

## 5-YEAR REVIEW

Short Form Summary

**Species Reviewed:** *Zanthoxylum oahuense* (a'e)

**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 *Zanthoxylum oahuense* (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/7998>).

### **Review Analysis:**

Please refer to the previous 5-year review for *Zanthoxylum oahuense* published in the Federal Register on August 30, 2019, (available at [https://ecos.fws.gov/docs/tess/species\\_nonpublish/2800.pdf](https://ecos.fws.gov/docs/tess/species_nonpublish/2800.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 *Z. oahuense*.

This small tree in the Rutaceae (rue) family is endangered and endemic to O'ahu. The current status and trends for *Zanthoxylum oahuense* are provided in the tables below.

New Status Information:

- Currently, there are approximately 55 *Zanthoxylum oahuense* individuals in the Ko‘olau mountains. Of these, only 10 total individuals have been recently monitored at Pia Valley, Kawai Nui Gulch, and Moanalua (Togikawa et. al. 2023a; Togikawa et. al. 2023b; Togikawa and Serrano 2023).
- Currently, there are two founder lines represented in *ex situ* storage, including explants in micropropagation and plants in a nursery or living collection (Lyon Arboretum 2023; O‘ahu Nursery 2023).

New Threats:

- None

New Management Actions:

- Monitoring and surveys—Plant Extinction Prevention Program (PEPP) monitors individuals of *Zanthoxylum oahuense* in the Ko‘olau mountains of O‘ahu (PEPP 2023; Togikawa et. al. 2023a; Togikawa et. al. 2023b; Togikawa and Serrano 2023).
- Ungulate monitoring and management —Fences and ungulates are monitored by the Army Natural Resources Program on O‘ahu [ANRPO] in the Ko‘olau mountains of O‘ahu (ANRPO 2023, Appendix 4-2).
- Nonnative plant control—Nonnative plants are controlled in the Ko‘olau mountains by PEPP (PEPP 2023).
- Control of predation and herbivory by rats—PEPP controls rats around *Zanthoxylum oahuense* using rat traps (PEPP 2023).
- Slug control—PEPP controls slugs around *Zanthoxylum oahuense* with applications of molluscicide (PEPP 2023).
- Collection and propagation for genetic storage and reintroduction—
  - PEPP reported collection of cuttings and airlayers from two individual plants (Togikawa and Serrano 2023).
  - Lyon Arboretum Micropropagation Laboratory reports seven explants in storage representing one founder (Lyon Arboretum 2023).
  - The O‘ahu Nursery reports three individual plants in propagation representing one founder (O‘ahu Nursery 2023).

**Table 1. Status and trends of *Zanthoxylum oahuense* 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>	21-25	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>	ca 50+	0	All threats managed in all 3 populations	No
			Reproduction (i.e., viable seeds, seedlings, saplings) at all 3 populations	Unknown
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	No
<b>2024 (5-year review)</b>	55+	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

\* 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 *Zanthoxylum oahuense* and ongoing conservation efforts.**

<b>Threat</b>	<b>Listing factor</b>	<b>Current Status</b>	<b>Conservation/ Management Efforts</b>
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, fencing, and ungulate exclosures
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, non-native plant control by PEPP
Climate change degradation or loss of habitat, including hurricanes	A	Ongoing	None
Invertebrate predation or herbivory	C	Ongoing	Partial, control by PEPP
Lack of adequate hunting regulations	D	Ongoing	None
Low viability	E	Ongoing	Partial, some collections of propagative materials

**Synthesis:**

Currently there are approximately 55 wild individuals of *Zanthoxylum oahuense* on O‘ahu. Individuals are provided protection by fencing, nonnative plant control, rodent control, slug control, and ungulate control. Airlayer collections and propagation are ongoing.

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.

*Zanthoxylum oahuense* is a long-lived small tree suspected to be an obligate outcrosser (dioecious). 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 100 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. Genetic storage is not complete (Table 1), there are not three populations totaling at least 100 individuals, and all threats are not being managed (Table 1, Table 2). Therefore, *Zanthoxylum oahuense* 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 updated or reiterated for the 5-year review for 2024.

- Surveys and inventories—
  - Continue surveys for populations of *Zanthoxylum oahuense* in areas of potentially suitable habitat.
  - Determine suitable locations for reintroductions.
- Ungulate monitoring and control—Construct fenced exclosures to protect individuals from the negative impacts of browsing by ungulates.
- Invasive nonnative plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species, and those that compete with *Z. oahuense*.
- Site and habitat protection—Develop and implement effective threat control measures to reduce the impact of invasive plants, slugs, and rats.
- Fire prevention and control—Develop and implement fire prevention management plans.
- 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.
- Predator and herbivore monitoring and control—Determine and continue to implement effective methods to control rats and slugs.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- 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:

- [ANRPO] Army Natural Resource Program on O‘ahu. 2023. Appendices to the Status report for the Mākua and O‘ahu Implementation Plans, Army Natural Resources Program, O‘ahu, Office of the Vice President for Research and Innovation, University of Hawai‘i.
- [HBMP] Hawaii Biodiversity and Mapping Program. 2010. Plant species GIS data and Access database.
- [HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- Lyon Arboretum. 2023. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- O‘ahu Nursery. 2023. Report on controlled propagation of listed species, as designated under the U.S. Endangered Species Act. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i.
- [PEPP] 2023. Plant Extinction Prevention Program FY 2023 Annual Report (Oct 1, 2022-Sep 30, 2023), US FWS CFDA Program #15.657; Endangered Species 17 Conservation-Recovery Implementation Funds, Coop Agreement F22AC02205, December 28, 2023, UH Manoa, PCSU, PEPP. 74 pp.
- Togikawa, K., S. Ching-Harbin, J. Serrano, K. Ruis, and M. Thomas. 2023a. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2023: Plant Extinction Prevention Program, FY 2023 Annual Report (Oct 1, 2022-Sep 30, 2023), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F22AC02205 (Interim Report), May 30, 2023, UH Mānoa, PCSU, PEPP. 8 pp. BioPacifica database record for *Zanthoxylum oahuense*, Pacific Islands Fish and Wildlife Office.
- Togikawa, K., J. Serrano, and K. Ruis. 2023b. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2023: Plant Extinction Prevention Program, FY 2023 Annual Report (Oct 1, 2022-Sep 30, 2023), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F22AC02205 (Interim Report), March 9, 2023, UH Mānoa, PCSU, PEPP. 8 pp. BioPacifica database record for *Zanthoxylum oahuense*, Pacific Islands Fish and Wildlife Office.
- Togikawa, K. and J. Serrano. 2023. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2023: Plant Extinction Prevention Program, FY 2023 Annual Report (Oct 1, 2022-Sep 30, 2023), USFWS CFDA Program #15.657,

- Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F22AC02205 (Interim Report), April 12, 2023, UH Mānoa, PCSU, PEPP. 8 pp. BioPacifica database record for *Zanthoxylum oahuense*, Pacific Islands Fish and Wildlife Office.
- [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.
- [USFWS] 2019. *Zanthoxylum oahuense*. 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.  
[https://ecos.fws.gov/docs/five\\_year\\_review/doc2800.pdf](https://ecos.fws.gov/docs/five_year_review/doc2800.pdf).
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**U.S. FISH AND WILDLIFE SERVICE**  
SIGNATURE PAGE for 5-YEAR REVIEW of *Zanthoxylum oahuense* (a'e)

**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

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

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