5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Achyranthes splendens* var. *rotundata* (round-leaved chaff-flower)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 58 species in Washington, Oregon, California, and Hawaii. Federal Register 75(226):71726-71729.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Chelsie Javar, Plant Biologist, PIFWO
Vickie Caraway, Plant Biologist, PIFWO
Daniel Clark, Oahu, Kauai, Northwest Hawaiian and American Samoa Islands Team Manager, PIFWO
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Recovery Program Lead, PIFWO
Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on January 31, 2012. The review was based on a review of current, available information since the last 5-year review for *Achyranthes splendens* var. *rotundata* (USFWS 2009). The National Tropical Botanical Garden provided an initial draft of portions of the five-year review and recommendations for conservation actions needed prior to the next five-year review. The document was reviewed by the Plant Biologist, Island Team Manager, and Plant Recovery Coordinator, followed by the Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

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 *Achyranthes splendens* var. *rotundata* published on July 22, 2009 (available at http://ecos.fws.gov/docs/five_year_review/doc2424.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status have come to light since listing to warrant a change in the Federal listing status of *A. splendens* var. *rotundata.*

Historically, *Achyranthes splendens* var. *rotundata* was found on arid and semi-arid coastal lowlands of Oahu, Molokai, and Lanai. This short-lived shrub is endangered and now occurs only on the island of Oahu. The current status and trends for *Achyranthes splendens* var. *rotundata* are provided below.

New threats:
Climate change - Climate change may pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) funded climate modeling that will help resolve these spatial limitations. High spatial resolution climate outputs are expected to be available sometime in 2013.

New management actions:

- Reintroduction / translocation implementation: Reintroduction of 3,259 individuals occurred at the Kalaeloa Unit of the Oahu National Wildlife Refuge Complex; a maximum of 350 to 400 individuals have survived (M. Silbernagle, USFWS, pers. comm. 2011).
- Captive propagation for genetic storage and reintroduction:
    - Thousands of seeds are stored at the National Botanical Garden (2010, 2011) on Kauai but the population source is unknown and the number of individuals represented is unknown, lessening the value of the seeds for restoration purposes.
    - Harold L. Lyon Arboretum (2012) listed 828 seeds in storage for *Achyranthes splendens* var. *rotundata*.
    - In 2011, 60 individuals remained in Waimea Valley Arboretum, representing 5 wild individuals (Waimea Valley Arboretum 2011).

Synthesis:
Downlisting and delisting objectives were provided in a draft recovery plan for *Chamaesyce skottsbergii* var. *kalaeloana* and *Achyranthes splendens* var. *rotundata* (USFWS 1993). While the draft recovery plan was not signed, we provide the draft downlisting and delisting objectives in Table 1.

To consider downlisting *Achyranthes splendens* var. *rotundata*, there must be at least three self-reproducing populations with a minimum of 500 reproductive plants per population in each of the two geographically distinct regions in which they occur (Ewa Plain and Kaena Point regions). The population trend should be growing or stable at 500 reproductive individuals and threats should be removed or controlled for at least 10 years prior to downlisting. Land area for each of these populations should be sufficient to provide a buffer of 30 to 50 meters (100 to 165 feet) around the expanded population.

To consider delisting *Achyranthes splendens* var. *rotundata*, all criteria for downlisting should be met as well as the following criteria: at least three populations of *A. splendens* var. *rotundata* with a minimum of 1,000 reproductive plants each should be re-established within the taxon's historical range on the island(s) of Lanai and/or Molokai to ensure against losses as a result of any catastrophic event affecting the *A. splendens* var. *rotundata* populations on the island of Oahu. In addition, all populations should be stable

and self-sustaining, with no human manipulation, for a minimum of 10 years prior to delisting and expected to remain so into the foreseeable future.

The downlisting goals for this species have not been met (Table 1), since no population of 500 mature individuals currently exists and all threats are not being sufficiently managed (Table 2). Therefore, *Achyranthes splendens* var. *rotundata* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Captive propagation for genetic storage and reintroduction - Continued collection of fruit and plant material for future reintroductions, concentrating on the population at Waianae Kai/Makaha.
- Surveys / inventories - Survey geographical and historical range for a current assessment of the species.
- Ecosystem-altering invasive plant species control - Eradicate invasive introduced plant species within the species' habitat and maintain those habitats free of invasive introduced plants.
- Reintroduction / translocation - Establish additional populations within suitable habitat in protected sites.
- Invertebrate control research - Determine and implement control methods for scale insects and ants in the populations.
- Genetics research - Assess genetic variability within extant populations.
- Habitat requirements research - Assess the suitability of habitat for reintroducing this species on Lanai and Molokai.
- Alliance and partnership development - Initiate planning and contribute to implementation of ecosystem level restoration and management to benefit this taxon.
- Population biology research - Study populations with regard to size and structure, geographical distribution, flowering cycles, pollination mechanisms, seed dispersal agents, longevity, seed banks, specific environmental requirements, limiting factors, and threats.
- Recovery plan update - Revise draft recovery plan with current information.

Table 1. Status and trends of *Achyranthes splendens* var. *rotundata* from listing through current 5-year review.

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in draft Recovery Plan	Downlisting Criteria Completed?
1986 (listing)	~ 400	0	3 naturally reproducing populations with a minimum of 500 reproductive plants per population in both the Ewa Plain and Kaena Point regions	No
			Each population secure from threats	No
			Each population stable and increasing in number for a minimum of 10 consecutive years.	No
			Land area for each of populations should be sufficient to provide a buffer of 30-50 meters around the expanded population	No
1994 (draft recovery plan)	~ 1,500	1,553	3 naturally reproducing populations with a minimum of 500 reproductive plants per population in both the Ewa Plain and Kaena Point regions	Partially
			Each population secure from threats	No
			Each population stable and increasing in number for a minimum of 10 consecutive years	Partially
			Land area for each of populations should be sufficient to provide a buffer of 30-50 meters around the expanded population	No

Date	No. wild indivs	No. outplanted	Downlisting Criteria identified in draft Recovery Plan	Downlisting Criteria Completed?
2009 (5-yr review)	~ 1,600-1,700	100s	3 naturally reproducing populations with a minimum of 500 reproductive plants per population in both the Ewa Plain and Kaena Point regions	Partially
			Each population secure from threats	Partially
			Each population stable and increasing in number for a minimum of 10 consecutive years	Partially
			Land area for each of populations should be sufficient to provide a buffer of 30-50 meters around the expanded population	No
2013 (5-yr review)	~1,600 - 1,700	350-400	3 naturally reproducing populations with a minimum of 500 reproductive plants per population in both the Ewa Plain and Kaena Point regions	Partially
			Each population secure from threats	Partially (see Table 2)
			Each population stable and increasing in number for a minimum of 10 consecutive years	No
			Land area for each of populations should be sufficient to provide a buffer of 30-50 meters around the expanded population	No

Table 2. Threats to *Achyranthes splendens* var. *rotundata* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Habitat conversion largely for industrial and agricultural developments	A	Ongoing	Partially: only reintroduced population is fenced
Deposition of trash and construction material into exclosures	A, E	Ongoing	Partially: periodic removal
Drought	A, E	Ongoing	No
Invasive introduced plants	A, E	Ongoing	Partially: sporadic weed control ongoing
Mortality of wild individuals due to scale farming by long legged ants (*Anoplolepis longipes*)	C	Ongoing	No
Climate change	A, E	Increasing	No

References:

See previous 5-year review for a full list of references. Only references for new information are provided below.

Harold L. Lyon Arboretum. 2012. Micropropagation database and seed storage inventory. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

National Tropical Botanical Garden. 2010. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 14 pages. Unpublished.

National Tropical Botanical Garden. 2011. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 15 pages. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1993. Recovery plan for *Chamaesyce skottsbergii* var. *kalaeloana* and *Achyranthes splendens* var. *rotundata* - Draft. U.S. Fish and Wildlife Service, Honolulu, Hawaii.

[USFWS] U.S. Fish and Wildlife Service. 2009. *Achyranthes splendens* var. *rotundata* (round-leaved chaff-flower) 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Honolulu, Hawaii. Available online at http://ecos.fws.gov/docs/five_year_review/doc2424.pdf.

Waimea Arboretum. 2011. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 15 pages. Unpublished.

Personal communications:

Silbernagle, M. Oahu National Wildlife Refuge Complex, U.S. Fish and Wildlife Service. E-mail to James Kwon, U.S. Fish and Wildlife Service, dated January 31, 2011. Subject: *Achyranthes* at Kalaeloa Unit.

U.S. FISH AND WILDLIFE SERVICE

SIGNATURE PAGE for 5-YEAR REVIEW of *Achyranthes splendens* var. *rotundata*
(Round-leaved chaff-flower)

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

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Maine M Bruegmann Date 2013-08-07