

Draft Amendment to the Recovery Plan for the Mauna Kea Silversword (*Argyroxiphium sandwicense* ssp. *sandwicense*)

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Original Prepared by: Pacific Region, U.S. Fish and Wildlife Service

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Species addressed in Draft Amendment: *Argyroxiphium sandwicense* ssp. *sandwicense* ('Ahinahina or Mauna Kea Silversword)

We have analyzed all of the best available information and find that there is a need to amend the recovery criteria for *Argyroxiphium sandwicense* ssp. *sandwicense* ('ahinahina) that have been in place since the recovery plan was completed. In this proposed modification, we discuss the adequacy of the existing recovery criteria, identify amended recovery criteria, and present the rationale supporting the proposed recovery plan modification. The proposed modification is to be shown as an appendix that supplements the recovery plan, superseding only the Recovery Criteria in the Executive Summary and the recovery objective section (page 21) of the recovery plan (USFWS 1994).

BACKGROUND INFORMATION

Recovery plans should be consulted frequently, used to initiate recovery activities, and updated as needed. A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification. Keeping recovery plans current ensures that the species benefits through timely, partner-coordinated implementation based on the best available information. The need for, and extent of, plan modifications will vary considerably among plans. Maintaining a useful and current recovery plan depends on the scope and complexity of the initial plan, the structure of the document, and the involvement of stakeholders.

An amendment involves a substantial rewrite of a portion of a recovery plan that changes any of the statutory elements. The need for an amendment may be triggered when, among other possibilities: (1) the current recovery plan is out of compliance with regard to statutory requirements; (2) new information has been identified, such as population-level threats to the species or previously unknown life history traits, that necessitates new or refined recovery actions and/or criteria; or (3) the current recovery plan is not achieving its objectives. The amendment replaces only that specific portion of the recovery plan, supplementing the existing recovery plan, but not completely replacing it. An amendment may be appropriate in cases where significant plan improvements are needed, but resources are too scarce to accomplish a full recovery plan revision in a short time.

Although it would be inappropriate for an amendment to include changes in the recovery program that contradict the approved recovery plan, it could incorporate study findings that enhance the scientific basis of the plan, or that reduce uncertainties as to the life history, threats, or species' response to management. An amendment could serve a critical function while awaiting a more comprehensive revised recovery plan by: (1) refining and/or prioritizing recovery actions that need to be emphasized, (2) refining recovery criteria, or (3) adding a

species to a multispecies or ecosystem plan. An amendment can, therefore, efficiently balance resources spent on modifying a plan against those spent on managing implementation of ongoing recovery actions.

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The Hawai'i and Pacific Plants Recovery Coordinating Committee (HPPRCC), comprising biologists from federal and state agencies, private conservation organizations, botanical gardens, and universities, was established to advise the Service on the biology and management needs for recovery of listed plants. The HPPRCC has outlined general actions and goals for stages leading towards recovery of listed Hawaiian plants (HPPRCC 2011). Current information is lacking for many Hawaiian plant species with respect to the status of the species and their habitats, breeding systems, genetics, and propagule storage options. The Service has therefore adopted downlisting and delisting criteria for Hawaiian plants based on the revised general recovery objective guidelines developed by the HPPRCC (2011).

General distinctions made by the HPPRCC that are relevant to *Argyroxiphium sandwicense* ssp. include the following:

- *Life span*: Long-lived perennials are those taxa either known or believed to have life spans greater than 10 years; short-lived perennials are those known or believed to have life spans greater than 1 year but less than 10 years; and annuals are those known or believed to have life spans less than or equal to 1 year. When it is unknown whether a species is long- or short-lived, the Service has erred on the side of caution and considered the species short-lived. This will be revised as more is learned about the life histories of these species.
- *Range size*: Narrow extant range and broad contiguous range are recognized as not needing different numbers of individuals or populations, only that the populations be distributed more narrowly or more broadly, respectively, across the landscape.
- *Reproduction strategies*: Obligate outcrossers are species that either have male and female flowers on separate plants or otherwise require cross-pollination to fertilize seeds, and therefore require equal numbers of male and female individuals contributing to reproduction, doubling the number of mature individuals needed for recovery. Species that reproduce vegetatively may reproduce sexually only on occasion, resulting in the majority of the genetic variation being between populations, therefore species dependent on vegetative reproduction require additional populations.
- *Annual population stability*: Species that fluctuate in number of individuals from year to year require a larger number of mature individuals on average to allow for a decline in years of extreme habitat conditions and recuperation in numbers in years of more normal conditions.

The following downlisting and delisting criteria were determined based on known biology of *Argyroxiphium sandwicense* ssp. *sandwicense* with consideration given to the above general guidelines. While it is a long-lived species, it is monocarpic (i.e. flowering only once before dying) (USFWS 1994). Therefore, for these purposes, it will be treated as an annual that grows, flowers, and dies, just over a longer period of time than an annual. It does not behave biologically as a long-lived perennial species that grows and flowers annually and repeatedly for over 10 years prior to dying. *A. sandwicense* ssp. *sandwicense* is also self-incompatible and

treated as an obligate outcrosser, incapable of self-pollinating to produce viable seeds (Carr *et al.* 1986). The State of Hawai'i Division of Forestry and Wildlife's botanist reviewed and confirmed these life-history traits and corresponding criteria as quantified in the peer-reviewed guidelines (HPPRCC 2011). This recovery plan amendment was written by the Pacific Islands Fish and Wildlife Office's plant recovery coordinator.

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list." Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors.

Recovery Criteria

See previous version of the recovery criteria for *Argyroxiphium sandwicense* ssp. *sandwicense* in the Executive Summary and Objectives section (page 21) of the recovery plan (USFWS 1994). The downlisting and delisting criteria were described as follows: "To be considered for downlisting, the silversword will need to occur in at least three large sites on Mauna Kea, have an expanding population structure with ample evidence of consistent and high regeneration, be genetically diverse, have all known extant populations protected, and have no immediate threats. To achieve delisting of the species, the subspecies will need to be reestablished in areas of historic abundance or other areas of maximal potential. Active genetic management may also be needed to assure long-term survival of the subspecies."

Synthesis

Argyroxiphium sandwicense ssp. *sandwicense* has only been known from a single population of approximately 30 individuals (USFWS 2012). This population currently consists of 15 individuals total at 2 locations. There are 2 smaller outplanting sites, 1 with 35 individuals and another with over 1,000. There is 1 large outplanted population with over 12,000 individuals (PEPP 2017).

All wild and reintroduced individuals are either on sheer cliffs where ungulates cannot traverse, or fenced where fences are maintained so the plants are considered protected from feral ungulates. Other documented threats, such as rodent predation, genetic consequences due to the limited number of wild individuals, invasive plants, and increased temperature and drought due to climate change remain ongoing and unmanaged (USFWS 2012).

The downlisting objectives will be superseded by the new downlisting criteria described below. The delisting objectives will remain as an addition to the new delisting criteria described below. The new criteria are aligned with standards provided based on the subspecies' life history and reproductive biology as described in HPPRCC (2011). The downlisting objective of "at least three large sites on Mauna Kea" will be replaced by the criterion of 5 to 10 populations of 2,000 individuals each. While the original downlisting objective specifies that the population needs to "have an expanding population structure", the amended criterion is that the populations need to be at least stable, and the time period for that stability is quantified for a minimum of 10 years.

The original downlisting objective of having “genetically diverse” populations has been amended to quantify “genetically diverse” by following Guerrant *et al.* (2004). The original downlisting objective lastly specifies that “all known extant populations protected, and have no immediate threats.” The amended criterion is revised to state that all major threats are controlled.

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and *A. sandwicense* ssp. *sandwicense* may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term “endangered species” means any species (species, subspecies, or distinct population segment) that is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

We provide both downlisting and delisting criteria for *Argyroxiphium sandwicense* ssp. *sandwicense*, which will supersede the downlisting objectives included in the Recovery Plan for the Mauna Kea Silversword, *A. sandwicense* ssp. *sandwicense* (USFWS 1994). The new Objectives section is now as follows: “The objective of this recovery plan is to delineate all actions necessary to achieve downlisting of the Mauna Kea silversword to threatened status. To achieve delisting of the species, the subspecies will need to be reestablished in areas of historic abundance or other areas of maximal potential. Active genetic management may also be needed to assure long-term survival of the subspecies.” The new Criteria section, which will follow the new Objective section, is provided below.

Downlisting Recovery Criteria

Argyroxiphium sandwicense ssp. *sandwicense* will be considered for downlisting when:

- 1) There are 5 to 10 populations in suitable, protected habitat with 2,000 mature individuals per population;
- 2) All major threats are controlled around the target populations;
- 3) Populations are represented in an ex situ collection as defined in the Center for Plant Conservation guidelines (Guerrant *et al.* 2004) that is secure and well managed; and
- 4) All target populations have been stable, secure, and naturally reproducing for a minimum of 10 years. Species-specific management actions may continue to be necessary.

Delisting Recovery Criteria

Argyroxiphium sandwicense ssp. *sandwicense* will be considered for delisting when:

- 1) There are 10 populations in suitable, protected habitat with 2,000 mature individuals per population;
- 2) All of the downlisting criteria have been met; and
- 3) All target populations have been stable, secure, naturally reproducing, and within secure and viable habitats for a minimum of 20 years. Subspecies-specific management actions must no longer be necessary, but an ongoing need for ecosystem-wide management actions may remain if long-term agreements are in place to continue management

These numbers are initial targets, but may be revised upward as additional information is available. An adequate population viability analysis (PVA) for *A. sandwicense* ssp. *sandwicense* should be conducted to assess needed numbers more accurately based on current management and monitoring data. Information necessary for the PVA includes: major limiting factors, breeding system, population structure and density, and proven management methods for major threats. Genetic analyses should be conducted to ensure that adequate genetic representation is present within and among populations.

All classification decisions consider an analysis of the following five factors: (1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; (3) is disease or predation a limiting factor; (4) are there inadequate existing regulatory mechanisms in place outside the Act (taking into account the efforts by states and other organizations to protect the species or habitat); and (5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the *Federal Register* and seek public comment and peer review of our analysis. Our final decision is announced in the *Federal Register*.

Rationale for Recovery Criteria

The amended recovery criteria are based on the current known biology of the species from the latest 5-year review, species expert data, and the Hawai'i and Pacific Plants Recovery Coordinating Committee's Revised Recovery Objective Guidelines (HPPRCC 2011, PEPP 2017, USFWS 2012).

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