5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Gardenia mannii* (Nanu)

Current Classification: Endangered

FR Notice announcing initiation of this review:

U.S. Fish and Wildlife Service (USFWS). 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

Lead Region/Field Office:

Region 1

Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor Endangered Species

Name of Reviewer(s):

Marie Bruegmann, Pacific Islands Fish and Wildlife Office, Plant Recovery Coordinator
Marilet A. Zablan, Pacific Islands Fish and Wildlife Office, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species

Methodology used to complete this 5-year review:

This review was based on the final critical habitat designation for *Gardenia mannii* and other species from the island of Oahu, as well as a review of current, available information. The National Tropical Botanical Garden, subcontracted by the Hawaii Biodiversity and Mapping Program, provided an initial draft of portions of the 5-year review.

Background:

For information regarding the species listing history and other facts, please refer to the Threatened and Endangered Species System (TESS) which is part of the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database.

Application of the 1996 Distinct Population Segment (DPS) Policy:

This Policy does not apply to plants.

Review Analysis:

Please refer to the final critical habitat designation for *Gardenia mannii* published in the Federal Register on June 17, 2003 (USFWS 2003) for a complete review of the species' status (including biology and habitat), threats, and management efforts. No new threats and 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 *G. mannii*.

At the time of listing, the 27 extant populations totaled between 70 and 100 individuals, with 23 of the 27 populations each containing 5 or fewer plants (USFWS 1996). Currently, *Gardenia mannii* is known from 18 populations with a total of 108 to 110

individuals: Haleauau 3 mature individuals; Kaiwikoele, Kamananui, and Kawainui 12 mature individuals; Kawai Nui and Kawai Iki 7 mature individuals; Helemano and Opaeula, scattered throughout Opaeula watershed, 33 mature individuals; Helemano and Poamoho, 18 mature individuals scattered throughout; Kaukonahua 2 mature individuals; Kahana and Makaua 2 mature individuals; Kaipapau to Punaluu 3 to 5 mature individuals; Kaluaa and Maunauna 6 mature individuals; Kalauao 4 mature individuals; Kapakahi 3 mature individuals; Ihi ihi-Kawawainui Ridge 2 mature individuals; Kamananui-Malaekahana Summit Ridge 13 mature individuals; Manana to Waimano Ridge 4 mature individuals; Pamalu 2 mature individuals; Pia 1 mature individuals; Pukele 1 mature individual; and Waialaei 1 mature individual (U.S. Army 2006). Only the Helemano and Opaeula population has stable numbers of mature individuals, based on the stability criteria in the recovery plan (USFWS 1998).

The major threats to *Gardenia mannii* are habitat degradation and destruction from fire (Factor E) and feral pigs (Factors A and D); landslides (Factor E); military activities (Factor E); and habitat degradation by and competition from invasive introduced plant species such as *Clidemia hirta* (Koster's curse), *Cordyline fruticosa* (ti), *Erigeron karvinskianus* (fleabane), *Lantana camara* (lantana) *Leptospermum scoparium* (New Zealand tea tree), *Passiflora suberosa* (huehue haole), *Psidium cattleianum* (strawberry guava), *Psidium guajava* (common guava), *Rubus argutus* (prickly Florida blackberry, ohelo eleele), and *Toona ciliata* (Australian red cedar) (USFWS 2003; Perlman 2007). Some populations of this species are seriously threatened by rat predation (Factor C). Scale insects, ants, black sooty mold and other pests attack *Gardenia* species in the nursery (Factor C). The Kapakahi Gulch population also is threatened by the black twig borer (USFWS 1998). Propagation seems to be the biggest hurdle to recovery at this time, as viable seeds are not produced. Efforts to find new methods of growing new plants have included cuttings, micropropagation, and air layering, with air layering appears the most successful to date.

In addition to all of the other threats, species like *Gardenia mannii* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks (Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *G. mannii* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by alien species (Factor E) (USFWS 1998).

Currently, there is no management occurring for this species other than collection for genetic storage (U.S. Army 2006).

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, 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 25 mature individuals per population.

The stabilization goals for this species have not been met (see Table 1). Therefore, *Gardenia mannii* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Fence the known populations of *Gardenia mannii* to reduce impacts from feral pigs.
- Control invasive introduced plant species within enclosures.
- Control rats around remaining individuals.
- Research effective control methods for the black twig borer.
- Develop and implement a coordinated fire protection plan.
- Develop reliable propagation methods and collect material from all wild individuals for genetic storage.
- 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.

References:

Perlman, Steve. 2007. National Tropical Botanical Garden, summary of field notes for *Gardenia mannii*. Unpublished.

[U.S. Army] U.S. Army Garrison, Hawaii. 2006. 2006 Status reports for the Makua implementation plan and the draft O`ahu implementation plan. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35950-35993.

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

[USFWS] U.S. Fish and Wildlife Service. 1996. Determination of endangered status for twenty-five plant species from the Island of Oahu, HI; final rule. Federal Register 61(198):53089-53108.

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

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability 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	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partial
			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	Partial
			3 populations with 25 mature individuals each	No
2007 – 5-yr review	108-110	0	All threats managed	No
			Complete genetic storage	Partial
			3 populations with 25 mature individuals each	Partial, one population only

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SIGNATURE PAGE for 5-YEAR REVIEW on *Gardenia mannii*

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

Field Supervisor, Fish and Wildlife Service

Approve Patrick Leonard Date 1/18/09