

**BIOLOGICAL SURVEY REPORT
SHORT-TERM SAFETY IMPROVEMENTS FOR THE WAIPI'O
VALLEY ROAD
HĀMĀKUA DISTRICT, HAWAI'I ISLAND**

by
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for
County of Hawai'i Department of Public Works
101 Pauahi Street, Suite 7
Hilo, HI 96720

File No. 203303-002
April 10, 2023





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April 10, 2023
File No. 204783-000

Mr. Stephen Pause, P.E., Director
County of Hawai'i Department of Public Works
101 Pauahi Street, Suite 7
Hilo, HI 96720-4224

Subject: Biological Survey Report
Short-Term Safety Improvements for the Waipi'o Valley Road
Hāmākua District, Hawai'i Island
TMKs: 4-9-001:002 and 003, 4-8-004:006 and 003

Dear Director Pause,

Haley & Aldrich is pleased to provide our Biological Survey Report in support of the above referenced project along Waipi'o Valley Road.

Should you have any questions, please feel free to contact me at (808) 587-7747 or jmarsters@haleyaldrich.com.

Sincerely yours,
HALEY & ALDRICH

A handwritten signature in black ink that reads "Janice L. Marsters".

Janice Marsters
Senior Principal

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1. Introduction

1.1 PROJECT DESCRIPTION

Waipi'o Valley Road (WVR) is located on the northern Hāmākua Coast of Hawai'i Island (Appendix A; Figure 1). Waipi'o Valley Road is affected by geologic slope hazards and related roadway stability issues that pose an immediate threat to daily users of the only road into Waipi'o Valley. A preliminary geotechnical report identified hazards along the roadway (COH DPW, 2022), and a subsequent assessment in 2022 of specific hazard areas identified an immediate hazard of overhanging and failing soil, rock, and vegetation in the upper approximately 750 feet of WVR. The proposed project will involve removing overhanging and loose soil and vegetation on the slope adjacent to the roadway.

Construction work for this "Short-Term Safety Improvements" project will be contained to unstable areas immediately upslope of WVR. The work will consist of mechanical or hand excavation of loose soil and rock, root mats, tree removal, and general vegetation clearing. Removed material will be loaded by the contractor into trucks and hauled to a laydown/staging area at the top of WVR or directly to the landfill. The roadway will not be affected or altered by the project. The laydown area proposed is in Tax Map Key (TMK) 4-8-004:006. Portions of the parcel are used by non-profit groups to educate students about Native Hawaiian plantings, traditions, and culture, and the project will not affect this land use.

Haley & Aldrich conducted a pedestrian biological survey of the Waipi'o roadway alignment encompassing the Area of Potential Effect (APE) (Figure 2). A potential laydown area at the top of the road was also surveyed.

1.2 AREA OF POTENTIAL EFFECT

The APE consists of the slope area where overhanging soil, rock, and vegetation will be removed immediately adjacent to the upper approximately 760 linear feet of Waipi'o Valley Road. The road is narrow and winds along the steep hillside of the south valley wall, with an approximately 152 feet elevation drop along the 760 feet of this project, with an average slope of 20%.

The property (Tax Map Key (TMK) 4-8-004:006) near the top of the WVR proposed for use as a contractor staging and storage area was formerly known as the Rice Property and was purchased by the County of Hawai'i in 2007. A Finding of No Significant Impact (FONSI) was issued for the property in 2007 (2007-05-08-HI-FEA; Rice Property at Waipio Lookout). The property is managed by County Department of Parks and Recreation and includes a large, grassed area (approximately 150' x 50') at the property's north end that may be allowed for the contractor's use. The south portion of the property is used by non-profit groups to educate students about Native Hawaiian plantings, traditions, and culture, and will not be affected by the project use of the site. Appendix B includes representative photos of the APE and potential laydown areas.

2. Description of Study Area

2.1 CLIMATE

Daily temperatures in Waipi’o Valley average 69 degrees Fahrenheit (°F) in the winter months (i.e., January and February) and 75°F in the summer months (i.e., August and September) (Giambelluca et al., 2014). The project area is located on Hāmākua Coast on the northern side of Hawai’i Island where the average rainfall is approximately 86 inches per year (Giambelluca et al., 2013). Rainfall occurs year-round, but most of the precipitation occurs in March and April. Humidity averages about 74.5%. Tradewinds with average speeds between 10-20 miles per hour (mph) from the north and northeast dominate the summer months (80-95% during approximately May to October) and prevail about 60% during the other times of the year.

2.2 TOPOGRAPHY, GEOLOGY, AND SOILS

Waipi’o Valley occurs in the Kohala Volcano, the oldest of the five volcanos that created Hawai’i Island. Kohala Volcano is a shield volcano estimated to be one million years old, and to last have erupted 120,000 years ago. Approximately 250,000 to 300,000 years ago, a landslide destroyed the northeast flank of the volcano. Waipi’o Valley was formed along the fault that bounded the landslide (USGS, 1995). A Mw 6.7 earthquake occurred near Kiholo Bay on the northwest coast of Hawai’i Island on October 15, 2006 causing significant rock falls on the Waipio Valley access roads and on the northern coastal cliffs at the mouth of Waipi’o Valley (Geosyntec Consultants, 2006).

Waipi’o Valley stretches from sea level at the valley floor up to 2,000 feet in the surrounding cliffs. The Waipi’o Valley Road is extremely steep, averaging 25% grade and changing 800 feet in elevation along its 0.7-mile length.

Most soils at the project site are characterized as primarily Ainakea-Rock outcrop complex, 70 to 100 percent slopes, and the east portion of the project site is characterized as Ainakea medial silty clay loam, 12 to 20 percent slopes (USDA NRCS, 2023). None of these soils are considered hydric soils (USDA NRCS, 2023). A map of the soils in the project area is shown in Appendix A; Figure 3.

2.3 DESIGNATED OR PROPOSED CRITICAL HABITATS

There are no designated or proposed Critical Habitats located within or near the project area (Appendix A; Figure 4) (USFWS, 2022b).

3. Methods

Prior to the field survey, a literature review of publicly available data on biological resources in the project area was performed. Documents reviewed include environmental documents, national wetlands inventory data, critical habitat area, USWFS guidance, and other scientific studies and research papers.

Biologist Taylor Chock and botanist Maya LeGrande conducted field surveys of the APE on January 4th and 5th, 2023. The survey assessed terrestrial flora and fauna in the APE shown in Appendix A; Figure 2. Observed plant, bird, mammal, and reptile species were recorded. Seasonal and temporal changes may affect the presence and location of plants and wildlife, and only plants and wildlife present at the time of the survey are documented.

A 5-minute avian point count survey was conducted along the road at the upper end near the lookout and near the bottom of the work area on January 4, 2023. These surveys recorded birds observed within a visible radius of the observer and by listening for vocalizations. Incidental observations of birds and wildlife were also recorded during the survey.

4. Results and Discussion

4.1 TERRESTRIAL FAUNA

4.1.1 Birds

The majority of birds observed during the pedestrian survey and five-minute bird count on January 4, 2023, were non-native, introduced species (Table 1). Seven non-native birds were observed or heard during the current survey. The most prevalent birds seen were Mejiro, or Warbling White-eyes (*Zosterops japonicus*). House finches (*Haemorhous mexicanus*) were observed foraging in the weedy shrub areas within the survey site and zebra doves (*Geopelia striata*) were observed along the access roads. Cattle Egrets (*Bubulcus ibis*), Common Mynas (*Acridotheres tristis*), Red-Crested Cardinals (*Paroaria coronata*), and Saffron Finches (*Sicalis flaveola*) were all observed infrequently.

One ʻio or Hawaiian hawk (*Buteo solitarius*), an endemic species, was observed during the survey flying from the coastline to perch in a tree along the Waipiʻo Access Road. The Hawaiian Hawk or ʻio was listed as Endangered by Federally and State agencies in 1967 due to low numbers of individuals along with loss and degradation of habitat. In 2020, the USFWS downlisted or removed the Hawaiian Hawk from the list of Endangered Species (USFWS, 2020); however, the species remains listed as Endangered by the State of Hawaiʻi under HRS §195D-4 and is also protected under the Migratory Bird Treaty Act. They can be found from sea level to above 8,530 feet on Hawaiʻi Island and are now considered “Near Threatened”. Hawaiian Hawks construct their nests approximately two months before laying eggs. Nest trees range from 32 to 79 feet in height and the nests are typically located 11 to 60 feet above the ground. Nests are constructed on stable platforms such as on the top of birds-nest ferns or crotches within the branches of the trees (Griffin, 1998).

Table 1: Birds Observed During the Survey

Common Name	Scientific Name	Biogeographic Status	Protected Status
Cattle Egret	<i>Bubulcus ibis</i>	Naturalized non-native resident	MBTA*
Common Myna	<i>Acridotheres tristis</i>	Naturalized non-native resident	None
Mejiro, Warbling White-eye	<i>Zosterops japonicus</i>	Naturalized non-native resident	None
House Finch	<i>Haemorhous mexicanus</i>	Naturalized non-native resident	MBTA*
ʻIo / Hawaiian Hawk	<i>Buteo solitarius</i>	Endemic	Near threatened**, MBTA*
Red-crested Cardinal	<i>Paroaria coronata</i>	Naturalized non-native resident	None
Saffron Finch	<i>Sicalis flaveola</i>	Naturalized non-native resident	None
Zebra Dove	<i>Geopelia striata</i>	Naturalized non-native resident	None

*MBTA: Protected by the Migratory Bird Treaty Act (USFWS, 2020). ** IUCN Red List Ranking—Near Threatened.

We consulted the USFWS Pacific Islands Fish and Wildlife Office (PIFWO) Information for Planning and Consultation (IPaC) website (PIFWO, 2023) (Appendix D). There are no critical habitats located within or immediately adjacent to the project location (Appendix A; Figure 4) (USFWS, 2022b). The IPaC website listed several native wetland bird species that could occur in the project area, including the Hawaiian goose (*Branta sandvicensis* / nēnē) and Hawaiian waterbirds such as the Hawaiian Duck or koloa maoli (*Anas wyvilliana*), Hawaiian coot or ‘alae ke‘oke‘o (*Fulica alai*), and Hawaiian stilt or ae‘o (*Himantopus mexicanus knudseni*). However, the steep slope areas to be remediated under this project do not contain standing water and are highly unlikely to host these species.

Although not seen during our surveys, seabird species may also pass through the area. IPaC listed three seabirds: the endangered Band-rumped Storm Petrel (*Oceanodroma castro*), the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened Newell’s Townsend’s Shearwater (*Puffinus auricularis newelli*) (PIFWO, 2022; Appendix D) that may be in the surrounding area. Coastal light pollution can disorient nocturnally active seabirds and potentially cause fledgling fallout.

IPaC listed the Hawaii ‘ākepa (*Loxops coccineus*), an endangered honeycreeper endemic to Hawai‘i, as an endangered species may pass through the project area. However, the range of ‘ākepa habitat is usually in native forests above 5,000 feet in elevation and, therefore, it is extremely unlikely for ‘ākepa to spend sustained time in lowland coastal areas (PIFWO, 2022; Appendix D). None were observed during the survey on January 4 and 5, 2022.

4.1.2 Mammals

During the surveys, minimal signs of feral pigs (*Sus scrofa*), such as trails and rooting were noted around the APE. Feral cats were observed near the top of the road, and domestic dogs (*Canis familiaris*) were observed at the lower end of the project area. No other mammals were observed within the APE, but small Indian mongoose (*Herpestes javanicus*) and one or more rodents found on Hawai‘i Island, European house mice (*Mus musculus domesticus*), roof rat (*Rattus r. rattus*), brown rat (*Rattus norvegicus*), or possibly Polynesian rats (*Rattus exulans hawaiiensis*) likely use various resources found within the general project area. All these introduced mammals are deleterious to native ecosystems and the native species dependent on them.

IPaC lists the endangered Hawaiian hoary bats, or ‘ope‘ape‘a (*Lasiurus cinereus semotus*) as a species that may occur in the project area. Hawaiian hoary bats are known to occur from sea level to upper elevations across a wide range of relatively undisturbed and highly modified habitats and may roost in both native and introduced tree species over 15 feet in height (Mitchell et. al, 2005). Many trees in and around the project area are greater than 15 feet in height and may serve as roosting habitat for Hawaiian Hoary Bats. No Hawaiian hoary bats were observed during the daytime survey.

4.1.3 Reptiles

The introduced Madagascar day gecko (*Phelsuma laticauda*) and brown anole (*Anolis sagri*) were observed during the site visit. *P. laticauda* were introduced illegally in the 1970s and have spread throughout the islands. *A. sagri* is highly invasive and has also established quickly in the islands. Both species are widely distributed throughout Hawai‘i Island.

Vocalizations of the introduced coqui frog (*Eleutherodactylus coqui*) were heard during the site visit. *E. coqui* was accidentally introduced to the Hawaiian Islands in the 1980s and quickly established on Hawai‘i Island in high densities, becoming an extreme nuisance.

The IPaC report identified Green Sea Turtles (*Chelonia mydas*) as a threatened species that may nest on any sandy beach area in the Pacific Islands. Nesting occurs on Hawaiian beaches from May through September, peaking in June and July, with hatchlings emerging through November and December. Construction on, or in the vicinity of beaches can result in sand and sediment compaction, sea turtle nest destruction, beach erosion, contaminant, and nutrient runoff, and increased direct light pollution that may disorient hatchlings or deter nesting females. The project will not affect or disturb any sandy beach areas where green sea turtles may nest or haul out.

4.1.4 Endangered Insects

The IPaC report identified the endangered Blackburn's sphinx moth (*Manduca blackburni*) as an endangered species that may occur in the project area, although the area is not listed as critical habitat for this species. According to the Federal Register 50 CFR Part 17, the moth has been found in Hilo, Pahala, Kalaoa, Kona, and Hāmākua on Hawai'i Island. The Blackburn's sphinx moth larvae utilize plants in the nightshade family (Solanaceae), which includes the common non-native tree tobacco (*Nicotiana glauca*). No tree tobacco or other plants suitable for moth habitat were observed during the survey.

4.2 TERRESTRIAL PLANTS

The survey for the Waipi'o Road project, including the road section and laydown area located at the top of the road, documented no sensitive or endangered plants. Seven native species of plants were documented, including two endemic and five indigenous species. Four Polynesian introductions were also observed along with the remaining 82 non-native naturalized species, bringing the total to 93 plant species. A full list of naturalized species can be found in Appendix C.

The APE was surveyed to the extent possible while walking the roadway. The majority of the species observed were non-native with dominant tree species including swamp mahogany (*Eucalyptus robusta*), guava (*Psidium cattleyanum* and *P. guajava*), Christmas berry (*Schinus terebinthifolius*), paperbark (*Melaleuca quinquenervia*), African tulip (*Spathodea campanulata*), *Melochia umbellata*, and umbrella tree (*heptapleurum actinophyllum*). Scattered individuals of native trees such as 'ōhi'a lehua (*Metrosideros polymorpha*), neneleau (*Rhus sandwicensis*), and hala (*Pandanus tectorius*) were observed on both sides of the roadway. The remaining natives are small shrubs or ferns seen infrequently includinguluhe (*Dicranopteris linearis*), pāla'a (*Odontosoria chinensis*), moa (*Psilotum nudum*), and 'ihi (*Oxalis corniculata*). Several Polynesian introductions were observed as well, which included kī (*Cordyline fruticosa*), niu (*Cocos nucifera*), mai'a (*Musa* sp.), and kukui (*Aleurites moluccana*).

The laydown area is dominated by ornamental plantings such as mai'a, mango (*Mangifera indica*), papaya (*Carica papaya*), māmaka (*Pipturus albidus*), 'ulu (*Artocarpus altilis*), and hibiscus (*Hibiscus* sp.). Naturalized tree species include swamp mahogany, and guava.

The IPaC report identified the following list of Endangered Species Act-protected species that may occur in the project area (IPaC, 2022; Appendix D and summarized in Table 1 below).

None of these listed species in Table 2 were identified during the survey conducted on January 4 and 5, 2023. There are no critical habitats within the project area (Appendix A, Figure 4).

Table 2: ESA-Listed Species that May Occur in Project Area

Common Name	Scientific Name	ESA Status	Present at Site Survey?
Hawaiian Hoary Bat	<i>Lasiurus cinereus semotus</i>	Endangered	No
Hawaiian Stilt	<i>Himantopus mexicanus knudseni</i>	Endangered	No
Hawaiian Coot	<i>Fulica americana alai</i>	Endangered	No
Hawaiian Duck	<i>Anas wyvilliana</i>	Endangered	No
Hawaiian 'Ākepa	<i>Loxops coccineus</i>	Endangered	No
Hawaiian Goose	<i>Branta (=Nesochen) sandvicensis</i>	Threatened	No
Band-rumped Storm Petrel	<i>Oceanodroma castro</i>	Endangered	No
Hawaiian Petrel	<i>Pterodroma sandwichensis</i>	Endangered	No
Newell's Townsend's Shearwater	<i>Puffinus auricularis newelli</i>	Endangered	No
Green Sea Turtle	<i>Chelonia mydas</i>	Threatened	No
Blackburn's Sphinx Moth	<i>Manduca blackburni</i>	Endangered	No
PLANT SPECIES			
'Aiea	<i>Nothocestrum latifolium</i>	Endangered	No
A'e	<i>Zanthoxylum dipetalum var. tomentosum</i>	Endangered	No
Carter's Panicgrass	<i>Panicum fauriei var. carteri</i>	Endangered	No
Hala Pepe	<i>Pleomele hawaiiensis</i>	Endangered	No
Hōlei	<i>Ochrosia haleakalae</i>	Endangered	No
Hōlei	<i>Ochrosia kilaueaensis</i>	Endangered	No
'Ihi	<i>Portulaca villosa</i>	Endangered	No
Kauila	<i>Colubrina oppoitifolia</i>	Endangered	No
Kuahiwi Laukahi	<i>Plantago princeps</i>	Endangered	No
Lo'ulu	<i>Pritchardia maideniana</i>	Endangered	No
n/a	<i>Neraudia ovata</i>	Endangered	No
Po'e	<i>Portulaca sclerocarpa</i>	Endangered	No
n/a	<i>Microlepidia strigosa var. mauiensis</i>	Endangered	No
Notes:			
Source: Pacific Islands Fish and Wildlife Office (PIFWO) 2023. Information for Planning and Consultation (IPaC). Accessed 31 January 2023. Accessible online at: https://ipac.ecosphere.fws.gov/ .			

5. Conclusions and Recommendations

Impacts to terrestrial flora are anticipated during mechanical excavation of unstable soil, rock, and vegetation on the slopes above the roadway. Depending on the extent of mitigation needed, mature trees may need to be cut or removed. No work will be conducted in streams or wetland areas.

Use of the laydown area may involve storing removed material for haul out or for construction vehicle parking and storage, which would disturb vegetation within the footprint of the used area. The area is currently cleared, but native and decorative plantings surround the cleared area. Proper best management practices (BMPs), avoidance and minimization measures (AMMs), and exclusion zones will be detailed in the design erosion and mitigation plans and implemented to minimize effects to surrounding flora.

No sensitive, protected, rare, or listed threatened, or endangered species were observed within the project area. However, the Hawaiian hoary bat, as well as the Hawaiian Hawk, which was ESA-delisted in January 2020 but still remains under federal protection per the Migratory Bird Treaty Act (MBTA) and under Hawai'i State protection per HAR §13-124, and various seabirds, may pass through the project area due to the proximity to mature trees and the ocean. Direct impacts to their habitat from the project may occur as mature trees may be cut or disturbed during construction activities to fulfill rockfall mitigation goals.

Recommended Mitigation

All field equipment including tools, machinery, vehicles as well as and footwear and clothing should be cleaned daily prior to and after field activities to control the spread or introduction of noxious plant species.

In the unlikely situation of a threatened or sensitive animal species observed in or around the project area, all construction work will halt until the individual leaves of its own accord. Construction routes and equipment areas should be staged along existing roads, walkways, and gravel areas to minimize impacts to planted vegetation. Suggested BMPs and AMMs to minimize impacts to federal and state listed species are listed below:

- a) To avoid and minimize impacts to the Hawaiian hoary bat, woody plants greater than 15 feet tall shall not be disturbed, removed, or trimmed during bat birthing and pupping season (June 1 through September 15), and barbed wire shall not be used for fencing.
- b) To minimize impacts to Hawaiian waterbirds, construction shall avoid creating standing/ponding water areas that may attract waterbirds.
- c) To minimize impacts to seabirds and marine species, the construction shall avoid outdoor lighting and conduct work during daylight hours. Should emergency nighttime work need to be conducted, all lights will be appropriately shielded, and nighttime construction will be avoided during the seabird fledging period (September 15 through December 15) as well as during green sea turtle nesting and hatching season (May through December), per the lighting information included in Appendix E.
- d) To avoid impacts to the Hawaiian Hawk, the following measures are recommended:
 - A nest survey of the APE is recommended during the Hawk breeding season (March through September) 10 days (maximum of 14 days) prior to the start of construction activities. The survey should be conducted by a qualified biologist using appropriate survey methods and

should focus on the large trees that could provide nesting habitat (Gorresen et. al, 2008, USFWS, 2008).

- If active nest(s) are located, no construction should occur within 1,600 feet of the nest until the chicks fledge or the nest is abandoned.
- If Hawaiian Hawk individuals are detected in the area during construction, all activities within 100 feet of the bird should cease. Work may continue when the bird has left the area on its own.

By incorporating the above mitigation measures, the project is unlikely to result in direct or indirect adverse effects on sensitive species.

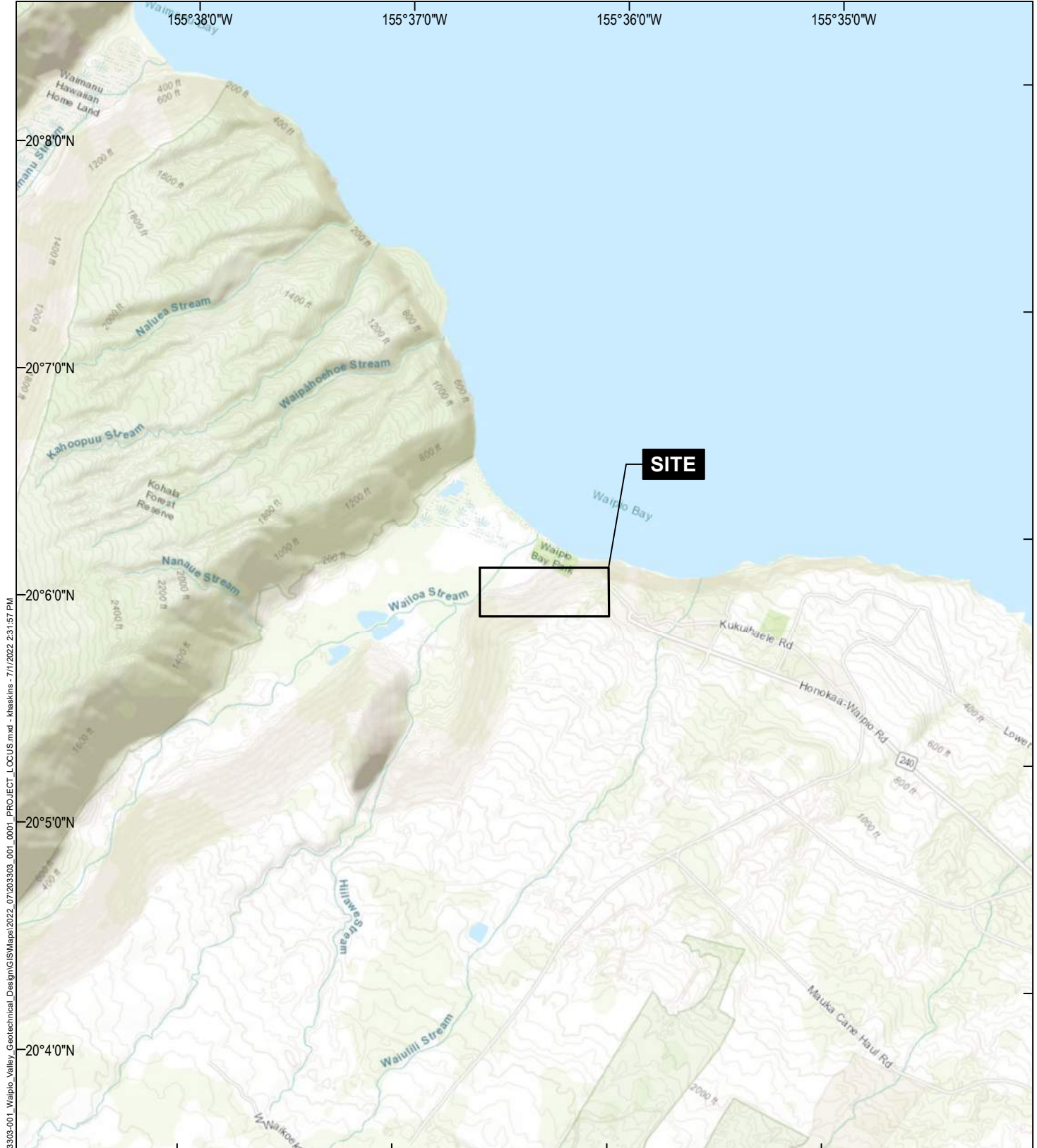
6. References

- COH DPW, 2022. Preliminary Geotechnical Engineering Evaluation for Waipi'o Valley Road. Job No. 3140023002. Accessible online at <https://www.hawaiicounty.gov/home/showpublisheddocument/304307/63781224279231445>. January.
- Geosyntec Consultants, 2006. Geological Engineering Reconnaissance of Damage Resulting from the October 15, 2006 Earthquakes, Island of Hawai'i, Hawai'i, USA. Available online at: https://www.eeri.org/lfe/pdf/usa_hawaii_Oct_15_2006_EQ_Geosyntec_Report.pdf.
- Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delporte, 2013: Online Rainfall Atlas of Hawai'i. *Bull. Amer. Meteor. Soc.* 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.
- Giambelluca, T.W., X. Shuai, M.L. Barnes, R.J. Alliss, R.J. Longman, T. Miura, Q. Chen, A.G. Frazier, R.G. Mudd, L. Cuo, and A.D. Businger. 2014. Evapotranspiration of Hawai'i. Final report submitted to the U.S. Army Corps of Engineers—Honolulu District, and the Commission on Water Resource Management, State of Hawai'i.
- Gorresen M.P., R.J. Camp, J.L. Klavitter, and T.K. Pratt, 2008. Abundance, Distribution, and Population Trend of the Hawaiian Hawk: 1998-2007 (HSCU-009). Hawaii Cooperative Studies Unit, Hilo.
- Griffin, C.R., P.W.C. Paton, and T.S. Baskett. 1998. Breeding Ecology and Behavior of the Hawaiian Hawk. *Condor* 100:654-662.
- Imada, C. T. 2019. Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). *Bishop Museum Tech. Rept.* 69. 209 pp.
- Macdonald, Abbot, and Peterson, 1983. *Volcanoes in the Sea*. Second edition. University of Hawai'i Press, Honolulu.
- Mitchell, C., C. Ogura, D. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. *Hawaii's Comprehensive Wildlife Conservation Strategy*. Department of Land and Natural Resources. Honolulu, Hawaii. 722p.
- National Oceanic and Atmospheric Administration, 2015. 50 CFR 226. Document 80 FR 50925. *Endangered and Threatened Species: Final Rulemaking to Revise Critical Habitat for Hawaiian Monk Seals*. 21 August.
- Pacific Islands Fish and Wildlife Office (PIFWO) 2023. Information for Planning and Consultation (IPaC). Accessed 31 January 2023. Accessible online at: <https://ipac.ecosphere.fws.gov/>.
- Palmer, Daniel D. 2003. *Hawaii's Fern and Fern Allies*. University of Hawaii Press, Honolulu.
- Staples G. W. and D. R. Herbst. 2005. *A Tropical Garden Flora: Plants cultivated in the Hawaiian Islands and other tropical places*. Bishop Museum Press.

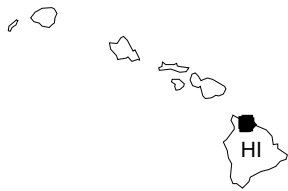
- USDA NRCS, 2023. Web Soil Survey. Available at: [Web Soil Survey \(usda.gov\)](https://www.nrcs.usda.gov/websoilsurvey/). Accessed 1 February 2023.
- U.S. Fish and Wildlife Service (USFWS). 1998. *Recovery Plan for the Hawaiian Hoary Bat (Lasiurus cinereus semotus)*. U.S. Fish and Wildlife Service, Region 1, Portland, OR.
- U.S. Fish and Wildlife Service, 2008. *Draft Post Delisting Monitoring Plan for the Hawaiian Hawk, or Io (Buteo solitaries)*. Endangered Species Division, Pacific Island Fish and Wildlife Office, Honolulu.
- USFWS, 2022a. Wetlands Mapper. Accessed 12 December. Accessible online at: <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.
- USFWS, 2022b. Critical Habitat for Threatened and Endangered Species. Accessed 12 December. Accessible online at: <https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77>.
- USGS, 1995. Volcano Watch - Volcanoes of the Big Island. 15 September. Available at: <https://www.usgs.gov/news/volcano-watch-volcanoes-big-island>.
- Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the flowering plants of Hawaii, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. Revised Edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

APPENDIX A

Figures



GIS: \\haleyaldrich.com\share\pdx_data\Notebooks\020303-001_Waipio_Valley_Geotechnical_Design\GIS\Maps\2022_07\202303_001_0001_PROJECT_LOCUS.mxd - khaakins - 7/1/2022 2:31:57 PM



MAP SOURCE: ESRI
 SITE COORDINATES: 20°06'54"N, 155°35'29"W

**HALEY
 ALDRICH**

WAIPIO VALLEY ROAD EVALUATION
 HONOKAA, HAWAII




PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 4000 FT
 SEPTEMBER 2022

FIGURE 1

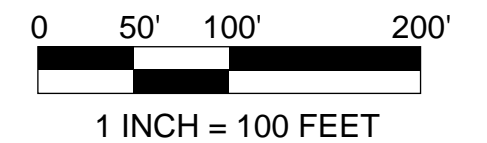


LEGEND

-  APPROXIMATE LIMITS OF PROPOSED CONSTRUCTION STAGING AREA
-  AREA OF POTENTIAL EFFECT
-  APPROXIMATE LIMITS OF EXCAVATION

NOTES:

- 1. BACKGROUND PLAN FROM GOOGLE EARTH, IMAGERY DATED 19 JUNE 2019.



SHORT TERM SAFETY IMPROVEMENTS FOR
THE WAIPI'O VALLEY ROAD
WAIPI'O, HAWAII, HAWAII
0203303-002-02

AREA OF POTENTIAL EFFECT

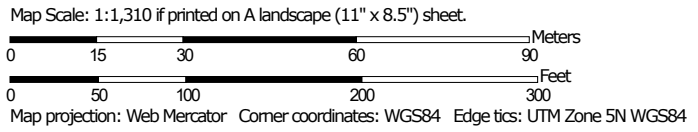
SCALE: AS SHOWN
FEBRUARY 2023

FIGURE 2

FIGURE 3:
Soil Map—Island of Hawaii Area, Hawaii
(Short-Term Safety Improvements for Waipio Valley Road)



Soil Map may not be valid at this scale.






Soil Map—Island of Hawaii Area, Hawaii
(Short-Term Safety Improvements for Waipio Valley Road)

MAP LEGEND




















Area of Interest (AOI)







Area of Interest (AOI)

Soils


-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

-  Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Hawaii Area, Hawaii
Survey Area Data: Version 15, Aug 30, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 3, 2019—Jun 28, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
440	Ainakea medial silty clay loam, 12 to 20 percent slopes	0.4	27.5%
445	Ainakea-Rock outcrop complex, 70 to 100 percent slopes	1.0	72.5%
Totals for Area of Interest		1.4	100.0%

FIGURE 4:

Critical Habitat for Threatened & Endangered Species [USFWS]





A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.



1mi

APPENDIX B
Representative Photographs of Project Area



Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
1		<p>Photo of ornamental plants such as kī (<i>Cordyline fruticosa</i>) and <i>Sphagneticola trilobata</i> on the upslope of Waipi’o Valley Road. The green guard shack can be seen in the background.</p>
2		<p>View of upper switchback of Waipi’o Valley Road. Native ‘ōhi’a lehua (<i>Metrosideros polymorpha</i>) can be seen in the center of the photo, introduced swamp mahogany (<i>Eucalyptus robusta</i>) and Christmas berry (<i>Schinus terebinthifolius</i>) trees are in the background.</p>



Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
3		<p>Section of Waipi'o Valley Road, showing the steep rock face upland of the road on the left side of the photo and drop off protected by the guard rail on the right side of the photo.</p>
4		<p>Photo taken looking down Waipi'o Valley Road (left) into Waipi'o Valley (right upper side of photo), showing typical vegetation along the downslope of the APE.</p>

Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
5		<p>Photo showing the downslope section of the APE, and native neneleau, or Hawaiian sumac (<i>Rhus sandwicensis</i>) trees. Hawaiian sumac and hala (<i>Pandanus tectorius</i>) were the most abundant native trees in the area.</p>
6		<p>Close up of the indigenous 'ihi, (<i>Oxalis corniculata</i>) growing on the upslope side of Waipi'o Valley Road.</p>

Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
7		<p>Photo of the open grassy lawn of the potential laydown area facing east. The area is clear, with native plantings on the left side of the photo and the road off to the left side of the photo.</p>
8		<p>Cultivated māmake (<i>Pipturus albidus</i>) plant near to the potential laydown area.</p>

Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
9		<p>Asphalt ramp to the entrance on the east side of the potential laydown area (to the right of the photo), facing south.</p>
10		<p>Asphalt ramp to the gated entrance behind the park ranger station on the west side of the potential laydown area (to the left of the photo), facing south.</p>

Appendix B: Representative Photographs of Project Area

No.	Photograph	Description
11		Photo of parking area and laydown area. Photo taken from across of Honoka'a Waipi'o Road, facing south.

APPENDIX C
List of Plant Species Observed

PLANT SPECIES LIST

The following checklist is an inventory of all the plant species observed within the project area of the proposed Short-Term Safety Improvements for the Waipi’o Valley Road. The plant names are arranged alphabetically by family and then by species into each of four groups: Gymnosperms, Ferns and Fern Allies (Pteridophytes), Monocots, and Dicots. The taxonomy and nomenclature of the Ferns and Fern Allies follow Palmer (2002), while the gymnosperms and flowering plants, Monocots and Dicots, are in accordance with Wagner *et al.* (1990) and Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes follow the 2019 Hawaiian Naturalized Vascular Plants Checklist series (Imada 2019).

For each species, the following name is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
E= endemic= native only to the Hawaiian Islands.
I= indigenous= native to the Hawaiian Islands and elsewhere.
P=Polynesian introduced=species that were introduced by the Polynesian migration to Hawaii, either intentionally or unintentionally, and are now naturalized.
X=introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is Cook’s arrival in the islands in 1778.

SCIENTIFIC NAME	COMMON NAME	STATUS
GYMNOSPERMS		
ARAUCARIACEAE		
<i>Araucaria columnaris</i> (G.Forst.) Hook.f.	Cook pine	X
PTERIDOPHYTES		
BLECHNACEAE		
<i>Blechnum appendiculatum</i> Willd.		X
CYATHEACEAE		
<i>Sphaeropteris cooperi</i> (Hook. ex F.Muell.) R.M.Tryon	Australian tree fern	X
GLEICHENIACEAE		
<i>Dicranopteris linearis</i> (Burm.f.) Underw.	uluhe, unuhe	I
NEPHROLEPIDACEAE		
<i>Nephrolepis brownii</i> (Desv.) Hovenkamp&Miyam.	Asian swordfern	X
LINDSAEACEAE		
<i>Odontosoria chinensis</i> (L.) J.Sm.	pāla’a	I
POLYPODIACEAE		
<i>Microsorium grossum</i> (Langsd. & Fisch.) S.B.Andrews	lāua’e	X
<i>Phlebodium aureum</i> (L.) J.Sm.	lāua’e haole	X

Appendix C: List of Plant Species Observed

SCIENTIFIC NAME	COMMON NAME	STATUS
PSILOTACEAE		
<i>Psilotum nudum</i> (L.) P. Beauv.	moa, upright whiskfern	I
PTERIDACEAE		
<i>Adiantum hispidulum</i> Sw.	rough maidenhair	X
<i>Adiantum raddianum</i> C.Presl	delta maidenhair	X
THELYPTERIDACEAE		
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	pai'ihā	X
<i>Christella parasitica</i> (L.) Lev.		X
MONOCOTS		
AGAVACEAE		
<i>Cordyline fruticosa</i> (L.) A.Chev.	kī, tī	P
ARACEAE		
<i>Epipremnum pinnatum</i> (L.) Engl.	pothos vine	X
ARECACEAE		
<i>Cocos nucifera</i> L.	niu, coconut	P
COMMELINACEAE		
<i>Commelina diffusa</i> Burm.f,	honohono	X
MUSACEAE		
<i>Musa sp.</i> L.	mai'a, banana	P
ORCHIDACEAE		
<i>Arundina graminifolia</i> (D.Don) Hochr.	bamboo orchid	X
<i>Spathoglottis plicata</i> Blume	Philippine ground orchid	X
PANDANACEAE		
<i>Pandanus tectorius</i> Parkinson ex Z	hala	I
POACEAE		
<i>Andropogon virginicus</i> L.	broomsedge	X
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	X
<i>Cynodon dactylon</i> (L.) Pers	manienie	X
<i>Digitaria insularis</i> (L.) Mez ex Ekman	sourgrass	X
<i>Megathyrsus maximus</i> (Jacq.) B.K.Simon & S.W.L. Jacobs	Guinea grass	X
<i>Melinis minutiflora</i> P.Beauv.	molasses grass	X
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop	X
<i>Oplismenus hirtellus</i> (L.) P.Beauv.	basketgrass, honohono	X

Appendix C: List of Plant Species Observed

SCIENTIFIC NAME	COMMON NAME	STATUS
<i>Paspalum conjugatum</i> P.J.Bergius	Hilo grass	X
<i>Sacciolepis indica</i> (L.) Chase	Glenwood grass	X
<i>Setaria parviflora</i> (Poir.) Kerguelen	yellow foxtail	X
ZINGIBERACEAE		
<i>Hedychium gardnerianum</i> Sheppard ex Ker Gawl.	Kāhili ginger, Himalayan ginger	X
DICOTS		
ACANTHACEAE		
<i>Justicia betonica</i> L.	white shrimp plant	X
ANACARDIACEAE		
<i>Mangifera indica</i> L.	mango	X
<i>Rhus sandwicensis</i> A.Gray	neneleau, Hawaiian sumac	E
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	X
APIACEAE		
<i>Centella asiatica</i> (L.) Urb.	Asiatic pennywort	X
ARALIACEAE		
<i>Heptapleurum actinophyllum</i> (Endl.) Lowry & G.M.Plunkett	octopus tree, umbrella tree	X
ASTERACEAE		
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	Maui pāmakani	X
<i>Ageratina riparia</i> (regel) R.M.King & H.Rob.	Hāmakua pāmakani	X
<i>Bidens pilosa</i> L.	Spanish needle	X
<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	crassocephalum	X
<i>Cyanthillium cinereum</i> (L.) H.Rob.	little ironweed	X
<i>Eclipta prostrata</i> (L.) L.	false daisy	X
<i>Emilia fosbergii</i> Nicolson	red pualele	X
<i>Emilia sonchifolia</i> (L.) DC. var. <i>sonchifolia</i>	Flora’s paintbrush	X
<i>Montanoa hibiscifolia</i> Benth.	tree daisy, Christmas daisy	X
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	X
<i>Sigesbeckia orientalis</i> L.	small yellow crown-beard	X
<i>Sonchus oleraceus</i> L.	sow thistle	X
<i>Sphagneticola trilobata</i> (L.) Pruski	wedelia	X
<i>Synedrella nodiflora</i> (L.) Gaertn.	nodeweed	X
<i>Youngia japonica</i> (L.) DC.	Oriental hawksbeard	X

Appendix C: List of Plant Species Observed

SCIENTIFIC NAME	COMMON NAME	STATUS
BEGONIACEAE		
<i>Begonia hirtella</i> Link	bearded begonia	X
BIGNONIACEAE		
<i>Spathodea campanulata</i> P. Beauv.	African tulip	X
CARYOPHYLLACEAE		
<i>Drymaria cordata</i> (L.) Willd. Ex Roem. & Schult. var. <i>pacifica</i> M.Mizush.	pipili, pilipili	X
CASUARINACEAE		
<i>Casuarina equisetifolia</i> L.	common ironwood	X
COMBRETACEAE		
<i>Terminalia catappa</i> L.	tropical almond	X
CUCURBITACEAE		
<i>Momordica charantia</i> L.	balsam pear	X
EUPHORBIACEAE		
<i>Aleurites moluccana</i> (L.) Willd.	kukui	P
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge	X
FABACEAE		
<i>Albizia chinensis</i> (Osbeck.) Merr.		X
<i>Canavalia cathartica</i> Thouars	maunaloa	X
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	X
<i>Crotalaria trichotoma</i> Bojer	curara pea	X
<i>Desmodium tortuosum</i> (Sw.) DC.	Florida beggarweed	X
<i>Grona triflora</i> (L.) H. Ohashi & K. Ohashi	tick clover	X
<i>Falcataria moluccana</i> (Miq.) Barenby & J.W. Grimes	Moluccan albizia	X
<i>Macroptilium atropurpureum</i> (DC.) Urb.	twining cow pea	X
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	X
LAMIACEAE		
<i>Salvia coccinea</i> Etl.	scarlet sage, Texas sage	X
LAURACEAE		
<i>Persea americana</i> Mill.	avocado	X
MALVACEAE		
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon	X
<i>Melochia umbellata</i> (Houtt.) Stapf	melochia	X
<i>Sida rhombifolia</i> L.		X

Appendix C: List of Plant Species Observed

SCIENTIFIC NAME	COMMON NAME	STATUS
MELASTOMATACEAE		
<i>Miconia crenata</i> (Vahl) Michelang.	clidemia, Koster's curse	X
MORACEAE		
<i>Ficus microcarpa</i> L.f.	Chinese banyan	X
MYRTACEAE		
<i>Eucalyptus robusta</i> Sm.	swamp mahogany	X
<i>Melaleuca quinquenervia</i> (Cav.) S.T.Blake	paperbark	X
<i>Metrosideros polymorpha</i> Gaudich. var. <i>polymorpha</i>	'ōhi'a lehua	E
<i>Psidium cattleianum</i> Sabine	strawberry guava	X
<i>Psidium guajava</i> L.	common guava	X
<i>Syzygium cumini</i> (L.) Skeels	Java plum	X
OXALIDACEAE		
<i>Oxalis corniculata</i> L.	yellow wood sorrel, 'ihi	I
<i>Oxalis debilis</i> Kunth. <i>corymbosa</i> (DC.) Lourteig	pink wood sorrel, 'ihi pehu	X
PASSIFLORACEAE		
<i>Passiflora edulis</i> Sims	liliko'i, passion fruit	X
POLYGALACEAE		
<i>Polygala paniculata</i> L.	milkwort	X
PROTEACEAE		
<i>Grevillea robusta</i> A.Cunn. ex R.Br.	silk oak, silver oak	X
ROSACEAE		
<i>Rubus rosifloius</i> Sm.	thimbleberry	X
SCROPHULARIACEAE		
<i>Buddleja asiatica</i> Lour.	huelo 'ilio, dog tail	X
URTICACEAE		
<i>Pilea microphylla</i> (L.) Liebm.	artillery plant	X
VERBENACEAE		
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Jamaican vervain	X

APPENDIX D
USFWS IPaC Resource List

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Hawaii County, Hawaii



Local office

Pacific Islands Fish And Wildlife Office

☎ (808) 792-9400

📅 (808) 792-9580

MAILING ADDRESS

300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000

PHYSICAL ADDRESS

300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850-0056

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

-
1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Hawaiian Hoary Bat <i>Lasiurus cinereus semotus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/770	Endangered

Birds

NAME	STATUS
Band-rumped Storm-petrel <i>Oceanodroma castro</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1226	Endangered
Hawaii Akepa <i>Loxops coccyneus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5714	Endangered
Hawaiian (=koloa) Duck <i>Anas wyvilliana</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7712	Endangered
Hawaiian Coot <i>Fulica americana alai</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7233	Endangered
Hawaiian Goose <i>Branta (=Nesochen) sandvicensis</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1627	Threatened

Hawaiian Petrel *Pterodroma sandwichensis* Endangered
Wherever found
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/6746>

Hawaiian Stilt *Himantopus mexicanus knudseni* Endangered
Wherever found
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/2082>

Newell's Townsend's Shearwater *Puffinus auricularis newelli* Threatened
Wherever found
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/2048>

Reptiles

NAME STATUS

Green Sea Turtle *Chelonia mydas* Threatened
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/6199>

Insects

NAME STATUS

Blackburn's Sphinx Moth *Manduca blackburni* Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
<https://ecos.fws.gov/ecp/species/4528>

Flowering Plants

NAME STATUS

`aiea *Nothocestrum breviflorum* Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
<https://ecos.fws.gov/ecp/species/7493>

<p>A'e <i>Zanthoxylum dipetalum</i> var. <i>tomentosum</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2297</p>	<p>Endangered</p>
<p>Carter's Panicgrass <i>Panicum fauriei</i> var. <i>carteri</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5578</p>	<p>Endangered</p>
<p>Hala Pepe <i>Pleomele hawaiiensis</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2910</p>	<p>Endangered</p>
<p>Holei <i>Ochrosia haleakalae</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/884</p>	<p>Endangered</p>
<p>Holei <i>Ochrosia kilaueaensis</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5248</p>	<p>Endangered</p>
<p>Ihi <i>Portulaca villosa</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4886</p>	<p>Endangered</p>
<p>Kauila <i>Colubrina oppositifolia</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/850</p>	<p>Endangered</p>

Kuahiwi Laukahi *Plantago princeps* Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
<https://ecos.fws.gov/ecp/species/4926>

Loulu *Pritchardia maideniana* Endangered
Wherever found
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/4945>

Neraudia *ovata* Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
<https://ecos.fws.gov/ecp/species/3669>

Po'e *Portulaca sclerocarpa* Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
<https://ecos.fws.gov/ecp/species/1719>

Ferns and Allies

NAME	STATUS
<i>Microlepia strigosa</i> var. <i>mauiensis</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4737	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Apapane <i>Himatione sanguinea</i> This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands.	Breeds Dec 1 to Jul 31

Black Noddy *Anous minutus melanogenys*

Breeds Apr 1 to Nov 30

This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands.

Hawai'i 'amakihi *Hemignathus virens*

Breeds Nov 15 to Aug 15

This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands.

Laysan Albatross *Phoebastria immutabilis*

Breeds Nov 15 to Jun 15

This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands.

Red-tailed Tropicbird *Phaethon rubricauda melanorhynchos*

Breeds Dec 15 to Oct 15

This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of

presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

- The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

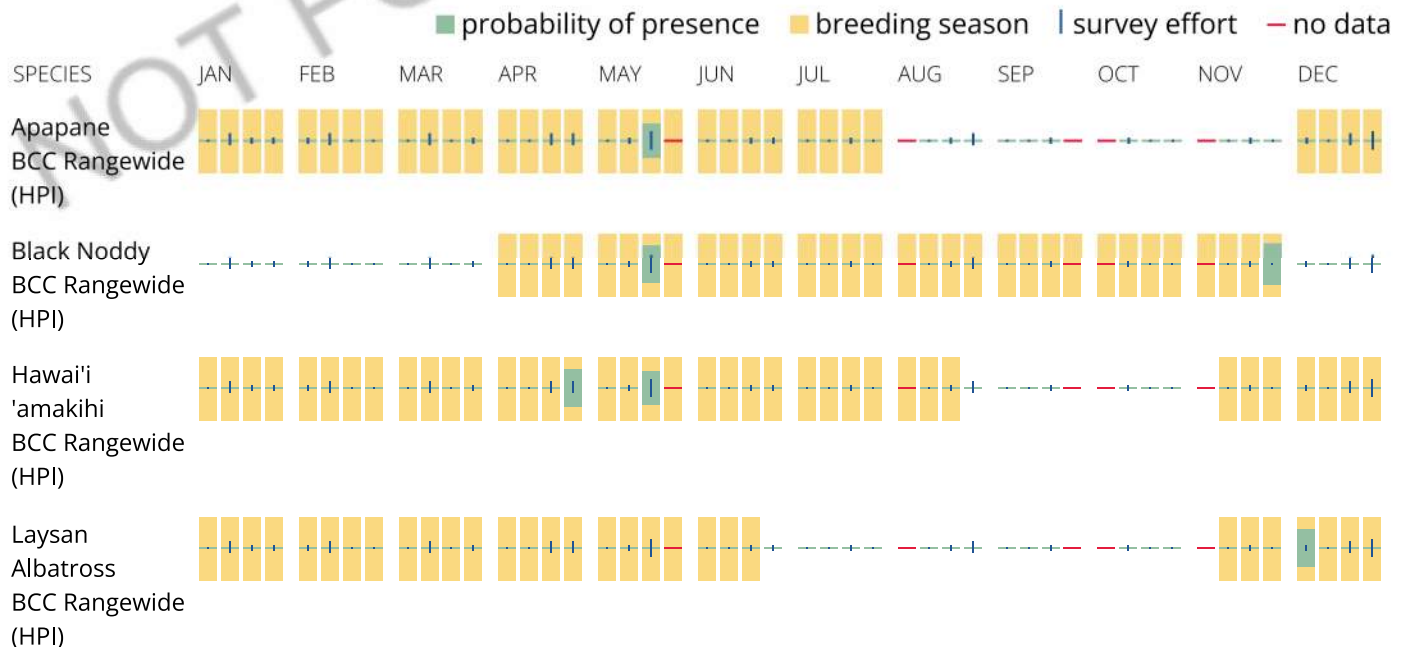
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (-)

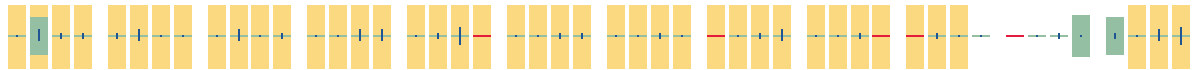
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Red-tailed
Tropicbird
BCC Rangewide
(HPI)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird

on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black

vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

[R5UBH](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should

seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

APPENDIX E
DLNR Seabird Friendly Lighting Solutions Flyer



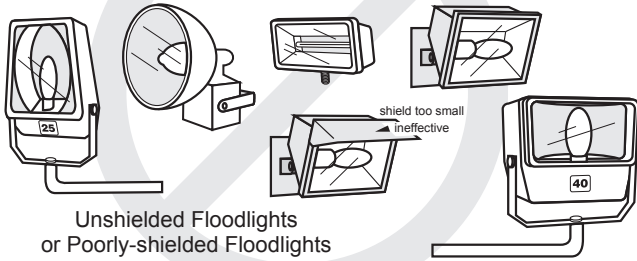
SEABIRD FRIENDLY LIGHTING SOLUTIONS

Help eliminate seabird light attraction. Select the best fixture for your application using this guide. Avoid uplighting, always shield floodlights, and aim downlights carefully to avoid light trespass. For more information go to www.kauai-seabirdhpc.info.

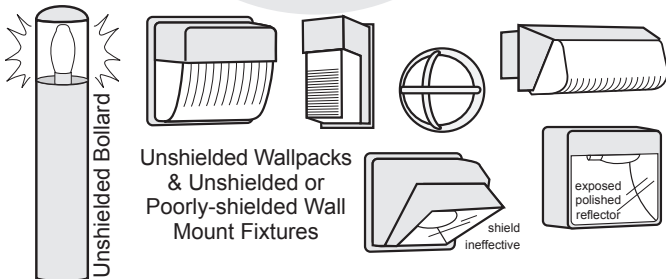


Unacceptable / Discouraged

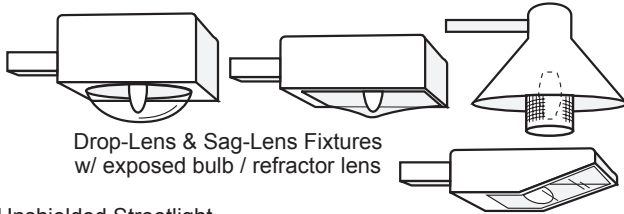
Fixtures that produce glare and light trespass



Unshielded Floodlights or Poorly-shielded Floodlights

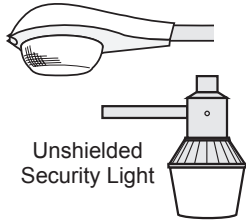


Unshielded Wallpacks & Unshielded or Poorly-shielded Wall Mount Fixtures

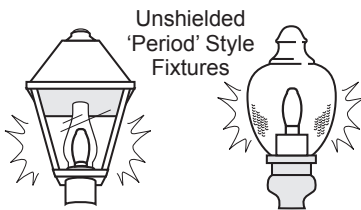


Drop-Lens & Sag-Lens Fixtures w/ exposed bulb / refractor lens

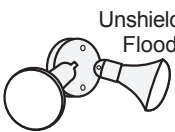
Unshielded Streetlight



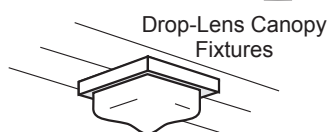
Unshielded Security Light



Unshielded 'Period' Style Fixtures

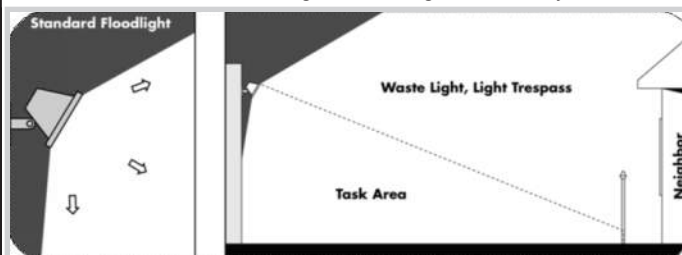


Unshielded PAR Floodlights



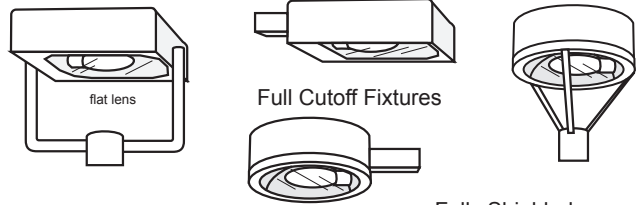
Drop-Lens Canopy Fixtures

Unshielded floodlight that is angled incorrectly



Acceptable

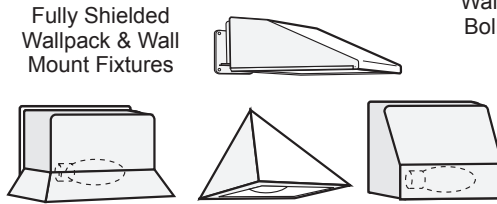
Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



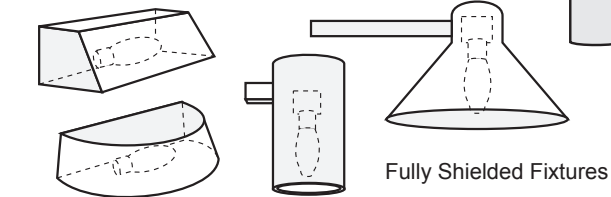
flat lens

Full Cutoff Fixtures

Fully Shielded Walkway Bollards



Fully Shielded Wallpack & Wall Mount Fixtures



Fully Shielded Fixtures

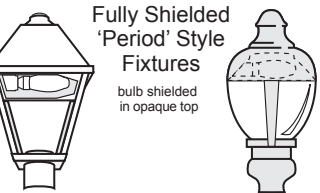
Full Cutoff Streetlight



Fully Shielded Security Light

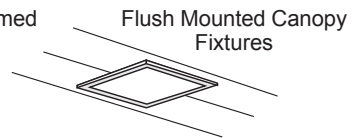


Shielded / Properly-aimed PAR Floodlights



Fully Shielded 'Period' Style Fixtures

bulb shielded in opaque top



Flush Mounted Canopy Fixtures

Shielded floodlight that is angled correctly

