

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Wilkesia hobydi* (Dwarf iliau)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2015. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 133 species in Hawaii, Oregon, Idaho, and Washington. Federal Register 80(30): 8100–8103.

Lead Region/Field Office:

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

Name of Reviewer(s):

Cheryl Phillipson, Biologist, PIFWO

Lauren Weisenberger, Plant Recovery Coordinator, PIFWO

Gregory Koob, Conservation & Restoration Team 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 (USFWS) beginning in January 2016. The review was based on a review of current, available information since the last 5-year review for *Wilkesia hobydi* (USFWS 2010). The evaluation by Cheryl Phillipson, Biologist, PIFWO, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Gregory Koob, Conservation and Restoration Team 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/tess_public).

Review Analysis:

Please refer to the previous 5-year review for *Wilkesia hobydi* published in the Federal Register on August 27, 2010 (USFWS 2010, available at https://ecos.fws.gov/docs/five_year_review/doc3310.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 *W. hobydi*.

This short-lived perennial herb in the Violaceae family is endangered and found on Kauai. The current status and trends for *Wilkesia hobydi* are provided in the tables below.

New Status Information:

In addition to those populations cited in the previous 5-year review, new observations include the following:

- At the time of the last 5-year review in 2010 there were 10 populations totaling between 759 and 809 individuals along the Na Pali coast of Kauai. The surveys conducted in 2006 are the most current information for nine of the ten populations. The Makaha population was visited by NTBG staff in 2015 and is estimated to have 30 individuals (NTBG 2015).

New Threats:

- Climate change loss or degradation of habitat—Climate change may pose a threat to this species. Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *Wilkesia hobydi* is highly vulnerable to the impacts of climate change, with a vulnerability score of 0.75 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions are needed to conserve this taxon into the future.
- Hurricanes—Loss and degradation of habitat—Hurricanes—Loss and degradation of habitat—Hurricanes were omitted in the last five year review. In November 1982, Hurricane Iwa struck the Hawaiian Islands, with wind gusts exceeding 100 miles per hour (mph) (161 kilometers per hour (kph)), causing extensive damage, especially on the islands of Niihau, Kauai, and Oahu (Businger 1998). In September 1992, Hurricane Iniki, a category 4 hurricane with maximum sustained wind speeds recorded at 140 mph (225 kph), passed directly over the island of Kauai. Many forest trees were destroyed (Perlman 1992), which opened the canopy and facilitated the invasion of nonnative plants (Kitayama and Mueller-Dombois 1995). A destructive hurricane holds the potential of driving a localized endemic species to extinction in a single event, and 70 percent of all listed plant species on Kauai are only found on Kauai. Hurricanes pose an ongoing and ever-present threat because they can happen at any time, although their occurrence is not predictable. Tropical cyclone frequency and intensity are projected to change as a result of climate change over the next 100 to 200 years (Vecchi and Soden 2007; Emanuel *et al.* 2008; Yu *et al.* 2010). In the central Pacific, modeling projects an increase of up to two additional tropical cyclones per year in the main Hawaiian Islands by 2100 (Murakami *et al.* 2013).

New Management Actions:

- The NTBG seed bank has nine founders represented from the Makaha population. There are a few dozen plants on the garden's grounds from collections from Makaha, and one plant from Polihale Ridge. There are also plants in the nursery from one collection from Makaha (NTBG 2017). One thousand seeds were sent to the National Center for Genetic Resources Preservation in 2008 for research (NTBG 2017).
- This species is currently being monitored by the State of Hawaii's Division of Land and Natural Resources Department of Forestry and Wildlife.

Synthesis:

In 2006, there were estimated to be between 759 and 809 individuals of *Wilkesia hobydi* in ten populations along the Na Pali coast on Kauai. Only one population has been monitored since

2006, where 30 individuals were observed in 2015. A landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *Wilkesia hobdyi* is highly vulnerable to the effects of climate change. Seeds are in storage and propagation.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Kauai Plant Cluster (USFWS 1995), and have been updated according to the draft revised recovery objective guidelines developed by the Hawaii 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 determination 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.

Wilkesia hobdyi is a short-lived perennial erect to decumbent shrub that is self-incompatible. To reach preventing extinction objectives, 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 an *ex situ* (at other than the plant's natural location, such as a nursery or seed bank) collection. In addition, a minimum of three populations should be documented on Kauai 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 100 mature individuals per population.

The preventing extinction goals for this species have not been met (Table 1). Although there may be three populations with 100 individuals, we do not know if these location have 100 mature individuals, nine of the ten locations have not been revisited since 2006 (that we are aware of), genetic representation is incomplete (Table 1), and threats are not being sufficiently managed throughout the range of the species (Table 2). Therefore, *Wilkesia hobdyi* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

No new threats and no other significant new information regarding the species' biological status have been reported since the last 5-year review in 2010. Therefore, the following recommendations for future actions are reiterated for 5-year review for 2017.

- Surveys and inventories—Survey potentially suitable habitat and historic range for a thorough current assessment of the species.
- Ungulate monitoring and control—Protect all occurrences against disturbances from feral ungulates. Construct and maintain fenced exclosures around all populations.
- Invasive plant monitoring and control—
 - Control established ecosystem-altering nonnative invasive plant species around all populations.

- Control invasive nonnative plant species around all populations that compete with the species.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock.
- Reintroduction and translocation—Reintroduce individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Stochastic events—Build resilience and redundancy—Increase numbers of populations and individuals scattered through historic range to reduce impacts from landslides.
- Population biology research—Study *Wilkesia hobydi* populations to determine viable population size and structure, geographical distribution, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, limiting factors, and threats.

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

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1992 (listing)	360–450	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	No
			Naturally reproducing, stable, and increasing in number	Unknown
			5–7 populations with 300 mature individuals each	No
			Stable for five consecutive years	Unknown
1995 (recovery plan)	420–510	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			Naturally reproducing, stable, and increasing in number	Unknown

			5–7 populations with 300 mature individuals each	No
			Stable for five consecutive years	Unknown
2003 (critical habitat)	406–471	0	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			Naturally reproducing, stable, and increasing in number	Unknown
			5–7 populations with 300 mature individuals each	No
			Stable for five consecutive years	Unknown
2010 (5-year review)	759–809	89	All threats managed in all 5–7 populations	No
			Complete genetic storage	Partially
			Naturally reproducing, stable, and increasing in number	Unknown
			5–7 populations with 300 mature individuals each	No
			Stable for five consecutive years	Unknown
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?

2016 (5-year review)	759–809	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Reproduction (<i>i.e.</i> viable seeds, seedlings) at all three populations	Unknown
			Three populations with 100 mature individuals each	Yes

*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 after Preventing Extinction).

Table 2. Threats to *Wilkesia hobyi* and conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	None
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	None
Landslides and flooding destruction or degradation of habitat	A	Ongoing	None
Hurricane destruction and degradation of habitat	A	Ongoing	None
Climate change loss or degradation of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	None
Invasive species—Hybridization impacts	E	Ongoing	None
Stochastic events—Reduced viability due to low numbers	E	Ongoing	Partial, seed collection

References:

See previous 5-year review in 2010 for a full list of references. Only references for new information are provided below.

Businger, S. 1998. Hurricanes in Hawaii. University of Hawaii, Honolulu. 6 pp.

- Emanuel, K., R. Sundararajan, and J. Williams. 2008. Hurricanes and global warming. American Meteorological Society: March. Pp. 347–367.
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- Murakami, H., B. Wang, T. Li, and A. Kitoh. 2013. Projected increase in tropical cyclones near Hawaii. *Nature Climate Change*, 5 MAY 2013, DOI: 10.1038/NCLIMATE1890.
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- Perlman, S. 1992. After Iniki: a survey of some of Kauai's rarest plants. Unpublished report. 9 pp.
- [USFWS] U.S. Fish and Wildlife Service. 2010. *Wilkesia hobyi* 5-year review summary and evaluation. https://ecos.fws.gov/docs/five_year_review/doc3310.pdf.
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- Vecchi, G.A. and B.J. Soden. 2006. Global warming and the weakening of the tropical circulation. *Journal of Climate* 20: 4316–4340.
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SIGNATURE PAGE for 5-YEAR REVIEW of *Wilkesia hobbdi*
(Dwarf iliau)

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**
