

Cyanea lobata
(haha)

**5-Year Review
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii**

5-YEAR REVIEW
Species reviewed: *Cyanea lobata*/ haha

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5-YEAR REVIEW
***Cyanea lobata* (haha)**

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:

Region 1, Endangered Species Program, Division of Recovery, Jesse D`Elia, (503) 231-2071

Lead Field Office:

Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

Cooperating Field Office(s):

N/A

Cooperating Regional Office(s):

N/A

1.2 Methodology used to complete the 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 16, 2009. The review was based on final critical habitat designations for *Cyanea lobata* and other species from the islands of Lanai and Maui (USFWS 2003a, b) as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Samuel Aruch, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before submittal to the Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1992. Endangered and threatened wildlife and plants; determination of threatened or endangered status for 15 plants from the island of Maui, Hawaii; final rule. Federal Register 57(95):20772-20788.

Date listed: May 15, 1992

Entity listed: Species

Classification: Endangered

Revised Listing, if applicable

FR notice: N/A

Date listed: N/A

Entity listed: N/A

Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003a. Endangered and threatened wildlife and plants; final designations and nondesignations of critical habitat for three plant species from the island of Lanai, Hawaii; final rule. Federal Register 68(6):1219-1273.

USFWS. 2003b. Endangered and threatened wildlife and plants; final designations and nondesignations of critical habitat for 60 plant species from the islands of Maui and Kahoolawe, Hawaii; final rule. Federal Register 68(93):25934-26165.

Critical habitat was not designated for *Cyanea lobata* on the island of Lanai (USFWS 2003a). Critical habitat was designated for *Cyanea lobata* in 3 units totaling 824 hectares (2,031 acres) on the island of Maui. This designation includes habitat on State and private lands (USFWS 2003b).

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (September 2010)]:
Stable

Recovery achieved:

1 (1-25%) (FY 2007 Recovery Data Call – most recent year reported)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

5

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: USFWS. 1997. Recovery plan for the Maui plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 130 pages + appendices.

Date issued: July 29, 1997

Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

☐ *Yes*

☒ *No*

2.1.2 Is the species under review listed as a DPS?

☐ *Yes*

☒ *No*

2.1.3 Was the DPS listed prior to 1996?

☐ *Yes*

☐ *No*

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

☐ *Yes*

☐ *No*

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

☐ *Yes*

☐ *No*

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

☐ *Yes*

☒ *No*

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

☒ *Yes*

_____ *No*

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

 X *Yes*

_____ *No*

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

 X *Yes*

_____ *No*

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Listing Factors A, C, D, and E) affecting this species is presented in section 2.3.2 and Table 2. Listing Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the Maui plant cluster recovery plan (USFWS 1997), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Cyanea lobata* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g.*, fenced, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has not been met. There is one population with three individuals of *Cyanea lobata* subsp. *baldwinii* on Lanai, three populations with a total of four individuals of *Cyanea lobata* subsp. *lobata* on Maui and all threats are not being managed.

For downlisting, a total of five to seven populations of *Cyanea lobata* should be documented on islands where they now occur or occurred historically. Each of these populations must be naturally reproducing,

stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Cyanea lobata* should be documented on islands where they now occur or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

Cyanea lobata was originally listed as endangered in 1992, to include subspecies *lobata* and *baldwinii* (USFWS 1992).

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

No new information.

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Cyanea lobata subsp. *lobata* is endemic to the island of Maui and *C. lobata* subsp. *baldwinii* is endemic to the island of Lanai. At Honokohau Gulch on West Maui in 2004, only one individual of *C. lobata* subsp. *lobata* survived at 594 meters (1,950 feet) elevation. This individual was in poor condition, with no flower or fruit, located at a site where three individuals were previously known (Perlman 2009). It has not been revisited since 2004, when it had declined dramatically in vigor from the previous visit. In 2004, at Mahinahina Gulch, West Maui, a single individual had fallen on its side on the west bank of a stream at about 625 meters (2,050 feet) elevation (Perlman

2009). This single individual grows on the south bank at 2.4-meters (8-feet) above a stream and is the only individual that has ever been known from the area. From 2004 through 2006, a single individual of *C. lobata* subsp. *lobata* was visited at Kaluanui Gulch, a tributary of Honokohau, at 442 meters (1,450 feet) elevation (Perlman 2009). This individual was dead during a visit in 2009 (Oppenheimer 2009). In 2007, two individuals, 1.2- to 1.5-meters (4- to 5-feet) in height, with flower buds and immature green fruit, were observed growing on a steep south facing slope at Haenanui Gulch, to the south of Honokowai Valley, West Maui, at 655 meters (2,150 feet) elevation (Perlman 2009). This represents a total of four individuals in three populations (Oppenheimer 2009).

On the island of Lanai, *Cyanea lobata* subsp. *baldwinii* was rediscovered around the Hauola headwaters in 2006, after not being observed for over 70 years. In 2006, Ken Wood and Hank Oppenheimer observed two individuals in the Hauola headwaters, just northwest of Haalelepaakai, at 970 meters (3,182 feet) elevation (Wood 2006, 2009). In the back of Hauola Gulch, below Munro Trail, at 1,036 meters (3,399 feet) elevation, Steve Perlman observed three mature individuals in 2008 (National Tropical Botanical Garden 2009a). In total, there were three mature individuals and one seedling; with a single immature plant that may have been this species or *C. gibsonii*, or a hybrid but it has since died. In addition, the seedling died in 2008, and the three mature individuals were severely impacted by rats (*Ratus* spp.), despite efforts to trap them. These individuals are still barely alive, identifiable by the presence of short basal resprout (Oppenheimer 2009).

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

Three mature individuals and two juveniles were observed in Mahinahina Gulch, West Maui which have since been determined to be hybrids between *C. lobata* and *C. scabra*. Their identification was formerly based on vegetative material; however, Oppenheimer collected flowering material and Thomas Lammers confirmed them as hybrids since not all five anthers have tufts of hairs (National Tropical Botanical Garden 2009a; Oppenheimer 2009; Perlman 2009).

2.3.1.4 Taxonomic classification or changes in nomenclature:

No new information

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g., corrections to the historical range, change in distribution of the species within its historic range, etc.):

See section 2.3.1.2.

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

On West Maui at Honokohau Gulch, the habitat is *Metrosideros polymorpha* (ohia) wet forest with *Adenostemma viscosa* (kamanamana), *Antidesma platyphylla* (hame), *Boehmeria grandis* (akolea), *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa), *Christella cyatheoides* (kikawaio), *Cibotium glaucum* (hapuu), *Clermontia kakeana* (haha), *C. micrantha* (oha wai), *Cyanea macrostegia* (haha), *C. scabra* (haha), *Cyrtandra grayi* (keokeo haiwale), *C. hawaiiensis* (keokeo haiwale), *Dicranopteris linearis* (uluhe), *Diplazium sandwichianum* (hoio), *Hesperomannia arborescens* (no common name [NCN]), *Kadua acuminata* (au), *Melicope* sp. (alani), *Metrosideros polymorpha* var. *glaberrima* (ohia), *Perrottetia sandwicensis* (olomea), *Pittosporum* sp. (hoawa), *Pouteria sandwicensis* (alaa), *Psychotria* sp. (kopiko), *Touchardia latifolia* (olona), and *Xylosma hawaiiense* (ae) (National Tropical Botanical Garden 2009b; Perlman 2009).

The Mahinahina Gulch habitat in West Maui is *Metrosideros polymorpha* – *Dicranopteris linearis* wet forest with *Broussaisia arguta*, *Cheirodendron trigynum*, *Christella parasitica* (NCN), *Cibotium* sp., *Clermontia kakeana*, *Cyanea elliptica* (haha), *Cyrtandra grayana* (keokeo haiwale), *Diplazium sandwichianum*, *Freycinetia arborea* (ie ie), *Perrottetia sandwicensis*, *Pipturus albidus* (mamake), *Pouteria sandwicensis*, *Psychotria* sp., *Selaginella arbuscula* (lepe lepe a moa), *Tectaria gaudichaudii* (iwa iwa lau nui), *Touchardia latifolia*, *Urera glabra* (opuhe), *Vandenboschia cyrtotheca* (NCN), and *Xylosma hawaiiense* (National Tropical Botanical Garden 2009b; Perlman 2009).

On West Maui, at Kaluanui Gulch, a tributary of Honokohau Stream, the habitat is *Metrosideros polymorpha* – *Dicranopteris linearis* wet forest with *Antidesma platyphylla*, *Broussaisia arguta*, *Cheirodendron trigynum*, *Cibotium* sp., *Claoxylon sandwicense* (poola), *Clermontia kakeana*, *Cyrtandra grayana*, *C. grayi*, *Diplazium sandwichianum*, *Dodonaea viscosa* (aalii), *Freycinetia arborea*, *Ilex anomala* (kawau), *Melicope peduncularis* (alani), *Myrsine lessertiana* (kolea lau nui), *Perrottetia sandwicensis*, *Pipturus albidus*, *Pittosporum* sp., *Pleomele* sp. (hala pepe), *Pouteria sandwicensis*, *Psychotria* sp., *Sadleria* sp. (amau), *Scaevola chamissoniana* (naupaka kuahiwi), *Urera glabra*, and *Xylosma hawaiiense* (National Tropical Botanical Garden 2009a, b; Perlman 2009).

At Haenanui Gulch, on the south rim of Honokowai Valley in West Maui, the habitat is degraded native wet forest vegetation with *Metrosideros polymorpha* and *Freycinetia arborea* growing on very steep rocky slope 5 to 8 meters (16 to 26 feet) above a narrow, intermittent stream in an open, weedy area. Native species in the area include *Antidesma platyphylla*, *Bobea elatior* (akahea lau nui), *Freycinetia arborea*, *Nephrolepis exaltata* (okupukupu), *Pipturus albidus*, *Pouteria sandwicensis*, *Pseudophegopteris keraudreniana* (waimakanui), *Psychotria kaduana* (kopiko kea), and *Vandenboschia cyrtotheca* (NCN) (National Tropical Botanical Garden 2009b; Perlman 2009).

On Lanai in the Hauola headwaters, just northwest of Haalelepaakai, *Cyanea lobata* subsp. *baldwinii* grows in a riparian area. The 70 percent open tree canopy is composed of *Metrosideros polymorpha* and the introduced invasive *Morella faya* (firetree). The native understory trees and shrubs are *Clermontia arborescens* (oha wai nui), *C. grandiflora* (oha wai), *Coprosma* sp. (pilo), *Cyanea gibsonii* (haha), *Cyrtandra grayana*, *Dubautia laxa* (naenae pua meleleme), *D. plantaginea* (naenae), *Freycinetia arborea*, *Melicope munroi* (alani), *Pipturus albidus*, *Pittosporum confertiflorum* (hoawa), and *Scaevola chamissoniana*. Slopes have 80 percent cover of ferns including *Cibotium* sp. (hapuu), *Dicranopteris linearis*, *Diplopterygium pinnatum* (uluhe lau nui), and *Sadleria* sp. (National Tropical Botanical Garden 2009a; Wood 2009).

2.3.1.7 Other:

No new information.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

Threats that modify habitat on West Maui include pigs (*Sus scrofa*), erosion, and invasive introduced plant species which include *Blechnum appendiculatum* (NCN), *Buddleia asiatica* (dog tail), *Clidemia hirta* (Koster's curse), *Lantana camara* (lantana), *Nephrolepis brownei* (Asian sword fern), *Physalis peruviana* (Cape gooseberry), *Psidium guajava* (common guava), *Rubus rosifolius* (thimbleberry), *Spathodea campanulata* (African tulip tree), and *Tibouchina herbacea* (glory bush) (Oppenheimer 2009; Perlman 2009). On Lanai the threats to the habitat for *Cyanea lobata* subsp. *baldwinii* are *Christella parasitica* (NCN), *Cinnamomum burmannii* (Padang Cassia), *Clidemia hirta*, *Cordyline fruticosa* (ti), *Leptospermum scoparium* (New Zealand tea tree), *Morella faya*, *Pluchea carolinensis* (sourbush), *Psidium cattleianum* (strawberry guava), *Rubus rosifolius*, *Tibouchina herbacea*, and *Schinus terebinthifolius* (Christmasberry) (National Tropical Botanical Garden 2009b; Wood 2009). Axis deer (*Axis axis*) are a potential threat at Haenanui (Oppenheimer 2009).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Not a threat.

2.3.2.3 Disease or predation:

Rats, deer, and slugs (species unknown) are herbivores of *Cyanea lobata* (Oppenheimer 2009; Perlman 2009; Wood 2009).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

The introduced invasive plant species discussed in section 2.3.2.1 above are also a threat to *Cyanea lobata* because they compete with the species for water, light, and nutrients.

In addition to all of the other threats, species like *Cyanea lobata* that are endemic to small portions of a few islands 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, landslides, flooding, and disease outbreaks. The extent of these natural processes on a species with very low numbers are exacerbated by anthropogenic threats, such as habitat loss for human development or predation by introduced species.

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 has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Cyanea lobata is being monitored by the Plant Extinction Prevention Program. Their plan for this species is to continue to attempt to collect seeds for genetic storage and reintroduction, and propagate and reintroduce the species into protected areas within suitable habitat (Plant Extinction Prevention Program 2009).

Hank Oppenheimer of the Plant Extinction Prevention Program collected seeds of *Cyanea lobata* subsp. *lobata* in 2006 which were sent to the Center for Conservation Research and Training Seed Laboratory and there are 5,772 seeds of *C. lobata* subsp. *lobata* in storage (Center for Conservation Research and Training Seed Laboratory 2009). Harold L. Lyon Arboretum Micropropagation Laboratory has 676 seeds of *C. lobata* subsp. *baldwinii* in storage (Harold L. Lyon Arboretum Micropropagation Laboratory 2010), and it has also been grown in micropropagation at the National Tropical Botanical Garden (National Tropical Botanical Garden 2009a). Seeds from the Honokohau plants were not collected, but the two Haenanui individuals and the single Mahinahina and Kaluanui plants are represented *ex situ* (off site) (Oppenheimer 2009). At the National Tropical Botanical Garden seeds have been collected

from plants cultivated in the nursery, which themselves originated from two of the Maui populations. The National Tropical Botanical Garden nursery had 100 plants in the nursery in 2009 (National Tropical Botanical Garden 2009a). The Olinda Rare Plant Facility has 16 propagules of *C. lobata* subsp. *lobata* and a single propagule of *C. lobata* subsp. *baldwinii* in the nursery (Olinda Rare Plant Facility 2010).

Haenanui Gulch is within The Nature Conservancy of Hawaii's Kapunakea Preserve and is actively managed for the control of feral ungulates. Currently this is contracted to the West Maui Mountains Watershed Partnership. Honokohau, Kaluanui, and Mahinahina are all within Maui Land and Pineapple Company lands and Puu Kukui Preserve, which are actively managed to control feral ungulates. Maui Land and Pineapple Company is constructing a deer fence across the lower end of Mahinahina (Oppenheimer 2009).

Four plants grown at National Tropical Botanical Garden were reintroduced in Kahakuloa section of the West Maui Natural Area Reserve in 2007. Another four are at the Olinda Rare Plant Facility awaiting reintroduction (Oppenheimer 2009).

2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Maui plant cluster (USFWS 1997), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Cyanea lobata* is a short-lived perennial, and to be considered for stabilization, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. For the species to be considered stable, each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has not been met. There is only one population with three individuals of *Cyanea lobata* subsp. *baldwinii* on Lanai and three populations with a total of four individuals of *Cyanea lobata* subsp. *lobata* on Maui (Table 1) and all threats are not being managed (Table 2). Therefore, *Cyanea lobata* meets the definition of endangered as it remains in danger of extinction throughout its range.

Table 1. Status of *Cyanea lobata* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1992 (listing)	Unknown	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1995 (recovery plan)	Unknown	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	15	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2010 (5-year review)	7	4	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No : 1 population with 3 individuals of <i>C. lobata</i> subsp. <i>baldwinii</i> on Lanai and 3 populations with a total of 4 individuals of <i>C. lobata</i> subsp. <i>lobata</i> on Maui.

Table 2. Threats to *Cyanea lobata*.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, D	Ongoing	Locations in West Maui are managed for ungulates
Rats – herbivory	C	Ongoing	No
Slugs – herbivory	C	Ongoing	No
Landslides	E	Ongoing	No
Invasive introduced plants	A, E	Ongoing	No
Climate change	E	Increasing	No
Small population size	E	Ongoing	Seed collection and one small reintroduction

3.0 RESULTS

3.1 Recommended Classification:

___ **Downlist to Threatened**

___ **Uplist to Endangered**

___ **Delist**

___ *Extinction*

___ *Recovery*

___ *Original data for classification in error*

 X **No change is needed**

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: ___

Reclassification (from Endangered to Threatened) Priority Number: ___

Delisting (regardless of current classification) Priority Number:

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Monitor known populations and collect any available seeds for genetic storage and reintroduction.
- Maintain or build fences around existing populations to protect from the negative impacts of ungulates.
- Control invasive introduced species around known populations.
- Develop and implement methods to control rats and slugs.
- Propagate to augment the existing populations.
- Establish additional populations within protected suitable habitat.
- Survey all potential habitat on West Maui and Lanai for additional individuals.
- Continue to develop potential biological control agents for *Clidemia hirta* and *Tibouchina herbacea*.
- Work with Hawaii 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 species.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

5.0 REFERENCES

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Cyanea lobata* (haha)

Pre-1996 DPS listing still considered a listable entity? N/A

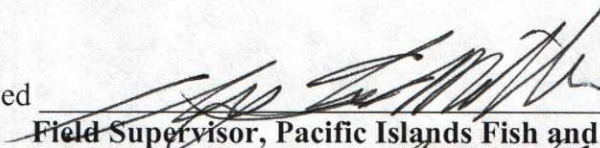
Recommendation resulting from the 5-year review:

☐	Delisting
☐	Reclassify from Endangered to Threatened status
☐	Reclassify from Threatened to Endangered status
☒	No Change in listing status

Review Conducted By:

Chelsie Javar, Fish and Wildlife Biologist
Marie Bruegmann, Plant Recovery Coordinator
Jess Newton, Recovery Program Lead
Assistant Field Supervisor for Endangered Species

Approved


Field Supervisor, Pacific Islands Fish and Wildlife Office

Date

