5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Stenogyne kanehoana* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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, Conservation & Restoration 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 2018. The review was based on a review of current, available information since the last 5-year review for *Stenogyne kanehoana* (USFWS 2013). The evaluation completed by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Conservation and Restoration 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/tess_public*).

Review Analysis:

Please refer to the previous 5-year reviews for *Stenogyne kanehoana* published in the Federal Register on January 18, 2008 and August 15, 2013 (available at *https://ecos.fws.gov/docs/five_year_review/doc1810.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4241.pdf*) for a complete review of the species' status, threats, and management efforts. 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 *S. kanehoana*.

This short-lived perennial scandent vine in the Lamiaceae (mint) family is endangered and endemic to O‘ahu. The current status and trends for *Stenogyne kanehoana* are provided in the tables below.

New Status Information:

- The last known wild individual at Haleʻauʻau died in 2013. Reintroduction efforts have been ongoing since 2006 (ANRP 2018).
- In 2012, three critical habitat units were designated for *Stenogyne kanehoana* in the lowland mesic ecosystem of the Waiʻanae mountains of Oʻahu (5,864 acres, 2,373 hectares) (77 FR 57648, September 18, 2012).

New Threats:

- Climate change loss 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 Hawaiʻi 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 *Stenogyne kanehoana* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.864 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- Ungulate control—All reintroductions are within fenced and managed areas; however, all fences must be monitored for ungulate incursion (ANRP 2018).
- Nonnative invasive plant control—All reintroductions are within areas managed for control of nonnative plants (ANRP 2018).
- Rodent control—The ANRP controls rats at the Mākaha management unit (ANRP 2018).
- Captive propagation for genetic storage and reintroduction—
    - The Lyon Micropropagation Laboratory reports storage of 82 explants representing one individual each from the now extirpated Haleʻauʻau and Kaluaa populations (Lyon Arboretum 2018.).
    - The Army Natural Resources Program-Oʻahu (ANRP) reports 29 plants in their nursery representing these same two individuals, , and one seed in storage from the Kaluaa individual) (ANRP 2018). Genetic storage goals have been met representing the last known wild individuals (ANRP 2018).
- Reintroductions—Plants are grown from cuttings of nursery plants and clonal material in micropropagation. Since the last 5-year review there have been approximately 570 individuals of *Stenogyne kanehoana* reintroduced into three populations (Haleʻauʻau, Kaluaa, and Mākaha), about 150 of these currently survive (ANRP 2018).

Synthesis:

Currently there are approximately 150 reintroduced individuals of *Stenogyne kanehoana* in three populations in the Waiʻanae mountains of Oʻahu. Eighty percent of these are in the more recently established Haleʻauʻau reintroduction. Some recruitment via vegetative

propagation has been observed at one reintroduction site. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *S. kanehoana* is highly vulnerable to the effects of climate change. Collection (from reintroductions and *ex situ* collections), propagation, and reintroductions are ongoing. Three areas are fenced and managed for ungulates and nonnative plants, and one area is managed for rodents. Reintroductions appear to decline fairly rapidly.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the O‘ahu Plants (USFWS 1998), and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i 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.

Stenogyne kanehoana is a short-lived perennial scandent vine. To prevent extinction, which is the first step 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. In addition, a minimum of three populations should be documented on O‘ahu where they now occur or occurred historically and each of these populations must be naturally reproducing (*i.e.,* viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. While genetic representation is complete and well maintained, there is only one population of at least 50 individuals which are all clonal outplants. Vegetative reproduction has been observed at one reintroduction site and plants continue to decline in numbers. Many but not all threats are managed (Table 1, Table 2). Therefore, *S. kanehoana* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
Other than the new data on this taxon’s vulnerability to climate change, we are not aware of any new threats. There is no significant new information regarding the species’ biological status since the last 5-year review in 2013. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2019.

- Surveys and inventories—Continue to survey geographical and historical range for a thorough assessment of the species' status.

- Ungulate monitoring and control—Continue to maintain fencing and monitor reintroduced populations to protect plants from impacts of feral ungulates.
- Invasive plant monitoring and control—
    - Continue to control established ecosystem-altering nonnative invasive plant species, and those that compete with *Stenogyne kanehoana* at all reintroduced populations.
    - Continue to avoid damaging the fern understory (*Dicranopteris linearis*, uluhe) which is needed for successful growth of *S. kanehoana*.
- Fire management—Implement fire management plans and coordinate fire response efforts.
- Climate change adaptation strategy—Assess the effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Disease—Investigate appropriate controls for powdery mildew outbreaks.
- Slug predation and herbivory—Implement effective control for slugs at all reintroduced populations.
- Captive propagation for genetic storage and reintroduction—
    - Continue seed and cuttings collections from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
    - Manage nursery collections to promote flowering. Continue research of pollination and hand pollination, including viability testing both *in situ* and *ex situ*.
- Reintroduction—
    - Continue to establish new populations and determine which sites have the highest likelihood of maintaining new introductions.
    - Implement measures to reduce the impact of hikers and military activities on populations.
- Population biology research—Study *Stenogyne kanehoana* with regard to population size and structure, geographical distribution, flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.
- Alliance and partnership development—Continue to work with the ANRP, the Division of Forestry and Wildlife, and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1992 (listing)	2–4	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	No
1998 (recovery plan)	0	Unknown	All threats managed in all three populations	No
			Complete genetic storage	Yes
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	1–6	Unknown	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2008 (5-year review)	1–2	30	All threats managed in all three populations	Partially
			Complete genetic storage	Yes
			Three populations with 50 mature individuals each	No
2012 (critical habitat)	Unknown	0	All threats managed in all three populations	Partially
			Complete genetic storage	Yes

			Three populations with 50 mature individuals each	No
2013 (5-year review)	0	9 mature, 115 immature total 124	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2019 (5-year review)	0	ca 570, 150 survive	All threats managed in all three populations	Partially
			Complete genetic storage	Yes
			Reproduction (*i.e.* viable seeds, seedlings) at all three populations	Partial
			Three populations with 50 mature individuals each	No, no reproduction and declining

* 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 after Preventing Extinction).

Table 2. Threats to *Stenogyne kanehoana* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, three areas fenced
Degradation of habitat by established ecosystem-altering invasive plant species	A	Ongoing	Partial, nonnative plant management in three areas
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan and coordinated fire management efforts
Climate change degradation or loss of habitat	A	Ongoing	None
Rodent predation and herbivory	C	Ongoing	Partial, rat control in one area
Invertebrate predation and herbivory	C	Ongoing	None
Competition with established invasive plant species	E	Ongoing	Partial, nonnative plant management in three areas
Human disturbance—Hikers and military activity			Partial, reintroductions fenced
Small population size and loss of reproductive vigor	E	Ongoing	Partial, collection, propagation and reintroduction ongoing

References:

See previous 5-year reviews for a full list of references (USFWS 2008, 2013). Only references for new information are provided below.

[ANRP] Army Natural Resource Program-O‘ahu. 2018. 2018 status report for the Makua and Oahu implementation plans. 217 pp.

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. 134 pp.

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

Lyon Arboretum. 2018. 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, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; Endangered status for 23 species on Oahu and designation of critical habitat for 124 species; final rule. Department of the Interior, Federal Register 77 (181): 57648–57862, September 18, 2012.

[USFWS] 2013. *Stenogyne kanehoana* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc4241.pdf.*

[USFWS] 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawaii, Oregon, Washington, and California. Federal Register 82(75): 18665–18668, April 20, 2017.

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

MEGAN LAUT Digitally signed by MEGAN LAUT Date: 2019.09.27 10:25:23 -10'00'

Date_____