5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Silene alexandri* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; 5-year status reviews of 46 species in Idaho, Oregon, Washington, Nevada, Montana, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 77(44):13248-13251.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Rachel Rounds, Fish and Wildlife Biologist, PIFWO
Maui Nui and Hawaii Island Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO
Kristi Young, Programmatic Deputy Field Supervisor, 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 March 6, 2012. The review was based on a review of current, available information since the last 5-year review for *Silene alexandri* (USFWS 2008). The evaluation by Rachel Rounds, Fish and Wildlife Biologist, was reviewed by the Island Team Manager and the Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

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 *Silene alexandri* published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1806.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 *Silene alexandri*.

This short-lived perennial subshrub is endangered and occurs on the island of Molokai (Plant Extinction Prevention Program [PEPP] 2013). The current status and trends for *Silene alexandri* are provided in the tables below.

New status information:
Surveys conducted by the Plant Extinction Prevention Program (2009) discovered four new individuals of *Silene alexandri* at Kewela in a population containing 17 individuals previously. In 2012, the single population contained 25 mature wild individuals of *S. alexandri* (PEPP 2012). Overall, the numbers of individuals have increased from approximately 6 individuals reported in the previous 5-year review to approximately 25 individuals in 2012 (PEPP 2012). The increase in numbers resulted from additional surveys.

New threats:

- Climate change destruction or degradation of habitat – Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Silene alexandri* is highly vulnerable to the impacts of climate change. Therefore, additional management actions are needed to conserve this taxon into the future.
- Ungulate degradation of habitat – Axis deer (*Axis axis*) populations have increased on Molokai and are now found in areas occupied by *S. alexandri* (PEPP 2011, 2013).
- Landslides and flooding destruction or degradation of habitat – The single population is threatened by landslides and erosion (PEPP 2009, 2013).
- Stochastic events – Drought mortality or reduced viability – Drought may exacerbate the effects of ungulates and has direct adverse impacts on *S. alexandri* (PEPP 2013).
- Slug herbivory – Herbivory by slugs (unidentified species) have been reported as a new threat to this species (PEPP 2012, 2013).
- Rodent predation and herbivory – Rats (*Rattus* sp.) are considered a threat to *S. alexandri* (PEPP 2010, 2012).

New management actions:

- Population viability monitoring and analysis – The Plant Extinction Prevention Program (2013) monitored the single existing population on Molokai.
- Ungulate monitoring and control
    - The East Molokai Watershed Partnership (EMWP) completed the last section of fence around the Kawela area in 2009 (EMWP 2009). The fences are monitored by the EMWP.
    - The EMWP continues to remove ungulates from the Kawela area (EMWP 2011).
- Invasive plant monitoring and control – The EMWP continues to remove invasive plants from the Kawela area (EMWP 2011).
- Fire monitoring and control – The EMWP is conducting management actions to reduce the threat of fire on the south slope of Molokai (EMWP 2008).
- Captive propagation for genetic storage and reintroduction
    - The Harold L. Lyon Arboretum's Seed Conservation Laboratory (2013) contains 8,131 seeds of *S. alexandri* in storage.

    - There are 282 propagules of *S. alexandri* in captive propagation at the Harold L. Lyon Micropropagation Laboratory (2013).
    - The National Tropical Botanical Garden (2013) has 100 seeds in storage.
- Survey / inventories – Four new individuals were discovered in 2009 at Kawela (PEPP 2009).
- Listing and critical habitat designation – A single occupied unit of critical habitat for *S. alexandri* was proposed in the lowland mesic ecosystem on Molokai (USFWS 2012). The final rule for critical habitat designations has not been published at the time of this review.

Synthesis:
Stabilizing, downlisting, and delisting objectives are provided in the Recovery Plan for the Molokai plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Silene alexandri* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (*e.g*., fenced) and be represented in an *ex situ* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on the island of Molokai. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The interim stabilization goals for this species have not been met (Table 1), as only a single population of fewer than 50 mature individuals exists, and all threats are not being sufficiently managed throughout its range (Table 2). Therefore, *Silene alexandri* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
- Ungulate monitoring and control – Maintain fencing to exclude browsing by ungulates.
- Invasive plant monitoring and control – Continue control of invasive introduced plant species within fenced areas.
- Captive propagation for genetic storage and reintroduction
    - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
    - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species' vulnerability to climate change.
- Reintroduction/translocation – Augment populations as genetically appropriate individuals become available in nurseries and as habitat is protected.
- Surveys / inventories – Survey the geographical and historical range of *Silene alexandri* for a thorough current assessment of the species' status.
- Fire monitoring and control – Develop and implement a fire management plan at the existing exclosure.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change.

- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild indivs	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1992 (listing)	Fewer than 10	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	35	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	0	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2007 (5-yr review)	6	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2012 (critical habitat - proposed)	25	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2014 (5-yr review)	25	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Table 2. Threats to *Silene alexandri* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, the population was fenced in 2007; ungulates are still being removed
Invasive introduced plants	A, E	Ongoing	Partially, EMWP conducts weed control within the fenced area
Rodent predation or herbivory – rats	C	Ongoing	None
Slugs herbivory	C	Ongoing	None
Landslides and erosion	E	Ongoing	None
Fire	E	Ongoing	Partially, EMWP working on fire management
Drought	E	Ongoing	None
Low numbers	E	Ongoing	Partially, captive propagation for genetic storage and reintroduction
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2008). Only references for new information are provided below.

[EMWP] East Molokai Watershed Partnership. 2009. FY09 end of year summary and status report, July 1, 2008 – June 30, 209. 6 pages. Unpublished.

[EMWP] East Molokai Watershed Partnership. 2008. East Molokai Watershed Partnership 2015 South slope management plan. Produced by The Nature Conservancy, Molokai Programs. August 7, 2008. 100 pages.

[EMWP] East Molokai Watershed Partnership. 2011. FY11 first quarter summary and status report. July 1, 2010 – September 30, 2010. 11 pages. Unpublished.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2013. Micropropagation database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2013. Seed storage database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

National Tropical Botanical Garden. 2013. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2012. Plant Extinction Prevention Program annual report, fiscal year 2012 (July 1, 2011-June 30, 2012). 169 pages. Unpublished.

[PEPP] Plant Extinction Prevention Program. 2013. Plant Extinction Prevention Program annual report, fiscal year 2013 (July 1, 2012-June 30, 2013). 207 pages. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 153 pages.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Silene alexandri* 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 6 pages.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Silene alexandri* (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

Appropriate Listing/Reclassification Priority Number, if applicable:_____

for **Programmatic Deputy Field Supervisor, Pacific Islands Fish and Wildlife Office**

Maile McBruegmann Date 2014-03-3