Abutilon menziesii HCP 2018-2019 Status Report

Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
August 2019
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I. Introduction

The *Abutilon menziesii* Habitat Conservation Plan was initiated in 1996 when a population of Ko'oloa'ula was discovered within the proposed construction zone of several projects in Kapolei, Oahu. This species is federally and state listed as endangered and this plan was initiated to mitigate for the effects of development on this population. The HCP outlined the measures planned over 20 years from 2001-2021. Specifically, the conservation goal of the HCP has been to represent as much of the original genetic diversity as possible within three newly created populations within protected areas on Oahu.

In 2017 the conclusion was drawn that this project would not ultimately meet the success criteria outlined in the original HCP, based on the minimum seedling recruitment and survivorship at the required at the 3 populations. There are several contributing biologic and abiotic factors to the lack of germination and survivorship at these sites. These include the lack of consistent and sufficient rainfall, the possibility of seed predation, and the heavy intrusion of nonnative weeds at planting sites. Due to this realization and funding constraints, the main focus for 2017-2018 was to begin to incorporate the restoration of this species within State Department of Land and Natural Resource ongoing projects have long term support. The sites were located at Hamakua Marsh, Makua Keaau Forest Reserve, and Waianae Kai Forest Reserve. During the 2018-2019 reporting period, the focus has been to maintain all existing plantings through weed control, outplanting, and monitoring. Figure 1 below shows the growth and habitat of a wild plant discovered recently within the Lualualei Naval Magazine, Oahu.

Figure 1. Wild population of *Abutilon menziesii* at Lualualei Naval Magazine, Oahu 2019.

II. Funding and Projected Project Completion

This project has an interesting history because the ITL was issued to DOT and development partners but the mitigation work was set to be done by DLNR DOFAW. The original funds were projected to support the HCP project for a 20-year time frame. The funds directly contributed to the HCP are outlined in Table 1. If equally divided for the 20 years of the project duration, the funds are approximately $72,500/year. Over the past 18 years the funds have been used for building and maintaining a nursery facility, purchasing 2 vehicles (one used, one new), field and propagation supplies (i.e. herbicides, pesticides, pots, media, etc.), as well as the salary for 1 full time skilled specialist (Specialist duties included: organized project locations, grew the plants, prepped and maintained the field sites, etc.).

Given this spending level, funds for this project are not projected to last the duration of the HCP and ITL timeline. In 2017 the project was put on ½ time by DOFAW in anticipation of this and the opportunity to support staff through other grant opportunities at the same time. This has allowed the project to be maintained at least in part until December 2019, at which time there will be no HCP funds remaining. In a good faith effort, DOFAW plans to continue some of the goals of the HCP by incorporating the outplanting of *Abutilon menziesii* into regular restoration efforts as described below.

Table 1. Abutilon HCP funds

Funding Source	Amount	Dates
DOT	$250,000	Mar-01
DOT	$750,000	Oct-04
DOT	$200,000	Oct-05
DHHL	$120,000	Jan-06
City and County of Honolulu	$30,000	Sep-06
UH West Oahu	$50,000	Feb-07
HART	$50,000	Mar-14
Revenue Total	**$1,450,000**	

III. Population Summaries

A. Diamond Head

This *Abutilon* population was established with clones of wild Kapolei stock in 2004. The site was initially on irrigation with heavy weed control. Irrigation was turned off approximately 5 years after establishment. Over the past year this population has been relatively healthy (see Figure 2). There has been some recruitment of plants to adult size, though overall recruitment has been lower than anticipated considering the size and health of the existing plants. During the wet season, the *Abutilon* are healthy and produce a large amount of seeds. The low recruitment may be due to the lack of consistent winter rains and the lower soil moisture as compared to other sites. The substrate at this site seems to dry out faster than soil at other locations. It is hard to predict the natural progression of *Abutilon* at this location. With semi-annual weed control, this population could be sustained for the next 20-30 years with a likely slow decline in health and viability unless site enhancement is done. Site enhancement that would increase the survival time of this population include outplanting new plants, adding other native species to the site, and installing a perimeter weed free zone.

The MOU between State Parks and Hawaii National Guard was created but never finalized with signatures. The DLNR HCP office is assisting with the finalization of this MOU between DOFAW and State Parks for the long term management of *Abutilon menziesii* at this site.

During 2018-2019, no new plants were outplanted. There are a total of 68 plants at Diamond Head representing 57% of the Kapolei genetic stock. This site is currently monitored once a month and selectively weeded (i.e. weeding only the high threat species). This weeding strategy emphasizes control versus elimination. There have been no new seedlings observed during the reporting period. Of the seedlings seen during previous reporting periods, 9 have survived for more than five years. Three seedlings from previous reporting years died during this reporting period.

Figure 2. Mature plants within the Diamond Head Crater planting site, August 2019.

B. Koko Crater Botanical Garden

The plants at Koko Crater were established as an ex situ representation of the Kapolei genetic stock. These plants are the most robust of any site. There are several factors that favor this site as a long-term ex situ site for *Abutilon* conservation. There are relatively low threat levels and ideal growing conditions that make this site favorable for long-term *Abutilon* survival. For example, there is controlled access to the site and weed management which reduces the fire threat. The current problem is that the plants are growing into each other, expanding vegetatively at a relatively fast rate. This leads to confusion when trying to track individual plants for genetic stability. A drastic thinning of the existing population to make tracking and management easier has been proposed.

The plants at Koko Crater Botanical Garden are thriving. There are 90 plants representing 60% of the Kapolei genetic stock. No new plants were outplanted during the reporting period. During 2018-

2019, the focus of work was to produce air layers. The plants located at Koko Crater are an invaluable source of working material for the program (i.e. cuttings, seeds, etc).

Figure 3. Koko Crater living collection site for Abutilon menziesii, 2019.

C. Honouliuli

The Honouliuli outplanting site is located along the western edge of the West Loc of Pearl Harbor and was established in 2002 and 2003. This site is within three to four miles of the original population and is well protected. The site itself is part of the Oahu National Wildlife Refuge Complex. The refuge consists of 37 acres of fenced land, much of which is occupied by two ponds. The land is still under Navy ownership but USFWS has a cooperative agreement with the Navy to manage the site as a refuge in perpetuity. This site was unexpectedly successful. There are more than 70 mature adults that have been recruited from the seed bank. Recruitment at the site is dependent on favorable winter weather, repeated Kona storm events. There have only been two to three favorable winter weather patterns over the lifespan of this site; which has led to the successful recruitment. No significant recruitment has been seen at this site in the past eight years due to a lack of Kona storms. It is not fully understood why the recruitment is so high at this site when other nearby sites that have had very little recruitment. The substrate and slope may contribute to the success. The soil is likely alluvial in origin and quite rich. The successful area at this site is situated on the top and sides of a large mound with sloping sides. The steepness of the mound allows for soil to move downslope and cover seeds that have fallen from the *Abutilon* above enhancing recruitment. Other factors that contribute to the success of this site may include the relatively low weed pressure, a favorable micro climate created by the tree canopy and adjacent body of water, and a shallow water table (i.e. less than 20 feet). There have been recent changes at this location including the installation of a predator proof fence. By installing the fence, the USWFS has isolated the *Abutilon* plants making it harder to access them. This may have, however, opened up other currently unused areas for planting. Another change to the site was the removal of the large kiawe trees that created and overs story above the second *Abutilon* planting area at this site. The plants seemed to have responded favorably to the removal of the trees and have grown in size and appear more robust.
At this time, a large portion of the plants are located along the perimeter fence line. Due to this, there is some likelihood of *Abutilon* migration outside the refuge boundary. This site could be enhanced by

incorporating other native plant species and regular application of gypsum to reduce salt loads in the soil. This may increase recruitment.

Efforts are being made to adjust the conditions of the soil at both sites so that they are more favorable for regeneration and growth. This site is monitored once a month and weeded as needed. Access is an issue at this site due to bird nesting and the usage by school groups for outdoor education. There were no new seedlings during the report period. Currently, there are 62 seedlings at the site from previous years. There are 62 seedlings that have survived longer than five years. This site has reached capacity; therefore, the only plantings planned in the future are for replacement of plants that die. Although all plants at this site produce seeds, a large percentage of the plants are also reproducing vegetatively by mounding (i.e. lower branches root on contact with the ground). As of 2019, there are a total of 71 adult plants representing 54% of the genetic stock available.

Figure 4. Mature plants at Honouliuli, Pearl Harbor National Wildlife Refuge, August 2019.

D. Kapolei Contingency Reserve Area (CRA)

The wild Kapolei population was the first to be discovered on Oahu and originally contained several dozen individuals. Due to the large development plans for the area, a portion of wild individuals were conserved within the 21-acre Contingency Reserve Area (CRA) within Kapolei. The thought behind the creation of the CRA being that once the requirements of the HCP were met (i.e. mainly that 3 newly established, protected, off-site populations were sufficiently established within the 20-year time frame) then the CRA would also be available for development. The Incidental Take License (ITL) issued to Hawaii Department of Transportation (and Ewa Development Partners to include: UH West Oahu, DHHL, etc.) will expire July 31, 2021.

During 2005-2006, 35 plants were moved to the CRA. Once the plants were moved, a perimeter fence was installed by the Department of Transportation contractors around the CRA site. A firebreak was also installed prior to the construction of the fence. The firebreak consists of a weed free gravel barrier. The perimeter fence and firebreak require regular and consistent weed control. Population numbers at this site have been reported this year at 35 remaining individuals. Some of which are wild and some of which have been planted.

This site is the largest and most urban of all the sites managed for *Abutilon menziesii*. *Abutilon* at the CRA on are the decline. This is presumably because of high levels of competition and very dry conditions. Possibly contributing to the dry conditions was the creation of a very large and deep flood water retention basin adjacent to the site. This effectively drained the surrounding areas and lead to overall lower moisture content in the soil at the CRA. The creation of the rail may have also disturbed subterranean water flows by blocking underground lava tubes that may have distributed water. Plants that are on irrigation are much healthier than ones without. This leads me to believe that water is a limiting factor at the site. The *Abutilon* plants not on irrigation are barely hanging on, declining, or dead. I would not recommend this site as a long-term wild site for this reason. The maintenance required to grow *Abutilon* successfully at this site is very high. Because the site is so dry, long-term irrigation would be required to ensure the long-term survival of *Abutilon.* The water lines would need to be maintained and repaired from animal damage once a month. This is a very fertile site and the weeds are abundant. This means the site needs to be hand weeded or sprayed every six weeks. The perimeter firebreak also needs to be maintained by mowing or spraying every two months. There has been no *Abutilon* recruitment at this site in over ten years. There has been a drastic decline in rainfall in this area over the last ten years. The normal Kona storms have been nonexistent. The *Abutilon* depend on Kona storms to bring rain to this area for recruitment. This area may have been more appropriate for *Abutilon* when it was subject to disturbance (i.e. weed control) associated with sugar cane farming. This site does, however, have thousands of native plants established that could be used for seed collection purposes. It is a viable resource for material for fire restoration purposes.

Figure 5. Abutilon menziesii within the Kapolei Contingency Reserve Area, August 2019.

E. Pouhala Marsh

This is a thriving native plant restoration site. The *Abutilon menziesii* are doing well here despite the very low recruitment numbers. There have been a handful of successful recruits at this site. Many of the plants are reproducing vegetatively. This type of asexual reproduction could lead to the long-term presence of plants at the site. Pouhala Marsh is part of an actively managed DOFAW wildlife sanctuary. The main threat at this location are invasive weeds such as kiawe trees and California grass growing along the stream bank. Weed pressure is relatively low except for the mauka western side where the grass and trees are present. Future management should include soil amendments like gypsum to improve soil structure and reduce the salt load. Future pond and wildlife enhancement may lead to increased viability of this site. If the dredge of the pond restoration could be used to enhance or create future *Abutilon* habitat. The "successful" Honouliluli site is growing on the same type of substrate, i.e. pond spoils. There are currently 42 mature plants at this location.

Figure 6. Mature Abutilon at Pouhala Marsh Aug 2019.

F. Hamakua Marsh

The Hamakua Marsh outplanting site is located on the windward side of Oahu on State DLNR DOFAW land managed for wetland birds and dry forest restoration. The site contains an active dry shrubland restoration site that involves DOFAW staff and community support from volunteers and school groups. The suggestion to add *Abutilon menziesii* to this site was made during an informal ESRC visit in 2017. During the 2017-2018 reporting period 65 plants were planted on site. After the initial outplanting, heavy rains occurred at the site that caused flooding that killed many plants. There are currently 30 plants on site. In FY2019 DOFAW wildlife assisted with weed control, common native outplanting, and monitoring.

With DOFAW's long term commitment to this site for wildlife management and dry forest restoration as well as the high level of community involvement and interest, Hamakua is still a good option for maintaining a viable population of *Abutilon menziesii*.

Figure 7. Dry forest shrubland restoration site with *Abutilon menziesii* at Hamakua Marsh, 2019.

G. Makua Keaau Forest Reserve

The Makua Keaau site was originally established to protect a wild population of the endangered plant species, *Gouania vitifolia*. However, this site has been the focus of dry forest restoration efforts for several rare plant species including *Abutilon menziesii*. Even though a fire swept through the area in August of 2018, the site remains viable for dry forest species and recruitment of native common and rare plant species has been observed. Over this reporting period 30 plants were planted within the actively managed area. The plants are not on irrigation, however water by catchment is available on site. All plants planted this year are thriving and DOFAW plans to add 30-50 more individuals this coming fall.

Figure 8. *Abutilon menziesii* at Makua Keaau dry forest restoration site, 2019.

H. Waianae Kai

This site was initiated in the 2017-2018 year within the Waianae Mountains Watershed Partnership (WMWP) and DOFAW Forestry restoration area in Waianae Kai. This site is well established with a variety of native dry shrubland species and is actively managed and funded by DOFAW Forestry. The site is regularly weeded and monitored by WMWP volunteer groups and WMWP staff as well as DOFAW staff. There are currently 25 plants within this site.

The restoration area is acting as a green barrier for fire as well as a site for community involvement. It is easily accessible for fire prevention and weed control.

Figure 9. *Abutilon menziesii* planted Waianae Kai restoration area 2019.

IV. Conclusions

The Endangered Species Recovery Committee (ESRC), which acts as an oversight committee for the HCP process, agreed in that the minimum success criteria will not be met by the time the remaining funds are spent. There have been several discussions over the past year as to how DLNR DOFAW, DLNR HCP, and the ESRC are to proceed with the HCP, for which the ITL is issued until July 31, 2021. There are several issues to address including: 1) How will the work continue until the close of the HCP timeframe when there are no HCP funds remaining? And who will work on the long-term maintenance of the established sites? 2) Will the CRA be able to be developed under the current ITL?

1) How will the work continue until the close of the HCP timeframe, July 31st, 2021, when there are no HCP funds remaining past December 2019? And who will work on the long-term maintenance of the established sites?

This is an unusual question as the ITL holder, HDOT (and partners) have been uninterested for the past several years in any attempts to discuss the AbuMen HCP including the successes or failures of the project. Any requests to discuss meeting, funding, or the HCP have been met with either no replies or very little interest. DLNR DOFAW has been the agency to implement the HCP mitigation measures but ultimately the ITL holder is HDOT. The ESRC would need to determine if more funds are necessary from the ITL holder but with the majority of the HDOT projects completed it may be difficult to garner interest for the HCP. In the meantime, as a good faith effort, DLNR DOFAW has been working to incorporate this species into ongoing restoration efforts at Hamakua, Pouhala, Waianae Kai, Makua Keaau, and Koko Crater. However, the level of attention this species will receive will be far less than is currently allocated within the HCP, with an employee dedicating a significant portion of their time just on this one species. Rather, DOFAW plans to support habitat management that would benefit *Abutilon menziesii* and other species, as well as outplant more plants of this species.

The long terms sites at Honouliuli and Diamond Head will be monitored and managed much less frequently, perhaps only a twice a year. But MOU's between the landowners and DLNR for the protection of the established populations should be finalized within the ITL timeframe.

2) Can the CRA be developed under the current ITL?

Under the HCP the CRA "temporarily protects a [portion of the population] until the short-term success criteria…are met at one wild site. … If an outplanting site does not meet the short-term success criteria, this reserve site could be considered as a wild site". At the April 25, 2019 ESRC meeting the committee determined that the minimum success criteria was not met sufficiently to qualify as to meeting the short-term success criteria. Therefore, the CRA would need to be retained as a wild site for *Abutilon menziesii* throughout the current HCP and is not available for development under the current ITL. At the close of the current ITL the interested stakeholders would need to apply for another ITL and another HCP would need to be established.

V. Site Summary

Table 2. Status of *Abutilon menziesii* populations

	Wild Sites			Other Sites				
	Diamond Head	**Honouliuli Reserve**	**Pouhala Marsh**	**CRA**	**Koko Head**	**Hamakua Marsh**	**Waianae Kai**	**Total**
2019 Mature (Reproductive) Plants	68	71	42	35	90	30	25	361
2019 % Genetic Representation	59%	54%	41%	unk	60%	18%	unk	unk
2019 Seedlings	0	0	0	0	0	0	0	0