5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Neraudia sericea* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 77 Species in Oregon, Washington, Idaho, and Hawaii. Federal Register 86(120):33726–33728, June 25, 2021.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, Acting Recovery 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 (PIFWO) of the U.S. Fish and Wildlife Service (Service) beginning in October 2022. The review was based on a review of current, available information since the last 5-year review for *Neraudia sericea* (USFWS 2018). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Acting Recovery 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/ecp/species/2237*).

Review Analysis:

Please refer to the previous 5-year reviews for *Neraudia sericea* published in the Federal Register on August 28, 2012, and October 23, 2018 (available at *https://ecos.fws.gov/docs/tess/species_nonpublish/1977.pdf* and *https://ecos.fws.gov/docs/tess/species_nonpublish/2651.pdf*) for a complete review of the species' status, threats, management efforts, and references cited. We are not aware of any significant new information regarding the species' biological status since listing to warrant a change in the Federal listing status of *N. sericea*.

This short-lived dioecious perennial shrub in the Urticaceae (nettle) family is endangered and occurs on Maui and Moloka‘i and is historically known from Lāna‘i and Kaho‘olawe. The status and trends for *N. sericea* are provided in the tables below.

New Status Information:

- Numbers of wild individuals continue to decline on Mauna Kahālāwai and Haleakalā (west and east Maui) and Molokaʻi, although new individuals were recently found on Mauna Kahālāwai at Panaʻewa (1) and Honokōhau (3) and on Haleakalā at Manawainui Gulch (2) (Maui Plant Extinction Prevention Program [Maui PEPP] 2021, 2023; Oppenheimer 2023, pers. comm.). Currently, there are approximately eight wild individuals at five locations on Mauna Kahālāwai and Haleakalā, and nine wild individuals at one location on Molokaʻi (Maui PEPP 2021, 2023; Coelho and Adams 2019a, 2019b; Oppenheimer et al 2016; Oppenheimer and Bustamente 2013).
- Currently, there are four founders (wild plants) from four populations on Mauna Kahālāwai and Haleakalā represented in *ex situ* storage and propagation, and nine founders from one population on Molokaʻi represented in *ex situ* storage and propagation.

New Threats:

- None reported.

New Management Actions:

- Surveys and monitoring—Maui PEPP surveys for and monitors the populations of *Neraudia sericea* on Mauna Kahālāwai and Haleakalā, and the Molokaʻi PEPP (MoPEPP) monitors populations on Molokaʻi (Coelho and Adams 2019a, 2019b; Maui PEPP 2017-2023; Oppenheimer et al 2016; Oppenheimer and Bustamente 2013; PEPP 2019a).
- Ungulate monitoring and control—The state's Department of Land and Natural Resources-Division of Forestry and Wildlife (DLNR-DOFAW) established the Nakula Natural Area Reserve (Nakula NAR) on lands at Kahikinui (Haleakalā) in 2011 to protect native koa forest and bird and bat habitat, including habitat for *Neraudia sericea* at Waiʻōpai (DLNR-DOFAW 2015, entire). The Kahikinui Forest Reserve management plan addresses management of Nakula NAR including maintenance of the 2,676-acre (1,083-hectare) exclosure (DLNR-DOFAW 2021, p. 45). After removal of more than 700 feral ungulates from the exclosure, habitat recovery was observed including natural regeneration of the keystone tree species of native koa (*Acacia koa*) (DLNR-DOFAW 2021, p. 45). In addition, an exclosure on private land adjacent to the NAR protects translocated populations of *N. sericea* from Waiʻōpai to Manawainui Gulch (Oppenheimer 2023, pers. comm.).
- Invasive nonnative plant monitoring and control—Maui PEPP controls nonnative plants at translocated populations at Waiʻōpai and at a wild population at Panaʻewa (Maui PEPP 2018, 2019, 2021, 2023).
- Collection and propagation for genetic storage and translocation—
  - Maui PEPP collected cuttings from translocated individuals at Waiʻōpai, Launiupoko, Panaʻewa, and Honokōhau (Maui PEPP 2017, 2021, 2023). In 2019, PEPP collected 129 seeds from one founder at Manawainui Gulch (PEPP 2019a, p. 157).
  - Lyon Arboretum Seed Conservation Laboratory reported storage of a collection of 17 seeds produced by a 1st-generation plant from a cutting

representing one founder at Launiupoko; storage of 910 seeds produced by wild and F1 plants (from cuttings) of one founder at Manawainui Gulch; and 41 seeds representing two founders at east Mākolelau (Molokaʻi) (Lyon Arboretum 2022).
    - The National Tropical Botanical Garden reported storage of 1,259 seeds representing one founder at Mākolelau and three 1st generation plants sourced from an unspecified location on Molokaʻi. The viability of these collections from 1991, 1995, and 2002 is unknown (NTBG 2022).
    - Between 2019 and 2022, the Olinda Rare Plant Facility (ORPF) reported propagation of 7 plants representing 6 founders at Makolelau (1 remains in storage); 36 plants representing 3 founders at Mokomoko (Kalae, none remain); more than 100 plants representing 3 founders at Manawainui (none remain); 9 plants representing 1 founder at Iao (9 remain), 1 plant representing 1 founder at Lihau (1 remains); and 1 plant representing 1 founder at Panaʻewa (1 remains) (ORPF 2023). In summary, 18 founders were represented in propagation; however, currently there are only plants representing 1 founder from Molokaʻi and 3 founders from Mauna Kahālāwai in storage (ORPF 2023).
- Translocation and augmentation—Maui PEPP translocates individuals and augments populations on Haleakalā and Mauna Kahālāwai (Oppenheimer 2023, pers. comm.). Since the last 5-year review, at least 73 individuals were outplanted at Manawainui Gulch and Waiʻōpai on Haleakalā and 31 individuals were outplanted at Olowalu, Launiupoko, and Kauaʻula on Mauna Kahālāwai (Maui PEPP 2017-2023). Currently, most of those individuals survive on Haleakalā, but only five survive on Mauna Kahālāwai (Maui PEPP 2021). Two translocated subpopulations at Olowalu (Mauna Kahālāwai) were destroyed in landslides resulting from a storm (PEPP 2019b, p. 15). The current status of translocations in 2016 at Kawela (5) and Kalae (Mokomoko) (2) on Molokaʻi are unknown. (PEPP 2018, p. 30; Coelho 2016, Bakutis and Coelho 2016).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1994 (listing)	>50–100	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

2012 (5-year review)	22 (Molokaʻi) 5 (Maui)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2018 (5-year review)	ca 16 (Molokaʻi) ca 14 (Maui)	ca 100, ca 60 remain	All threats managed in all 3 populations	No
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 100 mature individuals each	No
2023 (5-year review)	9 (Molokaʻi) ca 8 (Maui)	>100, ca <80 survive	All threats managed in all 3 populations	Partially, translocated individuals on Maui within exclosures at Kaua‘ula, Wai‘ōpai, and Manawainui Gulch and on Moloka‘i at Mākolelau; nonnative plant control at Wai‘ōpai and Pana‘ewa
			Complete genetic storage	Partially
			Natural reproduction at all 3 populations	Unknown

			3 populations with 100 mature individuals each	No

* The Preventing Extinction Stage was established in 2011. Prior to 2011, the Interim Stabilization Stage was the first stage towards recovery (now it is the second stage after Preventing Extinction).

Table 2. Threats to *Neraudia sericea* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, translocated individuals on Maui within exclosures at Kauaʻula, Waiʻōpai, and Manawainui Gulch and on Molokaʻi at Mākolelau
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plant control at Waiʻōpai and Panaʻewa
Degradation and destruction by landslides	A	Ongoing	None
Degradation and destruction by drought	A	Ongoing	None
Degradation and destruction by fire	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Predation and herbivory by ungulates	C	Ongoing	Partial, translocated individuals on Maui within exclosures at Kauaʻula, Waiʻōpai, and Manawainui Gulch and on Molokai at Mākolelau
Predation and herbivory by rodents	C	Ongoing	None
Predation and herbivory by invertebrates	C	Ongoing	None

Reduced viability due to low numbers	E	Ongoing	Partial, collection of seeds and cuttings, propagation, and translocation

Synthesis:
Currently, there are eight wild individuals of *Neraudia sericea* on Maui and nine on Molokaʻi. Exclosures at three populations on Maui and one population on Molokaʻi provide some protection from habitat destruction and herbivory by feral ungulates. There is some invasive nonnative plant control at two translocated populations on Maui. Four founders from Maui and one founder from Molokaʻi are represented in *ex situ* collections. Augmentation or translocation of individuals is ongoing on Haleakalā and Mauna Kahālāwai (east and west Maui), and on Molokaʻi. However, no recruitment has been reported.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Recovery Plan for the Multi-Island Plants (U.S. Fish and Wildlife Service 1999) and have been updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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.

Neraudia sericea is a short-lived dioecious perennial shrub. 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 that are well managed. In addition, a minimum of a total of three populations should be documented on one or more islands where they now occur or occurred historically (Maui, Molokaʻi, and Lānaʻi) and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met as there are no populations of at least 100 mature individuals, and only 13 founders from Maui and Molokaʻi are represented in collections (Table 1). Threats, including feral ungulates, landslides, drought, and rodent and invertebrate predation or herbivory, are not sufficiently managed throughout the range of the species (Table 1, Table 2). Therefore, *Neraudia sericea* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No significant new information regarding the species' biological status has been reported since the last 5-year review in 2018. Thus, the following recommendations for future actions are added or reiterated for the 5-year review for 2023.

- Surveys and inventories—Continue to survey for additional populations of *Neraudia sericea* in current and historical range on Maui and Molokaʻi and in areas of potentially suitable habitat on Lānaʻi for a thorough assessment of the species' status.
- Ungulate monitoring and control—Continue to construct and maintain exclosures and remove all feral ungulates from the exclosures to protect *N. sericea* from their negative impacts.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *N. sericea*, at all populations.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and determine future landscape needed for its recovery.
- Rodent monitoring and control—Implement effective control measures for predation and herbivory by rodents at all populations.
- Invertebrate monitoring and control—Develop and implement effective control methods for the black twig borer and slugs.
- Captive propagation for genetic storage and reintroduction—
    - Continue collection of genetic resources for storage, propagation, and translocation into protected suitable habitat within historical range.
    - Continue to experiment with alternate methods of propagation (e.g., cuttings, air-layering, and tissue culture).
- Translocation and augmentation—Continue population augmentation and translocation of individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase numbers of populations and individuals throughout historic range to reduce impacts of ungulate and rodent and invertebrate predation, and low numbers.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this taxon.

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[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

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[Maui PEPP] Maui Plant Extinction Prevention Program. 2017-2023. Maui Nui plant species monitoring reports, 2017-2023. Excel data tables.

[NTBG] National Tropical Botanical Garden. 2022. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Neraudia sericea* (no common name)

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review:

_____ Delisting
_____ Reclassify from Endangered to Threatened status
_____ Reclassify from Threatened to Endangered status
__X__ No Change in listing status

For **Field Supervisor, Pacific Islands Fish and Wildlife Office**

LAUREN WEISENBERGER Digitally signed by LAUREN WEISENBERGER Date: 2023.08.23 16:25:30 -10'00'

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