5-YEAR REVIEW
Short Form Summary
Species Reviewed: *Clermontia oblongifolia* subsp. *brevipes* (‘oha wai)
Current Classification: Endangered

Federal Register Notice announcing initiation of this review:
[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

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

Name of Reviewer(s):
Marie Bruegmann, Plant Recovery Coordinator, PIFWO
Jess Newton, Recovery Program Lead, PIFWO
Assistant Field Supervisor for Endangered Species, PIFWO

Methodology used to complete this 5-year review:
This review was conducted by a biological consultant for the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on March 16, 2009. The review was based on final critical habitat designations for *Clermontia oblongifolia* subsp. *brevipes* and other species from the islands of Molokai (USFWS 2003) as well as a review of current, available information. 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 evaluation of Samuel Aruch, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

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).

Application of the 1996 Distinct Population Segment (DPS) Policy:
This Policy does not apply to plants.

Review Analysis:
Please refer to the final critical habitat designations for *Clermontia oblongifolia* subsp. *brevipes* published in the Federal Register on March 18, 2003 (USFWS 2003) for a complete review of the species’ status (including biology and habitat), threats, and management efforts. No new threats and 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 *C. oblongifolia* subsp. *brevipes*.

At the time of listing in 1992, *Clermontia oblongifolia* subsp. *brevipes* was known from only a single population in East Molokai in the southeastern part of Kamakou Preserve; part of the Nature Conservancy of Hawaii (USFWS 1992). Currently, *C. oblongifolia* subsp. *brevipes* is found in a single population of 10 individuals on Uapa Ridge, East Molokai (A. Bakutis, Plant Extinction Prevention Program, pers. comm. 2009; Perlman 2009; Plant Extinction Prevention Program 2009). When listed in 1992 it had last been seen in 1982, and was thought to consist of fewer than 20 individuals. Another possible population, also from the Kamakou area, had not been seen for over 40 years and is believed to have been extirpated (USFWS 1996). In 1991, a small colony of *C. oblongifolia* subsp. *brevipes* was observed growing on the northwest side of Kamalo Valley above slopes degraded by feral goats (*Capra hircus*) at 1,036 meters (3,400 feet) elevation, and the species was also found growing occasionally at elevations heading up to the summit (Wood 2009). Whether this is the same population last seen in 1982 is unclear.

Five individuals were observed in 1997 at 1,317 meters (4,320 feet) elevation in the fenced unit of Kawelo, Kamakou Preserve, above the Kolekole cabin, near the rim of Pelekunu Valley (J. Lau, Hawaii Natural Heritage Program, pers. comm. 2000; Perlman 2009). In 2006, this species was observed in Kamakou Preserve, at the bottom of the hill before the first culvert (National Tropical Botanical Garden 2009a). Eleven individuals with flowers and immature fruit were observed in May 2009 at 1,509 meters (4,950 feet) elevation, and additional individuals were observed on Uapa Ridge also at 1,509 meters (4,950 feet) elevation (Perlman 2009). These same plants were revisited in September 2009 at Kamakou Summit. There may be as many as 10 additional individuals in the neighboring area, but a survey is needed to determine the exact number of individuals within this area. It is believed that there is only one remaining population of *Clermontia oblongifolia* subsp. *brevipes* on Molokai (A. Bakutis, pers. comm. 2009).

Clermontia flowers are protandrous (male parts maturing first), which indicates that they are primarily outcrossing between plants, although they may occasionally self-pollinate. *Clermontia* species are believed to have been pollinated by passerine birds (honeycreepers and honeyeaters). The seeds of *Clermontia* species are also believed to be spread by birds. *Clermontia* species are believed to play an important ecological role as a pioneer species at distinct edges, openings, and windfall areas within a forest (Lammers 1992).

Clermontia oblongifolia subsp. *brevipes* grows in a habitat consisting of shallow soil on gulch slopes in *Metrosideros polymorpha* (ohia) – *Leptecophylla tameiameiae* (pukiawe) – *Dodonaea viscosa* (aalii) forest/shrubland with associated native plant species including *Astelia menziesiana* (painiu), *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa), *Cibotium* sp. (haha), *Clermontia arborescens* (oha wai nui), *C. kakeana* (haha), *Coprosma* sp. (pilo), *Cyrtandra grayana* (keokeo haiwale), *Dicranopteris linearis* (uluhe), *Diplazium sandwichianum* (hoio), *Eurya sandwicensis* (anini), *Freycinetia arborea* (ie ie), *Ilex anomala* (kawau), *Kadua affinis* (manono), *Labordia hedyosmifolia* (kamakahala), *Lobelia gloria-montis* (no common name), *Machaerina* sp. (uki), *Melicope*

sp. (alani), *Myrsine lessertiana* (kolea lau nui), *Osteomeles anthyllidifolia* (ulei), *Pipturus* sp. (mamake), *Plantago pachyphylla* (laukahi kuahiwi), *Psychotria* sp. (kopiko), *Sadleria* sp. (amau), *Scaevola* sp. (naupaka kuahiwi), *Vaccinium* sp. (ohelo), and *Wikstroemia* sp. (akia) (Lau, pers. comm. 2000; National Tropical Botanical Garden 2009a; Perlman 2009; USFWS 1996; Wood 2009).

Feral pigs (*Sus scrofa*) and goats are a threat to the habitat of *Clermontia oblongifolia* subsp. *brevipes* (Listing Factors A and D). *Melinus minutiflora* (molasses grass) and other invasive introduced plant species also modify the habitat and compete with *C. oblongifolia* subsp. *brevipes* (Listing Factors A and E) (Perlman 2009; Wood 2009).

Predation on the fruit or plant parts of *Clermontia oblongifolia* subsp. *brevipes* by feral pigs, goats, rats (*Rattus* spp.), and slugs (unidentified species) are threats (Listing Factor C) (Perlman 2009; USFWS 1996).

Climate change may also pose a threat to this species (Listing Factors A and E). 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) has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

In addition to all of the other threats, species like *Clermontia oblongifolia* subsp. *brevipes* that are endemic to small portions of a single island are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes, landslides, flooding, and disease outbreaks (Listing Factor E). When considered on their own, the natural processes associated with being a single island endemic do not affect *C. oblongifolia* subsp. *brevipes* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by introduced species (Listing Factor E) (USFWS 1996).

In 2009, one million dollars in funds from the federal Department of Interior's Cooperative Endangered Species Conservation Fund was designated for use on Molokai, to help acquire a perpetual conservation easement over 248 hectares (614 acres) of strategic watershed on the eastern end of the island. The property has several federally listed threatened or endangered species as well as critical habitat in and around the proposed easement area. Among federally listed species that will benefit from this protection are *Clermontia oblongifolia* subsp. *brevipes* (kookoolau), *Canavalia molokaiensis* (awikiwiki), *Hibiscus arnottianus* ssp. *immaculatus* (kokio keokeo), *Brighamia rockii* (puaala), *Cyanea dunbariae* (haha), *Gardenia brighamii* (nanu), *Pritchardia munroi* (loulu), and *Phyllostegia hispida* (USFWS 2009; C. Rowland, USFWS, pers. comm. 2010).

The Nation Tropical Botanical Garden has 2,400 seeds collected from the Kamakou Preserve on Molokai, in long-term storage (National Tropical Botanical Garden 2009b).

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Molokai plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Clermontia oblongifolia* subsp. *brevipes* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g.*, fenced) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Molokai, and if possible, at least one other island where they now occur or occurred historically. For the species to be considered stable, each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The stabilization goals for this species have not been met as there are only around 16 individuals within a single population (Table 1) and all threats are not being managed (Table 2). Therefore, *Clermontia oblongifolia* subsp. *brevipes* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Continue monitoring existing populations.
- Conduct surveys to determine the current status of the species.
- Collect seeds from each population for genetic storage and potentially for reintroduction.
- Fence all populations to provide protection from the negative impacts of feral ungulates.
- Control rats in the vicinity of all populations.
- Control invasive introduced plant species around all individuals.
- Develop and implement an effective control method for slugs.
- Propagate to augment the existing population.
- Establish additional populations within protected suitable habitat.
- Work with Hawaii Division of Forestry and Wildlife and other land managers to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

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[USFWS] U.S. Fish and Wildlife Service. 2009. Press release: Fish and Wildlife Service provides $1 million in land acquisition funds to Hawaii. Honolulu, Hawaii. April 17, 2009.

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Personal Communications:

Bakutis, Ane. 2009. Molokai Plant Extinction Prevention Program, Kaunakakai, Hawaii. E-mail to Margaret A. Clark, National Tropical Botanical Garden, dated August 19, 2009. Subject: clarifying locations of *Clermontia oblongifolia* subsp. *brevipes*.

Lau, Joel. 2000. Hawaii Natural Heritage Program. Memo from Roy Kam, Hawaii Natural Heritage Program, Honolulu, Hawaii, dated June 20, 2000.

Rowland, Craig. 2010. Coordinator Conservation Partnerships Program, USFWS, Honolulu, Hawaii. E-mail to Marie Bruegmann, USFWS, dated April 16, 2010. Subject: additional information on status of Molokai easement.

Table 1. Status of *Clermontia oblongifolia* subsp. *brevipes* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1992 (listing)	Unknown	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	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2003 (critical habitat)	5	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
2010 (5-yr review)	~16	0	All threats managed in all 3 populations	No (Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No: there are only 16 individuals remaining

Table 2. Threats to *Clermontia oblongifolia* subsp. *brevipes*.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, C, D	Ongoing	No
Rats – herbivory	C	Ongoing	No
Slugs – herbivory	C	Ongoing	No
Invasive introduced plants	A, E	Ongoing	No
Small population size	E	Ongoing	Partially: seeds in storage
Climate change	A, E	Increasing	No

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SIGNATURE PAGE for 5-YEAR REVIEW of *Clermontia oblongifolia* subsp. *brevipes* ('oha wai)

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

Field Supervisor, Pacific Islands Fish and Wildlife Office

Date 8/29/11