

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Gardenia mannii* (nanu)

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):

Vickie Caraway, Plant 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 (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 Plant Biologist, Island 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).

Review Analysis:

Please refer to the previous 5-year review for *Gardenia mannii* (nanu) published on January 18, 2008 (available at http://ecos.fws.gov/docs/five_year_review/doc1820.pdf for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status have come to light since listing to warrant a change in the Federal listing status of *Gardenia mannii* (Nanu).

This long-lived tree is endangered and occurs on the island of Oahu. The current status and trends for *Gardenia mannii* are provided in the tables below.

New status information:

- Two individuals were seen in Kipapa Gulch (Imada *et al* 2011).
- A total of 96 individuals occur on Oahu, a decline from 125 individuals known in 2010 (Oahu Army Natural Resource Program [OANRP] 2012a) and the approximately 110 reported in the last five-year review.

New threats:

Climate change - Climate change may 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 to be available sometime in 2013.

New Management Actions:

- Captive propagation for genetic storage and reintroduction
 - Ten populations monitored by the OANRP staff are being managed for genetic storage (OANRP 2012a).
 - Twenty individual plants are in the Oahu Army Natural Resources Program nursery (OANRP 2012b).
- Surveys/inventories
 - The Hawaii Biological Survey of Bishop Museum conducted a rare plant survey of approximately 220 hectares (540 acres) in the southeastern section of the Oahu Forest National Wildlife Refuge in 2011, and found two individuals (Imada *et al.* 2011).
 - All populations of *Gardenia mannii* are monitored by OANRP (U.S. Army Garrison 2011).
- Life history research - Pollination and breeding system studies conducted in 2010 may indicate that the *Gardenia* may have flowers that are functionally dioecious, but further research is required to confirm this hypothesis (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. *Gardenia mannii* is a long-lived perennial, and to be considered stable, 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. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 25 mature individuals per population.

The stabilization goals for this species have not been met, since only one population of 25 or more mature individuals exists (Table 1) and all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Gardenia mannii* meets the definition of endangered, as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Ungulate exclosures - Complete fencing of the known populations of *Gardenia mannii* to reduce impacts from ungulates.
- Ecosystem-altering invasive plant species control - Control invasive introduced plant species within enclosures.
- Predator / herbivore control - Control rats around remaining individuals.
- Threats research - Research effective control methods for the black twig borer.
- Fire protection - Develop and implement a coordinated fire protection plan.
- Captive propagation for genetic storage and reintroduction
 - Develop reliable propagation methods and collect material from all wild individuals for genetic storage.
 - Continue air-layer collection efforts.
- Population biology research
 - Continue pollination and breeding system studies to enhance likelihood of future seed collections.
 - Study populations 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 - Initiate planning and contribute to implementation of ecosystem-level management and restoration to benefit this species.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1996 (listing)	70-100	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 25 mature individuals each	No
1998 (recovery plan)	70-100		All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2003 (critical habitat)	69-80	12	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	No
2008 (5-yr review)	108-110	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially, one population only
2013 (5-yr review)	96	0	All threats managed in all 3 populations	No (Table 2)
			Complete genetic storage	Partially
			3 populations with 25 mature individuals each	Partially: one population

Table 2. Status of threats to *Gardenia mannii* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, D, E	Ongoing	Partially - Haleauau is partially fenced
Fire – habitat modification and plant destruction	A, E	Ongoing	Partially
Military activities	E	Ongoing	Partially
Rat predation	C	Ongoing	None
Insects and diseases	C	Ongoing	None
Invasive introduced plants	A, E	Ongoing	Partially: weed control ongoing but not within all populations
Random natural processes like hurricanes, demographic fluctuations	A, E	Ongoing	None
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.

Imada, Clyde, Clifford, P. and Lau, J. 2011. 2010 Rare Plant Survey, Oahu Forest National Wildlife Refuge, Waipio, Oahu. Bishop Museum Technical Report 55. Prepared for U.S. Fish and Wildlife Service, Oahu Forest National Wildlife Refuge Complex. Honolulu, Hawaii. 92 pages. Unpublished.

[OANRP] Oahu Army Natural Resource Program. 2012a. Makua implementation plan - population unit status: *Gardenia mannii*. 2 pages. Unpublished.

[OANRP] Oahu Army Natural Resources Program. 2012b. Army nursery inventory summary, 2012-03-20. 1 page. Unpublished.

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>.

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>.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for the Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages; plus appendices.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Gardenia mannii* (Nanu) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. 5 pages. Available online at http://ecos.fws.gov/docs/five_year_review/doc1820.pdf.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Gardenia mannii* (nanu)

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

acting deputy

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