

Summary Report of Vegetation Survey along the Ala Kahakai, South Kohala

Introduction

As part of my graduate work in the Tropical Conservation Biology and Environmental Science (TCBES) program at the University of Hawai'i at Hilo, I conducted a vegetation survey along a roughly two mile stretch of the Ala Kahakai National Historic Trail in South Kohala. The purpose of this survey was to generate a botanical baseline of the composition and distribution of endemic, indigenous, and Polynesian-introduced terrestrial plant species along a select section of the historic Ala Kahakai trail system. This section began at 'Ōhai'ula (Spencer Beach Park) and ended just south of Kauna'oa Bay. This area boasts a rich cultural legacy, with defined sections of trail, ki'i pōhaku (petroglyphs), historic features, and mo'olelo (stories) that celebrate this landscape (Maly, 1999). The ecology along the trail is less understood. Between 2007 and 2011, a vegetation inventory project was conducted at Pu'ukoholā Heiau National Historic Site, which sits adjacent to 'Ōhai'ula (Cogan et al., 2011). Aside from this work, no other known vegetation surveys have been performed in lands neighboring this section of the Ala Kahakai. This present survey aims to provide support towards the Ala Kahakai's interest in inventorying native plants and providing educational resources to the public (Ala Kahakai, 2009).

Coastal species are at high risk from anthropogenic damage, rising sea levels, increased drought, and invasive plants and animals (Warshauer et al., 2009). Coastal plants serve a variety of ecological roles, such as providing food and shelter for native birds and insects (Magnacca, 2007; Warshauer et al., 2009) and mitigating coastal erosion (Fernandez-Montblanc et al., 2020). In order to protect and preserve these floral communities, we must first seek to understand their present status. Recording extant mea kanu kahakai (coastal plants) along the trail is valuable in formulating a baseline which land managers, researchers, conservationists, and cultural practitioners may use toward a variety of purposes, explored in depth further in this report.

Recent research in Hawai'i has emphasized the value in cultural systems and traditional ecological knowledge (TEK) as sources of resilience, particularly in light of ongoing ecosystem disturbance (McMillen et al., 2016; Kurashima et al., 2018). Ethnobotanical relationships in this region are indicated through inoa 'āina (place names) that feature plant names, such as 'Ōhai'ula (referring to the endemic 'ōhai shrub, *Sesbania tomentosa*) and Kauna'oa (an endemic vine, *Cuscuta sandwichiana*). The long-standing cultural connections and 'ike Hawai'i (Hawaiian knowledge) that Kānaka 'Ōiwi (Native Hawaiians) share with these plants was of primary interest to this project. Understanding both the cultural and ecological importance of these species can help encourage residents to gain a greater appreciation for nature and build deeper pilina (relationships) with place.

Methods

I aimed to document a meaningful representation of native and Polynesian-introduced species encountered, rather than a 100% survey of all individual plants. I focused on plants viewable from the trail and along the publicly accessible coastline makai (ocean-side) of the trail. I generally did not plot species growing mauka (upland) of the trail, as these lands are managed by private entities. Naturally occurring plants were my focus, though I did document purposefully outplanted individuals in some instances.

I conducted the bulk of my survey throughout August of 2022. I began at ‘Ōhai‘ula (Spencer Beach Park) and walked south to my ending point just below Kauna‘oa Bay. I went at a slow pace, so as not to miss any species of interest. I generally did my work in the mornings, returning on separate days in the evening to verify my observations. I was provided with a handheld Trimble unit to take points of species I encountered. Unfortunately, the Trimble experienced technical difficulties, and I resorted to using the mapping app Avenza on my phone to record points. Plant names were plotted along with any noteworthy information, such as overall health. Hand-written notes were recorded in a Rite in the Rain notebook. ‘Uhaloa (*Waltheria indica*), ‘ilima (*Sida fallax*), and niu (*Cocos nucifera*) were generally not plotted, as these species are ubiquitous across this landscape.

Results

I encountered 17 species of interest belonging to 11 different families along the survey area. These species are listed below (Table 1). Notes for each species are included further in this section. A map of recorded plants can be seen below (Fig. 1). This map can also be accessed via [ArcGIS Online](#).

HAWAIIAN NAME	ENGLISH NAME	SPECIES	FAMILY	STATUS
‘Aki‘aki	Seashore rush	<i>Sporobolus virginicus</i>	Poaceae	I
Hala	Screwpine	<i>Pandanus tectorius</i>	Pandanaceae	I
Hau	Sea hibiscus	<i>Hibiscus tiliaceus</i>	Malvaceae	I, P
‘Ilima		<i>Sida fallax</i>	Malvaceae	I
Kamani	Oil-nut	<i>Calophyllum inophyllum</i>	Clusiaceae	P
Kauna‘oa		<i>Cuscuta sandwichiana</i>	Convolvulaceae	E
Kīpūkai	Salt heliotrope	<i>Heliotropium curassavicum</i>	Boraginaceae	I
Kou	Beach cordia	<i>Cordia subcordata</i>	Boraginaceae	I
Milo	Portia tree	<i>Thespesia populnea</i>	Malvaceae	I
Naio papa	Bastard sandalwood	<i>Myoporum sandwicense</i>	Myoporaceae	E
Naupaka		<i>Scaevola taccada</i>	Goodeniaceae	I
Niu	Coconut	<i>Cocos nucifera</i>	Arecaceae	I, P
Nohu	Puncture vine	<i>Tribulus cistoides</i>	Zygophyllaceae	I
Noni	Beach mulberry	<i>Morinda citrifolia</i>	Rubiaceae	P
Pā‘ū o Hi‘iaka		<i>Jacquemontia ovalifolia</i> subsp. <i>sandwicense</i>	Convolvulaceae	E
Pōhuehue	Beach morning glory	<i>Ipomoea pes-caprae</i>	Convolvulaceae	I
‘Uhaloa		<i>Waltheria indica</i>	Malvaceae	I

Table 1. A list of all species observed, where Status indicates origin (E = endemic, I = indigenous, and P = Polynesian-introduced).

'Aki'aki

'Aki'aki was the only native grass I observed along my survey. It is possible other grasses of interest may exist along the trail and were not detected at this time. In most cases, 'aki'aki comprised sizable patches spanning several feet across. All populations appeared healthy.

Hala

I was surprised to encounter only two hala along this entire stretch, one of which was located close to the Mauna Kea Beach Hotel. It is my assumption that this individual was purposefully outplanted. I took a GPS point nevertheless. Unripe fruits observed at this time.

Hau

Surprisingly few hau bushes were observed, and most (if not all) were purposefully outplanted as hedges. I chose to take points for several that I encountered close to the trail.

'Ilima

As mentioned, 'ilima are ubiquitous across this landscape. I took a single point for an outplanted patch near the Mauna Kea Beach Hotel, as I observed several endemic nalo meli maoli (yellow-faced bees, *Hylaeus* spp.) feeding from flowers (Fig. 2). Most wild patches appeared dry due to lack of rain, but in decent health overall.

Kamani

The only location I observed kamani was at Spencer Beach Park. These two trees (recorded with a single point) were clearly outplanted. Both were flowering and fruiting at this time.

Kauna'oa

I observed a large swath of kauna'oa growing on patches of pōhuehue and naupaka along the shore of Kauna'oa Bay. This was the only area where I saw this species. The patch appeared to be in good health.

Kīpūkai

Extremely common in certain areas, where single points were taken to represent dozens of individuals. Mostly naturally occurring, though some patches may have been purposefully outplanted near the Mauna Kea Beach Hotel. They appear common in rocky, slightly disturbed areas. Flowering at this time.

Kou

Fairly common across this section, and generally in good health. Both flowering and fruiting at this time.

Milo

Milo trees were one of the most common native tree species encountered. Generally in good health. Many individuals were flowering and fruiting at this time.

Naio papa

Represented by a solitary individual growing nestled within a naupaka bush right along the trail. In good health, observed flowering and fruiting.

Naupaka

Very common throughout large sections of the survey area, and generally in good health. Observed both flowering and fruiting.

Niu

Common across large sections of the survey area. I chose not to take any points, since the majority encountered are outplanted along privately managed lands mauka of the trail.

Nohu

Represented by a single individual on a rocky outcrop. This specimen exhibited dying flowers and underdeveloped fruits and was in moderate to poor health, with scale insects of an unknown species observed along its stems.

Noni

Only a few individuals were observed, mostly along the start of the trail at Spencer Beach Park. All appeared to be in good health. A few were found to be fruiting.

Pā'ū o Hi'iaka

I only observed our endemic subspecies along the survey area, as opposed to the indigenous species *Jaquemontia ovalifolia* s.s. Many appeared to be in moderate health, often dry due to the lack of precipitation during this time of the year. Some were observed to be infested with scale insects. Several were flowering at this time. Often growing right at the edge of rocky outcrops overlooking the sea below. Points taken for this species sometimes represent several clustered individuals.

Pōhuehue

Visible flowers on the patches I encountered. In good health. Found along sandy stretches of coastline, such as Kauna'oa Bay and Mau'umae.

'Uhaloa

As mentioned, this extremely common plant was not plotted due to its ubiquity. Though a bit desiccated, the populations I observed seemed to be in good health overall.

Native and Polynesian-Introduced Plants Along the Ala Kahakai 'Ōhai'ula to Kauna'oa Bay South Kohala



Figure 1. Map displaying GPS points for species of interest along the survey area. An interactive version can be [accessed online](#).



Figure 2. Endemic nalo meli maoli (yellow-faced bee, *Hylaeus* spp.) feeding from an 'ilima flower growing in a landscaped area at the Mauna Kea Beach Hotel.

Discussion

As seen in the map above, I experienced intermittent sections of the Ala Kahakai with no species of interest (besides 'uhaloa and 'ilima, which I did not plot). The most common species I encountered were non-native and often invasive. Kiawe (*Prosopis pallida*) was found to be the dominant tree species across this tract. The most common non-native groundcover were grasses such as buffelgrass (*Cenchrus ciliaris*), fountain grass (*Pennisetum setaceum*), and lovegrass (*Erograstis* spp.). Tree heliotrope (*Tournefortia argentea*), which is considered naturalized, was also frequently encountered. In the future, it would be of interest to compile a more comprehensive list of the many non-native species that now characterize this coastline.

I was not surprised to see such low numbers of native and Polynesian-introduced plants relative to non-native species, yet it was dismaying all the same. Hawai'i's coastlines are dynamic zones by nature, but the negative effects of European colonization have resulted in rapid, unprecedented changes that native species struggle to adapt to. The invasive plants mentioned prevent recruitment of native species. Introduced mammals, birds, and insects impact native plants through activities such as herbivory and habitat degradation (Warchauer et al., 2009). Sizable tracts of the trail have been radically altered and

even obliterated due to development activities. Golf courses, paved walking paths, and non-native landscape plants were common sights. Other sections exhibited no plants at all, such as rocky cliff faces and pāhoehoe flats with little to no soil. Whether these exposed areas hosted native plants in the past remains uncertain. Some hardy species, such as pā'ū o Hi'iaka and kīpūkai, were found to be doing well in such locations; their numbers may once have been significantly greater, prior to the changes this coastline has seen.

Of note are the many coastal species I did not encounter along this stretch. I expected to see plants such as maiapilo (*Capparis sandwichiana*), 'ae'ae (*Bacopa monnieri*), 'ākulikuli (*Sesuvium portulacastrum*), and pili grass (*Heteropogon contortus*). Because my survey was confined to the trail and accessible coastline, there is a possibility that I missed these and other representative species. That said, the fact that I did not notice a single individual of these species speaks volumes regarding how depauperate this region has become. Several plants were observed only by a solitary individual or singular location, these being nohu, kauna'oa, kamani, and naio papa. These plants may be at risk of disappearing from our South Kohala coastlines entirely.

Seeing nalo meli maoli feeding from cultivated 'ilima at the Mauna Kea Beach Hotel was heartening. This moment exemplified the importance in selecting native plants for landscaping near-shore areas and the need to minimize pesticides and other chemicals that could cause harm. Invasive plants are considered a direct threat to the wellbeing of these native bees (Magnacca, 2007). Our native pollinators may be small, yet they play an enormous role in contributing to genetic variation and population resilience. In general, insects tend to be overlooked and undervalued. Efforts to study the composition and distribution of native coastal insects and their interactions with plants and other lifeforms should be considered.

Inoa 'Āina

Prior to conducting my survey, I used historic and modern maps to identify areas named for plant species. This work yielded five such inoa 'āina along the surveyed section. During my survey, I assessed these areas to document whether the plants referenced are still extant in their respective locations.

'Ōhai'ula Beach: 'Ōhai'ula translates to "red 'ōhai" (Pukui, 1976). an endemic and now endangered tree (*Sesbania tomentosa*). No 'ōhai were observed in this or any other location during my survey.

Kukui Point: Could refer directly to kukui trees (a Polynesian introduction, *Aleurites moluccana*) or to light in general. No kukui trees were observed here or elsewhere along this section of the trail.

Mau'umae Beach: Literally "wilted grass" (Pukui, 1976). Large patches of 'aki'aki were found here and may very well be the grass referred to. Fortunately, they were in good health and not wilting.

Keawehala Point: No definitions found, but I would suggest this name could translate to "the hala of Keawe," perhaps referring to the famous 17th century chief of this region, Keawe'īkekahiali'iokamoku. No hala was observed in this area.

Kauna'oa Bay: Kauna'oa refers to the endemic vine, *Cuscuta sandwichiana*. A large, healthy patch of kauna'oa was observed growing along this beach.

These inoa 'āina speak to us in the present, telling a story of the kilo (observations) made by kama'āina (native-born residents) long before. Keeping these inoa alive allows us to build upon these kilo, strengthening our own pilina with place. Out of these five places, only two were found to support plants that their names may be attributed to. Future work could include restoring plants to their credited locations, so that inoa 'āina and plants can continue thriving in tandem.

Future Visions

This survey provides a preliminary baseline of native and Polynesian-introduced plants in this area. As a solitary person performing this work, I was limited in terms of time and expertise. A more thorough survey with a larger team focusing on both native and non-native plants is recommended. At approximately 175 miles, the Ala Kahakai traverses a phenomenal expanse of our coastlines. It would be incredible to one day fully document the diverse assemblages of plants and other wildlife observed along the trail.

The data detailed herein can be used for a variety of purposes. These mapped individuals and patches could be monitored over time to understand phenomena such as population health, species interactions, and phenology. Seeds can be collected by conservation organizations for seedbanking, germinating and outplanting, or for educational purposes. Cultural practitioners reliant on natural materials, such as lei (flower garland) or kapa (Hawaiian barkcloth) makers, would benefit from knowing where species reside on publicly accessible lands. In the future, it would be wonderful to see conservation organizations and land managers partner to create community opportunities that highlight our coastal species, such as beach cleanups, outplanting events, and educational huaka'i (excursions). Private entities, including hotels and resorts, are encouraged to work with environmental organizations to select native species for landscaping. These species have evolved to thrive along our dynamic shorelines, requiring less input to maintain than non-native alternatives and resulting in beautified spaces that contribute to the health of our environment.

Educational Materials

A key outcome of this work was creating educational materials pertaining to our mea kanu kahakai. As mentioned, the map in Fig. 1 is publicly available to view via ArcGIS online. Using photographs I took during my survey, I created [plant identification cards](#) detailing twenty coastal species, including species descriptions and cultural information, and an [ethnobotanical brochure](#) highlighting the cultural importance of twelve coastal plants, with an additional list of resources. These documents can be used by residents, visitors, land managers, educators, and environmental professionals interested in spreading awareness about South Kohala's coastal vegetation. Learning about the ecological and cultural importance of our mea kanu has the power to strengthen people's love for place, sense of identity, and desire to mālama 'āina (care for the land) (Feinstein, 2004; Chinn, 2011). Enhancing the environmental literacy of our community is a key step toward protecting native species and perpetuating 'ike Hawai'i.

Conclusion

When we walk the trail today, we encounter pathways painstakingly crafted and traversed by nā po'e kahiko, the people of old. For kama'āina of Kānaka 'Ōiwi descent, this is an experience in walking in the footsteps of nā kūpuna, one's ancestors. The views we see from the trail today are undoubtedly different from what the elders once observed. Our mea kanu and so many other native communities have suffered significant changes over time, particularly during the last two centuries. More work is required to gain a broad sense of the species composition and distribution of our coastlines. For now, my work serves as a useful baseline in understanding the botanical assemblage of a small portion of the Ala Kahakai in South Kohala. The educational materials generated by this survey, including this report, have the potential to inspire people of all ages and backgrounds to cultivate meaningful pilina with this remarkable landscape. I personally have faith in our community's capacity to mālama 'āina, with 'ike Hawai'i at the forefront of these efforts. Like our coastal mea kanu, we stand resilient.

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