

Appendix I - Biological Survey Report



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Ecological Consultants

50 years of field notes, exploration, and excellence

**Waiawa Correctional Facility Project
Biological Survey Report**

Project # 4456-01

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Section 1.0 Project Description and Background

The State of Hawaii Department of Public Safety (PSD) operates the Waiawa Correctional Facility (WCF, henceforth also referred to as the Project Site), located in Waiawa in central Oahu (Figure 1). The State acquired the former U. S. Army Waiawa Military Reservation and established the WCF in 1985. The WCF encompasses approximately 158 acres (Tax Map Key (1) 9-6-005: 011) and is a 334-bed minimum-security prison for sentenced male inmates. The facility provides education and training in various fields such as food service, building maintenance, operation of heavy equipment, farming, and landscaping to help inmates successfully re-enter the community from prison. PSD and the Department of Accounting and General Services (DAGS) are applying for the State Special Use Permit and City's Plan Review Use Permit, and are planning several maintenance and construction activities at the WCF, which triggered an environmental review process under Hawaii Revised Statutes Chapter 343. DAGS and SSPM International, on behalf of PSD, are in the process of conducting the environmental review. This biological study was conducted to support the environmental planning and permitting for the proposed activities at WCF. This report presents the findings of the flora and fauna studies, the objectives of which were as follows:

- Conduct a reconnaissance-level wildlife survey to identify and document wildlife species (birds and mammals).
- Conduct a reconnaissance-level botanical survey to identify and document the vegetation communities and the plant species.
- Identify and document biological issues of concern, including the presence of any taxa that are state or federally listed as threatened or endangered, candidate species for listing, and sensitive habitats.
- Identify potential impacts and conservation measures that may be considered for inclusion into the planning and permitting phase of the project if any taxa that are state or federally listed as threatened or endangered or candidate species for listing are found at the Project Site.

The WCF lands fall within the State's "Agricultural" land use district. The WCF is situated in the Ewa District of Oahu, in an isolated location on a broad ridge on the western slopes of the Koolau Range, at an elevation of about 800 ft above mean sea level. It is surrounded by undeveloped forests of the Ewa Forest Reserve. It is about 1.5 miles east of Interstate Freeway H-2 and is accessed via the Waiawa Prison Road. The nearest developed areas include Pacific Palisades residential development about 1.2 miles to the south, Mililani Memorial Park about 1.7 miles to the west, and Mililani Mauka neighborhood about 2.25 miles to the north (Figure 1). The Waiawa Stream flows to the south of the Project Site. However, there are no natural surface waters, nor are there any wetland features identified by the National Wetlands Inventory (USFWS 2020a) at the Project Site. The Project Site does not overlap with designated or proposed critical habitat for any federally endangered or threatened taxa (USFWS 2020b).

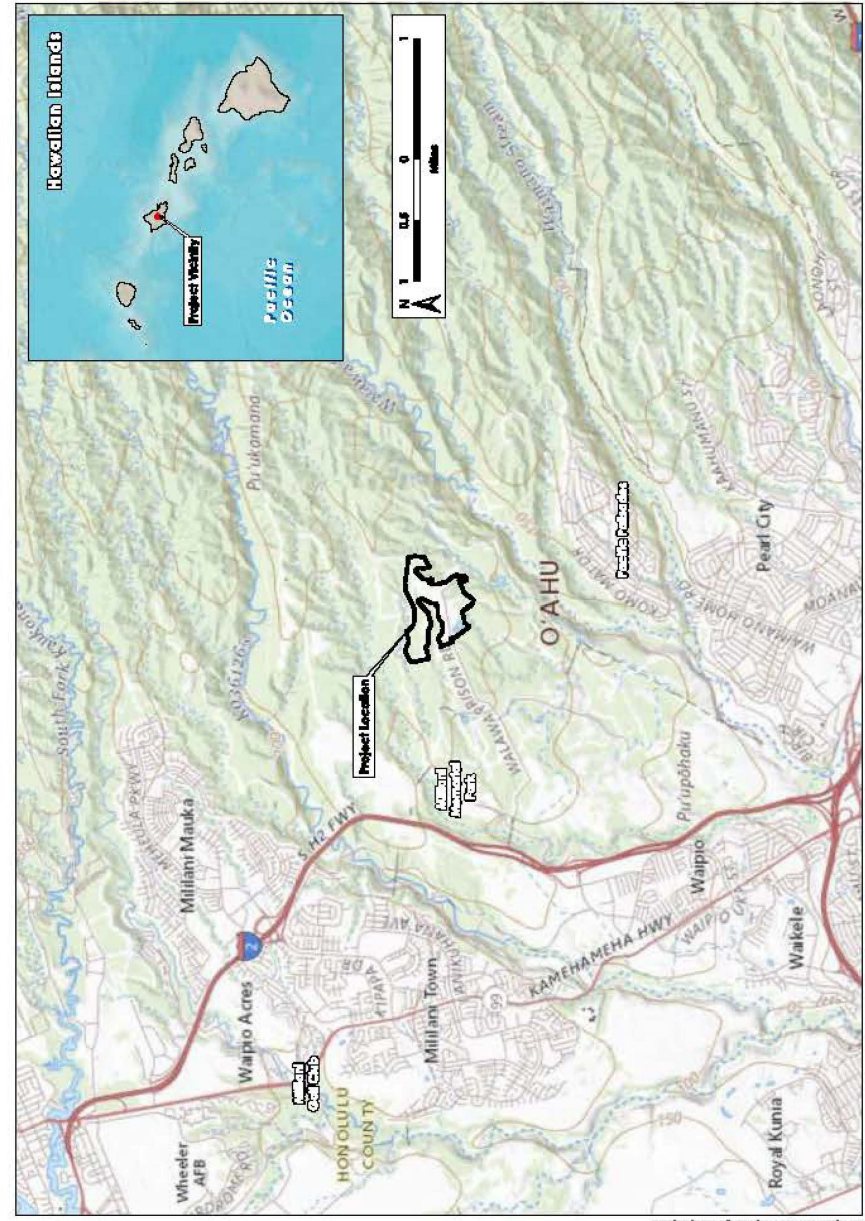


Figure 1. Project Vicinity Map
Waiawa Correctional Facility Biological Survey (4456-01)
December 2020

Section 2.0 Methods

A reconnaissance-level biological survey of the Project Site was conducted on August 26, 2020, from 9:00 a.m. to 4:00 p.m. Sunny to partially cloudy skies and moderate trade winds prevailed during the survey period. One botanist and one wildlife biologist (hereafter referred to as biologists) conducted the survey together. A handheld Global Positioning System (GPS) device preloaded with spatial details was used to navigate during the survey and record field observations. A security escort from the WCF accompanied the biologists throughout the survey. They used the paved and dirt roads to drive to different areas of the Project Site and then walked the accessible portions of that area and documented the vegetation types, plants, birds, and mammals. In general, rocky outcrops, shaded areas, and topographic depressions, which are more likely to support native plant species, were intensively surveyed.

Visual or auditory detection and identification of birds and mammals and identification of animal signs (e.g., scats, tracks, and nests) were used to document the presence of bird and mammal species. In addition to general observations made throughout the survey, six 10-minute point counts were conducted between 10 a.m. and 3 p.m. This effort included tallying all birds seen or heard by a single observer from a fixed point over a period of 10 minutes. Hawaii does not have native reptiles and amphibians. The only native terrestrial mammal, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotis*), is known to occur on Oahu (Tomich 1986). Protocol level Hawaiian hoary bat surveys to detect their activity at the Project Site were not part of the scope of this biological study to support the planning phase of the Project. Incidental observation of non-native mammal species were recorded during the survey. These were based on visual and auditory detection, coupled with visual observation of scat, tracks, and other animal signs.

The biologists were not able to survey some areas of the Project Site on foot either because the vegetation was too dense to walk through or because that area was not accessible (Figure 2). Tall dense thickets of guinea grass (*Megathyrsus maximus*) precluded surveying the northwestern corner of the Project Site on foot (Figure 2). The biologists scanned this area from strategic vantage points with binoculars, and to the extent possible, identified plant species and the vegetation types. The gulch vegetation surrounding an underground concrete tunnel in the southern part of the Project Site was fenced off and precluded access on foot. Also, in the southeastern corner of the Project Site, there was a locked gate south of Tents 7 and 8 which prevented access. The vegetation in these areas was also mostly assessed by scanning with binoculars from vantage points. The agricultural farm at WCF was also surveyed from the outside using binoculars (Figure 2).

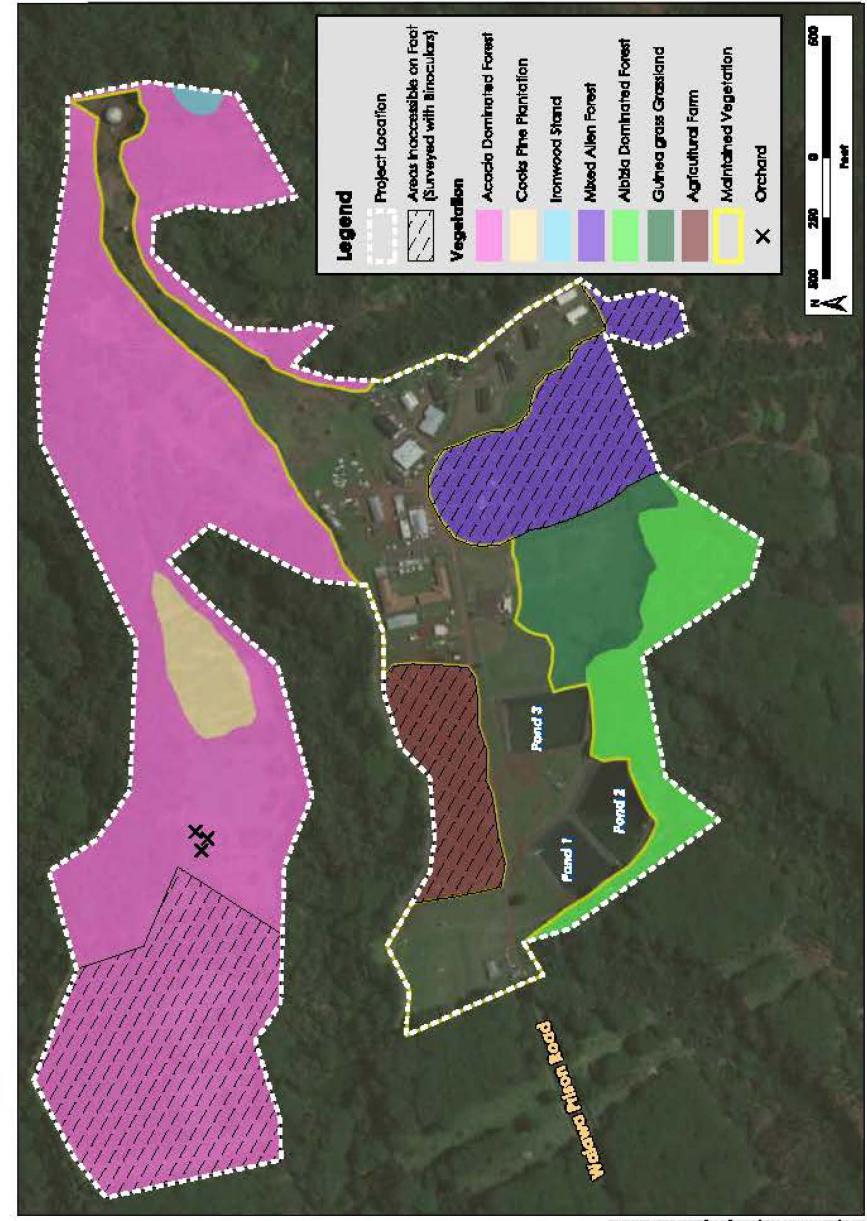


Figure 2. Vegetation Communities at Walawa Correctional Facility
Walawa Correctional Facility Biological Survey (4456-01)
December 2020

Section 3.0 Results

3.1 Flora

The taxa recorded during the biological reconnaissance survey are indicative of the season (i.e., rainy) and the environmental conditions at the time of the survey. No plant species that are state or federally listed as threatened, endangered, or candidates for listing, and no rare native Hawaiian plant species, were observed in the accessible parts of the Project Site. A total of 57 plant species were observed at the Project Site. The vast majority (53 species, about 93%) of these are either alien (non-native) or cultivated species, three (about 5%) are Polynesian introductions, and only one species (2%)—koa (*Acacia koa*), is native (endemic) to Hawaii (Wagner et al. 1999). Table 1 provides a list of the plant species observed in the accessible parts of the Project Site.

In general the vegetation at the Project Site is highly disturbed with several different vegetation communities that represent past and ongoing modifications here. The vegetation types found in the Project Site can be characterized as Acacia Dominated Forests, Cook Pine Plantation, Ironwood Stand, Mixed Alien Forest, Albizia Dominated Forest, Guinea Grass Grassland, Maintained Vegetation, and Agricultural Farm (Figure 2). Described below is the distribution and composition of these vegetation communities at the WCF Project Site.

Table 1. Plant Species Observed at the Waiawa Correctional Facility

| Family | Scientific Name | Common name | Status ¹ | Relative Abundance ² |
|-------------------------------|--|--------------------------|---------------------|---------------------------------|
| Gymnosperms | | | | |
| | <i>Araucaria columnaris</i> (G.Forst.) Hook. | Cook pine | A | C |
| Angiosperms – Monocots | | | | |
| Agavaceae | <i>Cordyline fruticosa</i> (L.) A.Chev. | Ti, ki | pol | R |
| | <i>Dracaena</i> sp. | Money plant | A | R |
| Araceae | <i>Calocasia esculenta</i> (L.) Schott | Taro | pol | U |
| | <i>Syngonium podophyllum</i> Schott | Arrowhead plant | A | R |
| Arecaceae | <i>Cocos nucifera</i> L. | Coconut | pol | U |
| Musaceae | <i>Musa</i> sp. | Banana | cul | U |
| Pandanaceae | <i>Pandanus</i> sp. | Screwpine | cul | R |
| Poaceae | <i>Axonopus compressus</i> (Sw.) P.Beauv. | Wide leaved carpet grass | A | C |
| | <i>Anthoxanthum odoratum</i> L. | Sweet vernalgrass | A | C |
| | <i>Chloris radiata</i> (L.) Sw. | Radiate finger grass | A | C |
| | <i>Cynodon dactylon</i> (L.) Pers. | Bermuda grass | A | C |
| | <i>Digitaria ciliaris</i> (Retz.) Koeler | Henry's crab grass | A | C |
| | <i>Eragrostis pectinacea</i> (Mchx.) Nees var. <i>pectinacea</i> | Carolina love grass | A | U |
| | <i>Urochloa maxima</i> (Jacq.) R. Webster | Guinea grass | A | A |
| | <i>Melinis repens</i> (Willd.) Zizka | Natal red top | A | U |
| | <i>Paspalum conjugatum</i> P.J.Bergius | Hilo grass | A | U |

| Family | Scientific Name | Common name | Status ¹ | Relative Abundance ² |
|-----------------------------|--|----------------------|---------------------|---------------------------------|
| | <i>Setaria parviflora</i> (Poir.) Kerguelen | Yellow foxtail | A | C |
| | <i>Stenotaphrum secundatum</i> (Walter) Kunze | Centipede grass | A | U |
| Pontederiaceae | <i>Eichhornia crassipes</i> (Mart.) Solms | Water hyacinth | A | U |
| Angiosperms – Dicots | | | | |
| Anacardiaceae | <i>Mangifera indica</i> L. | Mango | A | U |
| | <i>Schinus terebinthifolius</i> Raddi | Christmas berry | A | U |
| Apocynaceae | <i>Plumeria</i> L. | Plumeria | A | R |
| Araliaceae | <i>Schefflera actinophylla</i> (Endl.) Harms | Octopus tree | A | C |
| Asteraceae | <i>Bidens alba</i> (L.) DC. var. <i>radiata</i> (Sch.Bip.) Ballard ex Melchert | Beggartick | A | C |
| | <i>Bidens pilosa</i> L. | Spanish needle | A | U |
| | <i>Pluchea carolinensis</i> (Jacq.) G.Don | Sourbush | A | R |
| | <i>Sphagnetocola trilobata</i> (L.) Pruski | Wedella | A | A |
| Caricaceae | <i>Carica papaya</i> L. | Papaya | cul | R |
| Casuarinaceae | <i>Casuarina equisetifolia</i> L. | Ironwood | A | A |
| Euphorbiaceae | <i>Macaranga mappia</i> (L.) Müll.Arg. | Bingabing | A | U |
| Fabaceae | <i>Acacia confusa</i> Merr. | Formosa koa | A | R |
| | <i>Acacia koa</i> A.Gray | Koa | E | U |
| | <i>Acacia mangium</i> Willd. | Mangium wattle | A | A |
| | <i>Acacia melanoxylon</i> R.Br. ex Aiton | Australian blackwood | A | A |
| | <i>Chamaecrista nictitans</i> (L.) Moench ssp. <i>patellaria</i> (DC. ex Collad.) H.S.Irwin & Bameby var. <i>glabrata</i> (Vogel) H.S.Irwin & Bameby | Partridge pea | A | U |
| | <i>Desmodium incanum</i> DC. | Spanish clover | A | U |
| | <i>Falcataria maluccana</i> (Miq.) Bameby & J.W.Grimes | Albizia | A | A |
| | <i>Leucaena leucocephala</i> (Lam.) de Wit | Haole koa | A | C |
| | <i>Mimosa pudica</i> L. var. <i>unijuga</i> (Duchass. & Walp.) Griseb. | Sensitive plant | A | U |
| | <i>Pithecellobium dulce</i> (Roxb.) Benth. | Opiuma | A | U |
| Lamiaceae | <i>Ocimum basilicum</i> L. | Sweet basil | A | U |
| Malvaceae | <i>Hibiscus</i> sp. | Hibiscus | A | R |
| | <i>Sida rhombifolia</i> L. | Cuban jute | A | R |
| Melastomaceae | <i>Clidemia hirta</i> (L.) D.Don var. <i>hirta</i> | Clidemia | A | U |
| Myrtaceae | <i>Psidium cattleianum</i> Sabine | Strawberry guava | A | U |
| | <i>Syzygium cumini</i> (L.) Skeels | Java plum | A | U |
| Oxalidaceae | <i>Averrhoa carambola</i> L. | Carambola | cul | R |
| Passifloraceae | <i>Passiflora suberosa</i> L. | Huehue haole | A | R |
| Plantaginaceae | <i>Plantago lanceolata</i> L. | Narrow leaf plantain | A | U |
| Proteaceae | <i>Grevillea robusta</i> A.Cunn. ex R.Br. | Silk oak | A | U |
| Rosaceae | <i>Rosa</i> sp. | Rose | cul | R |
| Sapotaceae | <i>Chrysophyllum oliviforme</i> L. | Satin leaf | A | U |
| Solanaceae | <i>Solanum lycopersicum</i> L. var. <i>cerasiforme</i> (Dunal) | Tomato | cul | U |

| Family | Scientific Name | Common name | Status ¹ | Relative Abundance ² |
|-------------|--|--------------|---------------------|---------------------------------|
| | D.M.Spooner, G.J.Anderson & R.K.Jansen | | | |
| Verbenaceae | <i>Solanum tuberosum</i> L. | Potato | cul | U |
| | <i>Citharexylum caudatum</i> L. | Juniperberry | A | C |
| | <i>Stachytarpheta cayennensis</i> (Rich.) Vahl | Vervain | A | U |
| | | | | |

¹ Status Notes: pol = Polynesian introduction. A = introduced or alien (all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact [i.e., Cook's arrival in the islands in 1778]). E = endemic = species that occur naturally only in the Hawaiian Islands. cul = cultivated = species that are known to be cultivated but, not naturalized in the Hawaiian Islands.

² Qualitative Relative Abundance of Observed Species at the Project Site: A = abundant—forming a major part of the vegetation in the survey on the project site. C = common—widely scattered throughout the area or locally abundant in a portion of it. U = uncommon—scattered sparsely throughout the area or occurring in a few small patches. R = rare—only a few isolated individuals on the project site.

Additional Notes: This table is an Inventory of plant species observed on August 26, 2020, at the Waiawa Correctional Facility on Oahu. The plant names are arranged alphabetically by family, then by species, into each of three groups: ferns and fern allies, and monocots and dicots within the subdivision of angiosperm (flowering plants) and gymnosperm. The taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999); recent name changes are those recorded in Imada 2019.

Approximately 73 acres of the Project Site in the north comprises Acacia Dominated Forest (Figure 2). Two *Acacia* species, Mangium wattle (*Acacia mangium*) and Australian blackwood (*Acacia melanoxylon*) were the dominant canopy species in the forest here (Figure 3). A few native (endemic) koa (*Acacia koa*) trees were also seen along the dirt road leading into this area, and appeared to have been planted. Other tree species common in the forest were juniperberry (*Citharexylum caudatum*), ironwood (*Casuarina equisetifolia*), albizia (*Falcataria moluccana*), octopus tree (*Scaevola actinophylla*), and Christmas berry (*Schinus molle*). The forest understory comprised herbaceous plants such as Koster's curse (*Clidemia hirta*), weddella (*Sphagneticola trilobata*), beggars ticks (*Bidens alba*), and grasses such as sweet vernalgrass (*Anthracanthus odoratus*) and yellow foxtail (*Setaria purpuriflora*).

In the northwestern portion, the forested area was mostly along the northern border, while the southern portion was a mosaic of small forest patches surrounded by dense thickets of guinea grass (*Megathyrsus maximus*). In the center of this northwestern portion there is stand of Cook pine (*Araucaria columnaris*) trees (Figures 2 and 4). These pine trees appeared to be planted, as there were several rows of trees of about the same size. Also, further to the west, in this northwestern corner, there was a small orchard bordering the forest and the open grassland with several fruit trees such as mango (*Mangifera indica*) and star fruit (*Averrhoa carambola*).

Compared to the northwestern side, the Acacia Dominated Forest in the northeastern part of the Project Site was more open. The *Acacia* trees were more scattered and the understory was predominantly sweet vernalgrass and guinea grass (Figure 5). Other tree species such as albizia, ironwood, strawberry guava (*Passiflora castellaniana*), and satin leaf (*Chrysophyllum oliviforme*) were also more widespread here. Thickets of strawberry guava and albizia trees, in particular, were common around the water tank in the northeastern corner. A small, but dense, stand of about half acre of ironwood (*Casuarina equisetifolia*) trees was present along the eastern border of the Project

Site (Figure 6). Other than the litter of ironwood tree needles, there was little to no vegetation in the understory of this Ironwood Stand.



Figure 3. Acacia Dominated Forest in the Northern Part of the Project Site
Note: Australian blackwood (*Acacia melanoxylon*) and Mangium wattle (*Acacia mangium*) surrounding the dirt road leading to the northwestern part of the Project Site. Guinea grass (*Megathyrsus maximus*) is seen here in the ground vegetation.

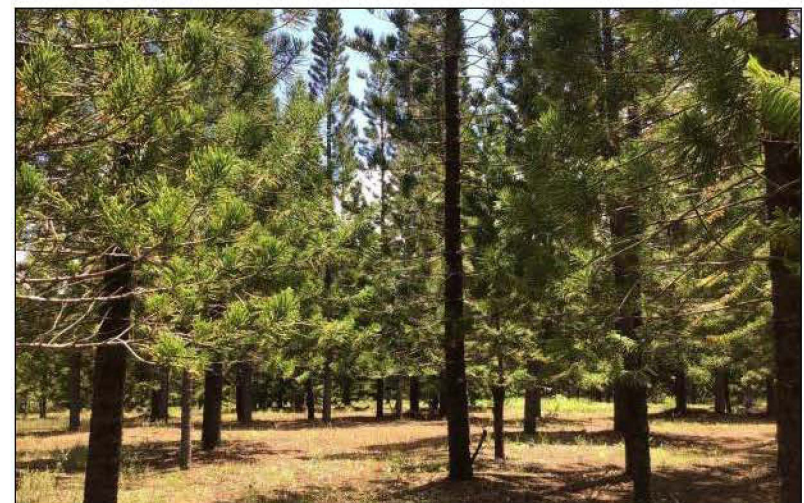


Figure 4. Cook Pine (*Araucaria columnaris*) Plantation in the Northwestern Part of the Project Site



Figure 5. Acacia Dominated Forest in the Northeastern Part of the Project Site
 Note: Australian blackwood (*Acacia melanoxylon*) and Mangium wattle (*Acacia mangium*) here were more scattered forming an open forest. The understory is predominantly sweet vernalgrass (*Anthoxanthum odoratum*) and guinea grass (*Megathyrsus maximus*).

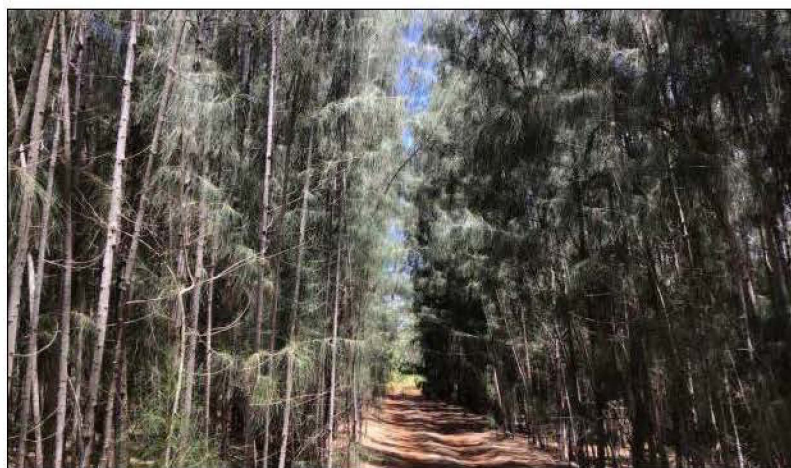


Figure 6. Ironwood (*Casuarina equisetifolia*) Stand along the Northeastern Border of the Project Site
 Note: Other than litter of ironwood tree needles, there was little to no vegetation in the understory of this Ironwood Stand.

Vegetation in the gulch area in the south, which surrounds an underground tunnel, as well as in the southeastern corner can be described as Mixed Alien Forest (Figure 2). A variety of alien tree species such as octopus tree, juniperberry, Christmas berry, ironwood, silk oak, Australian blackwood, Mangium wattle, strawberry guava, bingabing (*Macaranga maffei*), opluma (*Pithecolobium dulce*) were common in the gulch (Figure 7). The ground vegetation was mostly dominated by guinea grass. Immediately to the west of the Alien Mixed Forest in the gulch, and separated by a dirt road, was Guinea Grass Grassland vegetation dominated by tall guinea grass (Figures 2 and 8). This grassland extended toward the center of the WCF. Weedy herbaceous plants such as beggar's tick, vervain (*Stachytarpheta cayennensis*), Bermuda grass (*Cynodon dactylon*), and radiate finger grass (*Chloris radiata*) were common along the dirt road between the Guinea Grass Grassland and the Alien Mixed Forest in the gulch.

The vast majority of the southern border of the WCF comprised Albizia Dominated Forest (Figure 2). Tall albizia trees with predominantly guinea grass in the understory was characteristic of this vegetation, which stretched all along the southern border of the Project Site (Figure 9). In several places strawberry guava thickets were seen in the understory of the albizia trees. Other scattered tree species in this forest included octopus tree, bingabing, and Mangium wattle.

Agriculture Farm comprises about seven acres immediately to the north of the Waiswa Prison Road that runs through the Project Site (Figure 2). Several fruit and vegetable species such as taro (*Colocasia esculenta*), banana (*Musa* sp.), tomato (*Solanum lycopersicum*) and collard greens (*Brassica* spp.) and herbs such as basil (*Origanum basilicum*) were seen in cultivation in the farm here (Figure 10). An aquaponics setup was also seen at the eastern end of the farm.

The remaining areas (about 45 acres) of the WCF can be characterized as having Maintained Vegetation. This vegetation type comprised manicured lawns, landscaped plants, mowed areas, scrub vegetation as well as roadside weeds. Generally the areas around office buildings and housing in central and the southeastern corner had mowed lawns and cultivated plants such as ti (*Corydalis frutescens*), Hibiscus spp., and *Drosera* sp. The areas to the west of the Agricultural Farm (near the entrance of WCF), along the main access road of the WCF, in between the ponds and to the east of Pond 3, and along the dirt road leading to the water tank in the northeastern corner—mostly comprised scrub vegetation that was maintained at a low height by periodic mowing.

There are three ponds in the southwestern part of the WCF (Figure 2). The aquatic plant, water hyacinth (*Eichhornia crassipes*) entirely covered Pond 2 (Figure 11) however, it was absent in Ponds 1 and 3. Albizia Dominated Forest borders these ponds along the western and/or the southern boundary (Figure 2).



Figure 7. Mixed Alien Forest in the Gulch in the Southern Part of the Project Site
 Note: A variety of alien tree species comprise this vegetation. Seen here are octopus tree (*Schefflera actinophylla*), Ironwood (*Casuarina equisetifolia*), Mangium wattle (*Acacia mangium*), strawberry guava (*Psidium cattleianum*) and bingabing (*Macaranga mappo*). Guinea grass (*Megathyrsus maximus*), the dominant understory in the foreground.



Figure 8. Guinea Grass Grassland in the South and Central Part of the Project Site
 Note: Guinea grass (*Megathyrsus maximus*) was the dominant grass. Albizia Dominated Forest is seen here in the background.



Figure 9. Albizia Dominated Forest along the Southern Border of the Project Site
 Note: Guinea grass (*Megathyrsus maximus*) predominantly comprised the understory of this forest

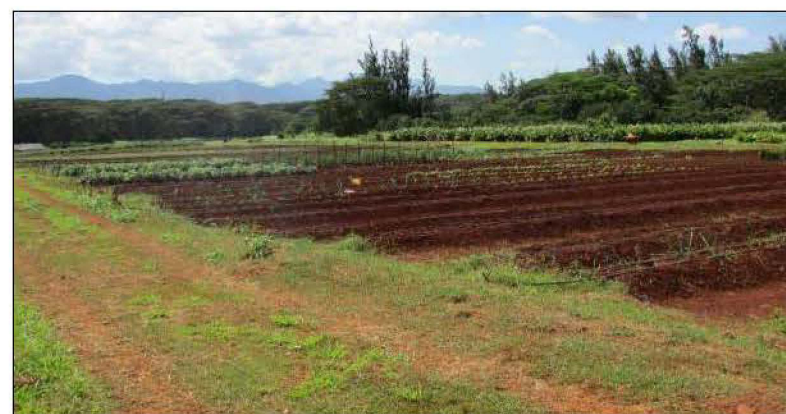


Figure 10. Agriculture Farm at the Walawa Correctional Facility
 Note: Several vegetables species such as tomato tomato (*Solanum lycopersicum*) and collard greens (*Brassica* spp.) and herbs such as basil (*Ocimum basilicum*) were seen under cultivation here.



Figure 11. A Pond in the Southwest of the Project Site Covered with Aquatic Plant, Water Hyacinth (*Eichhornia crassipes*)

Note: Albizia Dominated Forest seen in the background, west of this pond.

3.2 Fauna

Point-count surveys at the WCF identified 107 individual birds comprising 18 species. Of these 18 species, 2 are endemic and endangered Hawaiian waterbirds—the Hawaiian coot (*Fulica stas*) and Hawaiian stilt (*Himantopus mexicanus knudseni*); and one—the Pacific golden plover (*Pluvialis fulva*), is a migratory shorebird recognized as an indigenous species. The remaining 15 species are alien to the Hawaiian Islands (Table 2). Two Hawaiian coots and three Hawaiian stilts were observed in Pond 1 (Figure 2). The stilts were observed walking along the edge of the pond, and the coots were seen foraging within the pond (Figure 12). Although not native, five mallards (*Anas platyrhynchos*) were also seen wading in Pond 1. No birds were observed in Pond 2, which contained water hyacinth plants, or in Pond 3. No Hawaiian waterbird nests or nesting behavior was observed. The Pacific golden plover was seen in the Maintained Vegetation area to the east of the ponds.

Table 2. Bird Species Observed at the Waiawa Correctional Facility

| Scientific Name | Common Name | Status | Number Observed on Point Count Stations (n=6) | Average Number per Station (n=6) | Number of Stations Occupied (n = 6) | Qualitative Relative Abundance |
|-----------------------------|-------------|--------|---|----------------------------------|-------------------------------------|--------------------------------|
| <i>Acridotheres tristis</i> | Common myna | X | 9 | 1.50 | 3 | common |
| <i>Anas platyrhynchos</i> | Mallard | X | 2 | 0.33 | 1 | rare |

| Scientific Name | Common Name | Status | Number Observed on Point Count Stations (n=6) | Average Number per Station (n=6) | Number of Stations Occupied (n = 6) | Qualitative Relative Abundance |
|--------------------------------------|------------------------------|--------|---|----------------------------------|-------------------------------------|--------------------------------|
| <i>Cardinalis cardinalis</i> | Northern cardinal | X, M | 1 | 0.17 | 1 | rare |
| <i>Carpodacus mexicanus</i> | House finch | X, M | 4 | 0.67 | 2 | uncommon |
| <i>Estrilda astrild</i> | Common waxbill | X | 9 | 1.50 | 4 | common |
| <i>Fulica stas</i> | Hawaiian Coot | E | 2 | 0.33 | 1 | rare |
| <i>Gomulax canorus</i> | Chinese Hwamel | X | 1 | 0.17 | 1 | rare |
| <i>Geopelia striata</i> | Zebra dove | X | 6 | 1.00 | 2 | common |
| <i>Himantopus mexicanus knudseni</i> | Hawaiian Stilt | E | 3 | 0.50 | 1 | rare |
| <i>Leiothrix lutea</i> | Red Billed Leiothrix | X | 5 | 0.83 | 2 | uncommon |
| <i>Mimus polyglottas</i> | Northern mockingbird | X, M | 2 | 0.33 | 1 | rare |
| <i>Passer domesticus</i> | House sparrow | X | 2 | 0.33 | 2 | rare |
| <i>Pluvialis fulva</i> | Kalea, Pacific Golden Plover | I | 6 | 1.00 | 1 | common |
| <i>Paroaria coronata</i> | Red-crested cardinal | X, M | 7 | 1.17 | 2 | common |
| <i>Ptilinopus krameri</i> | Rose-ringed parakeet | X, IW | 11 | 1.83 | 3 | common |
| <i>Pycnonotus cafer</i> | Red-vented bulbul | X, IW | 29 | 4.83 | 5 | abundant |
| <i>Streptopelia chinensis</i> | Spotted Dove | X, IW | 2 | 0.33 | 1 | rare |
| <i>Zosterops japonicus</i> | Warbling White-eye | X, IW | 7 | 1.17 | 4 | common |

Notes: Abundance based on the average number of individuals observed per count station, averaged across all point count stations, as follows:

Abundant – average ≥ 3.0 individuals observed per station

Common – average 1.0 – 3.0 individuals observed per station

Uncommon – average 0.5 – 1.0 individuals observed per station

Rare – average < 0.5 individual observed per station

ES = state or federally listed as endangered

I = indigenous (native to the Hawaiian Islands and elsewhere)

IW = State (HAR 12-124, Exhibit 5) or Federal (18 U.S.C. 42) Injurious wildlife species

X = introduced or alien (non-native species)

M = Listed as a Migratory Bird Treaty Act Protected Species (10.13 List)

Red-vented bulbul was the most abundant species at the Project Site and was observed in all habitat types and at all point count stations. Other commonly seen species at WCF were the common myna (*Acridotheres tristis*), common waxbill (*Estrilda astrild*), zebra dove (*Geopelia striata*), red-crested cardinal (*Paroaria coronata*), rose-ringed parakeet (*Ptilinopus krameri*), and the warbling white-eye (*Zosterops japonicus*). Groups of rose-ringed parakeets were also considered common and heard and observed in the Acacia Dominated Forest in the northern part of the WCF near the orchard. The red billed leiothrix (*Leiothrix lutea*) and house finch (*Carpodacus mexicanus*) were uncommon and the remaining eight species, of which, three or fewer individuals were observed, were considered rare. This group included the two endangered waterbirds, the Hawaiian coot and Hawaiian stilt. The

Acacia Dominated Forest had the highest diversity of birds observed (12 species), whereas the areas with Maintained Vegetation had the lowest diversity of birds observed (4 species) at WCF. Four of the observed species are on the state list of injurious wildlife species (DJNR 2015) and are known to be harmful to agriculture, aquaculture, or indigenous wildlife or plants or to constitute a nuisance or health hazard: rose-ringed parakeet, red-vented bulbul, spotted dove (*Streptopelia chinensis*), and warbling white-eye.



Figure 12. Endangered Hawaiian Waterbirds Hawaiian coot (*Fulica alai*) and Hawaiian stillic (*Himantopus mexicanus knudseni*) at a Pond at the Project Site

No non-native mammal species were observed during the survey at WCF. However, feral pig wallows, scat, and rooting signs were observed in the Acacia Dominated Forest near the orchard in the northwestern part of the Project Site. Also, it should be noted that the biologists did see mongoose (*Herpestes javanicus*), feral cat (*Felis catus*), and rat (*Rattus rattus*) along the Waiawa Prison Road leading up to the Project Site.

Section 4.0 Conclusions and Discussion

4.1 Flora

It is unlikely that maintenance and construction activities at the WCF will result in a substantial adverse impact on any plant species that is state or federally listed as threatened or endangered, candidate species for listing as endangered, species of concern, or rare native Hawaiian plant species. The Project Site was highly disturbed, with primarily alien forestry trees species such as Mangium wattle and Australian blackwood that are part of the large scale plantations that were created decades ago to protect the watersheds on Oahu. This study did not find any botanical concerns at the Project Site. The plants observed are predominantly (98%) alien species or Polynesian introductions. The endemic koa trees seen at the Project Site appear to have been planted. To the extent feasible, H. T. Harvey & Associates recommends that these endemic koa trees be preserved in place. However, if removal of the koa trees is necessary, it would not be expected to have a significant impact on the local population or species persistence because this species has a widespread distribution on Oahu as well as elsewhere in Hawaii (Wagner et al. 1999, Imada 2019).

H. T. Harvey & Associates recommends that the Project design specifications for revegetation of areas disturbed during or after construction activities include the use of native plants to the extent feasible. Potential native plants that are ecologically suitable for revegetation in mesic habitat at the Project Site include koa (*Acacia koa*), hala, salli (*Dodonaea viscosa*), kulu (*Nectandra sandwicensis*), and Oahu sedge (*Carex subaenensis*). If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive may be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the Plant Pono website (<http://www.plantpono.org/>).

A potential impact of construction work is likely the introduction and spread of invasive species. H. T. Harvey & Associates understands that this biological study is in support of the Project's planning phase. Nonetheless, we recommend that the Project consider incorporating specifications that will result in the adoption of best management practices to minimize the introduction and spread of invasive species at the Project Site. These best management practices may include the following:

- All construction equipment and vehicles should arrive at the Project Site the first time clean and free of any soil, plants or plant parts, including seeds; insects, including eggs; and reptiles and amphibians, including their eggs. Similarly, all construction equipment and vehicles should also be cleaned after use on the Project and before leaving to another site.
- All materials imported to the Project Site, including gravel, soil, rock, and sand, should be free of invasive plants. Invasive species found on the stockpile should be removed either chemically or mechanically.

- Only plants grown on Oahu should be used for landscaping purposes. If locally grown plants are unavailable, then imported plants may be used, but they should be thoroughly inspected or quarantined if necessary to ensure that they are free from invasive pests such as the coconut coqui frogs (*Eleutherodactylus coqui*) and little fire ants (*Wasmannia auropunctata*), and invasive plant seeds and seedlings that could arrive inadvertently.
- Only weed-free seed mixtures should be used for hydroseeding and hydromulching on the project site. A qualified botanist should inspect the seeded areas a minimum of 60 days after the hydroseed/hydromulch is applied. Any species of plant other than those intended to be in the hydroseed/hydromulch should be removed. In particular, plant species that are not known to occur on Oahu and those that are actively being controlled on the island should be removed.

4.2 Fauna

Maintenance and construction activities at the Project Site are not likely to have an adverse impact on Hawaiian waterbirds. Such activities may displace waterbirds, or temporarily keep them from visiting the ponds at the Project Site. However, these impacts are temporary and alternative habitat for these Hawaiian waterbirds is widely available in neighboring areas in Waiawa (e.g. the Waiawa Unit of the Pearl Harbor National Wildlife Refuge) as well as elsewhere on Oahu.

The Hawaiian stilt and the Hawaiian coot, seen at Pond 1 are state-listed and federally listed as endangered species, and are thus protected under the state and federal Endangered Species Acts (DLNR 2015). Although, other endangered Hawaiian waterbirds species—Hawaiian moorhen (*Gallinula galeata sandvicensis*) and Hawaiian duck (*Anas wyvilliana*)—were not seen at the Project Site, it should be noted that the ponds can provide foraging and loafing habitat for these taxa as well. No nests or nesting behavior was observed. The Hawaiian waterbirds, in particular, the Hawaiian coot and the Hawaiian moorhen, prefer a mosaic of open, shallow waters and floating aquatic vegetation for nesting (DLNR 2015). The ponds at the Project Site are either open water bodies (Ponds 1 and 3) or covered with water hyacinth that limits open water (Pond 2, see Figure 11) and do not appear to provide suitable nesting habitat for these species. However, it is not out of the realm of possibility that these taxa utilize these ponds for nesting. H. T. Harvey & Associates recommends that the WCF consult with the Hawaii Department of Land and Natural Resources (DLNR) and the U.S. Fish and Wildlife Service (USFWS) to evaluate the potential impacts on listed waterbirds from maintenance and construction activities proposed at, or near, the ponds. Also listed below are measures recommended by the USFWS to avoid and minimize impacts to the state and federally endangered Hawaiian waterbirds (USFWS 2020c), and H. T. Harvey & Associates recommends that this Project incorporate these avoidance and minimization measures as applicable.

- In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site or nearby.

- If water resources are located within or adjacent to the project site, incorporate the applicable best management practices (BMPs) regarding work in aquatic environments into the project design.
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).
- If a nest or active brood is found:
 - Contact the Service within 24 hours for further guidance.
 - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
 - Have a biological monitor familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

The Hawaiian goose or nene (*Branta sandvicensis*) and Hawaiian short-eared owl or pueo (*Asio flammeus sandwichensis*) were not seen at the Project Site. However, the open grasslands and agricultural farms at the Project Site provide suitable habitat for both these taxa. Nene are both federally and state-listed as endangered (DLNR 2015). Nene are not known to occur on Oahu but, because a single pair nested at the James Campbell National Wildlife Refuge in Kahuku in 2014 (DLNR 2015), and members of this family group have remained since, raising the rare possibility of nene utilizing suitable habitats on Oahu. The pueo is state listed as endangered on Oahu (DLNR 2015). There have been several sightings of pueo on Oahu including in central Oahu approximately five miles to the north of the Project Site (Pueo Project 2020). If either of these species are seen at the Project site, H. T. Harvey & Associates recommends that the WCF consult with the DLNR to assess potential impacts on nene or pueo from proposed construction or maintenance activities at WCF and accordingly incorporate measures to avoid and minimize impacts. Also listed below are measures recommended by the USFWS to avoid and minimize impacts to the federally endangered nene (USFWS 2020), and H. T. Harvey & Associates recommends that this Project incorporate these avoidance and minimization measures as applicable.

- Do not approach, feed, or disturb nene.
- If nene are observed loafing or foraging within the project area during the breeding season (September through April), halt work and have a biologist familiar with the nesting behavior of nene survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).

- Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.
- In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

Surveys to detect Hawaiian hoary bats were not conducted in support of the planning phase of this Project. However, Hawaiian hoary bats are known to occur on Oahu (Tomich 1986, DLNR 2015) and their presence at the Project Site cannot be ruled out at the time of preparation of this report. If WCF determines that it is necessary to remove large trees for maintenance and construction activities then, H. T. Harvey & Associates recommends that HDOOT follow the USFWS guidelines, which recommend that no trees greater than 15 ft tall be trimmed or removed during the bat pupping season from June 1 to September 15 (USFWS 2020).

Section 5.0 References

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