



Ko`oloa `ula, *Abutilon menziesii*

DRAFT

DLNR-DOFAW O`ahu Stabilization Plan

Taxon Summary: *Abutilon menziesii* (Deg.) Christoph. Family: Malvaceae (Mallow Family)

Hawaiian Name: Ko`oloa Ula

Description and biology: Shrubs 2m tall, diffusely branching. Cordate-ovate leaf blades 3-10cm with crenate to serrate margins. Apex acute to long acuminate. Flowers are solitary in leaf axils and either pendulous or erect, calyx 1.1-1.7cm long glabrate to densely pubescent, sometimes 2 or 3 lobed. Corolla can have rotate to reflexed petals ranging from maroon to yellow. The staminal column also ranges in color from red to yellowish and is exerted 2-2.8cm long. Dark brown, pubescent, reniform seeds are born in pale brown, pubescent, cylindrical schizocarps 8-10mm long.

The Oahu populations of this species were once suggested that perhaps originated in plants escaped from cultivation. However, the current known distribution of wild individuals (Ewa plains and Lualualei) appear to be natural, although the habitats have been highly disturbed by human activity (this species appears to need some level of natural disturbance and acts as a secondary successor). The Oahu plants also show some morphological differences to the Lanai, Maui, and Hawaii island populations. For the purposes of this document the Oahu populations are assumed wild individuals.

Known distribution: *Abutilon menziesii* is known from dry shrublands on Hawaii, Maui, Lanai, and Oahu.

Habitat Characteristics and Associated Species:

Threats: Human activity (development), Fire, weeds, drought, climate change, probable loss of pollinators, non-native insect herbivory.

Introduction

Background on Oahu *Abutilon menziesii* conservation

In 1996 a population of *Abutilon menziesii* was discovered in a former sugar cane field within the footprint of the Department of Transportation's (DOT) plans to construct a road. Consequently, a Habitat Conservation Plan (HCP) was created as a mitigation for the construction. The HCP was created in 2004 to outline mitigation with specific goals to complete by the end of the Incidental Take License, issued by the State Board of Land and Natural Resources, which expires in 2021. The Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW) was tasked with implementing the HCP mitigation over this time frame on behalf of DOT.

For reference see <http://dlnr.hawaii.gov/wildlife/files/2013/10/Abutilon-HCP-Final.pdf>

DLNR-DOFAW has been working on the mitigation since 2004 and to date *Abutilon menziesii* has been planted at 5 wild sites: Honouliuli Wildlife Refuge, Diamond Head State Park, Pouhala Marsh, Kahuku, and the original wild site in Kapolei called the Contingency Reserve Area (CRA). The main goal of the *Abutilon* HCP was to establish 3 self-sustaining populations outside of the CRA. This goal was not accomplished in the time frame given for the HCP (2004 to present, 2017) as only 1 of the newly established populations (Honouliuli Wildlife Refuge) meet the required long term success criteria regarding seedling establishment and survivorship (see *Abutilon* HCP).

There are a few reasons why we believe there is a lack of germination and survivorship. The habitat available for this species on Oahu has been highly altered by humans (sugar cane and other agriculture, housing developments, and military reserves) as well as highly impacted by invasive species. There is virtually no intact dry forest shrubland habitat left on Oahu. It is not clear why the Honouliuli site has met the HCP success criteria where adjacent sites at Pouhala and CRA have not. But we believe it has to do with a level of disturbance and weed competition. It is possible that the Honouliuli site has less weed competition than Pouhala and the CRA. CRA is also so heavily weed infested that it is going through multiple stages of succession with the end result being a site less suitable for *Abutilon* than when the project began.

However, the main reason for the lack of seedling recruitment and survivorship appears to be lack of sufficient moisture on a regular basis. Although the sites were all begun under irrigation, the only period that saw seedling survivorship was from 2012-2013. When dealing with such an altered ecosystem as what remains appropriate habitat for *Abutilon menziesii* on Oahu, we have been forced to recognize the effects that the lack of consistent rains has had on this species conservation effort. It appears that the cycle of rainfall is 1) changing in response to climate variables and 2) is not frequent enough to carry a significant number of seedlings into maturity. For this species 20 years may not be enough time to achieve 3 self-sustaining populations with the current climate and given future predictions.

Stabilization Definition

The creation of this Stabilization Plan (SP) is to assist DLNR-DOFAW in transitioning the management of *Abutilon menziesii* from the HCP to general conservation activities. Conducting management of this species under the guidance of a DOFAW Stabilization Plan will provide a way for this Oahu populations to continue natural expansion and prevent extinction on Oahu. It is hoped that providing a longer period of time and a more diverse effort for the conservation of this species will lead to a greater level of successful population establishment.

The U.S. Fish and Wildlife Service (USFWS) defines plant stabilization per the recommendations published by the Hawaii and Pacific Plants Recovery Coordinating Committee (HPPRCC, 2011), a group of botanical experts gathered together by the USFWS to offer guidance on the recovery of listed plants in the Pacific.

The HPPRCC decided that a taxon would be considered stable if it met the following three criteria:

- 1) it has sufficient numbers of regenerating individuals in a minimum number of populations;
- 2) threats are controlled at these populations; and
- 3) these populations are fully represented in an ex situ collection (USFWS 1998b).

It is important to note that the requirements for stabilization are far below those required for delisting or downlisting and that stabilization is not synonymous with species recovery.

Stabilization Plan:

The goal of this plan is to incorporate stabilization actions for *Abutilon menziesii* into ongoing DOFAW management actions. With the HCP funding and timeline winding down, DOFAW recognizes the continued effort needed to help move this species towards stabilization. At this point DOFAW would like to assess the current HCP sites and weigh them against some of the previously discussed sites currently managed for plants and other wildlife. DOFAW is committed that there will be at least 3 main sites on Oahu and one on a Maui Nui DOFAW site to be maintained at 80 mature individuals each. Each site will be monitored over time and utilizing adaptive management adjustments will be made. Adopting this plan would mean that more populations would be established than the current 3 wild sites required by the HCP, and the cost of the actions would be managed by existing staff and outreach programs. By having stabilization actions incorporated into DOFAW projects the outcome is potentially longer lasting, further reaching, and more effective in the long term.

DOFAW is proposing to continue working at a maintenance level at the currently established sites along with established *Abutilon* HCP partners such as USFWS, Koko Crater Botanical Gardens, Diamond Head State Parks, and Ewa Villages Golf Course. Additionally, DOFAW shall provide additional outplanting sites for this species at sites such as Kawainui and Hamakua Marsh Wildlife Sanctuaries and others until the three Stabilization Sites are determined (see Figure 1). Table 1 shows the current number of individuals at each of the current HCP managed sites. Over time it is projected that maintaining 80 mature individuals at the locations with the highest potential may produce a soil seed bank capable of replacing individuals on years when sufficient rainfall supports seedling development. At this time DOFAW is not certain that all of the HCP and/or possible sites have the ability to have significant recruitment. Specifically, more monitoring and assessment is necessary before determining which of the sites will be managed for stabilization purposes. Rather than spending more effort in areas that are not successful in maintaining mature plants or producing seedlings, DOFAW would like efforts to be focused on areas where there are enough support resources to maintain healthy populations. A discussion of each current site and potential management sites is found in Table 3. The list of potential sites in this draft document is not exhaustive and can be discussed further depending on recommendations by the ESRC and other DOFAW staff.

Under the original HCP goals (see original HCP 2004) there is a requirement for seedling establishment. Over the past 17 years of implementing the HCP, DLNR has noted that seedlings were established only in 2012-2013. For the purposes of this document we are focusing on the maintenance of mature individuals at suitable wild sites rather than seedling recruitment due to the anticipation that rainfall events will become less predictable and less frequent with climate change but we are hopeful a long term soil seedbank will help to establish the necessary new recruitment when rainfall is sufficient.

Table 1. Current (2017) *Abutilon* HCP management sites.

	Wild Sites				Other Sites			Total
	Diamond Head	Honouliuli Reserve	Pouhala Marsh	Kahuku	Ewa Villages	CRA	Koko Head	
2017 Mature (Reproductive) Plants	84	180	78	111	72	68	84	676

Table 2. DOFAW proposed in ground genetic repositories for Oahu stock.

	Genetic Repositories	
	Koko Crater Botanical Garden	Ewa Villages Golf Course
2017 Mature Plants	78	72
Genetic Representation	76%	70%

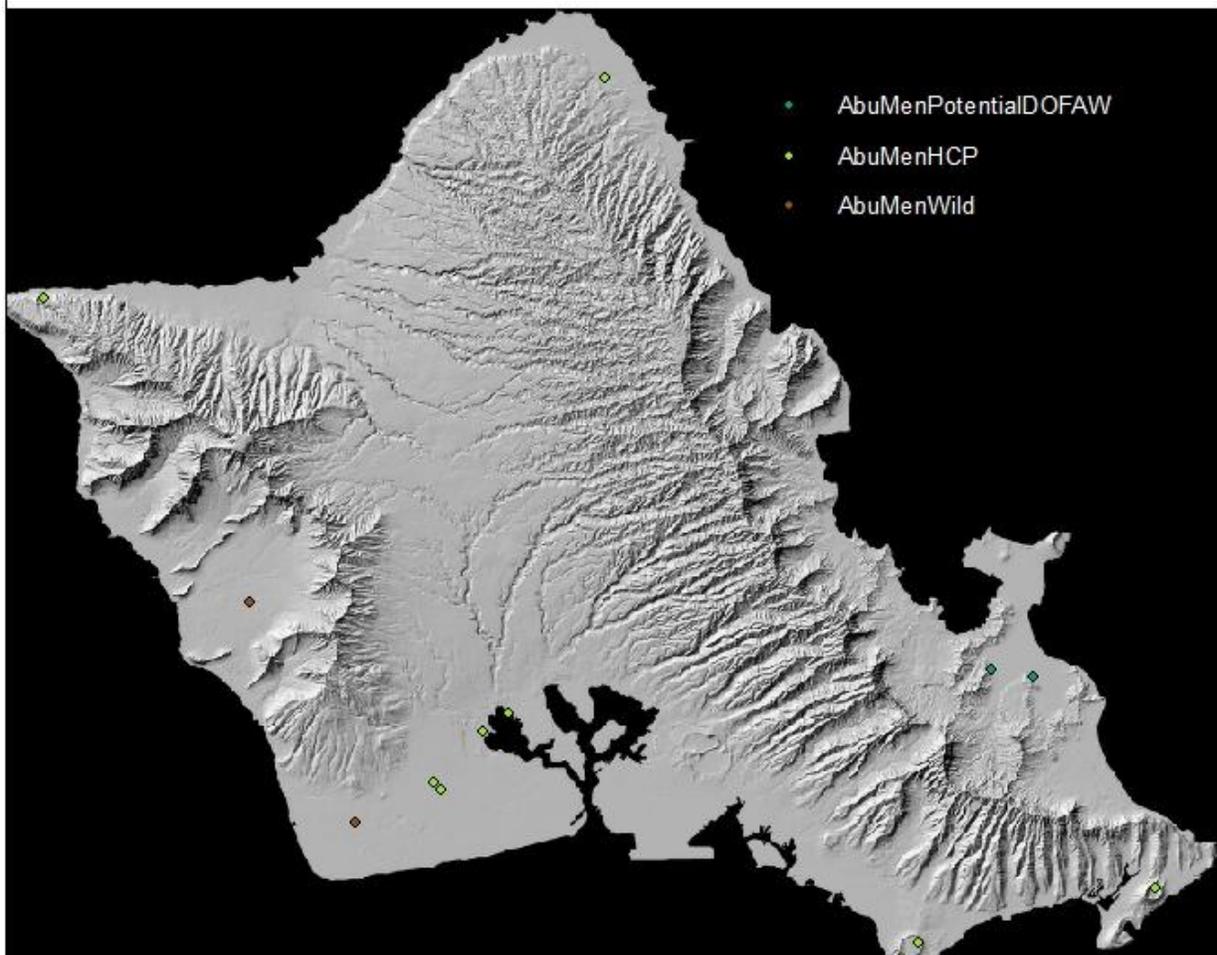


Figure 1. *Abutilon menziesii* historical, current wild and HCP populations, and potentially new DOFAW reintroduction sites.

Table 3. Potential list of Stabilization Sites. [this is not an exhaustive list]

Potential Stabilization Site	Pros	Cons	Considerations
Honouliuli	-currently meets seedling recruitment criteria -no additional planting needed -long term management (FWS) -threats currently controlled	-site is limited in size	
Pouhala Marsh	-some recruitment -long term management (DOFAW) -threats currently controlled	-site is limited in size	
Hamakua Marsh	-long term management -AbuMen test plants have recruited (2) -some threats controlled	-new site	
Kawainui Marsh	-long term management (DOFAW)	-new site -no plants tested	
Diamond Head	->80 mature individuals -large soil seedbank -recruits have survived	-Low number of recruit survival (12) -High weed density -drier than other sites -no other DOFAW projects	
CRA	-original wild site	-at urban interface (needs a fence) -High weed density -May need some tilling to bring site back to optimum disturbance levels -no other DOFAW projects	-ownership is not DLNR DOFAW
Kahuku	-111 mature individuals	-Only 1 year old; Potential unknown -no other DOFAW projects	-ownership is not DLNR DOFAW
Makua Keaau FR	-remnant native dry forest/shrubland -long term T&E and restoration management by DOFAW -ungulate threats controlled	-Difficult to access -new site -no plants tested -high fire threat	
Pahole NAR	-dry to mesic forest/shrubland -long term T&E restoration and management by DOFAW -ungulate threats controlled	-higher elevation than historically found (may be more appropriate given climate change) -no plants tested here	