

Table 2 (continued).

Common Name	Scientific Name	ST	RA
PSITTACIFORMES			
PSITTACIDAE - Lories Parakeets, Macaws & Parrots			
Psittacinae - Typical Parrots			
Rose-ringed Parakeet	<i>Psittacula krameri</i>	A	12.25
Arinae - New World Parakeets, Macaws & Parrots			
Red-crowned Parrot	<i>Amazona viridigenalis</i>	A	6.25
PASSERIFORMES			
PYCNONOTIDAE - Bulbuls			
Red-vented Bulbul	<i>Pycnonotus cafer</i>	A	7.13
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	A	3.88
CETTIIDAE - Cettia Warblers & Allies			
Japanese Bush-Warbler	<i>Cettia diphone</i>	A	0.19
ZOSTEROPIDAE - White-eyes			
Japanese White-eye	<i>Zosterops japonicus</i>	A	7.00
TIMALIIDAE - Babblers			
Red-billed Leiothrix	<i>Leiothrix lutea</i>	A	0.56
TURDIDAE - Thrushes			
White-rumped Shama	<i>Copsychus malabaricus</i>	A	0.88
MIMIDAE - Mockingbirds & Thrashers			
Northern Mockingbird	<i>Mimus polyglottos</i>	A	0.06
STURNIDAE - Starlings			
Common Myna	<i>Acridotheres tristis</i>	A	0.69
THRAUPIDAE - Tanagers			
Red-crested Cardinal	<i>Paroaria coronata</i>	A	0.31
CARDINALIDAE - Cardinals Saltators & Allies			
Northern Cardinal	<i>Cardinalis cardinalis</i>	A	0.38
FRINGILLIDAE - Fringilline and Carduline Finches & Allies Carduelinae - Carduline Finches & Hawaiian Honeycreepers			
House Finch	<i>Haemorhous mexicanus</i>	A	1.81
ESTRILDIDAE - Estrildid Finches			
Common Waxbill	<i>Estrilda astrild</i>	A	0.69
Chestnut Munia	<i>Lonchura atricapilla</i>	A	0.38

Key to Table 2

ST Status

A Alien – Introduced to the Hawaiian Islands by humans

IM Indigenous Migrant – Native but not unique to the Hawaiian Islands, does not nest in the Islands

RA Relative Abundance – Number of birds detected divided by the number of count stations (16)

Avian diversity and densities were in keeping with the highly disturbed habitats present along the survey corridor. Three species—Rose-ringed Parakeet (*Psittacula krameri*), Red-crowned Parrot (*Amazona viridigenalis*), and Japanese

White-eye (*Zosterops japonicus*)—accounted for 58 percent of all birds recorded during station counts. The most frequently recorded species was Rose-ringed Parakeet, which accounted for 27 percent of the total number of individual birds recorded during station point-counts.

Mammalian Survey

Three terrestrial mammalian species were observed during the course of this survey. We saw numerous small Indian mongoose (*Herpestes javanicus auropunctatus*) along the alignment and at least six feral pig (*Sus scrofa*). One cat (*Felis catus*) was seen. Scat, tracks, extensive pig trails, sign, and beds as well as two partial pig skeletons were recorded in locations within the site. The sheer amount of pig sign indicates the presence of a large population of pig within the greater area. Dog (*Canis familiaris*) was heard barking from locations outside of the area. Tracks and scat of dog, cat, and mongoose were encountered on all of the trails and unimproved roads we walked.

Discussion

Flora

In addition to the more recent survey of the Project site (AECOS, 2019), the authors previously surveyed a proposed solar facility on 387 ac (157 ha) in the same general area (AECOS, 2014): the south end of the 2014 survey area abuts the 2019 gen-tie survey at the southern-most point reached by the latter). Guinther surveyed a proposed BWS reservoir site above the H-2 at the 200-ft (60-m) elevation south of the gen-tie route, describing the vegetation there as follows (Guinther, 2017, p. 1):

The site is entirely covered by a scrub forest of low stature *koa haole* (*Leucaena leucocephala*) with an understory of similarly low-stature Guinea grass (*Megathyrsus maximus* var. *trichoglume*). These two species constitute close to 100% of the vegetation.... The nine other taxa noted as present during the survey occur in very small numbers.

Each of these surveys entailed travelling multiple times along roads crossing the property, and no plant species, other than those included in the several different floral lists, were seen. None of the plant species in these surveys or the present one covering the gen-tie route are considered important from a natural resources perspective. No plant species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species

programs (HDLNR, 1998; USFWS, 2019) were detected during the course of any of these earlier surveys or during the present survey.

Fauna

Avian diversity and densities are generally similar to those reported from a previous survey conducted on land to the north of the current survey site (AECOS, 2014). No vertebrate species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs (HDLNR, 2015; USFWS, 2019) were detected during the course of the present survey.

Shorebirds - As noted above, the Pacific Golden-Plover is an indigenous migratory shorebird species that nests in the high Arctic during the late spring and summer months, returning to Hawai'i and the tropical Pacific to spend the fall and winter months each year. Plover usually leave Hawai'i and return to the Arctic in late April or the very early part of May and are commonly encountered in open areas throughout the Hawaiian Islands from late summer through mid-spring.

Seabirds - Although no seabirds were detected during this survey, it is possible that the endangered Hawaiian Petrel (*Puffinus sandwichis*) and the threatened Newell's Shearwater (*Puffinus newelli*) over-fly the project area between April and the middle of December each year in very small numbers. Newell's Shearwater is not known to breed on the Island of O'ahu, though recent acoustical surveys have recorded low numbers of this species calling over the higher reaches of the Island (Young, et al., 2019). These authors also recorded one Hawaiian Petrel over the Island.

The primary cause of mortality in Hawaiian Petrel and Newell's Shearwater is thought to be predation by alien mammalian species at the nesting colonies (USFWS, 1983; Simons and Hodges, 1998; Ainley et al., 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with man-made structures and, if not killed outright, become easy targets of opportunity for feral mammals (Hadley, 1961; Telfer, 1979; Sincock, 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al., 1998; Ainley et al., 2001; Hue et al., 2001; Day et al., 2003).

Mammals - With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or 'ōpe'ape'a as it is known locally, all terrestrial mammals

currently found on the Island of O'ahu are alien species, and most are ubiquitous. The findings of the mammalian survey are consistent with the location of the property and environments present on the site. It is likely that cat (*Felis catus*) and some of the other established alien Muridae found on O'ahu—roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), and Polynesian rat (*Rattus exulans hawaiiensis*)—use various resources within the general project area on a seasonal basis. All of these introduced rodents are deleterious to native ecosystems and native faunal species within them. No mammalian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR, 1998; USFWS, 2015, 2019.).

Potential Impacts to Protected Species

Hawaiian hoary bat - It is possible that the Hawaiian hoary bat overflies the Project area on a seasonal basis. A potential impact that the gen-tie line poses to bats is during the clearing and grubbing phase of construction if trees are removed. The removal of trees may temporarily displace an individual if a bat is roosting in that vegetation. Because this bat uses multiple roosts within a home territory, the disturbance resulting from removal of a roosting tree is likely to be minimal. However, during the pupping season, a female carrying a pup may be less able to rapidly vacate a roost site when an inhabited tree is being felled. Further, an adult female may leave a pup in the roost tree while foraging. Very small pups will be unable to flee a tree that is being felled. Potential adverse effects from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 15 ft (4.6 m) during the bat pupping season (between June 1 and September 15).

Seabirds - The principal potential impact that the installation of the gen-tie line poses to protected seabirds is the increased threat that birds will be downed after becoming disoriented by lights associated with the installation during the nesting season. For the gen-tie, outdoor lighting could pose a threat to nocturnally flying seabirds only if, during construction, it is deemed expedient or necessary to conduct night-time construction as the completed line will not be lighted.

Jurisdictional Waters

Jurisdictional waters—also called "waters of the U.S."—are aquatic or features on the land that come under federal jurisdiction as established in the federal Clean Water Act. Actions that have a direct impact on jurisdictional waters are subject to the regulatory authority of the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA). The Project site does

not contain waters that would be considered jurisdictional under the Clean Water Act (CWA): all of the site is located on an interfluvium with no perennial or intermittent streams present. Some topographic maps and the HDLNR stream shapefile (HDLNR-DAR, 2008) show partial representations of water conveyance pipes ("aqueduct") and channels (as blue line features on USGS map, 7.5-Minute Series (Topographic), Waipahu Quadrangle (USGS, 1998). All of these features are long abandoned and no longer functional; they do not hold or convey water, nor could they.

However, the proposed route for the gen-tie line from the Waiawa Solar facility site to a HECO tie-in near Ka Uka Blvd. will cross two gulches and a feature identified by U.S. Fish and Wildlife (USFWS) as a type of "wetland"³ (see Fig. 2). We examined closely each of the crossings in order to render an opinion as to the likelihood of one or more being jurisdictional. If a feature is determined by the USACE to be jurisdictional, certain activities would require a permit from that agency before undertaking. Typical activities subject to the authority of USACE and USEPA would be dredging, placing of fill, and placement of structures within the boundaries of the jurisdictional waters. An electrical line suspended above the feature would not be subject to a U.S. Army permit requirement; only the placement of support towers within the jurisdictional boundary would be.

The proposed gen-tie route leaves the Project site descending down a moderately steep slope into the unnamed gulch, the upper rim of which forms the northwest boundary of the site. At the bottom, this gulch is rather broad where the line extends westward; the vegetation here is dominated by dense Guinea grass and large albizia trees (Fig. 3B). No visible evidence of water flow exists here; indeed a farm road utilizes part of the gulch bottom to cross from one side to the other and no visible evidence of erosion caused by water flow can be seen at this crossing (Figure 5). In our opinion, this crossing does not involve jurisdictional waters.

This unnamed gulch broadens out downslope to the feature indicated on the National Wetland Inventory (NWI) as a temporary flooded palustrine wetland dominated by scrub-shrub located behind a dike or dam (coded PSSAh). This code does not meet the Federal Wetland Classification Standard, but is used for historic data (USFWS, nd). No dam or dike is present, and it seems likely the feature is a former reservoir or possibly a settling basin. The bottom of the shallow basin is covered by a well-anchored mat of a geotextile material (Figure

³ Wetlands identified by USFWS are not necessarily wetlands as defined by the USACE, and only the latter are subject to USACE authority.

6) that extends both upslope and downslope of the road, which crosses at the presumed location of a former berm or dam.



Figure 5. Bottom of unnamed gulch at road crossing upslope from the gen-tie crossing point. Arrows indicate sheet flow direction over farm road.

The USFWS use of “SS” indicating the vegetation type is odd, although if viewed from the road crossing, this is the vegetation for a short distance upslope of the road. The feature, as indicated on topographic maps, is covered by Guinea grass with scattered trees (mostly Chinaberry) around the margin; downslope, trees are more common than is open grassland. No water is present, and no basin area exists to accumulate water. The fact that the geotextile fabric extends further downstream across the gulch bottom suggests this material was installed to prevent erosion and put in place after the dam itself was removed. The unnamed gulch is, in our opinion, not jurisdictional and the designated NWI “wetland” does not exist.

Pānakauahi Gulch is some 160 ft (50 m) deep and steep-sided in the vicinity of the HECO distribution line near the intersection of H-2 and the Ka Uka Blvd. off-



Figure 6. The geotextile “fabric” that covers several acres at and downslope of the former sugar-cane era reservoir.

ramp from H-2. The stream at the very bottom is dry and absent evidence of recent water flow (Figure 7). However, the bed is mostly sediment and medium to large boulders. At the point where the gen-tie line crosses, the stream bed is some 12 to 15 ft (4-5 m) across and incised into the gulch bottom some 3 to 4 ft (1 to 1.5 m). The banks are distinctively cut into the gulch bottom and would likely be regarded as the ordinary high water mark (OHWM) at this location⁴.

Vegetation within the OHWM of Pānakauahi Stream is sparse but includes wedelia, Chinese violet, coral berry, *maile hohono* (*Ageratum conyzoides*), *wauke*, and scattered to dense tufts of Guinea grass. The dry (intermittent) stream at the gulch bottom is tributary to perennial Waiawa Stream, their confluence located some 2.8 mi (4.5 km) downstream from the gen-tie cross-over. Waiawa Stream flows into Pearl Harbor, a traditional navigable water (TNW) and an arm of the Pacific Ocean. The unnamed gulch opens onto Pānakauahi Gulch 1.3 mi (2.1 km) upstream from Waiawa Stream.

⁴ An intermittent stream with: evidence of stream flow, a recognizable OHWM, designation on USGS topographic maps as a “blue line” stream, and having a clear connection to a traditional navigable water (TNW), would be regarded by the USACE as jurisdictional.



Figure 7. Bottom of Pānakauahi Gulch showing stream bed upstream of (above) and in the immediate area of the gen-tie line crossing (below).

Critical Habitat and State Conservation Districts

Federally delineated Critical Habitat is not present in the Project area (USFWS, 2019). No equivalent designation exists under state law. Conservation zoning in Hawai'i is promulgated at the state level by state Conservation Districts. No Conservation Districts occur near the gen-tie route.

Recommendations

- If night-time construction activity or equipment maintenance is conducted during construction of the gen-tie, all associated lighting should be shielded and, if large work lights are used, these must be placed on poles that are high enough to allow the lights to be pointed directly towards the ground.
- To avoid deleterious impacts to roosting bats, it is recommended that no woody vegetation taller than 4.6 m (15 ft) be removed between June 1 and September 15.

Implementing the recommendations listed above, as appropriate for construction and/or operation phases of the proposed gen-tie line, will avoid or minimize adverse impacts to any and all flora and fauna of concern associated with the Project area.

References

- AECOS* Inc. (*AECOS*). 1991. Survey of lower Waiawa Stream and impacts assessment for flood retention basins at the Waiawa Ridge Development Project. Prep. for Environmental Communications, Inc. *AECOS* No. 661: 21 pp.
- _____. 2014. Biological surveys for a SunEdison® Waiawa Solar Farm in Waiawa on O'ahu. Prep. for G70. *AECOS* No. 1415: 18 pp.
- _____. 2016. Botanical Surveys of U.S. Navy Properties in Support of an Integrated Natural Resources Management Plan at Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i. Prep. for AECOM Technical Services, Inc. *AECOS* No. 1412: p. 130-142.
- _____. 2019. Biological surveys for a solar electrical generating facility in Waiawa, central O'ahu. Prep. for G70. *AECOS* No. 1579: 24 pp.

- Ainley, D. G., R. Podolsky, L. Deforest, G. Spencer, and N. Nur. 2001. The Status and Population Trends of the Newell's Shearwater on Kaua'i: Insights from Modeling, in: Scott, J. M., S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna. Studies in Avian Biology No. 22*. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas. (Pg. 108-123).
- Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V., Remsen, Jr., D. F. Stotz, B. M. Winger, and K. Winker. 2018. *Check-List of North and Middle American Birds*. American Ornithological Society. Available online at URL: <http://checklist.aou.org/taxa>.
- _____, _____, _____, _____, _____, _____, _____, _____, and K. Winker. 2019. Sixtieth Supplement to the Check-list of North American Birds. *The Auk Ornithological Advances*, 136: 1-23.
- Cooper, B. A., and R. H. Day. 1998. Summer behavior and mortality of Dark-rumped Petrels and Newell's Shearwaters at power lines on Kauai. *Colonial Waterbirds*, 21(1): 11-19.
- Day, R. H., B. Cooper, and T. C. Telfer. 2003. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. *The Auk*, 120: 669-679.
- Giambelluca, T. W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte. 2013: Online Rainfall Atlas of Hawai'i. *Bull. Amer. Meteor. Soc.* 94: 313-316, doi: 10.1175/BAMS-D-11-00228.1. Online at URL: <http://rainfall.geography.hawaii.edu/>; last accessed on September 18, 2019.
- Guinther, E. B. 2017. Natural resources reconnaissance survey of a proposed Board of Water Supply (BWS) site (G6), Waiawa, O'ahu. AECOS Consultants No. AC096B: 4 pp.
- Hadley, T. H. 1961. Shearwater calamity on Kauai. *Elepaio*, 21: 60.
- Hawaii Department of Land and Natural Resources (HDLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

- Hawaii Department of Land and Natural Resources (HDLNR). 2015. Hawai'i Administrative Rules, Title 13, Department of Land and Natural Resources, Subtitle 5 Forestry and Wildlife, Part 2 Wildlife, Chapter 124, Indigenous Wildlife, Endangered and Threatened Wildlife, Injurious Wildlife, Introduced Wild Birds, and Introduced Wildlife. February 27, 2015. 16 pp.
- _____. Division of Aquatic Resources (HDLNR-DAR). 2008. "Streams (from DLNR, Division of Aquatic Resources" shapefile "streams_dar" shapefile (NAD 83 HARN) available from URL: <http://planning.hawaii.gov/gis/download-gis-data/>.
- Hue, D., C. Glidden, J. Lippert, L. Schnell, J. MacIvor, and J. Meisler. 2001. Habitat Use and Limiting Factors in a Population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawai'i. Pp. 234-242, in: Scott, J. M, S. Conant, and C. Van Riper III (eds) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna*. Studies in Avian Biology No. 22. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas.
- Imada, C. T. 2012. Hawaiian Native and Naturalized Vascular Plants Checklist (December 2012 update). *Bishop Museum Tech. Rept.* 60. 380 pp.
- Podolsky, R., D. G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. Mortality of Newell's Shearwaters Caused by Collisions with Urban Structures on Kaua'i. *Colonial Waterbirds*, 21: 20-34.
- Reed, J. R., J. L. Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariiform Birds: Reduction by Shielding Upward Radiation. *The Auk*, 102: 377-383.
- Simons, T. R., and C. N. Hodges. 1998. Dark-rumped Petrel (*Pterodroma phaeopygia*). In: A. Poole and F. Gill (editors). *The Birds of North America*, No. 345. The Academy of Natural Sciences, Philadelphia, PA. and the American Ornithologists Union, Washington, D.C.
- Sincock, J. L. 1981. Saving the Newell's Shearwater. Pp. 76-78 in: *Proceedings of the Hawaii Forestry and Wildlife Conference*, 2-4 October 1980. Department of Land and Natural Resources, State of Hawaii, 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, Honolulu. 908 pp.

- Telfer, T. C. 1979. Successful Newell's Shearwater Salvage on Kauai. *'Elepaio*, 39: 71.
- _____, J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Society Bulletin*, 15: 406-413.
- U.S. Fish & Wildlife Service (USFWS). 1983. Hawaiian Dark-Rumped Petrel & Newell's Manx Shearwater Recovery Plan. USFWS, Portland, Oregon. February 1983.
- _____. 2019. USFWS Endangered Species. Available online at URL: <https://www.fws.gov/endangered/>; Last visited on September 18, 2019; and Environmental Conservation Online System (ECOS), online at URL: <https://ecos.fws.gov/ecp/species-reports>; last visited on September 18, 2019. USFWS iPaC (Information for Planning and Consultation) site. Available online at <https://ecos.fws.gov/ipac/>; Last accessed on March 22, 2019.
- _____. undated website (nd). National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Available online at URL: <http://www.fws.gov/wetlands/Data/Mapper.html> and <https://fwsprimary.wim.usgs.gov/decoders/wetlands.aspx>; last accessed on September 12, 2019.
- Wagner, W. L., D. R. Herbst, and S.H. Sohmer. 1990. *Manual of the Flowering Plants of Hawai'i: Volume I and II*. Bishop Museum Special Publication 83. University of Hawai'i Press. 1853 pp.
- _____ and _____. 1999. *Supplement to the Manual of the flowering plants of Hawai'i*, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. Revised edition. 2 vols. University of Hawaii Press and B.P. Bishop Museum.
- Wilson, D. E., and D. M. Reeder (Eds), 2005. *Mammal species of the world: a taxonomic and geographic reference*. 3rd edition. 2 vols. John Hopkins University Press Baltimore, Maryland. 2142 pp.
- Young, L. C., E. A. VanderWerf, M. Mckown, P. Roberts, J. Schueter, A. Vorsino, and D. Sicho. 2019. Evidence of Newell's Shearwaters and Hawaiian Petrels on Oahu, Hawaii. *The Condor Ornithological Applications*, 121: 1-7.