

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Argyroxiphium kauense* (Mauna Loa (Ka‘ū) silversword)

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 kauense* (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/1069>).

Review Analysis:

Please refer to the previous 5-year reviews for *Argyroxiphium kauense* published in the Federal Register on July 21, 2009; July 23, 2015; and September 30, 2020 (available at https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1389.pdf; https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2259.pdf; and https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3158.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. kauense*.

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

New Status Information:

- The following information was provided in the annual reports from 2020 through 2024 for Hawai‘i Volcanoes National Park (HAVO 2020, 2021, 2022, 2023, 2024), the Plant Extinction Prevention Program’s (PEPP) database (PEPP 2019–2024), and the Hawaiian Silversword Foundation (Robichaux 2020, 2021, 2023, 2024). There are currently six sites where there are occurrences of wild and/or reintroduced individuals of *Argyroxiphium kauense* (Hawai‘i Volcanoes National Park 2024; Plant Extinction Prevention Program 2019–2024; Robichaux 2020, 2021, 2023, 2024). At Kahuku East-Keāpōhina there are 345 wild mature individuals, 2,845 seedlings, and 113 reintroduced plants, 33 of which were observed flowering followed by achene collections. At Kahuku East-Kilohana to Kahuku-Kapāpala there are 392 reintroduced plants (a 73 percent survival rate), with 155,000 to 165,000 achenes sowed in the area. At Mauna Loa Strip Road including Kīpukakulālio there are 273 reintroduced plants, 950 seedlings, 40 flowering plants with achene collections, and distribution of more than 15,000 achenes in the area. At Kūlanī there are 5 mature and approximately 1,000 immature plants. At Waiākea Upper there are 76 wild plants, approximately 200 first generation seedlings, and some collections from previously flowering plants.

New Threats:

- None reported.

New Management Actions:

- Monitoring—Wild populations and reintroduction areas are monitored annually (HAVO 2020, 2021, 2022, 2023, 2024; Robichaux 2020, 2021, 2023, 2024). In 2024, PEPP raised the level of concern for this species to “POP” meaning a “potential PEPP” ranking, with more population surveys to follow to better determine its status.
- Ungulate control—An enclosure was constructed at Kilohana encompassing 19 acres (7.7 hectares) (HAVO 2022). The fence at Waiākea Upper was retrofitted to 6 feet (1.8 meters) (PEPP 2019–2024).
- Drought monitoring and control—A water catchment was installed for the Kilohana to Kahuku-Kapāpala boundary area (HAVO 2021).
- Captive propagation for genetic storage and reintroduction—
 - Kahuku East-Kilohana to Kahuku-Kapāpala—Three stunted plants were removed from Kilohana and transferred to the greenhouse for propagation (HAVO 2020). In 2024, the Volcano Rare Plant Facility (VRPF) reported approximately 13,500 seeds collected from 2010 to 2016 representing the remnant wild population at Kahuku and 2,000 seeds in a collection representing managed breeding of plants at Kilohana. In 2024, HAVO reported collection and storage of 16,160 seeds from Kilohana.

- Kapāpala Upper—In 2024, the VRPF reported 16,000 seeds in a collection representing managed breeding of plants at Kapāpala.
- Waiākea Upper—Achenes were collected from 12 wild and 4 outplanted individuals at Waiākea Upper (PEPP 2019–2024). In 2024, the Lyon Seed Conservation Laboratory reported 19 of 20 founders at Waiākea were represented by more than 39,000 seeds collected, 2,800 withdrawn, and currently more than 37,000 in storage. VRPF reported 1,000 seeds representing 16 lines of managed breeding at Waiākea (VRPF 2024). Also in 2024, HAVO reported storage of 193,338 seeds and propagation of 353 plants all representing multiple founders (HAVO 2024b).
- Mauna Loa Strip Road, Kīpukakulalio—Hand-pollination of flowering plants was conducted at Kīpukakulalio (HAVO 2022, 2023, 2024a). As of 2024, HAVO collected and stored 172,690 seeds and propagated 67 plants (HAVO 2024b).
- Kūlani—Five reintroduced plants at Kūlani are represented by more than 19,000 seeds stored and 500 withdrawn for propagation (Lyon Arboretum 2024).
- Reintroduction and translocation—
 - Kahuku East-Keāpōhina—In 2020, there were 5,894 reintroduced individuals surviving. In 2023, achenes were collected from 11 plants and broadcast widely at Keāpōhina (HAVO 2023; PEPP 2019–2024; Robichaux 2023).
 - Kahuku East-Kilohana to Kahuku-Kapāpala—In 2021, approximately 140,000 to 150,000 achenes were sowed into the enclosure sourced from the reintroduced population at Kīpukakulalio (Robichaux 2020, 2021). Also in 2021, there were 26 reintroduced individuals at each of three sites (78 total). In 2022, more than 15,000 achenes were broadcast into six plots, and an additional 252 individuals were outplanted (for 330 total outplants) (Robichaux 2023). The initial survival rate was 95 percent (Robichaux 2021, 2022). At least 30 seedlings recruited from the sowed seeds (Robichaux 2021, 2022). By 2023 there were hundreds of seedlings observed, but with low survival rates. In 2024, an additional 62 plants were reintroduced (for a total of 392) with a 73 percent survival rate and lower vigor observed (Robichaux 2024; HAVO 2024).
 - Mauna Loa Strip Road, Kīpukakulalio—In 2020, 20 outplants were observed flowering and achenes from 19 of those plants were broadcast. In 2021, there were 578 seedlings and 165 surviving outplants. An additional 221 individuals were outplanted and 113 dead plants were observed that likely flowered in 2020. There were 197 recruits observed. In 2021 and 2022, no flowering was observed, and no new achenes were collected (Robichaux 2021, 2022). Many recruited second generation plants were large and flowering is anticipated in 2023 to 2024 (Robichaux 2021, 2022). In 2023, two plants flowered and hand-pollination of flowers was conducted (Robichaux 2023). In 2023, achenes resulting from hand-pollination were collected and stored at HAVO’s seed bank (Robichaux 2023). In 2024, 18 outplants flowered, 175 recruits were observed, and more than 15,000 achenes were dispersed into the area.

- Waiākea Upper—In 2022, there were 60 immature plants and 200 seedlings counted in the second site as a result of multiple direct sowings of achenes from the first site (PEPP 2019–2024).

Table 1. Status and trends of *Argyroxiphium kauense* 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	Stability Criteria Identified in Recovery Plan	Stability Criteria Completed?
1993 (listing)	~540	18	10 large, widespread populations of 2,000 individuals each	No
			Population structure expanding with consistent regeneration occurring	No
			Population genetically diverse	No
			All threats controlled	No
2009 (5-year review)	~1,000	24,000+	10 large, widespread populations of 2,000 individuals each	No
			Population structure expanding with consistent regeneration occurring	No
			Population genetically diverse	Yes
			All threats controlled	No
2015 (5-year review)	40	11	10 large, widespread populations of 2,000 individuals each	Partially
			Population structure expanding with consistent regeneration occurring	No
			Population genetically diverse	Yes
			All threats controlled	Partially

Table 1b.

Date	No. wild individuals	No. Outplanted	Preventing Extinction Criteria Identified by HPPRCC*	Preventing Extinction Criteria* Completed?
2020 (5-year review)	ca 57	ca 695 + achene sowing	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially, awaiting maturation
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partially, recruitment at 2 sites
			3 populations with 200 mature individuals each	No, reintroduction of immature plants
2025 (5-year review)	ca 400	>778 2,000+ seedlings/recruits	All threats managed in all 3 populations	Partially, 3 populations fenced
			Complete genetic storage	Partially, >20 founders represented + managed breeding of 2 populations
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Recruitment observed from seed sowing but low survival rate
			3 populations with 200 mature individuals each	Difficult to determine due to monocarpic life history

*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 kauense* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat and herbivory by feral ungulates	A, C	Ongoing	Partial, 3 populations fenced
Established ecosystem altering invasive plant species degradation of habitat	A, E	Ongoing	Partial, some nonnative invasive plant control efforts in fenced areas
Degradation and destruction by drought	A	Ongoing	Partial, water catchment installed at 1 population
Degradation and destruction by lava flows	A	Potential	None
Climate change degradation or loss of habitat	A	Ongoing	None
Illegal collections and over-visitation	B	Ongoing	Partial, plantings for public viewing established
Rodent predation and herbivory	C	Ongoing	None
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroduction
Loss of pollinators	E	Ongoing	Partial, cross-pollination and breeding programs for viable seed production

Synthesis:

Currently, there are approximately 400 wild individuals of *Argyroxiphium kauense* in three populations, all with observed recruitment from seed sowing. Three reintroduced populations are provided protection from feral ungulates by fencing. Some nonnative invasive plant control is conducted within exclosures. Seed collection, hand-pollination, propagation, and reintroduction are ongoing using breeding programs. Survival rates of reintroduced populations vary from less than 15 percent to greater than 70 percent. Recruitment and regeneration have been observed; where recruits have grown and reproduced. One site observed more than 1,000 seedlings. However, survivorship is limited and population trends are uncertain considering the monocarpic reproduction.

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 kauense is a perennial, monocarpic herb, and an obligate outcrosser. Individuals on average take 15 years to flower, produces achenes, and then die. 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. Although genetic storage collections are significant, there is difficulty in obtaining complete representation due to its monocarpic life history. There is one population totaling at least 200 individuals but with no observed recruitment. Recruitment from seed sowing is observed from at least three smaller reintroduced populations but the success rate of maturation to flowering and fruiting is variable. In addition, not all threats are being managed (Tables 1a, 1b, Table 2). Therefore, *Argyroxiphium kauense* 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 monitor known populations of *Argyroxiphium kauense* to assess resiliency and make collections.
- Ungulate monitoring and control—Continue to maintain exclosures to protect individuals from the negative impacts of feral ungulates.
- Invasive nonnative plant monitoring and control—Continue to control established ecosystem-altering nonnative invasive plant species and those that compete with *Argyroxiphium kauense* 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.
- Captive propagation for genetic storage and reintroduction—Continue collections and propagation efforts, including managed breeding programs, for maintenance of genetic stock and for reintroduction.
- Reintroduction and translocation—Continue to augment wild populations and translocate individuals into suitable managed habitat to increase species' viability for resiliency, redundancy, and representation.

- Alliance and partnership development—Continue to work with partners in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

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

[HAVO] Hawai‘i Volcanoes National Park. 2020. Annual report to the U.S. Fish and Wildlife Service threatened and endangered plants, TE-018078-21 2020. 31 pp.

[HAVO] 2021. Annual report to the U.S. Fish and Wildlife Service threatened and endangered plants, TE-018078-21 2020. 36 pp.

[HAVO] 2022. Annual report to the U.S. Fish and Wildlife Service threatened and endangered plants, TE-018078-21 2020. 38 pp.

[HAVO] 2023. Annual report to the U.S. Fish and Wildlife Service threatened and endangered plants Hawaii Volcanoes National Park ES019078. 36 pp.

[HAVO] 2024a. Annual report to the U.S. Fish and Wildlife Service threatened and endangered plants Hawaii Volcanoes National Park ES019078. 39 pp.

[HAVO] 2024b. 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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[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.

Robichaux, R. 2020. Year 1 annual performance report grant no. F20AC11233-00, Hawaiian Silversword Foundation. 3 pp.

Robichaux, R. 2022. Year 2 annual performance report grant no. F20AC11233-00, Hawaiian Silversword Foundation. 2 pp.

- Robichaux, R. 2023. Year 3 annual performance report grant no. F20AC11233-00, Hawaiian Silversword Foundation. 2 pp.
- Robichaux, R. 2024. Year 4 annual performance report grant no. F20AC11233-00, Hawaiian Silversword Foundation. 2 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2009. *Argyroxiphium kauense* (Mauna Loa (Ka‘u) silversword) 5-year review summary and evaluation. Pacific Islands Fish and Wildlife Office, Honolulu. 6 pp. https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1389.pdf.
- [USFWS] 2015. *Argyroxiphium kauense* (Mauna Loa (Ka‘u) silversword) 5-year review summary and evaluation. Pacific Islands Fish and Wildlife Office, Honolulu. 7 pp. https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/2259.pdf.
- [USFWS] 2020. *Argyroxiphium kauense* (Mauna Loa (Ka‘u) silversword) 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/3158.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.
- [USFWS and DLNR] USFWS and the Department of Land and Natural Resources. 2018. Safe Harbor Agreement, trustees of the estate of Bernice P. Bishop, DBA, Kamehameha Schools, Keauhou and Kīlauea Forest Lands, Hawai‘i Island, Hawai‘i. June 2017. 211 pp.
- [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, Hawai‘i.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Argyroxiphium kauense*
(Mauna Loa (Ka‘u) silversword)

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

Date _____