Lysimachia maxima
(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

Species reviewed: *Lysimachia maxima* (No common name)

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1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
Region 1, Jesse D'Elia, Chief, Division of Recovery, (503) 231-2071

Lead Field Office:
Pacific Islands Fish and Wildlife Office, Gina Shultz, Assistant Field Supervisor for Endangered Species, (808) 792-9400.

Cooperating Field Office(s):
N/A

Cooperating Regional Office(s):
N/A

1.2 Methodology used to complete the 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) between June 2006 and June 2007. The National Tropical Botanical Garden provided most of the updated information on the current status of *Lysimachia maxima*. They also provided recommendations for conservation actions that may be needed prior to the next five-year review. The evaluation of the lead PIFWO biologist was reviewed by the Plant Recovery Coordinator. These comments were incorporated into the draft five-year review. The document was then reviewed by the Recovery Program Leader and the Assistant Field Supervisor for Endangered Species before final approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:
USFWS. 2006. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 70 species in Idaho, Oregon, Washington, Hawaii, and Guam. Federal Register 71(69):18345-18348.

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1996a. Determination of endangered status for three plant species (*Cyanea dunbarii*, *Lysimachia maxima*, and *Schiedea sarmentosa*) from the island of Molokai, Hawaii; final rule. Federal Register 61(198):53130-53137.
Date listed: October 10, 1996
Entity listed: Species
Classification: Endangered

Revised Listing, if applicable
FR notice: N/A
Date listed: N/A
Entity listed: N/A
Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003. Endangered and threatened wildlife and plants; Final designations and nondesignations of critical habitat for 42 plant species from the island of Molokai, HI; final rule. Federal Register 68(52):12982-13141.

Critical habitat was designated for *Lysimachia maxima* in three units totaling 1,263 hectares (3,122 acres) on Molokai. This designation includes habitat on state and private lands (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2006 Recovery Data Call (September 2006)]: Declining

Recovery achieved:
1 (0-25%) (FY 2006 Recovery Data Call)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

5

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Molokai II: Addendum to the recovery plan for the Molokai plant cluster. 1998. U.S. Fish and Wildlife Service, Portland, Oregon. 52 pages.
Date issued: May, 20, 1998.
Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

_____ *Yes*
__X__ *No*

2.1.2 Is the species under review listed as a DPS?

____ *Yes*
__X_ *No*

2.1.3 Was the DPS listed prior to 1996?

____ *Yes*
____ *No*

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ *Yes*
____ *No*

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ *Yes*
____ *No*

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

____ *Yes*
__X_ *No*

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X_ *Yes*
____ *No*

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

__X_ *Yes*
____ *No*

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery?

__X__ *Yes*
____ *No*

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Factors A, C, D, and E) affecting this species is presented in section 2.3.2. Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for Molokai plants addendum (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Lysimachia maxima* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (*e.g.*, fenced where feasible) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Molokai. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has not been met.

For downlisting, a total of five to seven populations of *Lysimachia maxima* should be documented on Molokai. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Lysimachia maxima* should be documented on Molokai. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in section I.C.5 ("Associated Rulemakings") and in section II.D ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Lysimachia maxima* from listing through 5-year review.

Date	No. wild inds	No. outplanted	Stability Criteria	Stability Criteria Completed?
1996 – listing	20-40	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 pops with 50 mature individuals each	No
1998 – recovery plan	20-40	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 pops with 50 mature individuals each	No
2003 – critical habitat	45-50	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 pops with 50 mature individuals each	No
2007 – 5-yr review	20	0	All threats managed	No
			Complete genetic storage	Partially
			3 pops with 50 mature individuals each	No

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

2.3.1.4 Taxonomic classification or changes in nomenclature:

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

2.3.1.7 Other:

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

2.3.2.4 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

Lysimachia maxima is historically known from only a few collections from the Pelekunu trail, on the cliffs of the Pelekunu Mountains of eastern Molokai (Wagner *et al.* 1999; Wysong 2006). The number of plants in the population at Pelekunu has declined from about 20 plants in 1991 to about ten in 2006 (Perlman 2006, Wood 2005). The population at East Kawela had ten plants in 1991 and still had ten in 2001 (Perlman 2006).

The habitat for *L. maxima* is ohia-uluhe (*Metrosideros-Dicranopteris*) wet forest. The last population at Pelekunu grows in 60 percent native plant canopy cover, with 4.5 meters (15 feet) *Metrosideros* comprising about 50 percent of the canopy (Wood 2005).

Lysimachia maxima is currently threatened by habitat degradation from feral goats and pigs (Factors A and D), and habitat degradation by and competition from the introduced invasive plant *Clidemia hirta* (Koster's course) (Factor E) (Perlman 2006). Rats may also eat this plant (Factor C) (Wood 2005). Landslides, hurricanes, and other stochastic events are particularly a threat because of the small number of remaining individuals (Factor E) (USFWS 1996a and 1998).

In 1995, the Hawaii Division of Forestry and Wildlife released a leaf-eating insect (*Lius poseidon*), as a biological control agent to attempt to control the introduced invasive plant *Clidemia hirta* which affects many endangered plants on Molokai (USFWS 1996b). The effectiveness of leaf feeding adults or leaf-mining larvae has not been quantified, but results from other Hawaiian Islands has shown that *Lius poseidon* damages young plants more than mature plants in a combination with thrips damage (Conant 2002).

Lysimachia maxima is been propagated for restoration and genetics storage at Lyon Arboretum (Harold Harold L. Lyon Arboretum Micropropagation Laboratory 2006). Cuttings have been made from wild plants and propagated at the National Tropical Botanical Garden. Most have succumbed to black twig borer (*Xylosandrus compactus*) (Factor C). In June 2006, National Tropical Botanical Garden had one mature plant in the cold room of the nursery and new cuttings under mist. The National Tropical Botanical Garden will transfer plants to Molokai's Kaluapapa National Historical Park when they are ready for outplanting, as this is adjacent to the Pelekunu Preserve (National Tropical Botanical Garden 2006).

The stabilization and recovery goals for this species have not been met, as only 20 individuals are known. Therefore, *Lysimachia maxima* meets the definition of endangered as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ **No change is needed**

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (regardless of current classification) Priority Number: ____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Continue seed collection for *ex situ* genetic storage and reintroduction.
- Manage ungulates and invasive introduced plants around remaining individuals.
- Augment populations as plants become available in nurseries and habitat is protected.
- Conduct rodent control.
- Reintroduce individuals into suitable habitat within historical range that is being managed for known threats to this species.
- Survey for populations in known historical sites and other areas of suitable habitat.

5.0 REFERENCES:

Conant, P. 2002. Classical biological control of *Clidemia hirta* (Melastomataceae) in Hawaii using multiple strategies. Pages 13-20 *In* Smith, C.W., J. Denslow and S. Hight (editors). Proceedings of a workshop on Biological Control of invasive plants in native Hawaiian ecosystems, Technical report 129. Pacific Cooperative Studies Unit, University of Hawaii at Manoa, Honolulu, Hawaii.

Harold L. Lyon Arboretum Micropropagation Laboratory. 2006. Report on controlled propagation of species, as designated under the U.S. Endangered Species Act. Unpublished.

National Tropical Botanical Garden. 2006. Database query for *Lysimachia maxima* localities, 2006. Unpublished.

Perlman, S. 2006. Field Botanist, National Tropical Botanical Garden, field log summaries from 1991 through 2006, compiled June, 2006. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; Final designations and nondesignations of critical habitat for 42 plant species from the island of Molokai, HI; final rule. Federal Register 68(52):12982-13141.

[USFWS] U.S. Fish and Wildlife Service. 1996a. Determination of endangered status for three plant species (*Cyanea dunbarii*, *Lysimachia maxima*, and *Schiedea sarmentosa*) from the Island of Molokai, Hawaii; final rule. Federal Register 61(198):53130-53137.

[USFWS] U.S. Fish and Wildlife Service. 1996b. Recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 143 pages.

[USFWS] U.S. Fish and Wildlife Service. 1998. Molokai II: Addendum to the recovery plan for the Molokai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 52 pages.

Wagner, W.L., D. Herbst, and S.H. Sohmer. 1999. Manual of the flowering plants of Hawai`i, Revised Edition. University of Hawai`i Press, Bishop Museum Press, Special Publication. 97:1-1918.

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U.S. FISH AND WILDLIFE SERVICE
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Current Classification: E

Recommendation resulting from the 5-Year Review:

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

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:

Marilet A. Zablan, Recovery Program Leader and Acting Assistant Field Supervisor for Endangered Species, June 24, 2007
Marie Bruegmann, Plant Recovery Coordinator, April 16, May 9 and 24, and June 29, 2007
Christian Torres-Santana, Fish and Wildlife Biologist, December 22, 2006, April 5 and June 29, 2007

Approve Patricia Cole Date 1/19/08
Lead Field Supervisor, Fish and Wildlife Service