Amaranthus brownii
(No common name)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

5-YEAR REVIEW
Amaranthus brownii (No common name)

I. GENERAL INFORMATION

A. Methodology used to complete the review

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the Fish and Wildlife Service between July 2005 and June 2006. The Hawaii Biodiversity and Mapping Program was contracted to provide updated information on the current status of *Amaranthus brownii*. They also provided recommendations for future actions that may be needed prior to the next 5-year review. The evaluation of the lead PIFWO biologist was reviewed by the Listing Program Leader and Plant Recovery Coordinator. These comments were incorporated into the draft 5-year review. The draft 5-year review was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before PIFWO submission to the Regional Office.

B. Reviewers

Lead Region: Region 1

Lead Field Office: Pacific Islands Fish and Wildlife Office

C. Background:

1. FR Notice citation announcing initiation of this review:

U.S. Fish and Wildlife Service. July 6, 2005. Endangered and Threatened Wildlife and Plants; Initiation of 5-year Reviews (of 33 species in Region 1). 70 FR 38972-38975.

2. Species status:

Decreasing (FY 2006 Recovery Data Call)

3. Recovery achieved:

1, meaning 0 - 25 percent of the identified recovery objectives for *Amaranthus brownii* have been achieved (FY 2006 Recovery Data Call)

4. Listing history:

Original Listing

FR notice: U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered status for three plants from the island of Nihoa, Hawaii. *Federal Register* 61(163): 43178-43184.
Date listed: August 21, 1996
Entity listed: Species
Classification: Endangered

Revised Listing, if applicable:
N/A

5. Associated actions:
Critical habitat was designated for *Amaranthus brownii* in one unit totaling 171 acres (69 hectares) on the island of Nihoa (U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; designation of critical habitat for five Hawaiian plant species from the Northwestern Hawaiian Islands. *Federal Register* 68(99): 28053-28075).

6. Review History: Just the original listing, designation of critical habitat, and recovery plan development actions.

7. Species' Recovery Priority Number at start of review: 5, meaning a species with a high degree of threat and a low recovery potential.

8. Recovery Plan or Outline
Name of plan: Final Recovery Plan for Three Plant Species on Nihoa Island. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 81 pp.
Date issued: March 31, 1998
Dates of previous revisions: N/A
Some of the actions outlined in the Recovery Plan have been initiated but not completed (*e.g.*, controlling alien plant and insect species). Some recovery actions will require long-term commitments (*e.g.*, regular surveys for alien species; collections of seeds/cuttings for establishment of *ex situ* populations) or may only be necessary intermittently (*e.g.*, outplanting).

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) Policy
This Policy does not apply to plant species.

B. Recovery Criteria
1. Does the species have a final, approved recovery plan?
__X__ ***Yes***
____ ***No***

2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?
__X__ ***Yes***
____ ***No***

3. **Adequacy of recovery criteria.**

   a. **Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?**

   _X_ *Yes*

   No

   b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?**

   X *Yes*

   No

4. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.**

The threats (Factors A, C, and E) affecting this species are discussed in detail in section II.C. Factors B and D are not considered a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the Final Recovery Plan for Three Plant Species on Nihoa Island (Service 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Amaranthus brownii* is a short-lived perennial, and to be considered stable, this species must be managed to control threats (Factors A, C, and E) and be represented in an *ex situ* collection. In addition, a minimum of three colonies should be documented on the island of Nihoa where the species now occurs or occurred historically. Each of these colonies must be naturally reproducing and increasing in number, with a minimum of 100 mature individuals per colony.

This recovery objective has not been met.

For downlisting, a total of at least five colonies of *Amaranthus brownii* should be documented on the island of Nihoa where it now occurs. Each of these colonies must be naturally reproducing, stable or increasing in number, and secure from threats (Factors A, C, and E), with a minimum of 500 mature individuals per colony. Each colony should persist at this level for a minimum of 5 consecutive years before downlisting is considered.

This recovery objective has not been met.

A)Present or threatened destruction, modification or curtailment of its habitat or range;
B) Overutilization for commercial, recreational, scientific, or educational purposes;
C) Disease or predation;
D) Inadqequacy of existing regulatory mechanisms;
E) Other natural or manmade factors affecting its continued existence.

For delisting, additional colonies of *Amaranthus brownii* should be established on the island of Necker. Kilauea Point and Midway Atoll National Wildlife Refuges should also be assessed for suitability for colonies of *A. brownii*. The colonies must be naturally reproducing, stable or increasing in number, and secure from threats (Factors A, C, and E), with 500 mature individuals per colony, and should persist at this level for a minimum of 10 consecutive years before delisting is considered.

This recovery objective has not been met.

C. Synthesis

Amaranthus brownii is known from the island of Nihoa, in the Northwestern Hawaiian Islands, where it was first collected in 1923. It was described as "common on the ridge leading to Miller's Peak" and "abundant" on the ridges to the east (Herbst 1977). In 1983, the 2 known colonies were about 0.25 miles apart, near Miller's Peak and in Middle Valley, and totaled about 35 plants (Conant 1985). At the time of listing in 1996, no individuals had been observed since 1983, as all surveys were conducted in the dry summer months when *A. brownii* is difficult to distinguish from other desiccated herbaceous plants. Almost all of the 21 site visits conducted by the Refuges staff have taken place in the drier summer months (Beth Flint, U.S. Fish and Wildlife Service, pers. comm. 2006).

At the time we listed *Amaranthus brownii*, we identified historical disturbance of habitat by Polynesian settlement of Nihoa as a possible explanation for a reduction in its total numbers (Factor A). Currently, the only legal visitors to the island include Service personnel or permitted scientific researchers who are aware of the fragile nature of Nihoa's environment and are required to follow strict conservation guidelines while on the island. There has been no evidence of trespassing over a 20-year period of nearly annual visits by U.S. Fish and Wildlife Service Refuges staff (Beth Flint, pers. comm. 2006). Although there is the potential for unauthorized landings and subsequent habitat disturbances, the difficulty in landing and accessing the island makes this an unlikely possibility. An additional threat to this species includes substrate changes (such as erosion, rock slides, and landslides) to its rocky outcrop habitat (Factor A). Fire is also identified as a potential threat (Factor A).

Perhaps the greatest current threat to the native biota of Nihoa is predation by the nonnative grasshopper *Schistocerca nitens*, which has caused widespread defoliation of the island's vegetation over the last few years (Factor C) (Wegmann, in litt. 2002; Gilmartin 2005). The grasshopper was first recorded on Nihoa in the early 1980s, but it was not until 2002 and again in 2004 that vegetation on Nihoa was denuded by it. Botanist Steve Perlman visited Nihoa in 2004 for the purpose of surveying for rare plant species and did not observe any individuals of *A. brownii*. The high population level of the alien grasshopper had resulted in the widespread defoliation of the vegetation on the island, thereby increasing the difficulty in detecting any *A. brownii* that may have been present (Steve Perlman, National Tropical Botanical Garden, pers. comm. 2006).

Although the grasshopper has become naturalized throughout the Hawaiian Islands, it is only on Nihoa where its population density has been observed to rise to levels that cause widespread defoliation of vegetation. In recognition of the serious threat that *S. nitens* poses to the native biota of Nihoa, a workshop aimed at addressing the grasshopper problem was organized. This workshop, convened in April 2005, in Honolulu, brought together specialists in the field of grasshopper biology and control with biologists familiar with the biology of the Northwestern Hawaiian Islands. While the primary long-term goal is eradication or at least suppression of *S. nitens* on Nihoa, the immediate goals of the workshop were: 1) to identify data needs to facilitate suppression of *S. nitens* on Nihoa; 2) to develop a list of possible grasshopper control methods; 3) to provide recommendations for mitigation action; and 4) to recommend a monitoring strategy for the island (Gilmartin 2005). In early April 2006, botanist Natalia Tangalin spent 7 days on Nihoa late in the wet season but failed to find any individuals of *A. brownii* (Natalia Tangalin, National Tropical Botanical Garden, pers. comm. 2006). Both Perlman and Tangalin believe that even though they did not detect *A. brownii* during their visits to Nihoa, there is a good likelihood that the species is still extant, as it is an herbaceous annual and its phenology may vary depending on rainfall and climatic factors (Service 1998).

Competition from and habitat degradation by invasive nonnative plant species was identified as a threat to *Amaranthus brownii* in both the 1996 listing rule and in the 1998 Recovery Plan for this species (Factors A and E). *Portulaca oleracea* (pigweed) is identified as the primary nonnative plant threat to *A. brownii*.

In addition to the above threats, species like *Amaranthus brownii* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks (Factor E). Currently, there are no known plants or seeds of *A. brownii* in any botanical collection.

Although *Amaranthus brownii* occurs on a National Wildlife Refuge, the refuge is difficult to access and therefore management to date has been minimal. The stabilization, downlisting, and recovery goals for this species have not been met and, therefore, *Amaranthus brownii* meets the definition of endangered as it remains in danger of extinction throughout all of its range.

III. RESULTS

A. Recommended Classification

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X__ No change

B. New Recovery Priority Number Not applicable

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Conduct additional surveys for *Amaranthus brownii* late in the wet season, when mature plants are most likely to be present.
- Secure propagules of *Amaranthus brownii* for long-term storage of genetic material and for *ex situ* cultivation.
- Establish new populations of *Amaranthus brownii* on Nihoa, and possibly Necker and Midway Atoll.
- Study and address the grasshopper (*Schistocerca nitens*) threat to the biota of Nihoa.

V. REFERENCES

Conant, Sheila. 1985. Recent observations on the plants of Nihoa Island, Northwestern Hawaiian Islands. Pacific Science 39: 135-149.

Gilmartin, W. G., ed. 2005. Workshop to Identify Research and Mitigation Measures to Address the *Schistocerca nitens* Crisis on Nihoa Island, Northwestern Hawaiian Islands. April 25-26, 2005, Honolulu, Hawaii.

Herbst, D.R. 1977. Vegetation. *in* The Natural History of Nihoa Island, Northwestern Hawaiian Islands, R.B. Clapp, E. Kridler, and R.R. Fleet eds., Atoll Res. Bull. 207: 26-38.

U.S. Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Three Plants from the Island of Nihoa, Hawaii. Federal Register 61(163): 43178-43184.

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Wegmann, Alexander. 2002. Trip Report File, U.S. Fish & Wildlife Service, Hawaiian Islands National Wildlife Refuge, Honolulu. 10 pp.

EXPERTS CONSULTED

Flint, Beth. 2006. U.S. Fish and Wildlife Service. Personal communication.

Perlman, Steve. 2006. National Tropical Botanical Garden. Personal communication.

Tangalin, Natalia. 2006. National Tropical Botanical Garden. Personal communication.

U.S. FISH AND WILDLIFE SERVICE
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Current Classification ___Endangered__

Recommendation resulting from the 5-Year Review

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
__X_ **No change is needed**

Appropriate Listing/Reclassification Priority Number _N/A_

Review Conducted By

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_____ Date JUL - 3 2007
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Approve _____ Date Aug 2 2007
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