5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Panicum niihauense* (lauʻehu)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

Lead Region/Field Office:

Interior Region 12/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaiʻi

Name of Reviewer:

Cheryl Phillipson, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Megan Laut, 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 (Service or USFWS) beginning in October 2021. The review was based on a review of current, available information since the last 5-year review for *Panicum niihauense* (USFWS 2017). 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 (*https://ecos.fws.gov/ecp/species/252*).

Review Analysis:

Please refer to the previous 5-year reviews for *Panicum niihauense* published in the Federal Register on January 18, 2008, and September 17, 2017 (available at *http://ecos.fws.gov/docs/tess/species_nonpublish/1193.pdf* and *http://ecos.fws.gov/docs/tess/species_nonpublish/2482.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 *P. niihauense*.

This short-lived annual to perennial grass in the Poaceae (grass) family is listed as endangered and is known from the island of Kauaʻi and historically from Niʻihau. The status and trends for *Panicum niihauense* are provided in the tables below.

New Status Information:
In 2017, there were six wild individuals of *Panicum niihauense* on Kauaʻi and none observed on Niʻihau since 1949 (USFWS 2017). In 2019, three individuals were observed at Polihale, Kauaʻi (Perlman 2019). In 2021, the Kauaʻi Plant Extinction Prevention Program (Kauaʻi PEPP) surveyed and counted three wild individuals remaining (PEPP 2021).

New Threats:

- None reported.

New Management Actions:

- Surveys and monitoring—The National Tropical Botanical Garden (NTBG) and the Plant Extinction Prevention Program (PEPP) survey and monitor wild and reintroduced populations of *Panicum niihauense* on Kauaʻi (Kishida and Perlman 2018a, b; Perlman 2019; PEPP 2017). A reintroduced population was monitored and showed that four mature and three immature plants remained, with 54 dead individuals counted (Kishida and Perlman 2018a). An augmented population had three mature reintroduced individuals remaining and documented seven dead individuals (Kishida and Perlman 2018b).
- Captive propagation for genetic storage and reintroduction—
    - In 2019, the Kōkeʻe Mid-Elevation Nursery (KMEN) reported propagation of 11 plants representing one founder (KMEN 2019). In 2020, KMEN reported propagation of one plant representing a second founder, and addition of a second-generation plant in the nursery produced during germination trials at Lyon Arboretum (KMEN 2020).
    - From 2019 to 2020, NTBG propagated 11 plants representing at least two founders to add to a living collection; propagation of three plants for the nursery; and storage of nearly 3,000 seeds representing at least two founders (NTBG 2019, 2020).
    - From 2002 until 2018, the Lyon Arboretum Seed Conservation Laboratory reported storage of more than 41,000 seeds representing 17 founders from the population at Polihale (Lyon Arboretum 2022). In addition, more that 4,000 seeds were collected from a plant in cultivation (Lyon Arboretum 2022).
- Reintroduction and augmentation—
    - In 2017, the Kauaʻi PEPP assisted the State's Division of Forestry and Wildlife with reintroduction of 52 individuals at Polihale (PEPP 2017). In 2020, an additional nine individuals were outplanted (PEPP 2020).
    - In 2018, PEPP received a grant award to propagate and outplant *ex situ* from previous collections of *Panicum niihauense* (USFWS 2018).
- 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.
- Integrated Natural Resources Management Plan—The U.S. Navy's current draft INRMP provides management actions and goals for protecting *Panicum niihauense* habitat within the Pacific Missile Range Facility on Kauaʻi (Naval Facilities Engineering Command, Hawaiʻi [NAVFAC] 2021). The Navy monitors the

landscape area within their jurisdiction and has restrictions on its use, directing personnel to avoid driving vehicles in sensitive dune vegetation. Planned goals to reach eventual removal of critical habitat (depending on funding) include nonnative invasive plant control (removing *Prosopis pallida* [long-thorned kiawe], *Pennisetum ciliare* syn. *Cenchrus ciliaris* [buffelgrass] and *Leucana leucocephala* [koa haole]); surveys for *P. niihauense* to be conducted every 3 years; outplanting of native plant species with installation of an irrigation system for use until reintroduced plants are established; and possible outplanting of *P. niihauense* (NAVFAC 2021, Appendix D, p. 121). In 2021, updates to these goals included planned construction of a plant nursery and hiring of a botanist to manage the nursery (McFarland and Behnke 2021).

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1996 (listing)	23	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1999 (recovery plan)	23	0	All threats managed in all 3 population	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat	23	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
2008 (5-year review	32–37	6	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No

Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2017 (5-year review)	32–41	>100; ca 70 survive	All threats managed in all 3 populations	No
			Complete genetic storage	Yes
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partially
			3 populations with 150 mature individuals each	No
2022 (5-year review)	3	9	All threats managed in all 3 populations	Partially
			Complete genetic storage	Yes, 17 founders represented
			Natural reproduction at all 3 populations	Partially
			3 populations with 150 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 *Panicum niihauense* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, some control at reintroduction sites and at PMRF
Climate change degradation and destruction of habitat, including hurricanes	A	Ongoing	None
Human disturbance—off-road vehicle use	E	Ongoing	Partial, INRMP addresses PMRF staff use of off-road vehicles

Reduced viability due to low numbers	E	Ongoing	Partial, collection, propagation, and reintroduction

Synthesis:
Currently, there are three wild individuals of *Panicum niihauense* on Kaua‘i. Seed collections and propagation are ongoing with all founders represented. One reintroduced population is within an exclosure; another is in a managed area, and both have some nonnative invasive plant control. Reintroduction is ongoing at three sites with a fourth site as a living collection.

Stabilizing (interim), downlisting, and delisting objectives are provided in the Kaua‘i Islandwide Recovery Plan (USFWS 2021) 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.

Panicum niihauense is a short-lived annual to perennial grass. 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 where this species now occurs or occurred historically and each of these populations must be naturally reproducing (i.e., viable seeds, seedlings) with a minimum of 150 mature, reproducing individuals per population.

The preventing extinction goals for *Panicum niihauense* have not been met. Numbers of wild individuals are declining rapidly with only three wild individuals remaining (Table 1). Collection, propagation, and reintroduction are ongoing with 18 founders represented (Table 1, Table 2). Three reintroduced populations are within managed areas. However, this species is susceptible to threats, such as nonnative plant competition, off-road vehicle use, and climate change (Table 2). Therefore, *P. niihauense* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:
No new threats and no significant new information regarding the species’ biological status have been reported since the last 5-year review in 2017. Thus, the following recommendations for future actions are reiterated or updated for the 5-year review for 2022.

- Surveys and inventories—Continue to survey for populations of *Panicum niihauense* in areas of potentially suitable habitat.
- Nonnative invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *P. niihauense* at all populations.
- Climate change adaptation strategy—Research suitability of habitat for viability of species, including where to conduct translocations in the future due to impacts of climate change.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock.
- Reintroduction and augmentation—Continue to reintroduce individuals and augment populations into protected suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency and redundancy—Increase numbers of individuals and populations through habitat restoration and translocation in suitable habitat where threats are controlled to reduce impacts of climate change, including hurricanes, as well as small population size.
- Human interaction monitoring and management—Continue to implement measures to prevent disturbance and destruction by use of off-road vehicles.
- 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:

[HPPRCC] Hawai‘i and Pacific Plants Recovery Coordinating Committee. 2011. Revised recovery objective guidelines. 8 pp.

Kishida, W. and S. Perlman. 2018a. 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), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Panicum niihauense*, Pacific Islands Fish and Wildlife Office

Kishida, W. and S. Perlman. 2018b. 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), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Panicum niihauense*, Pacific Islands Fish and Wildlife Office

[KMEN] Kōkeʻe Mid-Elevation Nursery. 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, Hawaiʻi.

[KMEN] 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, Hawaiʻi.

Lyon Arboretum. 2022. 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, Hawaiʻi.

McFarland, B. and J.H. Behnke. 2021, PMRF INRMP annual metrics meeting, 14 OCT 2021, unclassified slideshow.

[NTBG] National Tropical Botanical Garden. 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, Hawaiʻi.

[NTBG] 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, Hawaiʻi.

[NAVFAC] Naval Facilities Engineering Command. 2021. Draft Integrated Natural Resources Management Plan, Pacific Missile Range Facility, islands of Kauaʻi, Kaʻula, and Niʻihau, State of Hawaiʻi, April 2021. 221 pp. + appendices.

Perlman, S. 2019. Hawaiʻi 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), USFWS CFDA Program #15.657, Endangered Species Conservation-Recovery Implementation Funds, Coop Agreement F18AC00502, December 26, 2019, UH Mānoa, PCSU, PEPP. 192 pp. + appendices. BioPacifica database record for *Panicum niihauense*, Pacific Islands Fish and Wildlife Office.

[PEPP] Plant Extinction Prevention Program. 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] 2020. Plant Extinction Prevention Program, fiscal year 2020 interim performance report (October 1, 2019-September 30, 2020) cooperative agreement F18AC00502 (interim report), F19AC00532 (interim report), US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—

recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program. 70 pp.

[PEPP] Plant Extinction Prevention Program. 2021. Fiscal year 2021 interim performance report (October 1, 2020-September 30, 2021) cooperative agreements F18AC00502 and F19AC00532, US Fish and Wildlife Service CFDA Program #15.657, Endangered species conservation—recovery implementation funds, University of Hawaii at Manoa, Pacific Cooperative Studies Unit, Plant Extinction Prevention Program.

[USFWS] U.S. Fish and Wildlife Service. 2008. *Panicum niihauense* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/1193.pdf.*

[USFWS] 2017. *Panicum niihauense* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/tess/species_nonpublish/2482.pdf.*

[USFWS] USFWS Coast Program. 2018. Catalog of Federal Domestic Assistance (CFDA) Number: 15.630, Award #F17AC00452, Plant Extinction Prevention Program, Interim Report, October 1, 2017—September 30, 2018, Pacific Cooperative Studies Unit, University of Hawai‘i, Honolulu. 26 pp.

[USFWS] 2020. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 129 Species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85(48): 14240–14243, March 11, 2020.

[USFWS] 2021. Kaua‘i Islandwide Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. 65 pp. + appendices.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Panicum niihauense* (lau‘ehu)

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**

MEGAN LAUT Digitally signed by MEGAN LAUT Date: 2022.07.22 12:31:56 -10'00'

_____ Date_____