

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Cyperus fauriei* (no common name)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. Federal Register 88(83): 20088–20092, May 7, 2018.

Lead Region/Field Office:

Interior Region 12/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, 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) beginning in October 2019. The review was based on a review of current, available information since the last 5-year review for *Cyperus fauriei* (USFWS 2012). 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 review for *Cyperus fauriei* published in the Federal Register on August 28, 2012 (available at https://ecos.fws.gov/docs/five_year_review/doc4076.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. fauriei*.

This short-lived perennial sedge in the Cyperaceae (sedge) family is endangered. The status and trends for *Cyperus fauriei* are provided in the tables below.

New Status Information:

- There are no reported surveys for or monitoring of *Cyperus fauriei* since the last five-year review in 2012. At that time, on Moloka‘i, there was one population

estimated to number in the thousands, extending from Kūpā‘ia gulch through Kamakou Preserve and east to Kamalō, with a separate occurrence to the west in the upper Waihānau drainage. There were two small populations on the island of Hawai‘i totaling 17 individuals. Currently on the island of Hawai‘i, the Plant Extinction Prevention Program (PEPP) knows of no individuals (PEPP 2020, in litt.).

- In the 2012 proposed rule for listing and designation of critical habitat on the islands of Moloka‘i, Lāna‘i, Maui, and Kaho‘olawe, two critical habitat units in the lowland dry ecosystem on Lāna‘i were proposed for *Cyperus fauriei* (4,332 hectares (ha); 10,705 acres (ac)); however, critical habitat was excluded on Lāna‘i because the benefits provided to the species from conservation actions by the landowner outweighed the benefits of designation (77 FR 34464, June 11, 2012; 81 FR 17790, March 30, 2016). In the final rule of 2016, two critical habitat units in the lowland mesic and montane mesic ecosystems were designated for *C. fauriei* on Moloka‘i (3,879 ha, 9,586 ac) (81 FR 17790, March 30, 2016). Critical habitat as designated on the island of Hawai‘i in 2003 remains the same (one unit, 127 ha; 313 ac) (68 FR 39624, July 2, 2003).
- This taxon was listed as endangered as *Mariscus fauriei* (59 FR 10305, March 4, 1994). In the 2012 5-year review for *Cyperus fauriei*, we noted that Strong and Wagner (1997) acknowledged a trend in sedge taxonomy to apply a broad circumscription to the genus *Cyperus*, and that they had accepted the synonymy of the genus *Mariscus* for *Cyperus* for Hawaiian taxa. Historically, the genus *Mariscus* has also been recognized as a subgenus of *Cyperus*, but taxonomists noted that no consistent characters (*e.g.*, leaf anatomy, spikelet structure, photosynthetic metabolism type) separated the *Mariscus* group from other species in *Cyperus*, and recommend merging it within *Cyperus* subg. *Cyperus* (Tucker 1994, p. 10; Strong and Wagner 1997, p. 39). This change was also accepted in the most recent update to the Manual of the Flowering Plants of Hawai‘i (Wagner *et al.* 2012, p. 81). In 2015, the Service announced the revised taxonomy of four wildlife and 50 plant species under the Endangered Species Act of 1973, as amended, revising the List of Endangered and Threatened Wildlife and Plants (at 50 CFR Part 17) to reflect the updated accepted taxonomy and nomenclature of these species. At the same time, the 2016 final critical habitat rule for 135 species on Maui Nui, this taxonomic change was also recognized (81 FR 17790, March 30, 2016). We made editorial revisions to species descriptions and critical habitat map titles used in 68 FR 39624 (July 2, 2003) for this species to reflect this taxonomic change.

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 Hawai‘i 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. This assessment concluded that *Cyperus fauriei* is vulnerable to the impacts of climate change, with a vulnerability score of 0.289

(on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). Therefore, additional management actions may be needed to conserve this taxon into the future, such as locating key microsites that overlap with current and future climate envelopes for outplanting efforts.

New Management Actions:

- None reported.

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

Date	No. wild individuals	No. outplanted	Stabilization Criteria identified in Recovery Plan	Stabilization Criteria Completed?
1994 (listing)	ca 20–30 (Moloka‘i) 13 (Hawai‘i)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1996 (recovery plan)	20–30 (Moloka‘i) 20–30 (Hawai‘i)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	20–30 (Moloka‘i) 100–200 (Hawai‘i)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No

2012 (5-year review)	1,000s (Moloka'i) 17 (Hawai'i)	0	All threats managed in all 3 populations	Partially
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
2016 (critical habitat)	Unknown	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	Partially
Date	No. wild individuals	No. outplanted	*Preventing Extinction Criteria identified by HPPRCC	*Preventing Extinction Criteria Completed?
2020 (5-year review)	Unknown (estimates of 1000s on Moloka'i)	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			Reproduction (i.e. viable seeds, seedlings) at all 3 populations	Unknown
			3 populations with 150 mature individuals each	Unknown

* 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 fauriei* and ongoing 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 and competition	A, E	Ongoing	None
Degradation and destruction by fire	A	Ongoing	None
Degradation and destruction by landslides and flooding	A	Ongoing	None
Degradation and destruction by agricultural and urban development	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	None
Lack of adequate hunting regulations	D	Ongoing	None

Synthesis:

Currently, there is one extended population of *Cyperus fauriei* on Moloka‘i with an estimated thousands of individuals, and no known individuals on the island of Hawai‘i. Monitoring of the Moloka‘i populations, however, has not occurred during the last five years. A landscape-based assessment of climate change vulnerability for native plants of Hawai‘i using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *C. fauriei* is vulnerable to the effects of climate change. No genetic materials are in storage, and no propagation, reintroduction, or threat control efforts are being conducted.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Big Island Plant Cluster (USFWS 1996), 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 fauriei is a short-lived perennial sedge with known tendency for decline or large fluctuations in population size. 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. In addition, a minimum of three populations should be documented on the islands of Hawai‘i, Moloka‘i, or Lāna‘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. While it is possible there are 3 populations with 150 reproducing individuals each or one large metapopulation with 450 mature individuals, there has been no recent monitoring of this species, therefore the current status of these populations is unknown (Table 1). There is no genetic material in storage or propagation (Table 1). In addition, not all threats are being managed (Table 1, Table 2). Therefore, *Cyperus fauriei* 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 2012. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2020.

- Surveys and inventories—Conduct surveys for occurrences of *Cyperus fauriei* on the islands of Hawai‘i and Moloka‘i, especially in areas of known occurrences, to determine its current status.
- Habitat protection—
 - Develop and implement effective measures to reduce the impacts of agricultural and urban development.
 - Implement erosion control measures to address the effects of landslides and flooding.
- Ungulate monitoring and control—Construct and maintain fencing to protect individuals from the negative impacts of feral ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species and those that compete with *Cyperus fauriei*, especially within any fenced exclosures.
- Fire monitoring and protection—Develop and implement the fire management plan for otherwise unmanaged areas where this species occurs or is reintroduced.
- Climate change adaptation strategy—Assess the modeled effects of climate change on this species and use to determine future landscape needed for its recovery.
- Captive propagation for genetic storage and reintroduction—

- Begin collection and propagation efforts for maintenance of genetic stock and for reintroduction.
- Track individuals as to source to ensure more complete genetic representation of propagules for storage and reintroduction.
- Reintroduction and translocation—
 - Identify suitable reintroduction sites and continue to establish new populations and augment wild populations on Moloka‘i and the island of Hawai‘i.
 - Determine appropriate protected reintroduction sites on Lāna‘i.
- Alliance and partnership development—Continue to work with the Hawaii Division of Forestry and Wildlife, The Nature Conservancy, Pūlama Lāna‘i, and other partners and land managers in planning and implementation of ecosystem-level restoration and management to benefit this species.

References:

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 134 pp.

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

[PEPP] Plant Extinction Prevention Program. 2020. Statewide estimates for multi-island rare plant species in Hawai‘i, data notes. Plant Extinction Prevention Program and State of Hawai‘i’s Department of Land and Natural Resources; Division of Forestry and Wildlife.

Strong, M.T. and W.L. Wagner. 1997. New and noteworthy Cyperaceae from the Hawaiian Islands. Bishop Museum Occasional Papers 48: 37–50.

Tucker, G.C. 1994. Revision of the Mexican species of *Cyperus* (Cyperaceae). Systematic Botany Monographs 43: 1–213.

[USFWS] U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of endangered or threatened status for 21 plants from the island of Hawaii, state of Hawaii, final rule. 59 FR 10305, March 4, 1994.

[USFWS] 1996. Recovery plan for the Big Island plant cluster. Portland. 176 pp.

[USFWS] 2003. Endangered and threatened wildlife and plants; final designation and nondesignation of critical habitat for 46 plant species from the island of Hawaii, HI; final rule. 68 FR 39624, July 2, 2003.

- [USFWS] 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species, proposed rule. 77 FR 34464, June 11, 2012.
- [USFWS] 2012. *Cyperus fauriei* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI.
https://ecos.fws.gov/docs/five_year_review/doc4076.pdf.
- [USFWS] 2016. Endangered and threatened wildlife and plants; designation and nondesignation of critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; final rule. 81 FR 17790, March 30, 2016.
- [USFWS] 2018. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawaii, Palau, Guam, and the Northern Mariana Islands. 88 FR 20088, May 7, 2018.
- Wagner, W.L., D.R. Herbst, N. Khan, and T. Flynn. 2012. Hawaiian vascular plant updates: a supplement to the Manual of the Flowering Plants of Hawai‘i and Hawai‘i’s Ferns and Fern Allies. 126 pp.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Cyperus fauriei*
(no common name)

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

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