

***Flora-Fauna Study of Kahua Olohu
TMK 9-5-12:05 (13 acres)
Nā‘ālehu, Ka‘ū, Island of Hawai‘i***

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Introduction

This flora-fauna study was prepared to assist the County of Hawai‘i in ensuring the appropriate and responsible use and stewardship of lands such as Kahua Olohu acquired with funds from the Public Access, Open Space and Natural Resources Preservation Fund. The land in question (“the property”) consists of a 13-acre-acre property situated *makai* of the Hawai‘i Belt Road between downtown Nā‘ālehu and the Nā‘ālehu Police Station (see Figures 1-a & 1b). The County has determined that it is important to determine the presence of special status flora and fauna (termed herein rare, threatened and/or endangered or RTE) terrestrial plants and animals. This information is a critical prerequisite to the implementation of maintenance/development actions on this property, whether by the County or approved community-based groups and volunteers. It is likewise important to establish a responsible management policy for public use.

The specific scope of work for the project involved the following:

1. Examine background information, including land records for the property provided by the CLIENT and botanical and archaeological studies in previous EAs and EISs accessible on the OEQC database or provided by the CLIENT, with the goal of determining which RTE species have a reasonable probability of inhabiting the property prior to performing any fieldwork.
2. Conduct fieldwork and systematically inventory all plant species present. GEO will GPS coordinates of any RTE plants/patches identified and take a minimum of one photograph of each such plant/patch to permanently document its condition. GEO will also assess the habitat for birds and Hawaiian hoary bats. Any Hawaiian hoary bats, birds, shorebirds, reptiles, amphibians and non-native mammals observed during our surveys will also be documented.
3. Provide a comprehensive report of survey results, observations, and recommendations pertaining to the biota specified above. The report will include text, photographs, illustrations, figures, maps, tables, exhibits, references, etc., necessary to effectively communicate the survey’s purpose, methodology, surveyor’s credentials, educated assumptions, findings, and recommendations. This will provide the County and the interested public with a full and complete understanding of the RTE flora and fauna that exist or are likely to exist at the site, as well as the impact their presence has/have on the County’s management of the site and the public’s use of the land.

Background Information

The geologic substrate on the property consists of ash-mantled lava flows from Mauna Loa dated older than 10,000 years (Wolfe and Morris 1996). The soils here are classified as Kanohina ashy very fine sandy loam, 2 to 10 percent slopes, and Naalehu medial silty clay loam, 3 to 10 percent slopes. Both are deep, well-drained ash-derived soils over pahoehoe bedrock. (Sato et al 1973). The property has an elevation of about 520 feet above sea level and receives an average annual rainfall of about 39 inches (Giambelluca et al 2013).

The pre-human vegetation of the Nā'ālehu area was likely Lowland Dry/Mesic Forest (per Gagne and Cuddihy 1990). This consisted of an open canopy forest dominated by a wide variety of trees, shrubs, herbs, vines and ferns. It likely had a diverse cover of native dry-forest trees and shrubs, and may have been dominated by lapa (*Diospyros sandwicensis*) and alahe'e (*Psydrax odoratum*), with a number of other species perhaps including now rare trees such as wiliwili (*Erythrina sandwicensis*), and a large number of smaller shrubs, herbs, vines and grasses. However, the area has been farmed for centuries, including over a century of sugar cane cultivation, dairy farming, and ranching. Even on properties in the region that have experienced no development, introduced plants, animals and pests profoundly altered the biota. Prominent species in the property's elevational zone now include the aliens guinea grass (*Megathyrus maximus*), haole koa (*Leucaena leucocephala*) and Christmas berry (*Schinus terebinthifolius*).

The recent history of this particular property was discussed in an article in the *Hawai'i Tribune-Herald*:

In a 9-0 vote, the Hawaii County Council gave final approval to a resolution authorizing Finance Director Deanna Sako to negotiate acquisition of the land near Naalehu.

Ka'u Councilwoman Maile David said the property, located on Mamalahoa Highway, was the site of games associated with the Makahiki season, a time during the winter months Hawaiians traditionally associated with recreation and peace.

In more recent history, the site was used for cattle grazing and was purchased by Puna residents James and Elizabeth Weatherford in 2008 for farming.

The county later discovered through an archaeological survey cultural artifacts identifying the site as part of a larger Makahiki complex. At the time, it was considering purchasing the land so it could lay pipes to a wastewater treatment plant it planned to build behind the property.

The Department of Environmental Management since changed its preferred site to another adjacent parcel that won't have the same impact (Callis 2015).

Geometrician has conducted overview biological surveys of a number of nearby properties as part of due diligence for landowners, including 2,100 acres in Waikapuna

(9-5-007:005, 008 and 016); a 26-acre property adjacent to the Hongwanji in Nā‘ālehu (9-5-022:001); a 366-acre and a 1,055-acre property on Kaalaiki Road *mauka* of the highway (9-5-014:008 and 017). In addition to these surveys, which primarily involved pasture properties, Geometrician has surveyed more intact coastal ecosystems at the Waikapuna shoreline; Honuapo Park; Kāwā; a 200-meter wide coastal band extending between Punalu‘u and Honuapo; and an 800-meter wide coastal band extending between South Point and Green Sands Beach. In general, RTE species were not found in the absence of some combination of shoreline environment, topography protecting plants from feral ungulates, or rugged lava flow geology.

Given the elevation, rainfall, geology, soil, land use history, and evidence of previous surveys, the property is extremely unlikely to host RTE plants. Some native fauna could utilize the property, but given the dominance of non-native fauna and the lack of native floral resources, no RTE fauna would normally be expected. It is important to note that no non-marine plant or animal critical habitat is located within 10 miles of the property.

Survey Methods and Findings

The area was surveyed on several occasions by Ron Terry¹ in September 2017. Plant species were identified in the field and, as necessary, collected and keyed out in the laboratory. Special attention was given to the possible presence of any federally listed (USFWS 2017) threatened or endangered plant species, although the habitat did not indicate a strong potential for their presence.

The work also included a faunal survey restricted to a tally of birds and introduced mammals, reptiles, or amphibians observed during the botanical survey and ecological fieldwork, as well as two additional one-hour bird observations. The field survey also assessed the general value of the habitat areas for native birds. Although there were no radar or ultrasound observations conducted that might have detected the endangered Hawaiian hoary bat, the general value of the habitat for the Hawaiian hoary bat was evaluated.

Not included in the survey was any systematic assessment of invertebrates. However, GEO searched the area for the principal plant species in the area known to support the larvae and pupae of the endangered Blackburn’s sphinx moth (*Manduca blackburnii*), the one listed endangered insect that is potentially present.

Vegetation, Flora and Rare, Threatened or Endangered Plants

As shown in the photos in Figure 2, the survey found the current vegetation to be dominated by the non-native species guinea grass, with several other non-native grasses, herbs and vines at much lower cover levels. These include koa haole and Christmas berry, *Macroptilium* sp., lantana (*Lantana camara*), comb hyptis (*Hyptis pectinata*) and hairy abutilon (*Abutilon grandifolium*). Much of the lack of diversity was due to goat

¹ Ron Terry, Ph.D., is a biogeographer with 25 years of professional experience in preparing biological surveys and assessing environmental impacts. As discussed above, Dr. Terry has extensive experience in the biological survey in Ka‘ū.

grazing, which is apparently being conducted to reduce vegetation so that the property may be re-used for cultural purposes. But even in areas where it did not appear that goats had yet grazed, the diversity was extremely low and no native plants were present. On the highway margins of the property were a number of other weedy or ornamental species. All plant species observed, with the exception of some roadside weeds, are listed in Table 1. No native plants were present. It should be noted that no ponds, intermittent streams or other drainages are present and there is no riparian vegetation.

None of the plants present on the property provide habitat for the Blackburn's sphinx moth (*Manduca blackburni*). This close relative of the tomato hornworm of North America was formerly common on all Hawaiian Islands. Its populations were drastically reduced because of the decline of its principal natural host plant, the native tree 'aiea (*Nothocestrum* spp.). Blackburn's sphinx moth has since adapted to occasionally utilize non-native host plants in the Solanaceae family, particularly *Nicotiana glauca* (tree tobacco). No tree tobacco plants or other hosts were found on the property.

Birds

Only three species of birds were detected during the survey, all non-natives typical of those found in similar areas of lowland disturbed habitat: Japanese white-eye (*Zosterops japonicus*); common myna (*Acridotheres tristis*) and house finch (*Carpodacus mexicanus*), all at extremely low densities, due to the guinea grass habitat. Additional survey times may have yielded other bird species, but it is unlikely that any native forest birds would have been seen. It is probable, though, that the site is at least occasionally visited by the Hawaiian endemic sub-species of the short-eared owl or pueo (*Asio flammeus sandwichensis*) and the migratory resident Pacific golden-plover or kolea (*Pluvialis fulva*). The habitat is marginally suitable for use by both birds. On occasion, the endangered Hawaiian hawk (*Buteo solitarius*) might forage over the property. This wide-ranging raptor nests in large trees and can be vulnerable to disturbance during the nesting season from March through September. No suitably large trees are present on the property, but some are present in the land *mauka*.

Although undetected during this survey, some endangered Hawaiian petrels (*Pterodroma sandwichensis* or 'ua'u) and band-rumped storm-petrels (*Oceanodroma castro*), as well as threatened Newell's shearwaters (*Puffinus auricularis newelli*), may overfly the area between the months of June and October. All three of these pelagic seabird species nest high in the mountains in burrows. There is no suitable nesting habitat for any of these seabird species within or near the property. The Hawaiian petrel was formerly common on the Island of Hawai'i. This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea, as well as at the mid-to-high elevations of Hualālai. It has within recent historic times been reduced to relict breeding colonies located at high elevations on Mauna Loa and, possibly, Hualālai. The primary cause of mortality in all these seabird species in Hawai'i is thought to be predation by alien mammalian species at the nesting colonies. Collision with man-made structures is another significant cause. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds may collide with manmade structures. If they are not killed outright, the dazed or injured birds are easy targets for feral mammals.

Hawaiian Hoary Bat

The Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), the only native Hawaiian land mammal, may also utilize the property, as it is found in most areas on the island of Hawai‘i and has been observed in both Christmas berry and koa haole scrub vegetation (Hawai‘i DLNR-DOFAW 2005; Bonaccorso 2010). It was not observed in our survey, which took place in daylight and did not use any detection equipment, but it should be presumed present. Bats may forage for flying insects over portions of the property on a seasonal basis, and they may find some of the larger shrubs and trees suitable nesting habitat. Hawaiian hoary bats are vulnerable to disturbance during the summer pupping season.

Introduced Mammals, Reptiles, and Amphibians

Other than domestic goats (*Capra h. hircus*), no live mammals were seen during the survey. It is likely that the property is occasionally used by small Indian mongooses (*Herpestes a. auropunctatus*), feral cats (*Felis catus*), mice (*Mus* spp.), and rats (*Rattus* spp.). There are no native terrestrial reptiles or amphibians in Hawai‘i. None were observed in our surveys, but it is possible that some species of anole, gecko and skink could occupy the property. None of these alien species have conservation value and all are deleterious to native flora and fauna.

Impacts and Mitigation Measures

As discussed above, no rare plants or plants listed by the U.S. Fish and Wildlife Service as threatened or endangered plant species appear to be present on the property, nor are there uniquely valuable habitats. No existing or proposed federally designated critical plant (or animal) habitat is present on the property. There appears to be no potential to adversely affect RTE plant species.

If future activities at the property involve outdoor lighting, it may attract threatened and endangered Hawaiian seabirds, which may become disoriented by the lighting, resulting in birds being downed. To avoid the potential downing of these threatened and endangered seabirds due to interaction with outdoor lighting, no construction using unshielded equipment maintenance lighting should be permitted after dark between the months of April and October. All additional permanent lighting should conform to the Hawai‘i County Outdoor Lighting Ordinance (Hawai‘i County Code Chapter 9, Article 14), which requires shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting.

The endangered Hawaiian hoary bat is vulnerable to disturbance while roosting with its juveniles in the pupping season. Although there are very few woody plants on the property (some sizeable trees are directly adjacent), it is recommended that woody plants taller than 15 feet should not be removed or trimmed during the bat birthing and pup rearing season (June 1 through September 15).

Report Limitations

No biological survey of a large area can claim to have detected every species present. Some plant species are cryptic in juvenile or even mature stages of their life cycle. Dry conditions can render almost undetectable plants that extended rainfall may later invigorate and make obvious. Thick brush can obscure even large, healthy specimens. Birds utilize different patches of habitat during different times of the day and seasons, and only long-term study can determine the exact species composition. The findings of this survey must therefore be interpreted with proper caution; in particular, there is no warranty as to the absence of any particular species.

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Figure 1a. Property Location



Figure 1b. Google Earth Close-up



Figure 2. Property Photos



2a. View toward northeast from southern apex ▲ ▼ 2b. View towards northwest from southern apex (note results of goat grazing in both photos)



Table 1 Plant Species Observed on or Directly Adjacent to Kahua Olohu

Scientific Name	Family	Common Name	Life Form	Status
<i>Abutilon grandifolium</i>	Malvaceae	Hairy abutilon	Herb	A
<i>Anredera cordifolia</i>	Basellaceae	Madeira vine	Vine	A
<i>Cenchrus purpureus</i>	Poaceae	Napier grass	Herb	A
<i>Chloris barbata</i>	Poaceae	Swollen fingergrass	Grass	A
<i>Cleome gynandra</i>	Brassicaceae	Spider flower	Herb	A
<i>Crassocephalum crepidioides</i>	Asteraceae	Crassocephalum	Herb	A
<i>Digitaria insularis</i>	Poaceae	Sourgrass	Herb	A
<i>Eragrostis tenella</i>	Poaceae	Lovegrass	Herb	A
<i>Euphorbia heterophylla</i>	Euphorbiaceae	Kaliko	Shrub	A
<i>Euphorbia hirta</i>	Euphorbiaceae	Garden spurge	Herb	A
<i>Ficus microcarpa</i>	Moraceae	Chinese banyan	Tree	A
<i>Hyptis pectinata</i>	Lamiaceae	Comb hyptis	Shrub	A
<i>Indigofera suffruticosa</i>	Fabaceae	Indigo	Shrub	A
<i>Ipomoea triloba</i>	Convolvulaceae	Little bell	Vine	A
<i>Lantana camara</i>	Verbenaceae	Lantana	Shrub	A
<i>Leonotis nepetifolia</i>	Lamiaceae	Lion's ear	Herb	A
<i>Leucaena leucocephala</i>	Fabaceae	Haole koa	Tree	A
<i>Macroptilium sp.</i>	Fabaceae	Macroptilium	Shrub	A
<i>Malvastrum coromandelianum</i>	Malvaceae	Malvastrum	Herb	A
<i>Megathyrsus maximus</i>	Poaceae	Guinea grass	Grass	A
<i>Samanea saman</i>	Fabaceae	Monkeypod	Tree	A
<i>Schinus terebinthifolius</i>	Anacardiaceae	Christmas berry	Shrub	A
<i>Tridax procumbens</i>	Asteraceae	Coat buttons	Herb	A

Key: A = alien, E = endemic, I = indigenous, Endan= listed endangered