

## **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. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

### **Lead Region/Field Office:**

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

### **Name of Reviewer(s):**

Jiny Kim, Fish and Wildlife Biologist, PIFWO

Daniel Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team  
Manager, PIFWO

Marie Brueggemann, 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 January 31, 2012. The review was based on a review of current, available information since the last 5-year review for *Stenogyne kanehoana* (USFWS 2008). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Fish and Wildlife Biologist, Islands Team Team Manager, and 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](http://ecos.fws.gov/tess_public)).

### **Review Analysis:**

Please refer to the previous 5-year review for *Stenogyne kanehoana* published on January 18, 2008 (available at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1810.pdf](http://ecos.fws.gov/docs/five_year_review/doc1810.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 *S. kanehoana*.

This short-lived shrub is endangered and occurs on the island of Oahu. The current status and trends for *Stenogyne kanehoana* are provided in the tables below.

New threats:

- Climate change - Climate change may also pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected in 2013.
- Disease – An undetermined species of powdery mildew has been identified as a new threat to *Stenogyne kanehoana* (U.S. Army Garrison 2008).

New management actions:

- Ungulate exclosures - Haleauau and Kaluaa are ungulate free.
- Captive propagation for genetic storage and reintroduction
  - Both wild founders of *Stenogyne kanehoana* are represented in genetic storage as a living collection in the greenhouse and at the Harold L. Lyon Arboretum (U.S. Army Garrison 2010; Oahu Army Natural Resources Program [OANRP] 2012a, b).
    - The Harold L. Lyon Arboretum (2012) has 98 plants of *Stenogyne kanehoana* in micropropagation.
    - OANRP (2012a) has 17 individuals of *Stenogyne kanehoana* in its nursery.
- Reintroduction / translocation
  - Plants have been cultivated in the OANRP nursery and used for reintroducing a population in Kaluaa (OANRP 2012a).
  - Survivorship was improved significantly from 2006 to 2009. The first two reintroductions had survival rates of 11 percent and 44 percent, while in 2009 the survival rate was 88 percent. Clones were planted into dense *Dicranopteris linearis* (uluhe) patches and care was taken not to damage the ferns. This approach shows promising results and some plants are currently reproducing vegetatively (U.S. Army Garrison 2009). In 2012, nine mature and 115 immature individuals survived at this site (OANRP 2012c).
- Population viability monitoring - Three factors were identified as affecting the rarity of *Stenogyne kanehoana*:
  - Vegetative reproduction of *S. kanehoana* by long, rambling stems, which may root when contacting the ground, leading to the formation of additional plants.
  - Infrequent or inconsistent flowering.
  - A large percentage of non-flowering or non-fruiting plants (U.S. Army Garrison 2008).
  - Genetic research - Leaf samples were sent to Dr. Cliff Morden at the University of Hawaii in 2010 for analysis of the genetic variation within the two founder individuals of *Stenogyne kanehoana* (U.S. Army Garrison 2010). The plant from Kaluaa is genetically distinct from those of Haleauau. There are several genetic markers distinguishing plants from these two populations.

However, these two populations are not so genetically distinct that they should not be crossed in sexual propagation. The genetic similarity among the Kaluaa plant and the 2004 Haleauau plant is about equal to the genetic similarity of the other Haleauau plants. The genetic variation present among these populations in the past is likely to have been much greater and the two populations likely were part of the same gene pool (Morden 2010).

- Threats research
  - Invasive slugs have negatively impacted the regeneration of *Stenogyne kanehoana* (U.S. Army Garrison 2010).
  - In 2009 slug control research using Sluggo, a slug and snail bait, began in the field at the Kahanahaiki population unit on U.S. Army lands (U.S. Army Garrison 2009, 2010).
  - In October 2010 Sluggo was registered for use in the State of Hawaii by the Hawaii Department of Agriculture (Joe 2011) for control of slugs and nonnative snails in forested areas for the protection of native, threatened, and endangered plants of Hawaii. However, since native snails also exist in areas where threatened and endangered plants occur, additional research is needed to find a control method that can be used in areas where native snail species co-occur with listed plants to prevent non-target species impacts from treatment.
  - Ecosystem-altering invasive plant species control - Weeds are managed in the Kaluaa population, but not in the Haleauau population (U.S. Army Garrison 2010).

**Synthesis:**

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for plants from the island of Oahu (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial.

*Stenogyne kanehoana* 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 Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

These stabilization goals for this species have not been met (Table 1), since no population contains 50 or more mature individuals. Additionally, all threats are not being sufficiently managed throughout all populations (Table 2). Therefore, *Stenogyne kanehoana* meets the definition of endangered as it remains in danger of extinction throughout its range.

## Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction
  - Collect cuttings or seed from tagged individuals, keeping close track of the maternal source for use in *ex situ* propagation.
  - Manage nursery collections to promote flowering. Continue research in pollination and continue to hand-pollinate. This includes collecting pollen, testing pollen viability, and pollinating all flowering plants, both *in situ* and *ex situ*.
- Reintroduction / translocation
  - While surveying for new populations or reintroduced populations, determine which sites are least invaded by invasive introduced plant species and which appear to have the highest likelihood of maintaining new reintroductions.
  - Continue to reintroduce the species back into its known historical range.
- Ungulate exclosures – Construct, maintain, and monitor ungulate-proof exclosures around each population.
- Ecosystem-altering invasive plant species control – Control invasive introduced plant species around all populations. Continue to target all canopy weeds along the catchment ridge of Kalauu to maintain native dominated matrix with care to avoid damaging the *Dicranopteris linearis* (uluhe) understory which is needed for successful growth of *Stenogyne kanehoana* (U.S. Army Garrison 2011).
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- Surveys / inventories – Survey geographical and historical range for a thorough current assessment of the species status.
- Site / area / habitat protection – Develop and implement effective measures to reduce the impact of military activities and hikers.
- Fire protection – Develop and implement fire management plans for all wild and reintroduced populations.
- Alliance and partnership development - Enhance coordination and collaboration among other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- 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.

- Threats research
  - Assess the modeled effects of climate change on this species, and use the results to determine future landscape needed for the recovery of the species.
  - Investigate appropriate controls for powdery mildew outbreaks.
  - Implement controls for invasive slugs around *Stenogyne kanehoana* populations.

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

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>Stabilization Criteria identified in Recovery Plan</b>	<b>Stabilization Criteria Completed?</b>
1992 (listing)	2-4	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	0	Unknown	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	1-6	Unknown	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2007 (5-yr review)	1	30	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes
			3 populations with 50 mature individuals each	No
2012 (5-yr review)	1	9 mature, 115 immature – total 124	All threats managed in all 3 populations	Partially (see Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

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

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – Degradation of habitat by pigs	A, D	Ongoing	Partially
Established ecosystem-altering invasive plant species	A, E	Ongoing	Partially
Deforestation	A, E	Ongoing	Unknown
Military training activity	E	Ongoing	Unknown
Fire	A, E	Ongoing	None
Hikers	E	Ongoing	Fencing should address this
Extremely low genetic variability)	E	Ongoing	Partially
Powdery mildew	C	Ongoing	None
Slug herbivory	C	Ongoing	None
Low numbers create greater risk from stochastic events	E	Ongoing	Partially, propagation and outplanting is ongoing
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.

Harold L. Lyon Arboretum. 2012. Micropropagation database and seed storage databases. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Morden, C. 2010. Genetic fingerprinting of *Stenogyne kanehoana* individuals in greenhouse collections of Army Biological Resources Unit, Schofield Barracks. Department of Botany and Pacific Cooperative Studies Unit, University of Hawaii at Manoa.

Joe, S. 2011. Special local needs registration for Sluggo approved in the state of Hawaii through 2015. Ecosystem Management Program Bulletin 52:1-8. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/EMP\\_Spring\\_2011.pdf](http://manoa.hawaii.edu/hpicesu/DPW/EMP_Spring_2011.pdf).

[OANRP] Oahu Army Natural Resources Program. 2012a. Army nursery summary. 1 page. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012b. Genetic storage summary. 7 pages. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012c. Oahu implementation plan - population unit status; *Stenogyne kanehoana*. 1 page. Unpublished.

- U.S. Army Garrison. 2008. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawaihoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. 624 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2008\\_OIP/2008\\_OIP\\_edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2008_OIP/2008_OIP_edited.pdf).
- U.S. Army Garrison. 2009. 2009 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 711 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2009\\_OIP/2009\\_OIP\\_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2009_OIP/2009_OIP_Edited.pdf).
- U.S. Army Garrison. 2010. 2010 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 588 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2010\\_YER/2010\\_YER\\_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2010_YER/2010_YER_Edited.pdf).
- U.S. Army Garrison. 2011. 2011 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit. Schofield Barracks, Hawaii. 269 pages. Available online at [http://manoa.hawaii.edu/hpicesu/DPW/2011\\_YER/2011\\_YER\\_Edited.pdf](http://manoa.hawaii.edu/hpicesu/DPW/2011_YER/2011_YER_Edited.pdf).
- [USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. Portland, Oregon. 207 pages + appendices.
- [USFWS] U.S. Fish and Wildlife Service. 2008. *Stenogyne kanehoana* (no common name) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 12 pages. Available online at [http://ecos.fws.gov/docs/five\\_year\\_review/doc1810.pdf](http://ecos.fws.gov/docs/five_year_review/doc1810.pdf).



**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
- No Change in listing status

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Date 2013-08-15