Status and trends of *Nesogenes rotensis* from listing through current 5-year review.**

Date	No. wild individuals	No. outplanted	Downlisting Criteria Identified in Recovery Plan	Downlisting Criteria Completed?
2004 (listing)	34	0	2 populations with 300 mature individuals each	No
			Sufficient habitat is protected and managed to achieve criterion	No
			Management and control of nonnative species	No
2007 (recovery plan)	35-40	0	2 populations with 300 mature individuals each	No
			Sufficient habitat is protected and managed to achieve criterion	No
			Management and control of nonnative species	No
2012 (5-year review)	30-40	0	2 populations with 300 mature individuals each	No
			Sufficient habitat is protected and managed to achieve criterion	Partially (see Table 2)
			Management and control of nonnative species	No
2017 (5-yr review)	403 (152 mature)	0	2 populations with 300 mature individuals each	No
			Sufficient habitat is protected and managed to achieve criterion	Partially (see Table 2)
			Management and control of nonnative species	No

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2020 (5-yr review)	403 (152 mature)	0	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	No
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partially, reproduction at 1 population
			3 populations with 50 mature individuals each	Partially, 1 population

\* The Preventing Extinction Stage was established in 2011. Prior to 2020, the Downlisting Criteria wastage was the first stage towards recovery (now it is the third stage after Preventing Extinction and Interim Stabilization).

**Table 2. Threats to *Nesogenes rotensis* and ongoing conservation efforts.**

Threat	Listing Factor	Current Status	Conservation/ Management Efforts
Established ecosystem-altering invasive plant species degradation of habitat	A	Increasing	No
Agricultural and urban development	A	Ongoing	No
Inadequacy of existing regulatory mechanisms	D	Ongoing	No
Human disturbance	E	Ongoing	Partially: Existing population management and restoration at Poña Point
Typhoon	E	Ongoing	No
Climate change	A, E	Increasing	No

**Synthesis:**

Currently, there are one to two populations, one population of 403 individuals at Poña Point, including 152 reproductive individuals, and another population at Puntan Fina Atkos, when surveyed in 2016 could not locate individuals and more surveys are needed to determine its status. There has been some propagation via seeds and outplanting to Poña Point. There is some management and restoration at Poña Point to minimize disturbance of the area.

Downlisting and delisting objectives are provided in the Final Recovery Plan for Two Plants on Rota (USFWS 2007), and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee (HPPRCC 2011). The HPPRCC identifies an additional initial objective, the Preventing Extinction Stage, in addition to the Interim Stabilization, Delisting, and Downlisting objectives. Furthermore, life history traits such as breeding system, population size fluctuation or decline, and reproduction type (sexual or vegetative), have been included in the calculation of goals for the number of populations and reproducing individuals for each stage. The goals for each stage remain grouped by life span defined as annual, short-lived perennial (fewer than 10 years), or long-lived perennial.

*Nesogenes rotensis* is a short-lived perennial herb. To prevent extinction, which is the first milestone in recovering the species, the taxon must be managed to control threats (e.g., fenced) and have 50 individuals (or the total number of individuals if fewer than 50 exist) from each of three populations represented in *ex situ* (secured off-site, such as a nursery or seed bank) collections. In addition, a minimum of three populations should be documented on the island of Rota where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.*, viable seeds, seedlings), with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There is only one populations with greater than 50 mature individuals, the genetic storage goals have not been met (Table 1), and not all threats are not being managed (Table 2). Therefore, *Nesogenes rotensis* meets the definition of endangered as it remains in danger of extinction throughout its range.

#### **Recommendations for Future Actions:**

- Survey protocol development: Given the recognized seasonal die-back exhibited by this species, and consequent variation in detectability through the calendar year, develop guidance defining season(s) when the species can be more reliably observed, and consistently counted.
- Resurvey and reconfirm the population at Puntan Fina Atkos, including its current condition, numbers, and distribution.
- Population monitoring – Monitor annually the number of individuals in the Poña Point Fishing Cliff and Puntan Fina Atkos populations.
- Survey for additional populations of *Nesogenes rotensis* in other areas of similar habitat, including the exposed limestone karst coastal cliffs that are common along the eastern shore of Rota. Revisit and reconfirm the two historical occurrences of *Nesogenes rotensis* at Puntan Haiña and Puntan As Fani.
- Habitat requirements research – Conduct research on *Nesogenes rotensis* habitat requirements, with emphases on identifying key suitability parameters in order to a) inform effective management of the existing populations at the two confirmed

(and any additionally-found) sites, and b) recognize appropriate sites for successful re-/establishment of the species.

- Conduct studies to clarify whether *Nesogenes rotensis* functions hemiparasitically, and if so, which host species may be essential for its survival.
- Conduct studies to determine if parasitic or pioneering plant species such as *Cassytha filiformis* or *Casuarina equisetifolia* are negatively affecting populations of *Nesogenes rotensis*, either directly or via impacts to potential host plant species.
- Monitor to determine whether other invasive nonnative plant species in the vicinity of either population may be negatively affecting *Nesogenes rotensis*. Particular attention should be given to species not previously documented at those sites, or those species whose numbers appear to be increasing.
- In the event that plant interactions such as those described above are found to negatively affect *Nesogenes rotensis*, develop and implement control techniques to limit or eliminate such affects.
- Disturbance ecology: Consider the roles of typhoon events for this species. The known distribution of *Nesogenes rotensis* is in sites highly subject to the periodic major disturbance events of typhoons, and its recovery from such events has been documented. Beyond a degree of typhoon-resilience, might *N. rotensis* be somewhat typhoon-dependent? (i.e., does it need periodic re-establishment of early-seral conditions to compete with other plants and persist on a site?) If some type(s) of disturbance is found to be important to the species' persistence, that information could indirectly inform decisions about managing other forms of disturbance.
- Captive propagation for genetic storage and reintroduction:
  - Collect cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
  - Collect seeds from all existing populations and send to at least two or three different facilities for propagation and storage.
- Captive propagation protocol development – Conduct studies to determine how to propagate the species and maintain the species in nurseries.
- Reintroduction / translocation protocol development – Maximize the genetic variation among individuals at each reintroduction site, maintain detailed provenance information.
- Reintroduction / translocation site identification – While surveying for new populations, determine which sites are least invaded by invasive introduced plant species and which appear to have the highest likelihood of maintaining new reintroductions.
- Threats research – Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.
- Site / area / habitat protection – Develop and implement effective measures to reduce the impact of urban development, typhoons, and human disturbance if and where these are found to be detrimental to the species.
- Alliance and partnership development – Work with the CNMI Department of Lands and Natural Resources, Division of Forestry, Division of Fish and Wildlife,

- and other land managers to coordinate planning and support implementation of ecosystem level restoration and management to benefit this species.
- Regulatory protections – Work with CNMI authorities to ensure that federal and local regulations provide the necessary protections to support the recovery of *Nesogenes rotensis*, whether by adding the species to the CNMI Threatened and Endangered Species list, or by other means.
  - Review the recovery plan (USFWS 2007) to determine if any new information suggests any need to update the plan to more effectively attain recovery goals (e.g., if *Cassytha* is determined to be a substantial issue for recovery, then Recovery Criteria 3 may need to address parasitic and/or pioneering as well as non-native species.)

### References:

- U.S. Fish and Wildlife Service. 2007. Recovery Plan for Two Plants from Rota (*Nesogenes rotensis* and *Osmoxylon mariannense*). Portland, Oregon. 86 pp.
- U.S. Fish and Wildlife Service. 2012. *Nesogenes rotensis* (No common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI. 17 pp.
- U.S. Fish and Wildlife Service. 2014. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 5 species in Oregon, Palau, Guam, and the Northern Mariana Islands. Federal Register 79(32): 9263-9264.
- U.S. Fish and Wildlife Service. 2016. Propagation and Outplanting of Three Endangered Plant Species on Rota. Proposal description from Section 6 Endangered Species grant F16AP00687 award letter. U.S. Fish and Wildlife Service, Region 1 Office, Portland, OR. 27pp.
- Williams, L. and S. Kremer. 2006. CNMI Traditional Section 6 Final Report E-1-R-1 FY2006. Division of Fish and Wildlife, Department of Lands and Natural Resources, Commonwealth of the Northern Mariana Islands. 28pp.

### Personal communications:

- Bamba, James. 2020. Nursery Technician, Rota Department of Forestry, CNMI Department of Lands and Natural Resources. Email to Tyler Willsey, U.S. Fish and Wildlife Service, dated May 21, 2020. Subject: Re *2018 Rota Plant Survey Report*.
- Berry, Lainie. 2017. Endangered Species Program Manager, CNMI Department of Lands and Natural Resources. Email to Peter McBride, U.S. Fish and Wildlife Service, dated February 2, 2017. Subject: Re *Nesogenes* at Pona Point.

Berry, Lainie and Bethany Chagnon. 2016. Endangered Species Program Manager, CNMI Department of Lands and Natural Resources, and Biologist, CNMI Division of Fish and Wildlife. In-person interview August 25, 2016, and follow-up email to Peter McBride, U.S. Fish and Wildlife Service, dated September 2, 2016. Subject: *Nesogenes* field data.

Manglona, James. 2016. Forester, CNMI Forestry, and Rota Rare Plants Project lead. In-person interview on August 26, 2016. Subject: Propagation & native regeneration of *Serianthes nelsonii*, *Osmoxlon mariannense*, and *Nesogenes rotensis*.

Taisacan, Estanislao. 2016. Retired, CNMI Division of Fish and Wildlife; and Rota Rare Plants Project participant. In-person interview on September 1, 2016. Subject: Field surveys of *Serianthes nelsonii*, *Osmoxlon mariannense*, and *Nesogenes rotensis*.

