5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Argyroxiphium sandwicense* subsp. *sandwicense* (Mauna Kea silversword, ʻāhinahina)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Nevada, Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands. Federal Register 88(56):17611–17614, March 23, 2023.

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, PIFWO
Megan Laut, Recovery Program 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 2024. The review was based on a review of current, available information since the last 5-year review for *Argyroxiphium sandwicense* subsp. *sandwicense* (USFWS 2020). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/262*).

Review Analysis:

Please refer to the previous 5-year reviews for *Argyroxiphium sandwicense* subsp. *sandwicense* published in the Federal Register on August 28, 2012 and September 30, 2020 (available at *https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1994.pdf* and *https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3159.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 *A. sandwicense* subsp. *sandwicense*.

This perennial monocarpic herbaceous rosette shrub in the Asteraceae (sunflower) family is endangered and is known from the island of Hawai‘i. The status and trends for *Argyroxiphium sandwicense* subsp. *sandwicense* are provided in the tables below.

New Status Information:

- In 2019, there were 11 fenced individuals at the Mauna Kea East Slope site (Plant Extinction Prevention Program [PEPP] 2019–2024). The fenced reintroduction site at Waipāhoehoe Gulch was monitored in 2018 (PEPP 2019–2024). An additional reintroduction site at Waipāhoehoe Gulch was established in 2021 (PEPP 2021, p. 11). The fenced population at Pōhakuloa Gulch (Mauna Kea Summit Region) was monitored and achenes collected in 2018 (PEPP 2019–2024). The current status of the fenced population consisting of two wild individuals in 2012 and additional reintroduced plants at the Mauna Kea Ice Age NAR is uncertain (PEPP 2019–2024). In summary, at least 13 wild plants remain at two locations.
- A controlled breeding program secures genetic representation of two wild populations, with seeds produced from crosses representing at least 15 wild plants.

New Threats:

- None reported.

New Management Actions:

- Monitoring—Wild and reintroduced populations are monitored by PEPP (PEPP 2024, pp. 5, 13).
- Ungulate control—PEPP monitors fencing and completed the addition of skirting on one fence where ungulate ingress was a problem (PEPP 2022, p. 6).
- Rodent monitoring and control—PEPP installed rat traps where achene predation was observed (PEPP 2022, p. 7; PEPP 2023, p. 5).
- Captive propagation for genetic storage and reintroduction—
    - Between 2005 and 2021, the Lyon Arboretum Seed Conservation Laboratory reported collection and storage of more than 612,000 seeds/achenes representing 11 founders (wild and reintroduced) at Waipāhoehoe Gulch and Pu‘ukaiwiiwi, 4 founders at Waipāhoehoe Gulch (wild and reintroduced), and 6 founders (wild) at Pōhakuloa Gulch (Lyon Arboretum 2024). The achenes result from a mixture of open-pollinated and hand-pollinated flowers within a breeding program.
    - In 2024, the Volcano Rare Plant Facility (VRPF) reported storage of 21,000 seeds representing various collections at Pōhakuloa Gulch, and 49,000 seeds representing various collections at Waipāhoehoe Gulch. Many are the results of a breeding program (VRPF 2024).
    - PEPP collects achenes for storage (PEPP 2022, p. 16).
    - The Center for Mauna Kea Stewardship propagates *Argyroxiphium sandwicense* subsp. *sandwicense* at their high elevation nursery for reintroduction (Keir, M. pers. comm. 17 JUN 2025).
- Reintroduction and translocation—
    - Approximately 12,000 immature plants were translocated to a site at Waipāhoehoe Gulch, with a current survival rate of at least 76 percent (PEPP

2021, p. 11). This site is monitored closely for success and possible recruitment.

- PEPP reintroduced six individuals to Pu‘ukaiwiiwi and 32 individuals to Waipāhoehoe Gulch (PEPP 2024, p. 9).

Table 1. Status and trends of *Argyroxiphium sandwicense* subsp. *sandwicense* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b show progress according to Preventing Extinction Goals.

Table 1a.

Date	No. wild individuals	No. Outplanted	Downlisting Criteria Identified in Recovery Plan	Downlisting Criteria Completed?
1986 (listing)	110	Small number	3 large sites on Mauna Kea	No
			Expanding population structure	No
			Genetically diverse	No
			All known extant populations protected	No
			No immediate threats	No
2012 (5-year review)	38	457	3 large sites on Mauna Kea	Partially, 1 large population at Waipāhoehoe
			Expanding population structure	No
			Genetically diverse	Yes
			All known extant populations protected	Partially, exclosures constructed
			No immediate threats	Partially

Table 1b.

Date	No. wild individuals	No. Outplanted	Preventing Extinction Criteria Identified by HPPRCC*	Preventing Extinction Criteria* Completed?
2020 (5-year review)	16	13,460	All threats managed in all 3 populations	Partially, 1 population fenced
			Complete genetic storage	Complete for 3 populations
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partially, recruitment observed at 1 site
			3 populations with 200 mature individuals each	No, 2 small remnant populations + outplants
2025 (5-year review)	13	12,000, 6, and 32 individuals reintroduced to 3 sites	All threats managed in all 3 populations	Partially, 3 populations at least partly fenced
			Complete genetic storage	Partial
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partial
			3 populations with 200 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 *Argyroxiphium sandwicense* subsp. *sandwicense* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Climate change degradation or loss of habitat including drought	A	Ongoing	Partial, monitoring populations for drought stress
Ungulate predation and herbivory	C	Ongoing	Partial, 3 populations at least partly fenced
Rodent predation and herbivory	C	Ongoing	Partial, rodent control at 1 or more populations
Invertebrate predation and herbivory	C	Ongoing	None
Lack of adequate hunting regulations	D	Ongoing	Partial, 3 populations at least partly fenced
Competition by nonnative invasive plant species	E	Ongoing	None, no nonnative invasive plant control reported
Lack of pollinators	E	Ongoing	Partial, research ongoing for *A. s.* subsp. *macrocephalum*
Hybridization	E	Ongoing	None
Reduced viability due to low numbers, high seedling mortality, and need for outcrossing	E	Ongoing	Partial, seed collection, breeding program, propagation, and reintroduction

Synthesis:
Currently, there are approximately 13 mature wild individuals of *Argyroxiphium sandwicense* subsp. *sandwicense* in three populations. Three reintroduced populations are partially protected from feral ungulates by fencing. Seed collection, hand-pollination, propagation, and reintroduction are ongoing using breeding programs. Survival rates of reintroduced populations are as high as 76 percent; recruitment has been observed.

Preventing extinction, interim stabilization, downlisting, and delisting objectives are provided in the Hawai‘i and Pacific Plants Recovery Coordinating Committee’s Revised Recovery Objective Guidelines (HPPRCC 2011). 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.

Argyroxiphium sandwicense subsp. *sandwicense* is a perennial, monocarpic herbaceous shrub, and an obligate outcrosser. It takes years to mature, when it then flowers, produces achenes, and dies. 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 the island of Hawai‘i where the species occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 200 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic representation is nearly complete, there is difficulty determining reproductive success due to its monocarpic life history. In addition, not all threats are being managed (Tables 1a, 1b, Table 2). Therefore, *Argyroxiphium sandwicense* subsp. *sandwicense* 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 2020. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2025.

- Surveys and monitoring—
  - Continue to survey historical range for a thorough assessment of this subspecies' status.
  - Continue to monitor wild and reintroduced populations especially regarding recruitment.
- Ungulate monitoring and control—Continue to maintain and modify exclosures as needed to prevent ingress by feral ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *Argyroxiphium sandwicense* subsp. *sandwicense* at all populations.
- Climate change adaptation strategy—Continue to research the suitability of habitat for reintroduction of this species in the future due to the impacts of climate change, including drought.
- Predator and herbivore monitoring and control—
  - Continue to implement effective control methods for rodents.
  - Continue to research the effects of nonnative invertebrates and implement effective control measures if necessary.
- Captive propagation for genetic storage and reintroduction—
  - Continue collections and propagation efforts, including managed breeding programs, for maintenance of genetic stock and for reintroduction.
  - Develop and implement effective measures to reduce impacts of collection.
- Reintroduction and translocation—Continue to augment wild populations and reintroduce individuals into suitable managed habitat to increase species' viability for resiliency, redundancy, and representation.
- Population biology research—
  - Continue to investigate techniques to improve seed and seedling viability to improve natural recruitment.

    - Research methodology to use in assessing the suitability of reintroduction sites.
- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit this subspecies.

References:

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

Lyon Arboretum. 2024. 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.

[PEPP] Plant Extinction Prevention Program. 2019–2024. Plant Extinction Prevention Program fiscal years 2019 to 2024 interim performance report (October 1, 2018-September 30, 2024). U.S. Fish and Wildlife Service CFDA Program $15.657 Endangered Species Conservation—Recovery Implementation Funds, Cooperative Agreement: F18AC00502 (Final performance report), University of Hawaii at Manoa, Pacific Cooperative Studies Unit. 105 pp.

[PEPP] 2021. Plant Extinction Prevention Program fiscal year 2021 interim performance report (October 1, 2020-September 30, 2021), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 46 pp.

[PEPP] 2022. Plant Extinction Prevention Program fiscal year 2022 interim performance report (October 1, 2021-September 30, 2022), Cooperative Agreement F19AC00532 (Interim report), U.S. Fish and Wildlife Service CFDA Program #15.657 Endangered Species Conservation—Recovery Implementation Funds, University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 50 pp.

[PEPP] 2024. University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit. Plant Extinction Prevention Program Fiscal Year 2024 Interim Performance Report (October 1, 2023-September 30, 2024), Cooperative Agreements F19AC00532, F22AC02205, F23AC01766. 56 pp.

[USFWS] U.S. Fish and Wildlife Service. 2012. *Argyroxiphium sandwicense* subsp. *sandwicense* (Mauna Kea silversword, ‘āhinahina) 5-year review summary and evaluation. Pacific Islands Fish and Wildlife Office, Honolulu. 7 pp.

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[USFWS] 2020. *Argyroxiphium sandwicense* subsp. *sandwicense* (Mauna Kea silversword, ʻāhinahina) 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. 8 pp. *https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3159.pdf*.

[USFWS] 2023. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 133 Species in Oregon, Washington, Idaho, Montana, California, Nevada, Hawaii, Guam, and the Commonwealth of the Northern Mariana Islands. Federal Register 88(56):17611–17614, March 23, 2023.

[VRPF] Volcano Rare Plant Facility. 2024. 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, Hawaiʻi.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Argyroxiphium sandwicense* subsp. *sandwicense*
(Mauna Kea silversword, ʻāhinahina)

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**

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