

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Dracaena forbesii* (hala pepe)

**Current Classification:** Endangered

### **Federal Register Notice announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 167 Species in Oregon, Washington, Idaho, Montana, California, Hawaii, Guam, and the Northern Mariana Islands . Federal Register 87(90): 28031–28034, May 10, 2022.

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

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

### **Name of Reviewer:**

Daniel Adamski, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Megan Laut, Recovery Program 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 2023. The review was based on a review of current, available information since the last 5-year review for *Dracaena* [*Pleomele*] *forbesii* (USFWS 2019). The evaluation by Daniel Adamski, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, Recovery Program 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/ecp/species/5965>).

### **Review Analysis:**

Please refer to the previous 5-year review for *Dracaena* [*Pleomele*] *forbesii* published in the Federal Register on August 30, 2019 (available at [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2796.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2796.pdf)), for a complete review of the species’ status, threats, management efforts, and references cited. 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 *D. forbesii*.

This short-lived perennial tree in the Asparagaceae (asparagus) family is endangered and endemic to O‘ahu. The current status and trends for *Dracaena forbesii* are provided in the tables below.

#### New Status Information:

- *Pleomele forbesii* was described by Degener in 1946 and was recognized as such when listed as Endangered (Degener 1946; USFWS 2012). In 2014, Lu and Morden conducted a phylogenetic analysis of dracaenoid plant genera and found that the Hawaiian *Pleomele* species are morphologically and phylogenetically distinct from other dracaenoids and should be recognized as a distinct genus. The genus change was to *Chrysodracon forbesii* in the most recent taxonomic treatment in the checklist of Hawaiian flora (Smithsonian 2019). In 2023, the scientifically accepted taxonomy for the species was changed to *Dracaena forbesii* (USFWS 2023). This taxonomic change does not affect the range or endangered status of this species. We will refer to this species as *Dracaena forbesii* throughout the following sections of this document.
- At the time of the previous five-year review in 2019, there were fewer than 150 wild individuals of *Dracaena forbesii* on O‘ahu. There has been only one recorded observation of *Dracaena forbesii* since that time, when five individuals were monitored in 2022 (Serrano et. al. 2022).
- Currently, eight founder lines are represented in *ex situ* storage, including explants in micropropagation, and plants in a nursery or living collection (Lyon Arboretum 2023; O‘ahu Nursery 2023). Seeds of this species have been identified as recalcitrant, and therefore cannot be dried or stored conventionally (dry at -18°C) (Chau et al. 2019; Hawai‘i Seed Bank User’s Guide (<https://laukahi.org/hawai%ca%bbi-seed-bank-users-guide/>)).

#### New Threats:

- None

#### New Management Actions:

- Monitoring and surveys— Plant Extinction Prevention Program (PEPP) surveys for individuals of *Dracaena forbesii* (Serrano et. al. 2022).
- Ungulate monitoring and management — Fences and ungulates are monitored by the Army Natural Resources Program on O‘ahu [ANRPO], protecting individuals of *Dracaena forbesii* (ANRPO 2023, Appendix 4-2).
- Collection and propagation for genetic storage and reintroduction—
  - In 2022, a total of 15 cuttings were collected from five individual plants at Makaleha for use in propagation (Serrano et. al. 2022).
  - Lyon Arboretum Micropropagation Laboratory reports three explants in micropropagation representing three founders (Lyon Arboretum 2023).
  - The O‘ahu Nursery reports 15 individual plants in propagation representing five founders (O‘ahu Nursery 2023).

**Table 1. Status and trends of *Dracaena forbesii* from listing through current 5-year review. Table 1a shows progress according to Interim Stabilization Goals; Table 1b shows progress according to Preventing Extinction Goals.**

**Table 1a.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. Outplanted</b>	<b>Stability Goals identified in Recovery Plan</b>	<b>Stability Goals Completed?</b>
<b>2012 (Listing)</b>	290–307	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

**Table 1b.**

<b>Date</b>	<b>No. wild individuals</b>	<b>No. outplanted</b>	<b>*Preventing Extinction Criteria identified by HPPRCC</b>	<b>*Preventing Extinction Criteria Completed?</b>
<b>2019 (5-year review)</b>	<150	0	All threats managed in all 3 populations	Partial
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	No
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No
<b>2024 (5-year review)</b>	5-150	0	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			Natural reproduction at all 3 populations	Unknown

			3 populations with 50 mature individuals each	No
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\* 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 stage after Preventing Extinction).

**Table 2. Threats to *Dracaena forbesii* and ongoing conservation efforts.**

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate destruction and degradation of habitat	A	Ongoing	Partial, some individuals may benefit from fencing
Degradation of habitat by established ecosystem altering invasive plant species	A	Ongoing	None
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Invertebrate predation	C	Ongoing	None
Established invasive plant species competition	E	Ongoing	None
Lack of regeneration	E	Ongoing	Partial, some living collections

**Synthesis:**

Currently there are at least 5 to no more than 150 wild individuals of *Dracaena forbesii* on O‘ahu. Known populations are in need of monitoring. Some individuals are provided protection by fencing. Collections and propagation are ongoing. Research is needed on best methods for genetic storage.

Stabilizing (interim), downlisting, and delisting objectives are 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.

*Dracaena forbesii* is a short-lived perennial tree. To prevent extinction, which is the first milestone 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 that are well managed. In addition, a minimum of a total 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) with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic storage is not complete (Table 1), all threats are not being managed (Table 1, Table 2), and there are no populations totaling at least 50 mature individuals. Therefore, *Dracaena forbesii* meets the definition of Endangered as it remains in danger of extinction throughout its range.

### **Recommendations for Future Actions:**

No significant new information regarding the species’ biological status has been reported since the last 5-year review in 2019. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2024.

- Surveys and monitoring—
  - Continue monitoring known populations of *Dracaena forbesii*.
  - Determine suitable locations for reintroductions.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Dracaena forbesii*.
- Site and habitat protection—Develop and implement effective threat control and habitat protection measures to reduce the impacts of invasive plant species and ungulate destruction of habitat.
- Predation or herbivory by invertebrates—Implement effective control methods for invasive slugs and snails.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to the impacts of climate change, including increasing temperatures, periods between rain events, and increasing frequency and intensity of hurricanes. Additional management actions may be needed, such as locating key microsites that overlap with current and future climate envelopes for translocation efforts.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction. Determine appropriate storage techniques.
- Build resiliency, redundancy, and representation — Increase species’ viability through habitat restoration, threat control, and reintroduction and translocation into suitable habitat that is being managed for known threats to this species to reduce impacts of climate change degradation and nonnative plant competition.
- Alliance and partnership development—Continue to work with partners and other land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

## References:

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- [U.S. Fish and Wildlife Service] 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] 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.
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**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Dracaena forbesii* (hala pepe)

**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

**For Field Supervisor, Pacific Islands Fish and Wildlife Office**

\_\_\_\_\_ Date \_\_\_\_\_