5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Abutilon sandwicense* (no common name)

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 Pacific Islands Fish and Wildlife Office,
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 staff of 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 designation for *Abutilon sandwicense* and other species from the island of Oahu (USFWS 2003), as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Tamara Sherrill, 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 designation for *Abutilon sandwicense* published in the Federal Register on June 17, 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 *A. sandwicense*.

Abutilon sandwicense was listed as endangered in 1991. At that time, it was known from 7 populations containing about 300 to 400 individuals (USFWS 1991). In 1998 when the recovery plan was written, less than 300 individuals were known from 14 populations (USFWS 1998). When critical habitat was designated in 2003, 30 populations totaling 253 to 263 individuals were reported (USFWS 2003).

Abutilon sandwicense is endemic to the Waianae Mountains of Oahu. It occurs on both the windward and leeward sides of the range, from 293 to 732 meters (960 to 2,400 feet) elevation (U.S. Army Garrison 2008). Ten populations are reported within lands managed by the Army at Schofield Barracks and Makua Military Reserve, and seven populations elsewhere in the Waianaes. Within the Kaawa to Puula management area there are nine subpopulations with a total of 36 mature and 88 immature individuals. These subpopulations include Palikea Gulch; Manuwai Gulch; "Nerang Gulch" (an unnamed gulch containing the endangered *Neraudia angulata*); a cliff below the endangered tree *Caesalpinia kavaiensis*; the southwest proposed fence line ridge; Kamomoku Iki Gulch; and Kaimohole Gulch. Kahanahaiki and Kaluakauila no longer have wild individuals, and Keaau has only one mature individual and ten seedlings. The total number of individuals within Army lands in 2009 were 37 mature, 92 juvenile, and 16 seedlings (U. S. Army Garrison 2008; Oahu Army Natural Resource Program 2009).

The Army also surveyed for *Abutilon sandwicense* outside Army lands. In 2008, eight populations still had wild individuals with a total of 100 mature, 158 juvenile, and 50 seedlings counted in both 2008 and 2009. Those populations are located at East Makaleha, Ekahanui, Huliwai, Makaha Makai, Makaha Mauka, North Mikilua, Waianae Kai, and West Makalehu. Halona, Nanakuli, and South Mikilua no longer have extant wild individuals (U. S. Army Garrison 2008; Oahu Army Natural Resource Program 2009). This brings the current total number of mature individuals to 137 in 18 populations. Of these populations, only one population, Makaha Makai, has more than 50 individuals (U.S. Army Garrison 2008).

Abutilon sandwicense grows on gulch slopes and in gulch bottoms in dry to dry-mesic forests, with associated native species including *Alectryon macrococcus* (mahoe), *Antidesma pulvinatum* (mehame), *Caesalpinia kavaiensis* (uhi uhi), *Charpentiera* sp.(papala), *Claoxylon sandwicensis* (poola), *Coprosma foliosa* (pilo), *Cyanea angustifolia* (haha), *Diospyros sandwicensis* (lama), *Diplazium sandwichianum* (hoio), *Erythrina sandwicensis* (wiliwili), *Eugenia reinwardtiana* (nioi), *Flueggea neowawraea* (mehamehame), *Hibiscus arnottianus* (kokio keokeo), *Isodendrion longifolium* (aupaka), *Leptecophylla tameiameiae* (pukiawe), *Lobelia niihauense* (no common name), *Microlepia strigosa* (palapalai), *Myrsine lanaiensis* (kolea), *M. lessertiana* (kolea lau nui), *Nestegis sandwicensis* (olopua), *Nothocestrum latifolium* (aiea), *Nototrichium humile* (kului), *Pipturus albidus* (mamake), *Pisonia sandwicensis* (papala kepau), *Pittosporum* spp. (hoawa), *Pleomele forbesii* (halapepe), *P. halapepe* (halapepe), *Pouteria sandwicensis* (alaa), *Perrottetia sandwicensis* (olomea), *Psychotria hathewayi* (kopiko), *P. mariniana* (kopiko), *Psydrax odorata* (alahee), *Rauvolfia sandwicensis* (hao), *Reynoldsia sandwicensis* (ohe makai), *Sapindus oahuensis* (lonomea), *Urera*

glabra (opuhe), *Viola chamissoniana* (pamakani), and *Xylosma hawaiiense* (ae) (Perlman 2009; U. S. Army Garrison 2008; Wood 2009).

The flowers of *Abutilon sandwicense* are large and showy, indicating that the pollinator may have been nectar-feeding birds. In recent years, introduced honeybees have been observed visiting flowers, but it is unknown whether they function as surrogate pollinators. Flowering can be observed at any time of the year, but the peak flowering months are April through June. Dispersal agents for this species are unknown. Reproduction in this species is primarily by seed. Seeds need scarification (physical or mechanical weakening of the seed coat) for germination. Many Hawaiian species in the Malvaceae family have long-lived seeds, thus a seedbank may still exist in places where populations were known historically. Cultivated plants usually take at least three to four years to mature (U. S. Army Garrison 2008).

Major threats to *Abutilon sandwicense* include fire (Listing Factor E); ungulates including cattle (*Bos taurus*), pigs (*Sus scrofa*), and goats (*Capra hircus*) (Listing Factors A and D); and invasive introduced plant species including *Ageratina riparia* (spreading mist flower), *Aleurites moluccana* (kukui), *Clidemia hirta* (Koster's curse), *Erigeron karvinskianus* (daisy fleabane), *Ficus microcarpa* (Chinese banyan), *Grevillea robusta* (silk oak), *Hyptis pectinata* (comb hyptis), *Bryophyllum pinnatum* (airplant), *Buddleia asiatica* (dogtail), *Leucaena leucocephala* (haole koa), *Melia azedarach* (pride-of-India), *Melinis minutiflora* (molasses grass), *Montanoa hibiscifolia* (tree daisy), *Oplismenus hirtellus* (basketgrass), *Urochloa maxima* (guinea grass), *Passiflora suberosa* (corkystem passionflower), *Pimenta dioica* (allspice), *Psidium cattleianum* (strawberry guava), *Psidium guajava* (common guava), *Rivina humilis* (coral berry), *Rubus argutus* (blackberry), *Schinus terebinthifolius* (Christmasberry), *Syzygium cumini* (Java plum), and *Toona ciliata* (Australian red cedar) (Listing Factor A and E) (Perlman 2009; U. S. Army Garrison 2008).

Two serious insect pests damage *Abutilon sandwicense*: black twig borer (*Xylosandrus compactus*) and Chinese rose beetle (*Adoretus sinicus*) (Listing Factor C) (U. S. Army Garrison 2008; Oahu Army Natural Resource Program 2009). Rats (*Rattus* spp.) and slugs (species undetermined) are also predators of this species (Listing Factor C) (Perlman 2009).

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.

The Army has a management strategy for *Abutilon sandwicense* which includes fencing to exclude feral ungulates, fire management, and weed control. They have collected seeds from many of the extant wild individuals at numerous locations, and have successfully propagated from both seeds and vegetative cuttings. Populations will be

augmented with appropriate genetic material as fencing is completed and plants become available from nurseries (U. S. Army Garrison 2008). In 2008, the Army reported 14 plants in their Wahiawa nursery, and 929 seeds in storage. Twenty eight individuals were reintroduced at Kaluakauila (U. S. Army 2008). The Center for Conservation Research and Training Seed Storage Laboratory has 737 seeds from at least 5 locations in long-term storage (Center for Conservation Research and Training Seed Storage Laboratory 2009). The species is cultivated and/or stored as seed in several botanical gardens around the state (National Tropical Botanical Gardens 2009; Maui Nui Botanical Gardens 2009; Waimea Valley Arboretum 2009).

The interim stabilization goals for this species have not been met (Table 1), as only one population has more than 50 mature individuals and all threats are not being managed (Table 2). Therefore, *Abutilon sandwicense* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Continue to collect material for genetic storage and propagation for reintroduction.
- Fence all populations to exclude feral ungulates.
- Develop and implement fire management plans.
- Control invasive plant species.
- Determine and implement methods to control insect pests.
- Work with Hawaii Division of Forestry and Wildlife and Hawaii State Parks 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.

References:

Center for Conservation Research and Training Seed Storage Laboratory. 2009. Seed storage lab database report. University of Hawaii at Manoa. Honolulu, Hawaii. 617 pages. Unpublished.

Perlman, S. 2009. *Abutilon sandwicense*. National Tropical Botanical Garden, Kalaheo, Hawaii. 4 pages. Unpublished.

U. S. Army. 2008. Report to U.S. Fish and Wildlife Service on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 9 pages. Unpublished.

U. S. Army Garrison. 2008. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range, Kawailoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. 624 pages.

Maui Nui Botanical Garden. 2009. Report to U.S. Fish and Wildlife Service on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. 15 pages. Unpublished.

National Tropical Botanical Garden. 2009. Report to U.S. Fish and Wildlife Service on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. National Tropical Botanical Garden, Kalaheo, Hawaii. 15 pages. Unpublished.

Oahu Army Natural Resource Program. 2009. 2009 status report for the Makua and Oahu implementation plans. U.S. Army Garrison, Hawaii and Pacific Cooperative Park Studies Unit, Schofield Barracks, Hawaii. 711 pages. Available online at <http://www.botany.hawaii.edu/faculty/duffy/DPW.htm.>

[USFWS] U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; determination of endangered status for 26 plants from the Waianae Mountains, island of Oahu, Hawaii; final rule. Federal Register 56(209):55770-55786.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pp., plus appendices.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-35998.

Waimea Valley Arboretum. 2009. Report to U.S. Fish and Wildlife Service on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act, Honolulu, Hawaii. 16 pages. Unpublished.

Wood, K.R. 2009. Notes on *Abutilon sandwicense*. National Tropical Botanical Garden, Kalaheo, Hawaii. 1 page. Unpublished.

Table 1. Status of *Abutilon sandwicense* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Stability Criteria identified in Recovery Plan	Stability Criteria Completed?
1991 (listing)	300-400	0	All threats managed in all 3 populations	No
			Complete genetic storage	No
			3 populations with 50 mature individuals each	No
1998 (recovery plan)	<300	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Unknown
2003 (critical habitat)	253-263	0	All threats managed in all 3 populations	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Unknown
2010 (5-year review)	137	28	All threats managed in all 3 populations	Partially (Table 2)
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	Partially: only Makaha Makai with 73 individuals over 50

Table 2. Threats to *Abutilon sandwicense*.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, D	Ongoing	Partial: portions of Kaawa to Puulu and Ekahanui and Huliwai populations fenced
Invertebrates – herbivory	C	Ongoing	No
Rats – herbivory	C	Ongoing	No
Invasive introduced plants	A, E	Ongoing	Partial: weed control in portions of Kaawa to Puulu and Ekahanui and Huliwai populations
Fire	E	Ongoing	Partial: fuel break weed control occurring in some populations
Climate change	A, E	Increasing	No

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of *Abutilon sandwicense*
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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 6/2/11