

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Osmoxylon mariannense* (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: Region 1/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), beginning on May 7, 2018. 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 *Osmoxylon mariannense* (USFWS 2016a). 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).

Review Analysis:

Please refer to the previous 5-year review for *Osmoxylon mariannense* published on May 23, 2017 (available at https://ecos.fws.gov/docs/five_year_review/doc5125.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 *Osmoxylon mariannense* as endangered.

Osmoxylon mariannense is a small forest tree endemic to the native limestone forests of Rota (Costion & Lorence 2012). Although it is an understory or forest edge species of unimposing stature, the species is conspicuous for its large, palmately-lobed leaves, as well as the large, umbelliform (~spherical) floral and fruit structures when present. Although the species was first collected in the late 1880s, it remained undescribed until 1933. Reports from the latter part of the twentieth century documented 20 or fewer

known individuals on Rota. After 2000, counts were down to 10 or less individuals. In 2004, the species was listed as Endangered by the USFWS, and it is currently classified as Critically Endangered by the IUCN (Wiles 1998).

The current status for *Osmoxylon mariannense*, as known, is provided in Table 1 below. Threats to the species (Table 2) continue, including habitat destruction and degradation due to development; recruitment failure due to insect, slug, rodent, and ungulate herbivory; vulnerability to typhoons, fire, and other natural or anthropogenic disturbance events; consequences of small population sizes (including exasperation of previous vulnerabilities); and potential climate change effects.

New Status Information:

- There remain only 2 known wild and as of September 11, 2020 there are 133 outplanted individuals of *Osmoxylon mariannense*

New Threat Information:

- No new threats information is available for the species

New Management Actions:

- Propagation and outplanting programs: through the Rota Rare Plants project (Partners Grant No. F14AC00510) from June 2015 through August 2019, 133 young *Osmoxylon* have been outplanted at locations on and around the Sabana; these plants are currently 1-5 years old, and are protected by fencing enclosures (Manglona 2016). Note also, that there are 35-40 older *Osmoxylon* (12-15 years old) that were outplanted in multiple locations (James Manglona, pers. comm. 2016).
- In 2016, Lainie Berry of CNMI Department of Lands and Natural Resources began work on surveys and propagation of *Osmoxylon*, under a USFWS Section 6 grant (F16AP00687; USFWS 2016b). In addition to surveys for previously unknown individuals as well as all previously-known natural and outplanted trees, efforts to propagate the species has been ongoing since 2016. Seed collection, propagation via established techniques, outplanting in conservation areas with exclusion fencing has resulted in 133 outplantings of the species and 2 nursery stock plants representing two different wild trees from Fanlagon (James Bamba, CNMI Department of Lands and Natural Resources, pers. comm. 2020).

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

Date	No. wild individuals	No. outplanted	Downlisting Criteria Identified in Recovery Plan	Downlisting Criteria Completed?
2004 (listing)	8	0	2 populations with 100 mature individuals each	No

			Sufficient habitat is protected and managed to achieve criterion	No
			Management and control of nonnative species	No
2007 (recovery plan)	8	35-40*	2 populations with 100 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)	Unknown	35-40	2 populations with 100 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)	2 or more (as of Aug 2016)	118	2 populations with 100 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)	2 or more (as of Aug 2020)	133	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	No
			3 populations with 25 mature individuals each	No

* 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 *Osmoxylon mariannense* and ongoing conservation efforts.

Threat	Listing Factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat and herbivory	A, C	Ongoing	Partially: Fenced enclosures protect outplantings from browsing.
Agricultural and urban development	A	Ongoing	Partially: Fenced individuals for protection from road maintenance at Sabana.
Invertebrate predation or herbivory	C	Ongoing	No
Rodent predation or herbivory – Rats	C	Ongoing	No
Slug herbivory	C	Ongoing	No
Inadequacy of existing regulatory mechanisms	D	Ongoing	No
Typhoon	E	Ongoing	No
Established invasive plant species competition	E	Ongoing	No
Low numbers	E	Ongoing	Partially: Captive propagation for translocation and reintroduction.
Climate change	A, E	Increasing	No

Synthesis:

Currently, there is only 1 known population, with a total of 2 naturally occurring and 133 outplanted individuals. Fruit collection, propagation, and outplanting are ongoing. There is some protection from ungulates through fencing efforts.

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.

Osmoxylon mariannense is a long-lived small tree. 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, saplings), with a minimum of 25 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are no populations of 25 reproducing individuals, and while genetic storage may be complete (Table 1), not all threats are being managed (Table 2). Therefore, *Osmoxylon mariannense* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

With the historically-known wild population being so small, and the status of those trees being so poorly known today, all previously recommended future actions remain in effect, with a few additions or modifications:

- Surveys / inventories – Resurvey the historical range of the species to determine if previously unknown or newly reestablished populations exist.
 - Conduct surveys for *Osmoxylon mariannense* in potentially suitable habitat on Rota that may have been overlooked previously.
 - Inventory all remaining individuals (wild and propagated) to assess survival, noting observable conditions or factors that appear to be accelerating the senescence or mortality of individual plants.
- Continue propagation and outplanting programs to establish *Osmoxylon* in a range of locations, particularly within the known historic distribution around the Mount Sabana plateau on Rota.
 - Continue to collect cuttings or seeds from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
 - Continue to collect seeds from all existing populations and send to at least two or three different venues for propagation and storage.
 - Evaluate seed viability under storage conditions, and develop protocols for effective storage parameters for propagation programs.
- Ungulate enclosure – Continue to construct and maintain ungulate-proof fenced enclosures around the remaining individuals or populations.
- Other currently-recognized herbivory concerns: develop and implement control programs for slugs and rodents (rats), at least within localized areas around established wild or outplanted trees.
- Threats research:
 - Conduct research to determine the impact of invertebrates on *Osmoxylon mariannense* populations.
 - Conduct research on methods to control invertebrates, if necessary.
 - Develop and implement an invertebrate control and /or eradication program, if necessary.

- Established invasive plant species control – Control invasive introduced plant species around all populations.
- Mitigation of risks from potential disturbance factors:
 - Evaluate whether there is evidence of typhoons being a significant risk factor for this species, at least in the current state of very limited population. If this is judged to be the case, develop and implement effective measures to mitigate the impact of typhoons, such as establishing multiple and relatively widely-distributed populations, to improve resiliency at the species level.
 - Maintain fencing around individuals on the Sabana, as well as those that might be harmed by highway maintenance.
 - Work with local DPW to ensure that road construction and maintenance activities do not harm existing individuals.
- Population biology research: Identify the pollination mechanisms for the species, including flowering periods, specific pollinators, and other factors.
- General outreach:
 - Develop public outreach programs to inform residents of Rota of the importance of native species and their habitat.
 - Work with private landowners to help them conserve this species on their property.
- 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 *Osmoxylon*.
- Assess the modeled effects of climate change on this species, for which records of historic distribution suggest a very restricted elevational—and thus, areal—range on Rota. Consider trends suggested by available climate models when evaluating future landscape needs for the recovery of the species.
- Regulatory protections – Work with CNMI authorities to ensure that federal and local regulations provide the necessary protections to support the recovery of *Osmoxylon mariannense*, 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 a need to update the plan to more effectively attain recovery goals.

References:

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- Manglona, J. 2016. Rota Rare Plants Project (Partners for Fish and Wildlife Program Grant F14AC00510), August 26, 2016 Progress Report.
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- Wiles, G. 1998. *Osmoxylon mariannense*. The IUCN Red List of Threatened Species 1998:e.T35037A9907707. <http://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T35037A9907707.en>. Downloaded on 12 December 2016.

Personal communications:

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- Manglona, James. 2016. Forester, CNMI Forestry, and Rota Rare Plants Project lead. In-person interviews on August 26 and October 14, 2016. Subject: Propagation & native regeneration of *Serianthes nelsonii*, *Osmoxylon mariannense*, and *Nesogenes rotensis*.
- Taisacan, Estanislao. 2016. Retired CNMI field biologist, and Rota Rare Plants Project participant. In-person interview on September 1, 2016. Subject: Field knowledge of *Serianthes nelsonii*, *Osmoxylon mariannense*, and *Nesogenes rotensis*.

Ulloa, Robert. 2016. CNMI Division of Fish & Wildlife field biologist. Telephone interview on October 14, 2016. Subject: Field knowledge of wild *Osmoxylon mariannense* occurrences.

