5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Melanthera kamolensis* (nehe)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 76 species in Hawaii, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573, February 12, 2016.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai‘i

Name of Reviewers:

Cheryl Phillipson, Biologist, PIFWO
Lauren Weisenberger, Plant Recovery Coordinator, PIFWO
Gregory Koob, 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 (USFWS) beginning in August 2017. The review was based on a review of current, available information since the last 5-year review for *Melanthera kamolensis* (as *Lipochaeta kamolensis*) (USFWS 2014). The evaluation by Cheryl Phillipson, Biologist, was reviewed by Lauren Weisenberger, Plant Recovery Coordinator, and Gregory Koob, 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 *Melanthera kamolensis* (as *Lipochaeta kamolensis*) published in the Federal Register on July 23, 2009 and March 27, 2014 (available at *https://ecos.fws.gov/docs/five_year_review/doc2453.pdf* and *https://ecos.fws.gov/docs/five_year_review/doc4401.pdf*) for a complete review of the species' status, threats, and management efforts. 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. kamolensis*.

This short-lived partly woody perennial herb in the Asteraceae (sunflower) family is endangered and endemic to east Maui. The current status and trends for *Melanthera kamolensis* are provided in the tables below.

New Status Information:

- In 2015, the Service published a technical correction for this and other plant and wildlife species, recognizing the taxonomic change from *Lipochaeta kamolensis* to *Melanthera kamolensis* (80 FR 35860, June 23, 2015). The taxonomic change does not affect the range or endangered status of this species.
- The latest review of the species by IUCN in 2015 reported one subpopulation of four individuals (Chau *et al.* 2015); however, by 2018, only one wild plant remained (Oppenheimer, 2018, in litt.).
- In 2016, critical habitat was designated in four units in the lowland dry ecosystem on east Maui for *M. kamolensis* (16,842 ac; 6,815 ha) (81 FR 17790, March 30, 2016).
- Results of a 2018 study of the biogeography and relationships within the *Melanthera* alliance supported the recognition of five genera: *Lipochaeta*, *Wollastonia*, *Melanthera*, *Lipotriche*, and *Echinocephalum*. All species endemic to the Hawaiian islands fall within *Lipochaeta* (Edwards *et al.* 2018). We will address this taxonomic change in a future Federal Register publication.

New Threats:

- Climate change loss or degradation of habitat—We previously reported that climate change may pose a threat to this species, citing the analysis by Fortini *et al.* (2013), but we did not include the species' vulnerability rank. The assessment by concluded that *Melanthera kamolensis* is extremely vulnerable to the impacts of climate change, with a vulnerability score of 0.95 (on a scale of 0 being not vulnerable to 1 being extremely vulnerable to climate change). In addition, this species is also one of the most vulnerable native Hawaiian plant species that has a projected future climate envelope. Therefore, additional management actions, such as locating suitable locations for recovery in both current and future climate envelopes, are needed to conserve this taxon into the future.

New Management Actions:

- Surveys and monitoring—The Plant Extinction Prevention Program (PEPP) surveys for and monitors populations of *Melanthera kamolensis* on east Maui (PEPP 2013, 2014, 2015, 2016, 2017b, 2018).
- Captive propagation for genetic storage and reintroduction—
    - In 2017, PEPP reported that 10 founders were represented in collections from Lualaʻilua; and that three of 10 founders from a hybrid swarm (with *M. rockii*) in the same area had been collected for molecular analyses to study the hybrid swarm (PEPP 2017a).
    - The Lyon Arboretum Micropropagation Laboratory reported germination and propagation of *Melanthera kamolensis* from two collections, one in 2001 and another in 2012, though no propagules remain. The Lyon Arboretum Seed Laboratory reports almost 2,000 seeds in storage from 11 individuals collected between 2013 and 2016. There are also pooled collections from eight plants (382 seeds) from another location (Lyon Arboretum 2017).

    - The Olinda Rare Plant Facility (ORPF) reported 20 cuttings and nine potted plants collected from 10 individuals at an undocumented location and 14 cuttings and three potted plants from four individuals at Kepuni Gulch in 2013. In 2014, ORPF further propagated cuttings into potted plants from five of the same individuals (15 plants) and six potted plants from two new individuals from Lualaʻilua. In 2015, 11 potted plants were sent out to Kahikinui (*in situ*). In 2017, almost 70 potted plants were produced, with at least six sent out *in situ* (Kanaio, Alena) (ORPF 2014, 2015, 2017).
- Stochastic events—Build resiliency and redundancy—PEPP establishes and monitors outplanting sites and has reintroduced 28 individuals at two sites at Lualaʻilua and 35 individuals at three sites in Kanaio NAR (PEPP 2016, 2017b, 2018).

Synthesis:
Currently, there is one remaining wild individual of *Melanthera kamolensis* on east Maui. A landscape-based assessment of climate change vulnerability for native plants of Hawaiʻi using high resolution climate change projections was made by Fortini *et al.* (2013) and their analysis showed that *M. kamolensis* is extremely vulnerable to the effects of climate change, in that there will be a smaller area of suitable habitat available for the species in the near future. At least 13 founders are represented in collections. Reintroduction is ongoing on east Maui with at more than 50 individuals outplanted.

Stabilizing (interim), downlisting, and delisting objectives were provided in the Recovery Plan for the Maui Plant Cluster (USFWS 1997), and have been updated according to the draft revised recovery objective guidelines developed by the Hawaiʻi 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.

Melanthera kamolensis is a short-lived perennial herb. To prevent extinction, which is the first step 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 east Maui. Each of these populations must be naturally reproducing (*i.e.,* viable seeds, seedlings, saplings) and increasing in number, with a minimum of 50 mature, reproducing individuals per population.

The preventing extinction goals for this species have not been met as there are no populations of at least 50 individuals, and while all extant plants are represented in

storage (Table 1), and all threats are not being sufficiently managed throughout the range of the species (Table 2). Therefore, *Melanthera kamolensis* 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 2014. Thus, the following recommendations for future actions are reiterated for the 5-year review for 2018.

- Population viability and monitoring—Continue monitoring the wild population of *Melanthera kamolensis.*
- Ungulate monitoring and control—Construct and maintain exclusion fences to protect *M. kamolensis* from the impacts of feral ungulates.
- Invasive plant monitoring and control—Control established ecosystem-altering nonnative invasive plant species around all populations.
- Fire monitoring and control—Develop and implement fire management plans for all wild and reintroduced populations.
- Captive propagation for genetic storage and reintroduction—
    - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
    - Evaluate genetic resources currently in storage to determine the need to place additional material into long-term storage due to this species' vulnerability to climate change.
- Reintroduction and translocation—Continue to augment current populations and reintroduce individuals into suitable habitat within historical range that is being managed for known threats to this species.
- Taxonomy research—Conduct research on the hybrid population to confirm hybrid status between *M. kamolensis* and *M. rockii*.
- Climate change adaptation strategy—Research the suitability of habitat for reintroducing this species in the future due to impacts of climate change. Develop a strategy for preventing the extinction of this species if no suitable habitat is predicted in the future.
- Alliance and partnership development—Initiate planning and work with landowners to contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

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

Date	No. wild individuals	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1992 (listing)	several 100	0	All threats managed in all three populations	No
			Complete genetic storage	No
			Three populations with 50 mature individuals each	Partially
1997 (recovery plan)	several 100	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2003 (critical habitat)	< 500	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	Partially
2009 (5-year review)	25	0	All threats managed in all three populations	No
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
2014 (5-year review)	30–40	0	All threats managed in all three populations	Partially
			Complete genetic storage	Partially

			Three populations with 50 mature individuals each	No
2016 (critical habitat)	30–40	12	All threats managed in all three populations	Partially
			Complete genetic storage	Partially
			Three populations with 50 mature individuals each	No
Date	**No. wild individuals**	**No. outplanted**	***Preventing Extinction Criteria identified by HPPRCC**	***Preventing Extinction Criteria Completed?**
2018 (5-year review)	1	> 50	All threats managed in all three populations	No
			Complete genetic storage	Partially, 13 founders represented
			Reproduction (*i.e.* viable seeds, seedlings) at all three populations	No
			Three 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 after Preventing Extinction).

Table 2. Threats to *Melanthera kamolensis* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulate degradation of habitat	A	Ongoing	Partial, hybrid population fenced
Established ecosystem altering invasive plant species degradation of habitat	A	Ongoing	None
Fire destruction and degradation of habitat	A	Ongoing	None
Landslides and erosion destruction of habitat	A	Ongoing	None
Drought degradation of habitat	A	Ongoing	None
Climate change degradation or loss of habitat	A	Ongoing	None
Ungulate predation or herbivory	C	Ongoing	Partially, hybrid population fenced
Stochastic events—Reduced viability due to low numbers	E	Ongoing	Partial, captive propagation for genetic storage and reintroduction ongoing

References:

See the previous 5-year reviews for a full list of references (USFWS 2009, 2014). Only references for new information are provided below.

Chau, M., M. Sporck-Koehler, S.M. Gon, L. Weisenberger, M. Keir, V.L. Caraway, and J. Kwon. 2015. *Melanthera kamolensis.* The IUCN Red List of Threatened Species 2015:*e.T80167423A80167432. http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T80167423A80167432.en.*

Edwards, R.D., J.T. Cantley, M.M. Chau, S.C. Keeley, and V.A. Funk. 2018. Biogeography and relationships within the *Melanthera* alliance: a pan-tropical lineage (Compositae: Heliantheae: Ecliptinae). Taxon: *https://doi.org/10.12705/673.6*, 13 pp.

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. Hawai‘i Cooperative Studies Unit, University of Hawai‘i at Hilo, Hawai‘i. 134 pp.

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

Lyon Arboretum. 2017. Micropropagation and seed conservation laboratory databases.

[ORPF] Olinda Rare Plant Facility. 2014. Controlled propagation report.

[ORPF] 2015. Controlled propagation report.

[ORPF] 2017. Controlled propagation report.

Oppenheimer, H. 2018, in litt., Maui Nui species status updates, excel table.

[PEPP] Plant Extinction Prevention Program. 2013. PEPP annual report fiscal year 2013 (July 1, 2012-June 30, 2013). 207 pp.

[PEPP] 2014. PEPP annual report fiscal year 2014 (July 1, 2013-June 30, 2014). 185 pp.

[PEPP] 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] 2017a. Statewide species totals *ex situ*, excel table.

[PEPP] 2017b. PEPP annual report fiscal year 2017 (July 1, 2016-June 30, 2017). 235 pp.

[PEPP] 2018. PEPP monthly report for April 2018. Excel table.

[USFWS] U.S. Fish and Wildlife Service. 2014. *Melanthera kamolensis* 5-year review summary and evaluation. USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI. *https://ecos.fws.gov/docs/five_year_review/doc4401.pdf.*

[USFWS] 2015. Endangered and threatened wildlife and plants; technical corrections for 54 wildlife and plant species on the list of endangered and threatened wildlife and plants. Federal Register 80 (12) FR 35860–35869, June 23, 2015.

[USFWS] 2016. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 76 species in Hawai‘i, Oregon, Washington, Montana, and Idaho. Federal Register 81(29): 7571–7573, February 12, 2016.

[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. Federal Register 81 (61): 17790–18110, March 30, 2016.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Melanthera kamolensis* (nehe)

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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