

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyperus trachysanthos* (pu‘uka‘a)

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:

Cheryl Phillipson, 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 *Cyperus trachysanthos* (USFWS 2020). The evaluation by Cheryl Phillipson, 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/7749>).

Review Analysis:

Please refer to the previous 5-year reviews for *Cyperus trachysanthos* published in the Federal Register on August 27, 2010, August 19, 2013, September 30, 2020 (available at https://ecos.fws.gov/docs/tess/species_nonpublish/1643.pdf, https://ecos.fws.gov/docs/tess/species_nonpublish/2066.pdf, and https://ecos.fws.gov/docs/tess/species_nonpublish/3162.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 *C. trachysanthos*.

This short-lived perennial sedge in the Cyperaceae (sedge) family is endangered and is known from the islands of O‘ahu and Kaua‘i, and historically from Ni‘ihau, Moloka‘i,

and Lāna‘i. The status and trends for *Cyperus trachysanthos* are provided in the tables below.

New Status Information:

- Monitoring of the population on O‘ahu on Navy-managed lands at Lualualei from January through September showed some variation in the number of individuals from 110, to 60–70, to 75, as area is flooded periodically from rain events (Wai‘anae Mountains Watershed Partnership [WMWP] 2022a, pp. 1. 8, 18; WMWP 2022b, pp. 1, 6; WMWP 2022c, p. 1). Plants are observed flowering and setting seed (WMWP 2022c, p. 1). The last observation at Makapu‘u, O‘ahu, was of one individual in 2005 (PEPP 2019–2023). The two subpopulations on Kaua‘i were last estimated to total from 100 to 400 individuals in 2020. Combined, the four populations/subpopulations on both O‘ahu and Kaua‘i total from 160 to 510 individuals, and possibly as many as 750 individuals (PEPP 2019–2023; Keir 2022; WMWP 2022a, pp. 1. 8, 18; WMWP 2022b, pp. 1, 6).
- Approximately 100 founders from five populations on O‘ahu and two founders from two populations on Kaua‘i are represented in seed collections and propagation or in living collections (Lyon Arboretum 2022; NTBG 2022). Nearly half of the individuals collected are from Hāmākua Marsh (O‘ahu), which may contain wild and/or translocated individuals.

New Threats:

- None reported.

New Management Actions:

- Monitoring and surveys—
 - The WMWP monitors the population within Lualualei in the Wai‘anae mountains of O‘ahu (WMWP 2022a, pp. 1. 8, 18; WMWP 2022b, pp. 1, 6; WMWP 2022c, p. 1).
 - The Division of Forestry and Wildlife monitors populations of *Cyperus trachysanthos* (Keir 2022).
- Fire prevention/management—
 - In 2022, a goal of the Navy’s Lualualei management plan was to prioritize preparation and implementation of a fire management plan (Naval Facilities Engineering Systems Command [NAVFAC] 2022, p. 5). Meetings were arranged with the newly created Wildland Fire Working Group (NAVFAC 2022, p. 5).
- Collection and propagation for genetic storage and reintroduction—
 - In 2022, the Lyon Arboretum Seed Conservation Laboratory reported storage of 12,666 seeds collected between 2001 and 2014 representing one cultivated plant from the Arboretum’s greenhouse and one plant cultivated from an old collection from an occurrence at Queen’s Beach (O‘ahu) (Lyon Arboretum 2022). Also stored are more than 34,000 seeds representing 57 individuals at Hāmākua Marsh (Kailua, O‘ahu), 1,299 seeds representing two founders at Lē‘ahi (Diamond Head, O‘ahu), more than 106,000 seeds representing 37 founders at Lualualei (O‘ahu), 2,121 seeds representing three founders at

Kealakīpapa (Makapu‘u, O‘ahu), 3,461 seeds representing one founder at Manini gulch (Ka‘ena Point, O‘ahu), and 1,676 seeds representing two cultivated plants at Kauai’s National Tropical Botanical Garden (NTBG) (Lyon Arboretum 2022).

- In 2019, the Maui Nui Botanical Garden (MNBG) reported storage of two cultivated plants from an unspecified source that produced 100s of seeds (MNBG 2019). In 2021, MNBG had one plant in a living collection from a plant cultivated at Kanaha Pond on Maui (MNBG 2021).
- In 1993, NTBG reported three plants from a subpopulation at Nualolo (Kaua‘i) in a living collection with 6,700 seeds collected and stored. In 2001, NTBG propagated 45 plants sourced from the subpopulation at Nualolo, and storage of 8,009 seeds. In 2002, NTBG propagated 12 plants and stored 1,178 seeds. From 2004 to 2005, NTBG collected and stored 36,505 seeds from two second generation plants. From 2018 to 2019, 3,231 seeds were collected from a second subpopulation at Nualolo ‘Āina, and 8,320 seeds were stored from a second generation plant from the same subpopulation. From 2019 to 2020, there were 78 plants in a living collection at NTBG’s Limahuli garden with collection of 110 seeds (NTBG 2022). In summary, more that 63,000 stored seeds represent approximately 139 propagated plants or plants at Nualolo, Kaua‘i, or in living collections.
- From 2020 to 2021, Dillingham nursery propagated 16 plants representing one founder at Hāmākua Marsh and four plants representing at least one founder at Lualualei (PEPP 2023, p. 47). In 2023, the O‘ahu Rare Plant Facility (ORPF) reported propagation (at the Dillingham nursery) of 12 plants from an unspecified source, four plants representing one founder at Hāmākua Marsh, and four plants representing one founder at Lualualei (ORPF 2023).
- Reintroduction/Augmentation—Outplanting has occurred, but no recruitment was observed (Keir 2022).

Table 1. Status and trends of *Cyperus trachysanthos* 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.

Date	No. wild individuals	No. outplanted	Stabilization Goals identified in Recovery Plan	Stabilization Goals Completed?
1996 (listing)	ca 350	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

2010 (5-year review)	ca 400 (O‘ahu)	several	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	Partial
2013 (5-year review)	Unknown	200	All threats managed in all 3 populations	Partial
			Complete genetic storage	Partial
			3 populations with 50 mature individuals each	Partial

Table 1b.

Date	No. wild individuals	No. outplanted	*Preventing Extinction Targets identified by HPPRCC	*Preventing Extinction Targets Completed?
2020 (5-year review)	7–100 (O‘ahu) 100–400 (Kaua‘i)	24	All threats managed in all 3 populations	Partial
			Complete genetic storage	Nearly complete
			Reproduction (i.e., viable seeds, seedlings) at all 3 populations	Partial
			3 populations with 150 mature individuals each	Partial
2024 (5-year review)	160–510	ca 3	All threats managed in all 3 populations	Partial, Lualualei is mowed after seed set

			Complete genetic storage	Partial
			Natural reproduction at all 3 populations	No, none reported
			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 *Cyperus trachysanthos* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, monitoring at Lualualei and Ka'ena Point are fenced
Established ecosystem altering invasive plant species degradation of habitat and competition	A, E	Ongoing	Partial, nonnative plant management at Lualualei and Ka'ena Point
Fire destruction and degradation of habitat	A	Ongoing	Partial, fire management plan in place for Lualualei
Degradation and destruction of wetlands	A	Ongoing	Partial, management at Lualualei
Climate change degradation or loss of habitat	A	Ongoing	None
Degradation and destruction by off-road vehicles	E	Ongoing	Ka'ena Point fenced
Herbicide use	E	Unknown	Unknown

Synthesis:

Currently, there are two populations of 100 to 400 individuals of *Cyperus trachysanthos* on Kaua'i and one small population totaling 60 to 110 individuals on O'ahu; with limited monitoring at other historical sites on O'ahu. One estimate is as high as 750 individuals for all populations combined, but monitoring is needed. Two populations are provided protection by fencing and nonnative plant control. Seed collections, propagation, and outplanting occurred in 2014 and 2020. Approximately 100 individuals from five populations on O'ahu and two founders from two populations on Kaua'i are represented in seed collections and propagation or in living collections, however, there is some question as to whether some of the individuals collected are from translocations or wild

populations. Recently, only three individuals were reintroduced. No recruitment has been reported.

Stabilizing (interim) and preventing extinction targets, and downlisting and delisting criteria are provided in the Recovery Plan for the Multi-Island Plants (USFWS 1999) 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.

Cyperus trachysanthos is a short-lived perennial sedge with a tendency for population size fluctuation. 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 and Kaua'i, and possibly on Lāna'i and Moloka'i, 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 150 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met. The populations on O'ahu and Kaua'i continue to decline. Genetic storage is partially complete for two populations (Table 1). No populations total 150 mature individuals and recruitment has not been documented (Table 1, Table 2). The threats of wetland loss, climate change, and herbicide use are not addressed (Table 2). Therefore, *Cyperus trachysanthos* meets the definition of Endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

There are no new threats or other significant new information regarding the species' biological status since the last 5-year review in 2020. Thus, the following recommendations for future actions are updated or reiterated for the 5-year review for 2024.

- Surveys and monitoring—Continue monitoring extant populations and conduct surveys for occurrences of *Cyperus trachysanthos* in known populations and historical and suitable habitat on the islands of O'ahu and Kaua'i to determine the species' current status.
- Invasive nonnative plant monitoring and control—Continue control of established ecosystem-altering nonnative invasive plant species, and those that compete with *C. trachysanthos*.

- Fire monitoring and control—Continue to develop and implement fire prevention management plans for all occurrences.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for the recovery of the species.
- Captive propagation for genetic storage and reintroduction—Continue collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Translocation/reintroduction—Continue to augment current populations and to translocate/reintroduce individuals into suitable habitat within historic range that is being managed for known threats to this species.
- Build resiliency, redundancy, and representation—Increase species' viability through habitat restoration and threat control, to reduce impacts of wetland loss, climate change and off-road vehicles.
- Alliance and partnership development—Continue to work with the Wai‘anae Mountains Watershed Partnership, and other 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.

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- [WMWP] 2022b. Performance progress quarterly report SF-PPR, March 31, 2022, Grant W9126G-21-0024. 13 pp.

[WMWP] 2023. Performance progress report SF-PPR, W9126G-21-2-0024, University of Hawai'i Office of Research Services, Pacific Cooperative Studies Unit. 24 pp.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyperus trachysanthos* (pu'uka'a)

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 _____