

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Mezoneuron kawaiense* (uhiuhi)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2019. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 91 species in Oregon, Washington, Hawaii, and American Samoa. Federal Register 84(112): 27152–27154, June 11, 2019.

Lead Region/Field Office:

Interior Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewer:

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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 2020. The review was based on a review of current, available information since the last 5-year review for *Mezoneuron kawaiense* (as *Caesalpinia kawaiensis*) (USFWS 2015). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Megan Laut, 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 reviews for *Mezoneuron kawaiense* (as *Caesalpinia kawaiensis*) in the Federal Register on August 27, 2010 and July 21, 2015 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1644.pdf and https://ecos.fws.gov/docs/tess/species_nonpublish/2262.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 *M. kawaiense*.

This long-lived perennial tree in the Fabaceae (pea) family is endangered and occurs on the islands of Kaua‘i, O‘ahu, and Hawai‘i, and is historic to Lāna‘i and Maui. The status and trends for *Mezoneuron kawaiense* are provided in the tables below.

New Status Information:

- In 2018, critical habitat was designated on the island of Hawai‘i for *Mezoneuron kavaense* in four units in the lowland dry ecosystem (4,810 hectares [ha], 11,886 acres [ac]) (83 FR 42362, August 21, 2018).
- In 2017, Bruegmann and Caraway reported eight known subpopulations totaling 60 individuals on O‘ahu, Hawai‘i, and Lāna‘i, and that many were senescent and nonreproductive (Bruegmann and Caraway 2017). Currently, on the island of Hawai‘i, there are 18 mature wild individuals at Pu‘uwa‘awa‘a, three mature wild individuals at Pālama Nui-‘O‘oma-Kohana Iki-Mahai‘ula (DLNR-DOFAW 2015, pp. 101, 171; VanDeMark et al. 2018; VanDeMark et al. 2019), several trees at Ka‘ūpūlehu (Ka‘ūpūlehu 2018), and eight wild trees at Waikōloa (Waikōloa Dry Forest Initiative (WDFI) 2020). In 2011 on O‘ahu, there was one wild individual at east Makaleha (Ching Harbin and Anderson 2011). In 2012 on O‘ahu, there was one wild individual at Manuwai (Lau et al. 2012); currently, there is one mature plant and two immature plants at this location (Ching Harbin et al. 2017a; Togikawa, and Kwon 2019; Ching 2021, in litt.). In 2013 on Kaua‘i, there was one declining wild individual at Koai‘e (Kishida and Mottley 2013).
- In August, 2018, fires in Wai‘anae, Kea‘au, and Mākaha valleys burned 5,000 ac (2,023 ha) destroying two exclosures in the Kea‘au Forest Reserve, and impacting several endangered plant taxa, including an outplanting of *Mezoneuron kavaense* (U.S. Army 2018; U.S. Army 2018, in litt.; Ching 2021, in litt.).

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—The Plant Extinction Prevention Program (PEPP) monitored reintroduced plants on Lāna‘i and found only one surviving of 11 planted, and by June that plant died (PEPP 2015).
- Ungulate monitoring and management—A deer-proof fence protects a reintroduced population at Kahoaloha, Kaua‘i (Kishida et al. 2014). Exclosures protect reintroduced plants at Mākaha (O‘ahu) and a wild plant on Hawai‘i (PEPP 2018; Naboa 2021, in litt.).
- Nonnative plant management—
 - Nonnative plants are managed at Kahoaloha and Koai‘e, Kaua‘i (Kishida et al. 2014; Kishida and Williams 2014) and at Mākaha (O‘ahu) (PEPP 2017).
 - PEPP controls nonnative plants at the reintroduction at Mākaha, O‘ahu (PEPP 2017).
- Management of herbivory and predation by invertebrates—The reintroduced plants at Koai‘e, Kaua‘i were treated with an insecticide (Kishida and Williams 2014).
- Collection and propagation for genetic storage and reintroduction—
 - The Lyon Arboretum Seed Conservation Laboratory reported a total of more than 600 seeds stored representing one founder from Lāna‘i, one founder from Kaua‘i, 6 founders from three populations on O‘ahu, and approximately 50 founders from four populations the island of Hawai‘i (Lyon Arboretum 2020).

- The State's Native Ecosystems Protection and Management Program (NEPM) reported four plants in refugia representing two founders from O'ahu and propagation of 10 plants representing five founders for reintroduction on O'ahu (NEPM 2020; Pahole 2019).
- The rare plant nursery for Ka'ūpūlehu Dryland Forest Preserve propagated 18 plants from one founder at Koena and reported collection and storage of 79 seeds from one founder from Hawai'i in 2017 (Ka'ūpūlehu 2018).
- From 2017 to 2020, the National Tropical Botanical Garden (NTBG) reported storage of 87 seeds representing plants from Kaua'i in living collections at three gardens (NTBG 2020). From 2015 to 2019, 10 plants were added to their living collections of *Mezoneuron kavaïense* at two gardens (NTBG 2020).
- In 2020, Pu'uwa'awa'a reported collection and storage of 12 seeds representing seven founders from Hawai'i (Pu'uwa'awa'a 2020).
- Between 2015 and 2019, the Volcano Rare Plant Facility (VRPF) reported collection and storage of 1,816 seeds representing 26 founders from Hawai'i. In 2017, VRPF stored six plants in inventory representing three founders and in 2018 there were seven plants in inventory representing the same three founders (VRPF 2020).
- PEPP established a living collection at Koko Crater Botanical Garden of 10 mature *M. kavaïense* (Togikawa et al. 2019).
- Waimea Arboretum (O'ahu) maintains 5 to 21 plants in refugia representing three founders from O'ahu (Waimea Arboretum 2013, 2014, 2015, 2017, 2018).
- Reintroduction and translocation—
 - NEPM reintroduced one individual at Upper Kapuna, O'ahu (ANRP 2020 Appendix 3-1)
 - In 2017, the rare plant nursery for Ka'ūpūlehu Dryland Forest Preserve reported reintroduction of 13 plants representing two founders from Hawai'i (Ka'ūpūlehu 2018), and in 2019, reintroduction of one individual (Ka'ūpūlehu 2019).
 - Between 2015 and 2019, Future Forests Nursery reported reintroduction at Pālanui of 94 individuals of *M. kavaïense* from Hawai'i with a loss of 43 plants (Pālanui 2014-2019).
 - Between 2016 and 2020, 831 individuals were reintroduced in five sites at Pu'uwa'awa'a (Pu'uwa'awa'a 2020).
 - VRPF also propagated plants from reintroduction on Hawai'i and from 2015 through 2019 there were 287 plants representing 16 founders sent to Pu'uwa'awa'a (VRPF 2020).
 - From 2016 to 2017, PEPP reintroduced more than 100 plants at three locations on O'ahu (PEPP 2017) and 21 plants at two locations on Kaua'i (one in an enclosure) (Kishida et al. 2014; Kishida and Williams 2014). In 2017, 22 plants were reintroduced into an enclosure on O'ahu; however, these plants burned in a fire the following year (Ching Harbin et al. 2017b; Ching 2021, in litt.). In 2018, six plants remained from a reintroduction at Mākaha in 2017 (Ching Harbin et al. 2018). In 2019, six immature plants

survived from a previous reintroduction of 15 plants at Manuwai, and by 2017 six immature plants remained (Ching Harbin et al. 2019).

- Agreements—A Memorandum of Understanding in place between the Service and a landowner provides protection from development to one individual of *M. kawaiense* on the island of Hawai‘i. The plant is within a small enclosure within a protective habitat boundary of about 250 to 300 feet (76 to 91 meters) (Naboa 2021, in litt.)
- Public relations and education—PEPP hosted an information booth at the 2015 Run for the Dry Forest event held at Pu‘uwa‘awa‘a (Hawai‘i). A t-shirt with a design featuring *M. kawaiense* (J. Yoshioka, artist) was available for purchase, and donations were accepted for block prints (PEPP 2016).

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

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1986 (listing)	<50 (Hawai‘i)	0	Regeneration adequate to replace individuals lost from population for at least 13 years	No
			Minimum habitat determined, current habitat secured and protected	No
			3 populations with 100 mature individuals each	Unknown
1994 (recovery plan)	>1 (Kaua‘i) 11 (O‘ahu) 1 (Lāna‘i) >80 (Hawai‘i)	0	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially
			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals each	No
2010 (5-year review)	6 (O‘ahu) 70–80 (Hawai‘i)	149 (Kaua‘i and Hawai‘i)	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially

			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals each	No
2015 (5-year review)	1 (Kaua'i) 4 (O'ahu) 72 mature, 22 immature (Hawai'i)	535	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially
			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals	No
2018 (critical habitat, Hawai'i)	72 mature, 22 immature (Hawai'i)	N/A	Regeneration adequate to replace individuals lost from population for at least 13 years	Partially
			Minimum habitat determined, current habitat secured and protected	Partially
			3 populations with 100 mature individuals each	No
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2021 (5-year review)	1 (Kaua'i) 2 (O'ahu) ca 35 (Hawai'i)	21 (Kaua'i) 123, ca 8 remain (O'ahu) ca 940, ca 900 remain (Hawai'i)	All threats managed in all 3 populations	Partially, exclosures at Pu'uwa'awa'a, Ka'ūpūlehu, Waikōloa, and Kealakehe (Hawai'i), Mākaha (O'ahu), Kahoaloha (Kaua'i)

			Complete genetic storage	Close to completion
			Natural reproduction at all 3 populations	Partial, recruitment at Kealakehe (Hawai‘i) and Kahoaloha (Kaua‘i)
			3 populations with 25 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 *Mezoneuron kawaiense* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Degradation and destruction of habitat by feral ungulates	A	Ongoing	Partial, exclosures at Pu‘uwa‘awa‘a, Ka‘ūpūlehu, Waikōloa, and Kealakehe (Hawai‘i), Mākaha (O‘ahu), Kahoaloha (Kaua‘i)
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	Partial, nonnative plants controlled at Kealakehe and North Kona (Hawai‘i) and Mākaha (O‘ahu), Kahoaloha (Kaua‘i)
Degradation and destruction by fire	A	Ongoing	Partial, fire management plan for military training area on O‘ahu, firebreak at Kealakehe (Hawai‘i)
Degradation and destruction by landslides and erosion	A	Ongoing	Partial, reintroduction efforts
Drought degradation and destruction	A	Ongoing	Partial, irrigation (at population that has since burned)
Predation and herbivory by rats	C	Ongoing	Partial, traps at Waikōloa (Hawai‘i)

Predation and herbivory by invertebrates—black twig borer, white fly, cottony cushion scale, slugs	C	Ongoing	Partial, insect control at Kealakehe and North Kona (Hawai‘i), and Koai‘e (Kaua‘i)
Reduced viability due to low numbers	E	Ongoing	Partial, seed collection, propagation, and reintroduction
Climate change	E	Ongoing	Partial, reintroduction efforts

Synthesis:

Currently, there are 35 wild plants on the island of Hawai‘i, and one wild mature plant plus two immature plants on O‘ahu, all other known wild plants are not locatable (O‘ahu, Kaua‘i) or are extirpated (Lāna‘i, Maui). Seed collections from wild, reintroduced plants, and from living collections are ongoing, with propagation and some reintroductions on Kaua‘i, O‘ahu, and Hawai‘i. Approximately 50 founders from Hawai‘i are currently represented in collections and about 6 founders from O‘ahu are represented, and representation from one wild plant on Kaua‘i is complete. Four populations on Hawai‘i are in exclosures, and at least one population each from O‘ahu and Kaua‘i are in exclosures. Nonnative plant control is reported at two locations on Hawai‘i and one location each on O‘ahu and Kaua‘i. Public outreach is conducted on the island of Hawai‘i.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for *Caesalpinia kawaiensis* and *Kokia drynarioides* (USFWS 1994) and have been updated according to the draft revised recovery objective guidelines developed by the Hawai‘i and Pacific Plants Recovery Coordinating Committee and in the Amendment to the Recovery Plan for *Caesalpinia kawaiensis* and *Kokia drynarioides* (HPPRCC 2011; USFWS 2019). 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.

Mezoneuron kawaiense is a long-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 Kaua‘i, O‘ahu, Hawai‘i, Lāna‘i, and/or Maui where they now occur or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings, saplings) with a minimum of 25 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. There are fewer than 40 wild individuals remaining. Approximately 1,080 individuals were reintroduced on Hawai‘i, O‘ahu, and Kaua‘i with a little more than 900 surviving; and one reintroduction on O‘ahu was destroyed in a wildfire in 2018. Minimal regeneration has been observed at two reintroduced populations. Genetic storage goals are close to completion for the preventing extinction stage (Table 1), but not all threats are being addressed and total population size continues to decline (Table 2). Therefore, *Mezoneuron kawaiense* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

We are not aware of any new threats or significant new information regarding the species’ biological status since the last 5-year review in 2015. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2021.

- Surveys and inventories—Continue surveys of geographical and historical range for a current assessment of the species’ status.
- Ungulate control—Maintain existing exclosures and monitor for incursions.
- Invasive nonnative plant monitoring and control—Eradicate invasive introduced plants within exclosures and maintain exclosures to be free of invasive nonnative plants.
- Predator and herbivore monitoring and control—Implement effective measures to control rats and slugs and determine and implement effective control methods for nonnative insects.
- Fire prevention and control—Implement existing fire management plan for O‘ahu and develop and implement fire management plans for occurrences on Kaua‘i and Hawai‘i.
- Captive propagation for genetic storage and reintroduction—
 - Continue collection of genetic resources for storage, propagation, and reintroduction into managed suitable habitat within historical range.
 - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species’ vulnerability to climate change.
- Reintroduction and translocation—
 - Continue reintroductions and augmentations into suitable habitat in areas that are managed for known threats.
 - Increase numbers of populations and individuals within suitable habitat to reduce impacts from drought, landslides and erosion.
 - Assess suitability of available habitat on Lāna‘i and Maui for possible reintroductions.
- Climate change adaptation strategy—Research suitability of habitat for reintroduction of this species in the future due to impacts of climate change, including drought.
- Population biology research—Study *M. kawaiense* to determine viable population size and structure, and reasons for low natural recruitment.
- 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 taxon.

References:

- [ANRP] Army Natural Resources Program. 2020. Makua and Oahu Implementation Plan ecosystem restoration management plan, MIP Year 17-21, Oct 2020-Sept 2025, management unit MU: Kapuna Upper, Appendix 3-1.
- Bruegmann and Caraway. 2017. *Mezoneuron kavaense*. The IUCN Red List of Threatened Species 2017: e.T33606A120745329.
<http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T33606A120745329.en>.
- Ching, S. 2021, in litt., Email regarding current status of *Mezoneuron kavaense* on O‘ahu. 3 SEP 2021.
- Ching Harbin, S. and R. Anderson. 2011. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form in PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Ching Harbin, S., K. Togikawa, A. Hardman, D. Bicoy, J. Char, and G. Hardy. 2017a. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form in PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Ching Harbin, K. Togikawa, G. Hardy, L. Mau, R. Ueunten, and A. Kitchner. 2017b. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form in PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Ching Harbin, S., K. Togikawa, and A. Tsuneyoshi 2018. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form in PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Ching Harbin, S., K. Togikawa, J. Harmon, L. Weisenberger, J. Kwon, L. Abbott, M. Becker, L. Phipps, M. Guaita, J. Oyola, J. Watson, and R. Hoff. 2019. Hawai‘i

- Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- [DLNR-DOFAW] Department of Land and Natural Resources-Division of Forestry and Wildlife. 2015. Draft habitat conservation plan for game management at Pu‘u Wa‘awa‘a and Pu‘u Anahulu, Napu‘u Conservation Project. 268 pp.
- [HPPRCC] Hawaii and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.
- Ka‘ūpūlehu. 2018. 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.
- Kishida, W. and C. Mottley. 2013. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Kishida, W., S. Perlman, K. Cassel, and A. Williams. 2014. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Kishida, W. and A. Williams. 2014. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Lau, J., S. Ching Harbin, N. Tangalin, T. Portner, and R. Peralta. 2012. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26,

- 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kawaiense*.
- Lyon Arboretum. 2020. 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.
- Naboa, E. 2021, in litt., Kealakehe-Kukuiola Project site visit report, including email and photographs, 7 JUN 2021, 22 pp.
- [NTBG]. National Tropical Botanical Garden. 2020. 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.
- [NEPM] Native Ecosystems Protection and Management. 2020. 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.
- Pahole. 2019. Pahole rare plant facility, 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.
- Pālamanui. 2014-2019. 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] Plant Extinction Prevention Program. 2015. PEPP annual report fiscal year 2015 (July 1, 2014-June 30, 2015). 179 pp.
- [PEPP] 2016. Plant Extinction Prevention Program FY 2016 Annual Report (Oct 1, 2015-Sep 30, 2016), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F14AC00174, December 24, 2016, UH Manoa, PCSU, PEPP. 237 pp.
- [PEPP] 2017. Plant Extinction Prevention Program FY 2017 Annual Report (Oct 1, 2016-Sep 30, 2017), Coop Agreement: F14A00174, U.S. Fish and Wildlife Service CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, 235 pp.
- [PEPP] 2018. Plant Extinction Prevention Program fiscal year 2018 interim performance report, October 1, 2017-September 30, 2018, cooperative agreement

- F14AC00174. University of Hawai‘i at Mānoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 49 pp.
- Pu‘uwa‘awa‘a. 2020. 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.
- Togikawa, K. and J. Kwon. 2019. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- Togikawa, K., S. Ching Harbin, T. Takahama, T. Portner, T. Lum, and A. Beiseley. 2019. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- [U.S. Army] U.S. Army, Environmental Division. 2018. Report to the U.S. Fish and Wildlife Service for Oahu Army Natural Resource Program, Permit: TES-043638, Reporting period January 1, 2018-December 31, 2018. 16 pp.
- U.S. Army 2018, in litt. GIS trace of Wai‘anae, Kea‘au, and Mākaha fire. 7 AUG 2018.
- [USFWS] U.S. Fish and Wildlife Service. 1994. Recovery plan for *Caesalpinia kavaensis* and *Kokia drynarioides*. USFWS Region 1, Portland, OR. 82 pp.
- [USFWS] 2010. *Caesalpinia kavaensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/1644.pdf.
- [USFWS] 2015. *Caesalpinia kavaensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/tess/species_nonpublish/2085.pdf.
- [USFWS] 2018. Endangered and threatened wildlife and plants; designation of critical habitat for three plant species on Hawaii Island; final rule. 83 FR 42362–42435, August 21, 2018.
- [USFWS] 2019. Amendment to the recovery plan for *Caesalpinia kavaensis* and *Kokia drynarioides*, May 6, 1994, Pacific Region, USFWS. 11 pp.

- [USFWS] 2019. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 91 species in Oregon, Washington, Hawaii, and American Samoa. Federal Register 84(112): 27152–27154, June 11, 2019.
- VanDeMark, R. Loo, and Z. Judd. 2018. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- VanDeMark R. Loo, and J. Wagner. 2019. Hawai‘i Rare Plant Restoration Group (HRPRG) Field Data Form *in* PEPP 2019: Plant Extinction Prevention Program, FY 2019 Annual Report (Oct 1, 2018-Sep 30, 2019), US FWS CFDA Program #15.657; Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Manoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Mezoneuron kavaense*.
- [VRPF] Volcano Rare Plant Facility. 2020. 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.
- [WDFI] Waikōloa Dry Forest Initiative. 2019-2020. T&E report for Waikōloa Dry Forest Initiative to State of Hawai‘i Department of Land and Natural Resources-Division of Forestry and Wildlife, 2019-2020. Excel table for population monitoring, accessions, collections, and seed storage.
- Waimea Arboretum. 2013. 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.
- Waimea Arboretum. 2014. 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.
- Waimea Arboretum. 2015. 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.
- Waimea Arboretum. 2017. 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.

Waimea Arboretum. 2018. Report on controlled propagation of listed species, as
designated under the U.S. Endangered Species Act. Unpublished report submitted
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U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW of *Mezoneuron kawaiense*
(uhiuhi)

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 _____