

WILDLIFE

**PROPOSED
MA'ALO LANDFILL
PROJECT
WILDLIFE HAZARD
ASSESSMENT**

August 2016

Prepared For

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**Proposed Ma'alo Landfill Project
Wildlife Hazard Assessment
Kaua'i, Hawai'i**

Prepared for

AECOM

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EXECUTIVE SUMMARY

The County of Kaua'i (County) proposes to construct and operate a new Municipal Solid Waste Landfill and a Resource Recovery Park (RRP) at the Ma'alo site on the island of Kaua'i, Hawai'i. The proposed Ma'alo landfill is located approximately 12,200 feet (2.3 miles) from the Lihue Airport (LIH) airport operations area (AOA) and the proposed limits of waste would be approximately 13,300 feet (2.5 miles) from the nearest LIH runway. Due to the proximity of the Ma'alo site to LIH, the Hawai'i State Department of Transportation (HDOT) has expressed concerns that the proposed project, if not properly designed and managed, could attract wildlife that may pose a threat to air traffic at LIH. In response to HDOT's concerns, the County conducted a Landfill Wildlife Hazard Assessment (LWHA) in general accordance with *Wildlife Hazard Management at Airports: A Manual for Airport Personnel* (Clearly and Dolbeer 2005). The LWHA team conducted 24 wildlife surveys over a 12-month period in the vicinity of both the existing Kekaha Landfill and the proposed Ma'alo site. This report details the findings of the assessment and provides recommendations for landfill design features and operational procedures that could avoid or mitigate potential wildlife hazards.

The study relied on data collected from the Federal Aviation Administration Wildlife Strike Database, existing literature, and field surveys. Strike data for LIH, as well as Hilo and Kahului Airports, and other existing literature indicate that some species of wading birds (including cattle egret [*Bubulcus ibis*]) and shorebirds (including Pacific golden plover [*Pluvialis fulva*]), Hawaiian goose [*Branta sandvicensis*], and columbids, munias, and larks are top hazard concerns for the reviewed airports. These avian groups are attributed to over 60% of the airport's strikes (cumulatively), are identified as requiring significant deterrence efforts at LIH, are identified as a zero tolerance species, or are present at or near the airfield in large flocks.

The LWHA team conducted field surveys at the existing Kekaha Landfill and around the proposed Ma'alo site. Survey data collected at the Kekaha Landfill provided insight into which avian species utilize the existing landfill, which landfill features attract avian species, which species utilize those features, and how they utilize the features. These data were used to determine which specific landfill features may be wildlife attractants, which species may be attracted to a landfill at the proposed Ma'alo site, and how those species might utilize the proposed landfill. While the proposed site is windward and the existing site is leeward, many of the same avian species are present in the vicinity of each site. The goal of the surveys at and around the proposed Ma'alo Landfill site was to assess the existing conditions and wildlife movements at and around the proposed site, identify the species currently present, and assess which species have the potential to cause hazards to aircraft in the area if a landfill were established at the proposed site.

The survey data clearly show that cattle egret and common myna (*Acridotheres tristis*) have a strong attraction to the existing Kekaha landfill. These birds actively fly to and from the landfill throughout daylight hours and utilize the active face of the landfill (the area where waste is being landfilled on a given day) for foraging and the inactive face (soil covered landfill areas) of the landfill for loafing. Over 50% of the cattle egret observations at the Kekaha landfill included birds in flight. Birds in flight are a greater concern to aircraft than birds on the ground, particularly when the birds attain the altitude of the airspace. The birds loafing on the soil-covered face appeared to be resting between foraging attempts on the active face. Cattle egret and common myna are present in large numbers in the Ma'alo area. Cattle egret were observed flying through the proposed Ma'alo site to access existing roosts in the site vicinity and they loaf and forage on site among the cattle that currently use the site. There are a number of existing cattle egret roosts in both the Kekaha and Ma'alo study areas. At Kekaha, the biologists observed cattle egrets flying from roosts that are up to 2.9 miles away from the landfill to forage at the landfill. There are four cattle egret roosts within 2.9 miles of the proposed Ma'alo site and LIH is roughly 2.3 miles from the proposed site. Based on the data, it is reasonable to expect that, unless the potential attractant can be controlled, cattle egret could make long flights to access a landfill at the proposed

Ma'alo site. These flights would have the potential to cross through LIH aircraft flight patterns. In addition, the proposed Ma'alo site is situated below the flight path of LIH-based helicopters. Birds attracted to a landfill at the Ma'alo site could potentially traverse the flight path of low flying helicopter traffic.

Cattle egret and common myna are among the species most commonly observed at the two sites. While some columbids (spotted and zebra doves [*Streptopelia chinensis* and *Geopelia striata*]) are attracted to many features at the Kekaha Landfill, they were not observed traveling long distances at high altitudes to access the landfill.

Rock pigeons (*Columba livia*) were observed in the agricultural fields near the landfill and were observed flying over the landfill, but they were not observed on the active face and are apparently not attracted to any of the landfill features at Kekaha. The Ma'alo survey data indicates that rock pigeons frequently make long flights between urban areas, gulches, and trees in the Ma'alo study area. Rock pigeons are known to be attracted to urban areas for foraging and may travel long distances to access forage areas. While the lack of rock pigeon attraction to the Kekaha Landfill suggests that a potential landfill at Ma'alo would not attract the species at higher numbers than the current site conditions (agricultural fields and pasture), the potential for attraction to some landfill features that may be different at Ma'alo than Kekaha due to differences in rainfall (e.g., retention ponds) warrants consideration as possible attractants. If these areas are not properly designed and managed, they could become attractants, and rock pigeons might make long, high elevation flights to access a landfill at the Ma'alo site.

The Ma'alo site experiences greater precipitation than the Kekaha site, which could create more attractive water features at Ma'alo than what was observed at Kekaha. Considering the wetter conditions at Ma'alo, wading and water birds may have a stronger attraction to a landfill at Ma'alo than what was observed at Kekaha. In addition, owls and geese were observed at both sites and may utilize a landfill in the Ma'alo area. These guilds are discussed below:

- Based on the Kekaha Landfill and Ma'alo survey data, several wading and water bird species may have limited attraction to a leachate pond, storm water basin, drainage area, or short grass areas at the proposed landfill. There could be greater attraction to these features in the Ma'alo area due to higher rainfall (e.g., if permanent water were allowed to accumulate in a leachate pond or infiltration basin). Since species in these avian groups are known to make long flights that could interfere with aircraft, inclusion of design elements and operational procedures to deter these species from the proposed landfill are warranted.
- Owls are attracted to the Kekaha Landfill and have been observed foraging at the Ma'alo site. Owls are known to travel long distances to access foraging areas. Tall grass could provide nesting and foraging habitat for pueo (*Asio flammeus sandwichensis*). Operational procedures to reduce the small mammal prey base and nesting opportunities at the Ma'alo site should be implemented to minimize owl attraction to the proposed landfill.
- Hawaiian geese are attracted to the green waste piles and other vegetated areas at the existing Kekaha landfill; there is no indication that Hawaiian geese are attracted to the active face. This species was observed foraging and roosting in grassy and agricultural areas near the proposed Ma'alo site, and is routinely observed flying through the site at various times of day. While apparently not attracted to waste, Hawaiian geese may be attracted to other suitable features at the proposed Ma'alo Landfill for shelter, roosting, or nesting. Habitat management activities are therefore recommended to deter Hawaiian goose attraction.

The surveys reveal that existing features and land use at the Ma'alo site and its vicinity currently attract wildlife. Introduction of the proposed landfill has potential to increase the area's attraction to wildlife, if

the landfill was not properly designed and managed. Avian attractants near airports are a concern to aviation; therefore, this LWHA recommends that the County design the landfill in such a way that minimizes wildlife attraction to the facility, and that the County prepare and implement an operational Landfill Wildlife Management Plan (LWMP). Landfill design recommendations in this LWHA include putrescible waste management alternatives, landscape guidelines, waterbody design guidelines, and structure design guidelines. Once the landfill is operational, the LWMP should implement passive wildlife management, including designation of a landfill wildlife coordinator, obtaining and maintaining permits, and managing wildlife habitat. The LWMP should provide for active wildlife controls as well. Active wildlife controls could include hazing and lethal removal of select species. Various options for these actions are provided in Chapter 4 of this LWHA.

Several species that are protected under the federal and Hawai'i Endangered Species Acts (ESAs) occur in and around the proposed Ma'alo site. Threatened or endangered species did not appear to be attracted to any waste-handling operations at the existing Kekaha landfill, but did show attraction to water features adjacent to the Kekaha landfill). The recommended landfill design modifications and LWMP procedures, which will be selected in consultation with the United States Fish and Wildlife Service (USFWS) and Hawai'i Department of Land and Natural Resources (DLNR), are expected to reduce these species' potential attraction to the landfill. Therefore, current data does not suggest that focused hazing or removal of threatened or endangered species would be required at the proposed landfill. If, however, any threatened or endangered species become attracted to the landfill despite the designed deterrent measures, the individuals may be subject to indirect harassment. Harassment is considered a form of "take" under the federal and state ESAs. Therefore, coordination with USFWS and Hawai'i DLNR would be necessary while designing the landfill features and developing the recommended LWMP, and permits or other agreements may be required.

In addition, lethal control of cattle egret would require the County to obtain a Migratory Bird Treaty Act (MBTA) Depredation Permit. In November 2013, USFWS published a Proposed Rule for a Migratory Bird Permit Control Order for Introduced Migratory Bird Species in Hawai'i (USFWS 2013). If approved, the control order would provide a mechanism for USFWS to issue a MBTA take permit for the control of cattle egret to benefit Hawai'i's native wildlife species. If conducted appropriately, cattle egret abatement activities at the Kekaha Landfill and/or the proposed Ma'alo Landfill can be complementary to other current efforts to control cattle egret populations on the island.

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1 INTRODUCTION

The presence of wildlife in and around airports increases the risk of wildlife/aircraft strikes, which poses a threat to human safety and can cause substantial damage to aircraft. Animals commonly involved in wildlife strikes include a variety of avian species, elk, deer, and canines. Flocking and large birds are of particular concern for airports because they can cause substantial damage to aircraft. To reduce the potential for wildlife strikes with aircraft, the Federal Aviation Administration (FAA) issued Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports* (AC 33B) (FAA 2007), which provides guidance to public-use airports about certain land uses that may attract hazardous wildlife. AC 33B discusses waste disposal projects, agricultural activities, water management facilities, wetlands, dredge spoil containment areas, golf courses, and other land uses that may attract hazardous wildlife. These land uses are discussed in relation to three separation zones around airports. Perimeter A includes a 5,000-foot buffer from the nearest air operations area (AOA) of airports that serve piston-powered aircraft. Perimeter B includes a 10,000-foot buffer from the nearest AOA of airports that serve turbine-powered aircraft. Perimeter C includes a 5-mile buffer around airports to protect approach, departure, and circling airspace. Because the land uses discussed above are known to attract hazardous wildlife, the FAA discourages these land uses within Perimeters A and B. For projects that are located outside of Perimeters A and B but within Perimeter C, the FAA may review and comment on development plans to determine if the changes present potential wildlife hazards to aircraft operations (FAA 2007). AC 33B indicates that proposed land use changes that may attract hazardous wildlife within the three separation distances should be avoided, eliminated, or mitigated.

For further guidance on the construction or establishment of new municipal solid waste landfills (MSWLF) near a public airport, the FAA issued AC 150/5200-34A, *Construction or Establishment of Landfills near Public Airports* (AC 34A) (FAA 2006). AC 34A provides guidance to public airports that should be used to comply with MSWLF site limitations contained in Title 49, Section 44718(d) of the United States Code (U.S.C.), as amended by Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century. Specifically, Section 44718(d), as amended, was enacted to limit the construction or establishment of a landfill within 6 miles of certain smaller public airports (FAA 2006). The Lihue Airport (LIH) is not the type of smaller public airport the statute applies to (FAA 2014).

The County of Kaua'i (County) is responsible for properly managing municipal solid waste on Kaua'i, in the safest and most efficient manner practicable. The island's only existing MSWLF, at Kekaha, is projected to reach capacity in the coming years. Therefore, the County proposes to construct and operate a new MSWLF and a Resource Recovery Park (RRP) at the Ma'alo site. The proposed Ma'alo Landfill is located approximately 12,200 feet from the LIH AOA and falls outside of Perimeters A & B, but within Perimeter C of the separation criteria established in AC 33B. The proposed limits of waste would be approximately 13,300 feet (2.5 miles) from the nearest LIH runway, but LIH does not meet the definition of a small public airport under AC 34A. Therefore, the site limitations contained in 49 U.S.C. 44718(d), as amended, do not apply to the proposed project. Similarly, the proposed Ma'alo Landfill lies outside of the 5,000-foot and 10,000-foot buffer zones from airports that are prohibited in both the Federal and the state landfill regulations (40 Code of Federal Regulations Section 258.10(a) and Hawai'i Administrative Rules Section 11-58.1-13(a)).

Due to the proximity of the Ma'alo site to LIH, the Hawai'i State Department of Transportation (HDOT) has expressed concerns that the proposed project could attract wildlife that may pose a threat to air traffic at LIH. In response to HDOT's concerns, the County retained SWCA Environmental Consultants (SWCA) and AECOM to conduct a Landfill Wildlife Hazard Assessment (LWHA). The objective of the LWHA is to evaluate baseline conditions and wildlife attractants present at on the proposed site, and the potential of the proposed project to create new or exacerbate existing wildlife hazards to air carrier operations at LIH. The LWHA identifies specific avian attractants, avian species, and their movements in

the vicinity of the proposed landfill that may threaten safe operations at LIH. This data may be used to develop design and operational mitigation measures tailored to minimize potential hazards. SWCA and AECOM reviewed available information, completed the 12-month field study, and have prepared this LWHA to document the findings of the study. Regulatory agency comments on the LWHA are included in Appendix B. This report summarizes the results of the assessment and provides recommendations for potential landfill design features and operations that could avoid or mitigate wildlife hazards.

1.1 Study Area Locations

The LWHA team observed wildlife activity at the existing Kekaha Landfill and at the proposed Ma'alo Landfill and RRP site (refer to Figures 1–3). These two study areas are located on opposite sides of the island. The existing Kekaha MSWLF is located on the leeward (west) side of Kaua'i, approximately 1.75 miles north of Kekaha town on the Kaumuali'i Highway. As shown in Figure 2, the Kekaha study area focuses on the existing landfill and approximately 2,978 acres around the Kekaha MSWLF. The study area extends from Kekaha town, north to the Sunrise Capital shrimp farm, and up to approximately 2 miles inland from the coast, near the foothills. The Kekaha study area captures a variety of wildlife habitats including the existing landfill, agricultural areas, wooded areas, coastline, urban development, and aquatic sites.

The proposed Ma'alo site (270 acres) and alternate RRP site (80 acres) are located on the windward (east) side of Kaua'i, approximately 2.2 miles northwest of LIH, east of Ma'alo Road. As shown in Figure 3, the Ma'alo study area includes approximately 12,777 acres of variable terrain and extends from approximately Nāwiliwili Bay in the south to the Wailua River in the north, and, from the coast in the east to the foothills of Mount Wai'ale'ale in the west. The study area includes a portion of the approach, departure, and western circling airspace for LIH. As discussed in Section 3.3.2.2, some of the cattle egrets that currently forage in and around the Ma'alo site roost in locations beyond this defined study area.

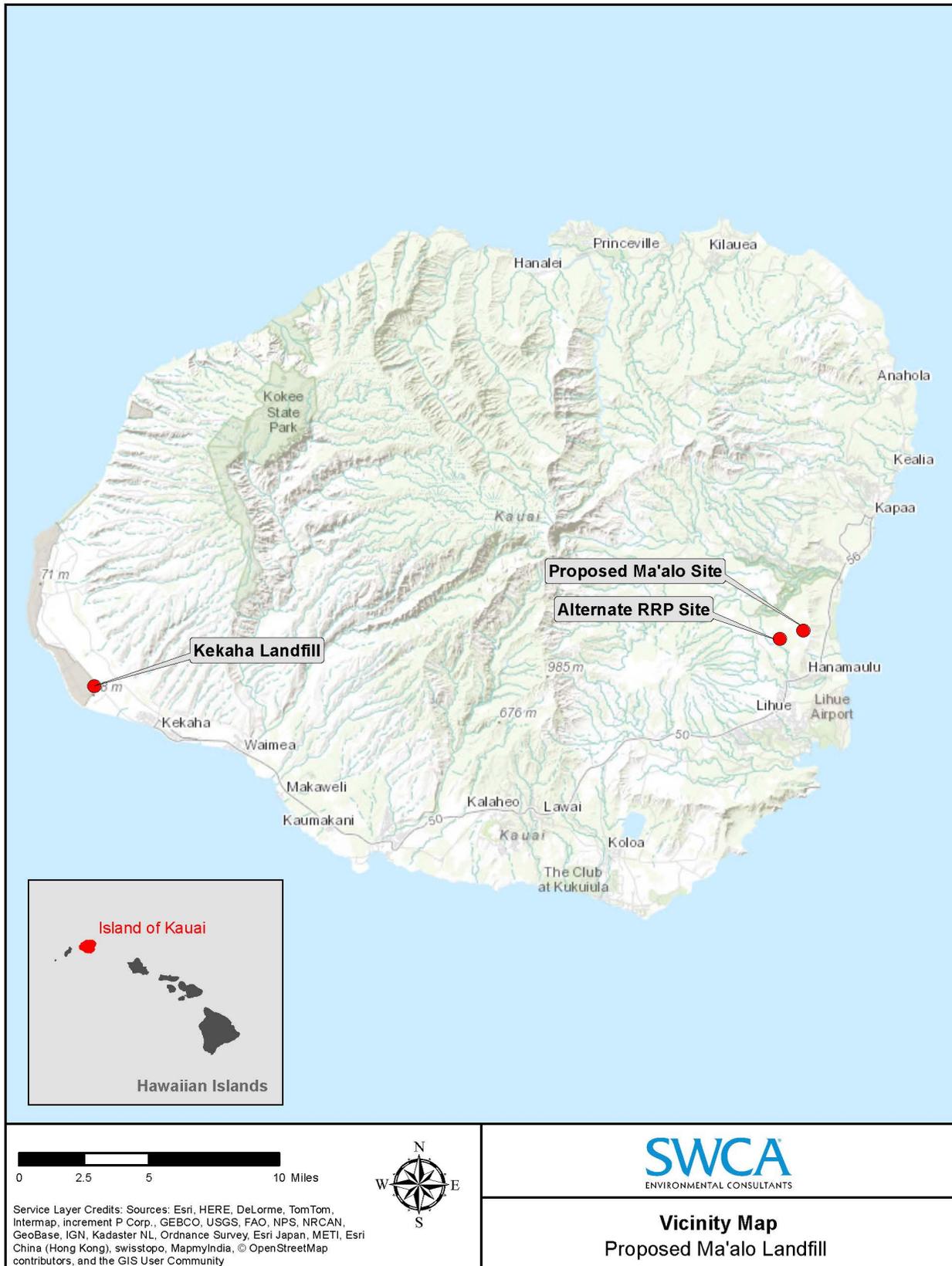
2 METHODS

The objective of this LWHA is to assess the potential for the proposed MSWLF to attract hazardous wildlife to the proposed landfill and around LIH, identify features of concern, and identify potential management alternatives. Assessing wildlife hazards for a facility that does not exist presents a challenge associated with predicting which species' behaviors are likely to be affected by the land use change, and how those species' behaviors may be affected. To address this challenge, the LWHA team studied the existing wildlife activity at the proposed Ma'alo Landfill site to determine what species are currently using the area. In addition, the LWHA team studied the wildlife activity at the existing Kekaha Landfill to establish a baseline of which species are attracted to which existing landfill features, and how these species utilize the landfill. The LWHA study includes but is not limited to reviews of existing data and field surveys.

2.1 Data Review

Wildlife Hazard Assessments (WHA) and wildlife strike data for airports are commonly studied and documented as part of airport-specific wildlife hazard management programs. These on-going studies and the associated FAA Wildlife Hazard Strike Database provide site-specific data for airports throughout the nation. In order to obtain a snap shot of the wildlife hazards that are experienced at LIH and other Hawaii airports with similar situations, the LWHA team reviewed the FAA Wildlife Hazard Strike Database and current WHAs/Wildlife Hazard Management Plans (WHMPs) for LIH and other Hawaiian airports that are situated near landfills.

Figure 1. Project Vicinity Map



The following resources were reviewed:

- *Wildlife Hazard Assessment, Lihue Airport LIH*, United States Department of Agriculture Wildlife Services (USDAWS), January 10, 2005.
- *Wildlife Hazard Management Plan Lihue Airport, Annex 1*, November 8, 2010.
- *Wildlife Hazard Management Plan, Hilo International Airport*. February 28, 2013.
- Federal Aviation Administration Wildlife Strike Database for LIH, Hilo International Airport (ITO), and Kahului Airport (OGG), Embry-Riddle Aeronautical University, 2014.

2.2 Field Surveys

The project team conducted wildlife surveys at and around the two sites over the course of 12 consecutive months (August 2014 through August 2015) following guidelines described in *Wildlife Hazard Management at Airports: A Manual for Airport Personnel* (Cleary and Dolbeer 2005). The following bullets summarize the survey activities. Sections 2.2.1 and 2.2.2, below, describe methods specific to each site.

- Point-count surveys for all wildlife were conducted twice per month, at each site, for 1 year to detect seasonal and daily patterns and movements. Each survey point was observed two times during each visit. The survey timing was coordinated to capture different times of day at each site throughout the survey period. In general, each point was surveyed during the morning hours, afternoon hours, and evening hours each month. The biologists observed each point for 5 minutes to identify general wildlife movements and uses in the viewable area. All observed activity was recorded on a data form and entered into a database (refer to Appendix A). Data includes species observed, number of individuals, activity, location, and direction of movements, along with a rough estimation of altitude.
- In addition to the point-count surveys, the biologists conducted inspections of various facilities, gulches, urban areas, aquatic sites, and surrounding areas to determine whether these features attracted wildlife.
- Nighttime spotlight surveys were performed four times during the year and consisted of approximately 2 hours of spotlighting wildlife at the Ma'alo and Kekaha sites. The biologists drove through the sites using a spotlight to detect wildlife by looking for eye shine. This provides information regarding nocturnal species' use of the sites.
- Based on feedback from USDAWS, the LWHA team conducted cattle egret (*Bubulcus ibis*) roost surveys in the vicinity of the sites. Three evenings of helicopter surveys were conducted within a 2-hour time window between 1.5 hours before sunset and 0.5 hour after sunset. One helicopter survey was conducted in the vicinity of the Kekaha landfill and two helicopter surveys were conducted in the Ma'alo vicinity. The biologists recorded roost locations using the Global Positioning System and estimated the number of birds using the roosts. The flight path directions of birds arriving were also recorded for each roost.
- To determine the roost locations for the cattle egrets that currently use the Kekaha Landfill and the Ma'alo Site (and vicinity), ground-based cattle egret roost surveys were also conducted, in the dawn and dusk hours. When a roost was identified, the numbers of egrets using the roost were estimated, and flight patterns to and from the roost were determined.

To facilitate the identification of avian movements in the study areas, the LWHA team divided both the study areas into zones, as shown in Figures 2 and 3. The Kekaha study area included five zones, and the Ma'alo study area included 10 zones. The zone boundaries were based on geographic features that are easily identifiable in the field.

The zones were established to assist the surveyors in identifying trends in avian movements. For instance, avian species are often observed utilizing the same flight paths at certain times of day. By establishing observation zones, the biologist can document that an avian species moves from one zone to another zone. This allows the LWHA team to hone in on the routine avian flight paths that occur in the study areas.

2.2.1 Kekaha Landfill

Survey data collected at the Kekaha Landfill provided insight into which avian species utilize the existing landfill on Kaua'i. The intent of the survey methodology at Kekaha was to identify which landfill features and adjacent areas are attractive to avian species, which species utilize the features, and how they utilize the features. To accomplish this, the survey team established six survey points at the landfill. Recognizing that an operational landfill is dynamic, the survey team established the points based on the landfill features and adjacent areas of interest. Due to the dynamic nature of an operational landfill, the survey points were adjusted throughout the survey period. However, the features that each point focused on remained consistent. Figure 2 shows the Kekaha survey area and general location of the survey points. The following bullets provide brief discussions of the survey points and the features of interest near each point:

- **Kekaha 1 (K1):** K1 was located at the leachate evaporation pond located between the landfill entrance and the landfill office. K1 allowed for direct observation of the active leachate pond, the stormwater infiltration basin, the public drop-off area, the office, and the eastern slope of the landfill. Data from K1 provides information on avian species attracted to engineered aquatic features, developed areas, and the finished and vegetated slope of the landfill.
- **Kekaha 2 (K2):** K2 was situated on the southern finished and vegetated slope of the landfill. This point provided a view of the drainages and windrows that border and bisect the landfill, and agricultural areas located to the south and east. Data collected from K2 provided information on avian species utilization of the finished and vegetated slopes of the landfill, adjacent agricultural areas, adjacent windrows and woodlands, and movements between these features and the active face of the landfill.
- **Kekaha Active Face (KAF):** KAF was located at the active portion of the landfill, the location of which changed over the course of the study but was generally in the northwestern portion of the landfill. This area included the uncovered waste pile and soil-covered waste areas that are utilized for soil and equipment staging. In general, the active face includes all areas where equipment was operating while placing and compacting waste. The focus of KAF was to document the species that utilize the active face. Data collected at KAF provided insight on which species are attracted to the active face, how the species access the active face, and how and when they utilize it.
- **Kekaha Inactive Face (KIF):** KIF was located on the landfill face but outside of the active area. This area included the portions of the landfill face that were compacted and covered with soil (interior cover). Portions of the inactive areas were graded and vegetated. Typically, these areas are situated adjacent to the active face but outside of the currently active area. Data collected at KIF provide information on how avian species utilize those portions of the landfill that are not active, are covered with soil, and/or vegetation, but have not been completed with final cover.

Figure 2. Kekaha Landfill Study Area



- **Kekaha Shrimp Ponds (KSP):** KSP was located at the top of the landfill, facing the shrimp ponds located north of the landfill. KSP focused on identifying which species are attracted to the manmade aquatic features and the trees between the landfill and the shrimp ponds.
- **Kekaha Green Waste (KGW):** KGW was located at the Kekaha green waste collection area on the vegetated portions of the closed Kekaha Phase I Landfill. At this point, the surveyors focused on which species are utilizing the active and inactive portions of the green waste stockpiles. This point includes the unprocessed green waste piles, the chipped and piled green waste rows, and vegetated portions of the closed Kekaha Phase I Landfill.

2.2.2 Ma'alo Site

The goal of the surveys at and around the proposed Ma'alo Landfill site was to assess the existing conditions, attractants, and wildlife movements at and around the proposed site with emphasis on locations relative to LIH flight patterns. The biologists collected data on wildlife uses and movements in the area to assess existing hazards and determine which wildlife movements might be affected by the proposed project. To accomplish this, the LWHA team conducted point count surveys at nine fixed points and also conducted windshield surveys in the area of concern. Windshield surveys involved documenting observed avian movements and activities while driving between survey points and through and around the survey area. The survey points were situated near the proposed Ma'alo site and LIH flight paths. Figure 3 shows the Ma'alo survey area and general location of the survey points. Each survey point provided views of attractants such as gulches, waterbodies, developed areas, etc. The windshield survey routes varied based on the wildlife movements observed during each survey event.

3 RESULTS

3.1 Existing Wildlife Attractants in the Study Areas

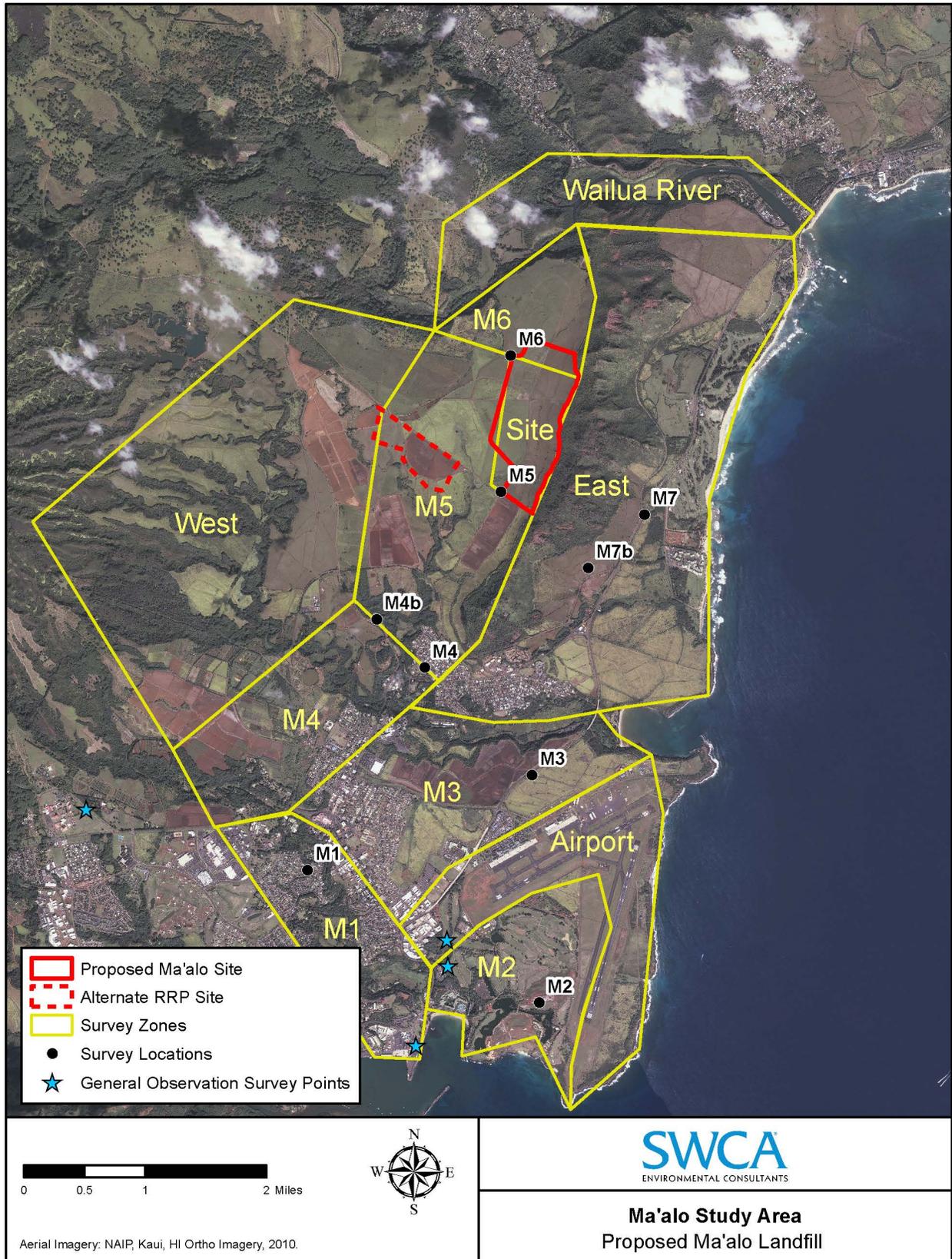
Wildlife attractants can generally be classified as food, water, and cover. The guiding document for identifying wildlife habitat is AC 33B, *Hazardous Wildlife Attractants on or near Airports*. The areas of interest for this study were identified with field surveys and geographic information system (GIS) data. Both color aerial photography and infrared imagery (raster imagery) were used for this analysis. The imagery was obtained from the State of Hawai'i Office of Planning, Hawai'i Statewide GIS Program (State of Hawai'i 2015). For the purposes of this study, it is not important to identify individual plant species, but rather to identify various habitat types such as forest, grassland, agricultural field, water, etc. The wildlife attractants in the Ma'alo and Kekaha study areas include non-native forests, agricultural fields and grazing lands, gulches, waterbodies, golf courses, and development. These habitats are discussed below and shown in Figures 4 and 5.

3.1.1 Non-native Forests

Forests in the vicinity of Ma'alo are comprised mainly of dense tall stature Albizia trees (*Falcataria moluccana*, *Albizia chinensis*), while forests in the vicinity of the Kekaha Landfill are mainly shorter stature kiawe (*Prosopis pallida*) and koa haole (*Leucaena leucocephala*).

Albizia trees typically occur in dense stands with a thick grassy understory, mostly of guinea grass (*Urochloa maxima*). These dense nearly monotypic stands are generally low in bird diversity; vocalizations of small canopy or understory birds such as the Japanese white-eye (*Zosterops japonicus*), house finch (*Carpodacus mexicanus*), and hwamei (*Garrulax canorus*) are typically heard. The stands are normally too dense to accommodate larger birds such as cattle egret within the habitat, but these species can be found along the edges.

Figure 3. Ma'alo Site Study Area



A recently planted eucalyptus plantation is present near the proposed Ma'alo site. Trees in the plantation were approximately 2 to 5 feet tall when this study began; by the end of the survey work, some trees had grown to approximately 25 feet. Based on communications with the plantation maintenance crew, the owners plan on harvesting the trees every 3 to 5 years.

Kiawe/koa haole non-native forest can consist of dense stands (e.g., closely spaced stands of koa haole) or more open stands with trees spaced further apart with a grassy understory. The bird diversity in dense stands is very similar to the Albiza forest—while the more open stands have greater small bird diversity (Japanese white-eye, Japanese bush warbler [*Horornis diphone*], northern cardinals [*Cardinalis cardinalis*], hwamei, various species of finches, etc.), larger birds are also able to fly and roost within the more open stands and can include birds such as barn owls (*Tyto alba*), pueo (*Asio flammeus sandwichensis*), and cattle egret.

3.1.2 Agriculture and Grazing Lands

Agricultural and grazing lands occur at the proposed Ma'alo site and in its vicinity (Zones: Site, M5, M6, and parts of M3, M4, and East), while Kekaha is mainly surrounded by agricultural lands (Zones: D4 and D2). Grazing lands comprise the entire proposed Ma'alo landfill site, and agricultural (crop) lands comprise the entire alternate RRP site at Ma'alo.

Corn is the most abundant crop in the study areas. The cornfields go through a cycle of growth, followed by harvesting, then fallow fields. Harvesting cycles do not appear to be synchronized. Fields in various stages of growth (or fallow) are often present. Nēnē (Hawaiian geese) were observed foraging and bedding down in recently harvested or recently fallow fields with low vegetative cover located near the Ma'alo sites. Rock pigeons (*Columba livia*) were observed foraging in recently harvested fields in flocks of more than a hundred birds. The introduced barn owl and native pueo were seen hunting over agricultural lands at dusk. Rose-ringed parakeets (*Psittacula krameri*) forage in large flocks in patches where corn is left unharvested. Cattle egret were regularly noted loafing and foraging in recently harvested or fallow fields, and often follow behind machinery to collect insects and reptiles. Spotted and zebra doves (*Streptopelia chinensis* and *Geopelia striata*), common myna (*Acridotheres tristis*), and large flocks of finches were typically observed foraging and loafing in agricultural fields and unpaved roads.

Grazing lands are those areas being actively grazed by cattle and goats. Grazing lands attract cattle egret, which are often seen perched on cattle or foraging in the grass. All finch species present can be expected to feed on seed heads of the grasses within grazing lands.

3.1.3 Gulches

Gulches are more abundant near the Ma'alo site than the Kekaha site. Three main watercourses run through the survey area: Nāwiliwili Stream (Zones M1 and M4), Hanamā'ulu Stream (Zones M3, M4, and M5), and Wailua River (Wailua River and Zone M6). Trees common in gulches, particularly along banks of streams are hau (*Hibiscus tiliaceus*), kiawe, parasol leaf tree (*Macaranga tanarius*), ironwood (*Casuarina equisetifolia*), and African tulip tree (*Spathodea campanulata*). Gulches provide roosting opportunities for communal species such as cattle egret and common myna and are flight corridors for many species. Cattle egrets were often seen flying along gulches at dawn and dusk as they commuted between their roosts and foraging grounds.

3.1.4 Wetlands and Waterbodies

Waterbodies present in the Ma'alo and Kekaha study areas include reservoirs and irrigation ditches within agricultural and grazing lands. Ponds and lagoons are present as water features within golf courses near the proposed Ma'alo site. Shrimp ponds are adjacent to the Kekaha Landfill (Zone D3).

Small patches of wetland, irrigation ditches, reservoirs, and ponds are present within the agricultural and grazing fields in both study areas. The United States Army Corps of Engineers (USACE) has confirmed that the proposed Ma'alo site “does not contain waters of the US, nor any adjacent wetlands” (USACE 2013). The reservoirs near the sites are primarily steep-banked with fluctuating water levels. Hawaiian ducks (*Anas wyvilliana*) are often observed using the reservoirs and in small ponds after rain. Irrigation ditches may harbor the native Hawaiian moorhen (*Gallinula chloropus sandvicensis*) and Hawaiian coot (*Fulica alai*). Hawaiian stilts (*Himantopus mexicanus knudseni*) were observed foraging in ephemeral patches of standing water and in shallow areas within irrigation ditches. Large irrigation canals are often tree lined and cattle egrets were observed roosting in trees along the banks (e.g., Zone D2 at Kekaha Landfill).

Several shrimp ponds are present at Kekaha. Most of the active ponds were covered with netting that excludes birds. Several ponds immediately adjacent to the active landfill had shallow standing water and were often used by Hawaiian stilt, black-crowned night heron (*Nycticorax nycticorax*), cattle egret, spotted and zebra doves, and common myna for foraging and loafing. The Hawaiian stilt was observed on two occasions in the Kekaha Landfill leachate evaporation pond, when water was present.

Ponds and lagoons are often present within golf courses as water features (Zone M3 and East). These ponds were used by all native Hawaiian water birds (Hawaiian moorhen, Hawaiian coot, Hawaiian duck, Hawaiian stilt, and black-crowned night heron) for foraging. Water birds appear to be more prevalent around water features on the golf course as compared to reservoirs within agricultural areas, likely because of the proximity of short grass in golf courses available for loafing and foraging. Cattle egret roost in trees growing next to lagoons (e.g., in hau trees at Kaua'i Lagoons Golf Course in Zone M2).

3.1.5 Golf Courses and Resorts

Golf courses and resorts are present in the general vicinity of the proposed Ma'alo site. These landscaped areas feature mowed or short grasses, scattered trees, and water features such as ponds or lagoons. Golf courses and resorts are attractive to many of the introduced birds in Hawai'i as well as to native water birds and Hawaiian goose, which loaf or forage on the short grass and utilize the water features. Other introduced birds such as cattle egrets, common myna, spotted and zebra doves, chickens, and finches are ubiquitous. The Pacific golden plover (*Pluvialis fulva*) is also common, and other migrants, such as the ruddy turnstone (*Arenaria interpres*), are occasionally present.

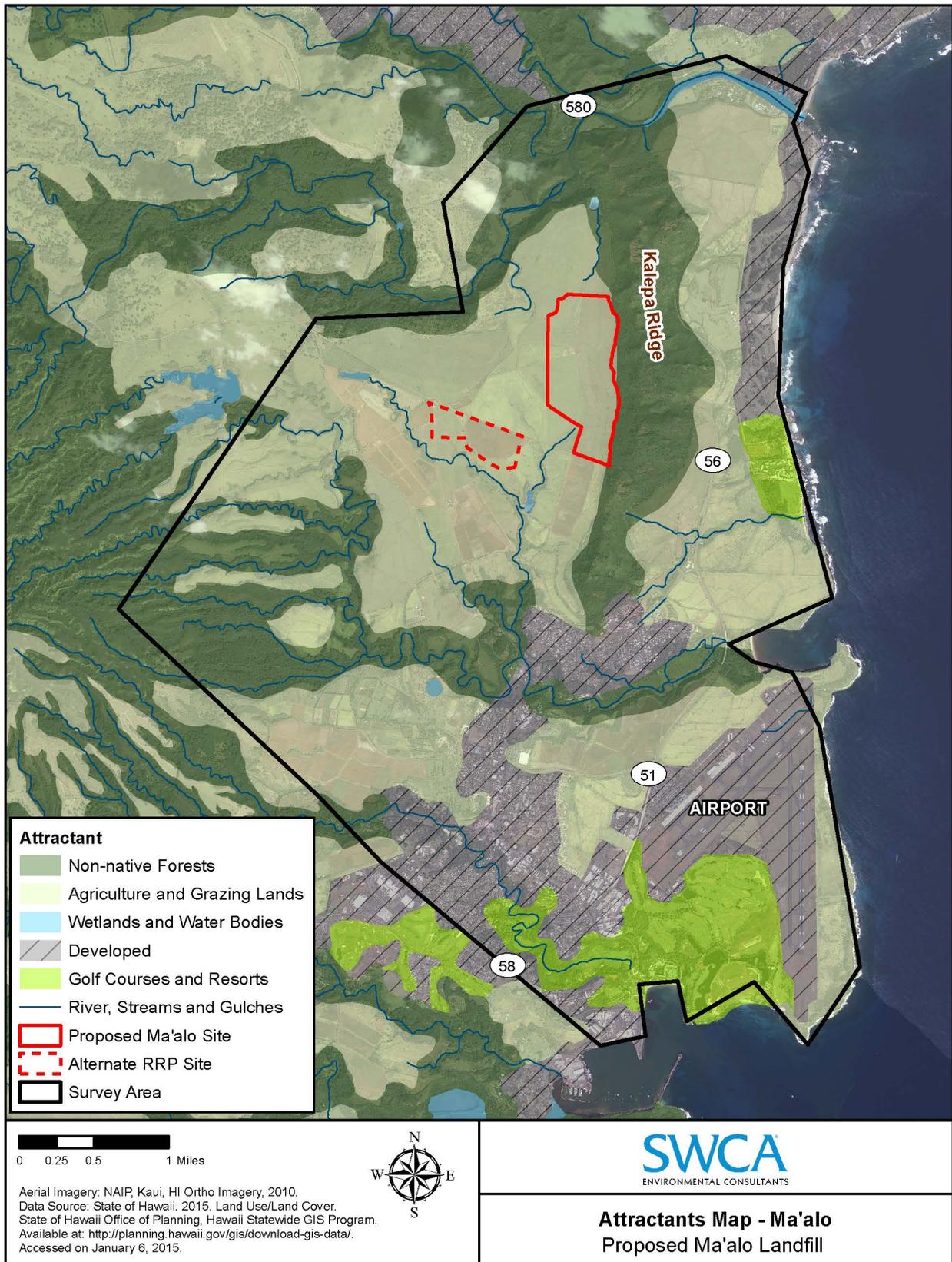
3.1.6 Development

Developments, including residential subdivisions, retail facilities, industrial areas, and schools were present in both survey areas. Most developments had paved roads, scattered ornamental and fruit trees, and mowed grass. Scattered trees and mowed grass are attractive to many of the introduced birds in Hawai'i for roosting and foraging. Birds such as cattle egrets, common myna, spotted and zebra doves, chickens, and finches are ubiquitous in developed areas throughout Kaua'i. The Pacific golden plover is also common, particularly in grassy lawns around houses and cemeteries.

Figure 4. Kekaha Landfill Attractant Map



Figure 5. Ma'alo Site Attractant Map



3.2 Existing Data Analysis

To gain insight about which species present significant challenges to wildlife hazard management at Hawaiian airports, the LWHA team evaluated existing data from some of the Hawaiian airports that are situated near existing landfills. The reviewed data included strike reports that occurred from January 1, 2004, through December 16, 2014 at LIH, Hilo International Airport (ITO), and Kahului Airport (OGG). Based on the existing data, the following groups of avian species pose hazard concerns:

- **Wading Birds and Shorebirds:** Pacific golden plover is responsible for the most documented strikes at all the reviewed airports. Other birds from this guild included sanderling (*Calidris alba*), ruddy turnstone, cattle egret, and Hawaiian stilt.
- **Cattle egret:** Cattle egret are only documented to have been involved in two strikes at the three reviewed airports from January 1, 2004, through December 16, 2014. However, they are large flocking birds, abundant on Kaua'i, and have been documented to travel over 15 kilometers daily to access a feeding site (Paton et al. 1986); therefore, they are a concern for aviation managers.
- In 1982, the FAA contracted the United States Fish and Wildlife Service (USFWS) to study the ecology of cattle egrets in the Hilo area. The goal was to postulate potential cattle egret control methods at ITO (Paton et al. 1986). A combination of lethal control for short-term problems and deterrent methods for long-term problems were recommended.
- **Columbids:** Based on the number of documented strikes, spotted dove, zebra dove, mourning dove (*Zenaida macroura*), and rock pigeon are among the top four groups (cumulatively) of species involved with aircraft strikes at all the reviewed airports.
- **Owls:** Based on the number of documented strikes, barn owl and short-eared owl (*Asio flammeus*) are among the top four groups of species involved with aircraft strikes at LIH and OGG.
- **Munias:** Based on the number of documented strikes, chestnut-breasted mannikin (*Lonchura castaneothorax*), nutmeg mannikin (*L. punctulata*), and tricolored munia (*L. malacca*) are among the top four groups of species involved with aircraft strikes at LIH and ITO. Chestnut-breasted mannikin is among the top five species requiring deterrence at LIH (USDAWS 2005).
- **Hawaiian goose:** FAA considers geese to be a no-tolerance species at airports (Cleary and Dolbeer 2005). HDOT has spent considerable resources on the management of this species at LIH and other Hawaiian airports.
- **Larks:** Western meadowlarks (*Sturnella neglecta*) are among the top five species requiring deterrence at LIH (USDAWS 2005). Based on the number of documented strikes, skylark (*Alauda arvensis*) is among the top four groups of species involved with aircraft strikes at OGG.

These avian groups represent hazard concerns for the reviewed airports because they are attributed to over 60% of the airport's strikes (cumulatively), identified as requiring significant deterrence efforts, identified as a zero tolerance species, or are present at or near the airfields in large flocks.

3.2.1 Lihue Airport Wildlife Hazard Assessment

According to the LIH WHA, egrets, doves, plovers, owls, ducks, and geese are hazards to aircraft at LIH (USDAWS 2005). The 2005 LIH WHA analyzed available data from strikes that occurred from 1995 through 2003. The study concluded that 24.13% of the strikes involved unknown species, 28.26% of the

strikes involved Pacific golden plover, 14.7% involved zebra dove, 8.6% involved chestnut-breasted mannikin, 6.93% involved barn owl, 5.83% involved Hawaiian short-eared owl, spotted dove accounted for 5.27%, western meadowlark accounted for 8.7%, and common myna accounted for 4.35% of the documented strikes (USDAWS 2005).

USDAWS conducts capture and relocation efforts, dispersal techniques, and lethal removal to deter wildlife from interfering with air operations at LIH. In 2003, the five species with the greatest number of individuals deterred included chestnut-breasted mannikin, Pacific golden plover, zebra dove, western meadowlark, and spotted dove (USDAWS 2005).

Although cattle egret and Hawaiian goose were not among the species most often struck or deterred at LIH, these species are likely a significant concern to LIH operations due to their presence near and on the airfield, size, and flocking behavior. An adult Hawaiian goose can weigh between 3.4 and 6.7 pounds. Birds that weigh over 4 pounds exceed the airframe and engine certification standards for wildlife strikes (Cleary and Dolbeer 2005). The FAA recommends zero tolerance of geese on airfields (Cleary and Dolbeer 2005). Adult cattle egrets weigh an average of 0.75 pound (Sibley 2003). Cattle egrets gather in large flocks and make daily dawn and dusk flights to roost sites at elevations that can conflict with incoming/outgoing aircraft. Hawaiian geese and cattle egrets are capable of causing substantial damage to aircraft, if involved in a strike. Significant numbers of cattle egret are currently present in the golf course between and adjacent to LIH's two runways, and throughout the site vicinity, and an ongoing program is underway to remove Hawaiian geese from the area.

3.3 Field Survey Results

Avian point-count survey data were compiled into a Microsoft Access database to facilitate analysis. The data were analyzed to identify avian wildlife and their movements. This was accomplished by categorizing the observed avian species into guilds. A guild is a group of species that use environmental resources in similar ways. Guilds do not always follow taxonomic classifications. For the purpose of this study, guilds were assigned based on the species' observed behaviors and their expected responses to common management actions. Identification of the various guilds using the Kekaha Landfill and Ma'alo site environments allowed the biologists to accurately identify which resources attract the guilds.

Once the species were categorized in guilds, the number of individuals observed, average group size, and group range of each guild were determined. The number of individuals observed cannot be interpreted as a population count because the same individuals were likely recorded on multiple surveys. Average group size is defined as the average number of individuals recorded per observation, and range represents the minimum and maximum number of individuals recorded during any observation.

3.3.1 Kekaha Landfill

3.3.1.1 KEKAHA AREA AVIAN SURVEYS

A total of 27,687 birds were observed during the avian surveys at Kekaha Landfill. Table 1 summarizes the avian point-count survey results for each avian guild observed during the surveys. Appendix A includes a list of species observed and the guild to which each species was assigned. A discussion of each guild follows Table 1. Figure 6 includes a map of the most common avian movements observed at the Kekaha Landfill.

Figure 6. Common Avian Movements at the Kekaha Landfill



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Table 1. Summary of Avian Point-Count Results at the Kekaha Landfill

Avian Guild	No. of Individuals Observed	Average Group Size (Range)	% of Individuals Observed
Sturnidae	13,493	19 (1–600)	49
Wading Birds and Shorebirds	9,686	10 (1–500)	35
Columbids	2,362	4 (1–130)	9
Sparrows, Finches, and Munias	1,158	4 (1–25)	4
Game Birds	699	3 (1–16)	3
Geese	121	4 (1–11)	<1
Ground Feeding Birds	95	1 (1–4)	<1
Gleaning Birds	24	1 (1–4)	<1
Owls	19	1 (1–5)	<1
Water Birds	5	2 (1-2)	<1
Seabirds	2	1 (1–1)	<1
Unidentified Birds	23	8 (1-20)	<1
Total Birds	27,687	10 (1–600)	n/a

Sturnidae

Common myna is in the Sturnidae family, along with starlings. These species are gregarious and travel, forage, roost, and nest in large groups. Common myna is the only Sturnidae species observed in the Kekaha study area. During the surveys, common myna was documented on 716 occasions. In total, these occurrences included 13,493 observed individuals. The most common activity observed among the common myna involved low altitude local movements from the adjacent trees and shrubs to the Phase II landfill. Once on the Phase II landfill, most the individuals were standing/loafing on the soil-covered face or foraging on the active face. Groups ranging from 200 to 600 common mynas were commonly observed standing/loafing on the soil-covered face, presumably staging or resting between feedings at the active face. Out of 716 common myna observations, 141 (19.7%) observations included common myna making long flights to access the landfill. The data indicate that common myna are attracted to the landfill for foraging. While at the landfill, they make short flights between the soil-covered face and the active face. The typical behavior is to roost in the trees surrounding the landfill, forage on the active face, rest on the soil-covered face, then return to the trees.

Wading Birds and Shorebirds

Typically, wading birds and shorebirds have long legs to wade through water or grass, long necks to extend towards prey, and sharp bills to capture prey. These birds hunt by standing motionless in grass or water and capture prey with quick strikes or by probing substrates for insects with their long bills. In the Kekaha study area, the guild is represented by cattle egret, Pacific golden plover, black-crowned night heron, and Hawaiian stilt. Approximately 35% of the birds observed in the Kekaha area were from this guild, most of which were cattle egrets.

Cattle egrets were observed at and near the Kekaha Landfill during all survey events and account for 94% of the wading bird observations. Most occurrences involved individuals loafing on the various landfill

features, foraging in the adjacent shrimp ponds, and conducting long flights at various altitudes through the survey areas. Groups including as many as 90 individuals were noted making long flights to or from the landfill. Thirty observations included cattle egrets making long flights at estimated altitudes exceeding 100 feet above ground level. Many flights were directly to or from a roost to the landfill. Due to their flocking behavior, large size, attraction to the landfill, and tendency to make long flights to access foraging and roosting areas, cattle egret are a concern to aviation on Kaua'i.



Photo 1. View of cattle egret loafing on the soil-covered face at Kekaha Landfill.

Pacific golden plover were observed on 15 occasions, primarily between October 2014 and January 2015. Pacific golden plover were observed at the leachate pond, the soil covered face, and green waste piles at the landfill. Based on the low number of observations, it appears that Pacific golden plover has little attraction to the landfill. The remaining observations involved movements between the adjacent agricultural fields, beach, and woodlands. There is no indication that this species is attracted to the active face of the landfill.

Black-crowned night herons and Hawaiian stilts account for 5% of the wading birds observed in the Kekaha study area. Most of these observations were associated with these species foraging in the adjacent shrimp ponds or making long flights to access the shrimp ponds. These species have not been observed utilizing the active landfill face for foraging; however, both species were observed on ten occasions foraging and/or loafing at the leachate evaporation pond, when water was present.

Columbids

The columbid guild is comprised of rock pigeon, spotted dove, zebra dove, and unidentified dove species. In 578 observations, 2,362 columbids were documented. Thirteen observations included spotted and zebra doves on the active face; conversely, 130 observations included individuals on the soil-covered face and 179 observations included vegetated areas on the landfill. Zebra doves and spotted doves were observed on the landfill; however, rock pigeons were largely observed utilizing the agricultural fields adjacent to the landfill. The zebra dove and spotted dove utilized the landfill for foraging, loafing/standing, local movements, and perching. These data indicate that zebra doves and spotted doves are attracted to many features in the landfill setting, but rock pigeons are mostly attracted to agricultural areas near the landfill.

There were only 29 observations of long flights to or from the landfill, four of which were reported at greater than 100 feet above ground level. This indicates that columbids are not traveling long distances to access the landfill.

Sparrows, Finches, and Munias

This guild is represented by smaller flocking bird species that forage on and near the ground, in brush, and in tree canopies. They fly from location to location, gathering seeds and insects. At the Kekaha study area, species in this guild include African silverbill (*Lonchura cantans*), chestnut munia (*Lonchura atricapilla*), nutmeg mannikin, house sparrow (*Passer domesticus*), Java sparrow (*Padda oryzivora*), house finch, and red avadavat (*Amandava amandava*). Species from this guild were observed on 270 occasions during the survey period. Of these observations, 24% included individuals on the active face and soil-covered face of the current Phase II Landfill. Most of the occurrences on the Phase II Landfill included house sparrows. The remaining observations occurred in the adjacent woodlands, grassy areas, and shrubs. The surveyors did not observe any of these species conducting long flights to access the landfill. The data indicate that the sparrows, finches, and munias at Kekaha are there because of the vegetated areas around the landfill. Occasionally a few individuals will leave the vegetated areas to forage for insects on the active face.

Game Birds

In the Kekaha study area the game bird guild includes Kaua'i chicken, black francolin (*Francolinus francolinus*), gray francolin (*F. pondicerianus*), and Erckel's francolin (*F. erckelii*). Game birds spend most of their time on or near the ground, only making short, low-elevation flights when necessary. Game birds were observed 203 times throughout the survey period. Ninety-five percent of the observations included Kaua'i chicken, which are prevalent throughout the island of Kaua'i. Nearly all of the Kaua'i chicken observations included individuals foraging or loafing at various portions of the landfill. In general, game birds remain on or close to the ground and do not make long-flights. The data and game bird flight behaviors indicate that Kaua'i chickens are attracted to the landfill for foraging purposes but are not expected to make long flights to access the landfill.

Geese

The Hawaiian goose is the only species from the geese guild observed in the Kekaha study area. Only three Hawaiian goose observations included groups making long flights over the active face of the landfill. All of these flights crossed over the active face and terminated in the vicinity of the shrimp ponds. Of the Hawaiian goose observations, 50% were associated with the adjacent shrimp ponds (originated or terminated in Zone D3). Eleven observations including 40 individuals (some of which are likely repeat sightings) indicated an attraction to the green waste piles and/or the vegetated areas in and around the closed Phase I portions of the landfill. Most of these observations included loafing geese. One observation of 10 individuals foraging in the short grass in the Phase I Landfill was noted. Based on the survey data, it appears that Hawaiian geese are attracted to the shrimp ponds or adjacent vegetation in Zone D3 and have some attraction to the green waste piles and grass areas in various portions of the landfill. There is no indication that Hawaiian geese are attracted to the active face, leachate pond, stormwater basin, or other MSW management facilities at the landfill.

Ground Feeding Birds

At Kekaha, this group includes northern cardinal, red-crested cardinal (*Paroaria coronata*), and northern mockingbird (*Mimus polyglottos*). Although these species are not closely related, they have a tendency to feed on the ground in search of seeds, insects, and fruit. These species were observed on 78 occasions. Only eight of these observations were at Phase II Landfill features (all on the soil-covered face). Sixty-three percent of the observations were associated with the vegetated areas at or adjacent to the green waste pile and Phase I Landfill. Based on the data, the cardinals and northern mockingbird do not appear

to be attracted to the landfill features, but are in the area due to the trees and shrubs surrounding the landfill.

Gleaning Birds

Gleaning birds move up, down, and around vegetation gathering insects from leaf and stem surfaces. This feeding technique keeps the birds close to vegetation except when the bird flies from one tree/shrub to another. These flights are typically short and stay within the target vegetation type. Gleaning bird species observed at Kekaha include Japanese bush warbler and Japanese white-eye. These species were observed or detected by vocalizations on 19 occasions in the vegetated areas adjacent to the landfill. There is no indication that gleaning birds are attracted to any of the landfill features.

Owls

Barn owl and short-eared owl comprise this guild. These two species were observed 13 times during the Kekaha surveys. All the barn owl observations occurred in the early evening hours and involved foraging or interactions with other owls in the vegetated portions of the Kekaha Landfill. Short-eared owls were observed at various times of day on and off the landfill. Owls are attracted to the landfill by the small mammal prey base that is assumed to exist there. There is no evidence that owls are making long, high-altitude flights to access the landfill. It appears they are roosting or perching in the nearby trees in the daytime and foraging at the landfill in the evening.

Water Birds

Hawaiian duck was observed on two occasions in the vicinity of the shrimp ponds located north of the Kekaha landfill. Hawaiian moorhen was observed once in a marshy area located several miles north of the landfill. Water birds were not observed utilizing the landfill property. There is no indication that water birds are attracted to the landfill, the landfill leachate pond, or the landfill infiltration basin. These features were generally dry during the survey period, which decreases the pond's attraction to water birds.

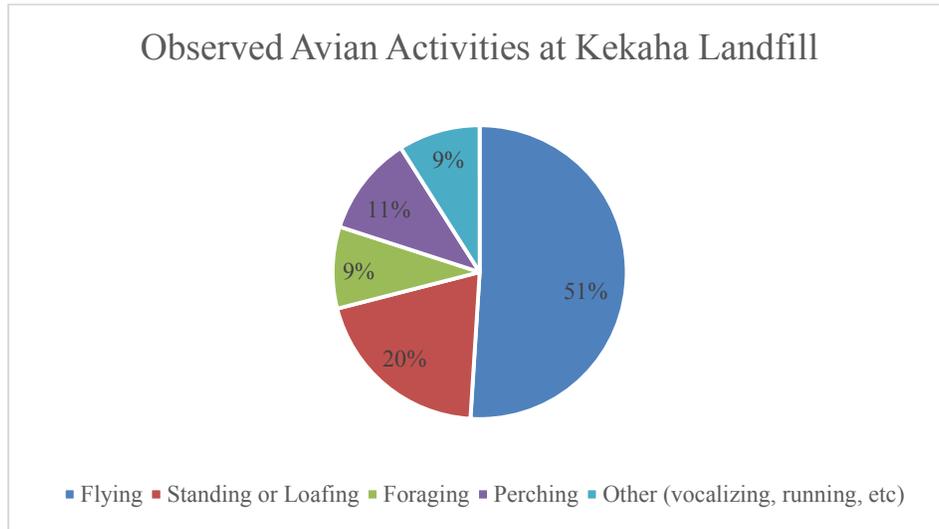
Seabirds

The seabird guild consists of species that spend most of their life on or near the sea. Laysan albatross (*Phoebastria immutabilis*) and great frigatebird (*Fregata minor*) were the only seabirds observed in the Kekaha study area. In both instances, these individuals were observed soaring or making a long flight in the proximity of the ocean just west of the landfill. There is no indication that seabirds are attracted to the landfill.

3.3.1.2 COMMON AVIAN ACTIVITIES AT AND AROUND KEKAHA LANDFILL

The survey efforts document a variety of avian activities in the survey area. Some activities are rarely observed, such as nest building. Other activities are very common, such as local movements. Analysis of the common activities observed provides insight on how avian species utilize the landfill. Out of 2,893 observations, 51% involved avian species flying to, from, or around the landfill. Twenty percent of the observations included avian species loafing or standing on the landfill property. Some of these birds were loafing near the active face of the landfill between foraging activities. Nine percent of the observations included avian species foraging on the landfill. Foraging opportunities are the main attraction to the landfill and the active face is the main source of resources. The relatively small number of observations attributed to foraging is a result of the birds foraging behaviors. Most of the birds were in flight or loafing around the active face and moving into the active face for many short duration foraging attempts.

Graph 1. Observed Avian Activities



In terms of numbers of birds observed, the most utilized features at the landfill by decreasing order of use are the soil-covered face (landfill areas with intermediate cover), active face, green waste pile, and leachate pond and infiltration basin. During operating hours, the number of birds observed utilizing the soil-covered face and active face ranges between 28 and 2,548 birds per survey, most of which are common myna and cattle egret. The average number of birds observed utilizing the active face and soil-covered face during landfill operating hours was 567 individuals per survey.



Photo 2. View of cattle egret foraging on the active face at Kekaha Landfill.

The second most utilized feature is the active face. Based on data from eight of the surveys there is an average of 49 birds on the active face while the canvas is applied (waste is temporarily covered with a canvas tarp). Conversely, there is an average of 109 birds on the active face while the canvas is not applied. This indicates that the general attraction to the landfill for foraging decreases once the canvas is applied to the active face. However, the common mynas do not leave the landfill immediately following application of the canvas; instead, they move to the soil-covered face to loaf.

3.3.1.3 KEKAHA AREA CATTLE EGRET ROOSTS

A total of eight nighttime cattle egret roosts and one daytime roost were identified by land based and helicopter surveys in the vicinity of the Kekaha landfill and surrounding area (refer to Figure 6). The biologists confirmed that birds from the six roosts that are within 2.9 miles of the landfill regularly utilize the landfill. These roosts include a day roost located immediately adjacent to the landfill that is only used during the daytime by birds that are foraging at the landfill. One night roost is approximately 0.5 mile east of the landfill in a tree-lined irrigation channel situated between agricultural fields. Two additional roosts are located along the same irrigation channel approximately 0.6 mile and 1.3 miles, respectively, north of the landfill. A night roost is located at Kekaha Beach Park approximately 1.6 miles southwest of the landfill. The Kekaha Beach roost is seasonal and utilized as a rookery. The sixth roost is located in a forested irrigation channel near Hukipo Road between agricultural fields immediately inland of Kekaha town.

Three other cattle egret roosts were identified, but it is not known whether they are used by birds that forage at the landfill. Two of these roosts are located in the town of Waimea at a distance of 5.3 and 5.9 miles east of the landfill. One of these two roosts is located in a tree at the edge of a reservoir between Haina Road and Waimea Canyon Drive. The furthest roost is located in trees along the eastern bank of the Waimea River. The largest night roost was identified by helicopter approximately 5.6 miles northwest of Kekaha Landfill near Polihale Beach Park. There were approximately 300–400 birds at the Polihale Beach Park roost, with many flocks arriving from the southwest around dusk.

3.3.1.4 KEKAHA SPOTLIGHT SURVEYS

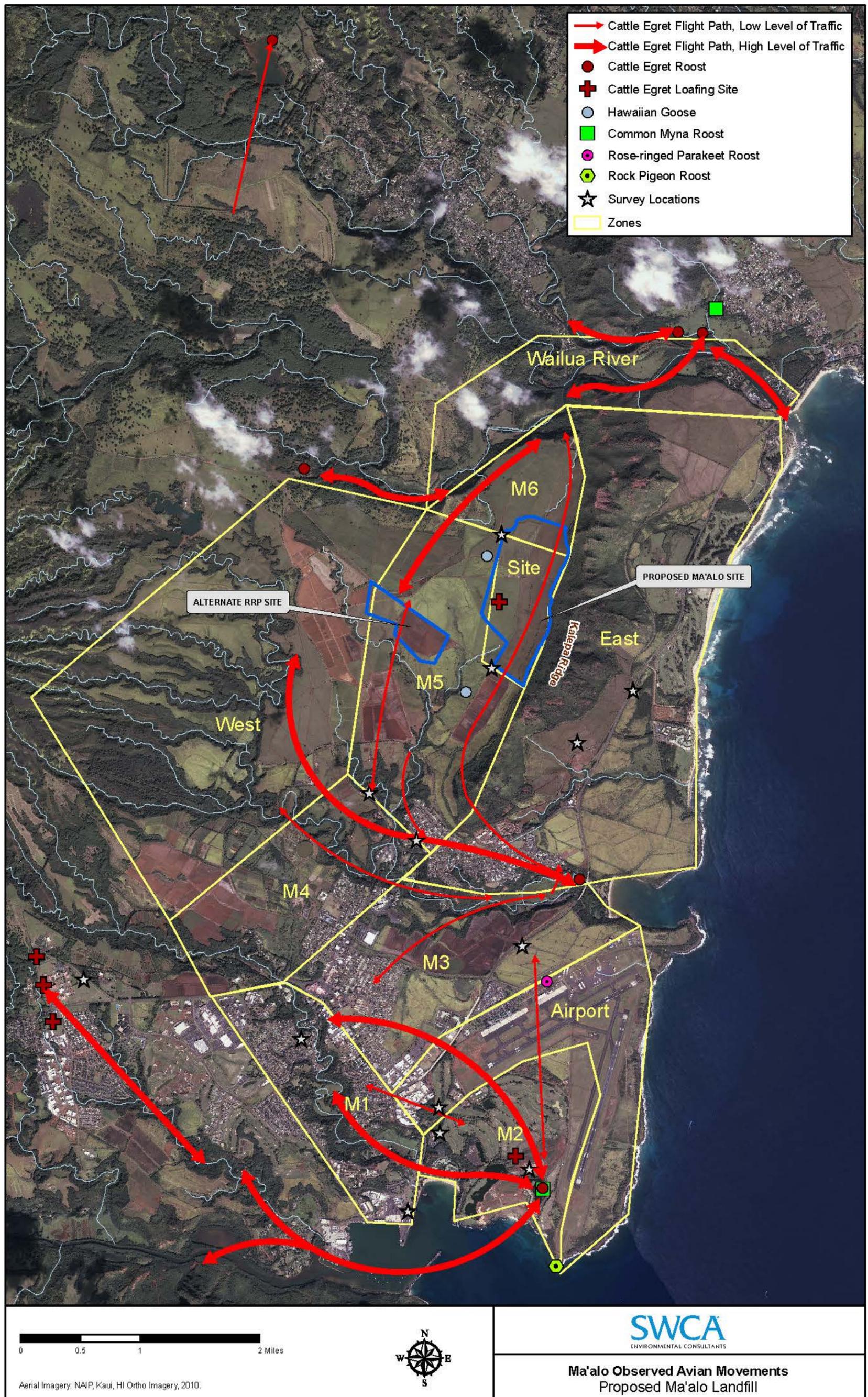
The biologists conducted four spotlight surveys at the Kekaha Landfill in October 2014, November 2014, February 2015, and May 2015. The spotlight surveys were conducted to document which species utilize the landfill after sunset. Barn owl, short-eared owl, and Kaua'i chicken were observed foraging in the landfill on all survey events. Numerous feral cats and dogs were foraging at the landfill after sunset as well. Hawaiian stilt were heard in the adjacent shrimp ponds after sunset. The common myna and cattle egret appeared to leave the landfill area after sunset.

3.3.2 Proposed Ma'alo Site

3.3.2.1 MA'ALO AREA AVIAN SURVEYS

A total of 21,593 birds were observed during the avian point-count surveys in the Ma'alo study area. Table 2 summarizes the avian point-count survey results for each avian guild. A brief discussion of each guild follows Table 2. Figure 7 includes a map of the common avian movements in the Ma'alo survey area.

Figure 7. Common Avian Movements at the Proposed Ma'alo Site



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Table 2. Summary of Avian Point-Count Results at the Proposed Ma'alo Site

Avian Guild	No. of Individuals Observed	Average Group Size (Range)	% of Individuals Observed
Columbids	6,248	9 (1–350)	29
Sparrows, Finches, and Munias	4,518	9 (1–129)	21
Wading Birds and Shorebirds	4,414	5 (1–311)	20
Sturnidae	2,416	4 (1–90)	11
Game Birds	1,363	6 (1–52)	6
Ground Feeding Birds	847	3 (1–40)	4
Parakeets	574	21 (1–200)	3
Water Birds	562	8 (1–80)	3
Gleaning Birds	350	2 (1–24)	2
Geese	269	6 (1–30)	1
Owls	4	1 (1–1)	<1
Unidentified Birds	28	3 (1–6)	<1
Total Birds	21,593	6 (1–350)	n/a

Columbids

The columbid guild is comprised of rock pigeon, spotted dove, zebra dove, and unspecified dove species. Columbids are abundant throughout the Ma'alo study area, accounting for 29% of the Ma'alo observations. The highest concentration of columbid observations is located around Hanamā'ulu town. In the Kekaha study area, some columbids appeared to be attracted to the landfill for foraging but were not making long flights to access the landfill. Conversely, the Ma'alo survey data indicates that columbids make numerous long flights between urban areas, gulches, and trees. Twenty percent of the long flights exceeded 100 feet in altitude and included up to 45 individuals. In all cases, these high altitude flights included rock pigeons. Rock pigeons were not attracted to the active face at Kekaha.

Groups of over 100 and up to 350 rock pigeons were routinely observed in the Ma'alo study area. While some columbids (spotted dove and zebra dove) were attracted to the Kekaha Landfill features and could be attracted to a new landfill at the Ma'alo site, rock pigeons were not attracted to the Kekaha Landfill. It is possible they would be attracted to some features of a new Ma'alo landfill. Based on the observed columbids attraction to the Kekaha Landfill and the observed columbid activities in the Ma'alo study area, rock pigeons may make long, high elevation flights to access a landfill at the Ma'alo site. These flights could conflict with LIH operations and warrant monitoring.

Sparrows, Finches, and Munias

In the Ma'alo study area, species in this guild include red avadavat, nutmeg mannikin, Java sparrow, house sparrow, house finch, chestnut munia, common waxbill (*Estrilda astrild*), and African silverbill. These species were observed throughout the Ma'alo study area with higher concentrations in Zones M2, M4, and M5. These zones include wooded areas, open space, and water features that attract these species.

Out of the 525 observations of the species in this guild in the Ma'alo area, only two observations included a long flight, which were at low altitude. This is consistent with the Kekaha data, which indicates that the species in this guild largely stay within the wooded areas around the landfill. This, coupled with the feeding behaviors of these species, suggests that they are not likely to make long flights to access a landfill at the Ma'alo site. Based on the survey data and the species' behaviors, species in this guild are not expected to fly through LIH flight paths to access a landfill at the Ma'alo site.

Wading Birds and Shorebirds

Wading birds and shorebirds observed in the Ma'alo study area included Pacific golden plover, ruddy turnstone, Hawaiian stilt, black-crowned night heron, and cattle egret. Of these species, cattle egret accounted for the most observations (77%) and Pacific golden plover with the second most observations (18%). Based on the Kekaha Landfill survey data, which shows that Pacific golden plover, Hawaiian stilt, and black-crowned night heron are attracted to the shrimp ponds, these species may have limited attraction to a leachate pond, stormwater basin, or short grass areas at the proposed landfill. However, at Ma'alo the potential attraction to these features may be reduced due to the presence of many other available natural and manmade foraging areas and water features in the area. Nevertheless, since these species are known to make long flights that could interfere with aircraft, inclusion of design elements and operational procedures to deter these species from the proposed landfill are warranted.

Cattle egret are abundant in the Ma'alo area in its current condition, and already pose a hazard to aircraft, as defined in AC 33B. Based on the Kekaha survey data, cattle egrets are expected to be attracted to the proposed landfill. At the Kekaha Landfill, cattle egret were observed making long flights between the landfill and roosting sites. In the Ma'alo study area, cattle egret were routinely observed making long flights in the morning and evening hours to and from roost sites. Most of these flights tend to follow gulches and follow Kalepa Ridge through the proposed site. There are multiple cattle egret roost sites in the Ma'alo area and around LIH that cattle egret could make daily movements to and from the proposed landfill for foraging. Such flights have the potential to conflict with LIH operations.

Sturnidae

Common myna is the only species in the Sturnidae guild that was observed in the Ma'alo study area. Common myna accounts for 11% of all the avian observations. This species is widely distributed in the survey area with observations documented in all of the 11 survey zones. The highest concentration of observations is located in Zone M5, located immediately west of Kalepa Ridge and of the proposed Ma'alo site. The second highest concentration of common myna observations was in Zone M2, which includes the Kaua'i Lagoons Golf Course. Common myna have a roost in this location, where up to 90 individuals have been documented. The birds at the golf course are rarely observed making long flights. Most observations at the golf course include local movements and loafing.

Out of 510 common myna observations, only three observations included long flights occurring at an altitude greater than 100 feet. One observation occurred at Survey Point M5 located near the southern boundary of the proposed Ma'alo site. Two high altitude flights were observed in the "east" survey zone near point M7. Common myna have a night roost in the false kamani trees (*Terminalia catappa*) near M7. In total, common myna were observed making long flights on 36 occasions; most of these occurred at altitudes less than 100 feet. This data reinforces the observations at the Kekaha landfill where common myna do not appear to be traveling long distances to access foraging areas. Therefore, it is unlikely that common myna located near the airport would fly through LIH flight paths or the AOA to access a foraging area at the Ma'alo site. However, common myna currently occur in large numbers throughout the Ma'alo study area and are attracted to landfills. Inclusion of design elements and operational procedures are recommended to deter common myna from the proposed landfill.

Game Birds

In the Ma'alo study area, the game bird guild includes Kaua'i chicken, ring-necked pheasant (*Phasianus colchicus*), Indian peafowl (*Pavo cristatus*), black francolin, gray francolin, and Erckel's francolin. Ninety-five percent of the individuals observed included Kaua'i chicken, which were widely distributed in the survey area.

Game birds spend most of their time on or near the ground, only making short, low elevation flights. None of the game bird observations in the Ma'alo study area included long flights. Feral and naturalized chickens are territorial and devoted to a limited range once the range is established. For these reasons, game birds are not expected to make long flights across LIH flight paths to access a landfill at the Ma'alo site.

Ground Feeding Birds

At Ma'alo, the ground feeding bird guild included northern and red-crested cardinals, white-rumped shama (*Copsychus malabaricus*), northern mockingbird, western meadowlark, and hwamei. Many of these species are nuisance species on airfields because they fly low to the ground, moving from one foraging location to another. Many of these low and short flights cross movement areas. However, when distant from the airfield on a site such as Ma'alo, these low short flights are not hazardous to aircraft because they occur far below the aircraft altitude.

These species were observed throughout the Ma'alo study area in vegetated areas. This is consistent with the Kekaha Landfill study area. At Kekaha, the ground feeding birds tend to stay around the vegetated areas surrounding the landfill. The ground feeding birds in the Ma'alo area are expected to have the same tendency if a landfill was constructed and operated at the proposed location, and are not expected to make long flights across LIH flight paths to access a landfill at the Ma'alo site.

Parakeets

Rose-ringed parakeet is commonly observed in areas around the proposed Ma'alo site and the airport. Parakeets are gregarious and forage, roost, and fly through the treetops in large groups. Two flights were noted to exceed 100 feet altitude. In the wild, these birds feed on fruit, seeds, and buds that are taken from living vegetation. Groups of up to 200 individuals have been observed foraging in agricultural areas (corn) and making long flights around the proposed site.

Large groups of rose-ringed parakeets have been observed flying through Zone M5 to the southeast towards Hanamā'ulu/Lihue. They may have been headed to a roost at the Kukui Grove Shopping Center at Lihue or a roost that is located in the LIH parking lot. These flights currently exist and may currently cross helicopter traffic patterns in the Ma'alo area. Due to rose-ringed parakeet's diet preferences, the introduction of a landfill in the Ma'alo area is not expected to alter the bird's movements.

Water Birds

In the Ma'alo study area, the water bird guild includes Hawaiian coot, Hawaiian moorhen, Hawaiian duck, and an unspecified duck species. Most of the observations were associated with groups loafing or foraging in and around manmade waterbodies at Kaua'i Lagoons Golf Course. Twenty-one observations included individuals in natural areas including creeks, waterbodies, ditches, and long grass habitats. Two occurrences involved a single bird flying over 100 feet altitude. In the Kekaha study area water birds are attracted to the adjacent shrimp ponds and a nearby marsh but have no attraction to the landfill property. This may be due to the lack of regular standing water in such features as the leachate pond at the Kekaha Landfill. Similar features at a new landfill at the Ma'alo site could contain more water due to higher rainfall, and could be more attractive to water birds.

Based on the Kekaha and Ma'alo site data, water birds may have limited attraction to water features or short grass areas at the proposed landfill. However, at Ma'alo the attraction may be reduced due to the presence of many other available natural and manmade habitat areas in the area. Since these species are known to make long flights that could interfere with aircraft, inclusion of design elements and operational procedures to deter water birds from the proposed landfill are recommended.

Gleaning Birds

In the Ma'alo study area the gleaning bird guild includes Japanese white-eye, red-billed leiothrix (*Leiothrix lutea*), and Japanese bush warbler. As mentioned above, this group of birds forages by flying around vegetation and gleaning insects from the foliage. This behavior keeps them close to the target vegetation resulting in short, low-elevation flights. Most of the gleaning bird observations included Japanese white-eye, the other species were rarely observed.

Eighty-eight percent of the observations included the birds flying or vocalizing among natural (unmaintained) vegetation types such as tall grass, shrubs, or trees. This is similar to the behavior of the gleaning birds observed at the Kekaha Landfill study area. Based on the feeding and sheltering behaviors of gleaning birds, it is unlikely that the introduction of a new landfill at the Ma'alo site would result in gleaning birds making long flights through LIH airspace to access the landfill.

Geese

The Hawaiian goose and Canada goose (*Branta canadensis*) were the only species from the geese guild observed in the Ma'alo study area. Canada goose was only observed on one occasion, at the Kaua'i Lagoons Golf Course; all other observations included the Hawaiian goose. The Hawaiian goose was observed in Zones M2, M3, M5, M6, and Site. All but one of the Hawaiian goose observations were in agricultural areas, grass areas, or a waterbody. Several observations included long flights with potential to interfere with LIH aircraft; however, most observations were associated with loafing in fields.

The Kekaha survey data indicates the Hawaiian goose has some attraction to the green waste stockpiles and short grass areas at the landfill. In addition, the size and flocking behavior of all geese species makes them a significant concern to aviation. Considering this, design features and operational procedures to minimize Hawaiian goose (or Canada goose) attraction to the landfill are recommended.

Owls

Barn owls and short-eared owls were observed during spotlight surveys at the proposed Ma'alo site and roosting in trees at the Kaua'i Lagoons Golf Course. Barn owls, and potentially short-eared owls, would probably be attracted to a landfill at the Ma'alo site by the small mammal prey base that would likely occur at the landfill. If the small mammal prey base was left unchecked, owls may travel long distances to forage at the site. Procedures to reduce the small mammal prey base are recommended.

3.3.2.2 MA'ALO CATTLE EGRET ROOSTS

During the study, the biologists observed historical (known) cattle egret roost sites and also located previously undocumented roost sites. The intent was to gather general information regarding cattle egret flight paths between roosting and foraging sites. Prior to beginning the study, USDAWS provided the approximate locations of four known cattle egret roosts. These data, coupled with the survey data, provided updated information on the cattle egret roosts in the vicinity of LIH. The surveys confirmed the presence of seven cattle egret night roosts plus one potential sub-roost identified around the Ma'alo site vicinity.

- **Wailua River (Opaekaa Falls) Roost, including a nearby 'sub-roost':** A large roost site supporting 200 or more birds is located immediately north of the Wailua River near Opaekaa Falls. A smaller 'sub-roost' was also identified very close to the main roost. Birds access these roosts by flying up and down the Wailua River and crossing over to the Opaekaa tributary of Wailua River from various directions. The roost also receives birds from the general direction of LIH and Kapa'a. The survey data indicates that numerous cattle egrets pass through and around the proposed Ma'alo site in the evening hours to access the roost(s). The biologists observed 50 to 75 birds in a tree at the edge of Wailua River and several flocks of five to 25 birds arriving from the south during the helicopter survey.
- **Wailua Reservoir Roost:** This historically known roost is still active. Ground based and helicopter surveys observed 180 to 200 birds utilizing the roost just before sunset. Helicopter surveys observed a majority of birds arriving from the south, but a small number of birds arrived from the north. Multiple evening surveys from Zone M5, which includes the proposed Ma'alo site, confirmed that large groups (up to 200) of cattle egret fly northeast and northwest towards Wailua River, potentially roosting at the Wailua Reservoir Roost at night.
- **Hanamā'ulu Stream Roost (aka Kapule Roost):** This historically known roost, located near the Hanamā'ulu Bridge and Hipa Road, is still active. On the morning of October 3, 2014, the Hanamā'ulu Stream Roost supported approximately 100 birds. Most birds were roosting in the hau trees on the mauka side of the bridge. During the ground-based surveys, cattle egret were observed flying to and from this roost along gulches of Hanamā'ulu Stream and its tributaries. Several tributaries of Hanamā'ulu Stream extend into Zone M5, which is adjacent to the proposed site. The helicopter and ground-based surveys confirmed that some of the cattle egrets from the Hanamā'ulu roost fly up the tributaries and through the proposed Ma'alo site.
- **Kaua'i Lagoons Roost:** This historically known roost is active and was observed to have an estimated 300 birds utilizing the roost at various times. The roost is located in hau trees along the freshwater lagoon on the hotel grounds. Common myna also roost in the neighboring trees. The dusk helicopter survey and ground-based surveys indicate that birds arrive from all directions, but primarily from the west. Egrets primarily utilize Nāwiliwili Gulch, and the mauka side of the Hā'upu Mountain Ridge in both directions to access daytime foraging areas. Flights in this location routinely exceed 100 feet above ground level. In addition, many cattle egret were observed loafing on the maintained grass of the helicopter landing pads of LIH; individuals were observed flying to this location from the south, presumably from the Kauai Lagoons roost.
- **Ma'alo Road Roost:** This small roost was identified during the May 22, 2015, helicopter survey. At the time of the survey, the roost supported approximately 20 cattle egrets and was located adjacent to a small reservoir in a farm. Cattle egret accessed the roost from the general direction of Zone M6.
- **Halenanahu Reservoir Roost:** This small roost was located west of Puhi. During the helicopter survey, 15 cattle egrets were using the roost. However, the general defoliation of the trees suggests that they are likely used as a night roost by a larger group.
- **Rice Ranch Roost:** This historical roost was still active during the May 22, 2015, helicopter survey. The roost is located adjacent to a reservoir on Rice Ranch and supported approximately 100 birds. Another 50 to 75 cattle egret were observed approximately 500 meters to the south of the main roost, perched in a kiawe tree and loafing with cattle.

3.3.2.3 MA'ALO SPOTLIGHT SURVEYS

Spotlight surveys conducted at the Ma'alo site confirmed that feral pig and barn owl are common on the site after sunset. Barn owl and feral pig use the site for foraging. A short-eared owl was observed in the proposed site as well. Hawaiian geese were routinely observed along the border of the proposed site. The Hawaiian geese appear to be using the agricultural areas just west and south of the site as a night roosting area. Cattle egret were not observed in or passing through the site after nightfall.

3.4 Summary of Avian Survey Results

The intent of the surveys at the existing landfill and near the Ma'alo site was to gather information regarding wildlife uses of the two areas that can assist in developing hazardous wildlife management plans for the proposed Ma'alo site. The following bullets summarize the data collected at the two sites that is applicable to the Ma'alo site.

The following species of potential concern are those considered most likely to pose a potential risk to airport operations. It is recommended that these potential risks be managed via changes to the proposed facility design, or operational wildlife management measures.

- Cattle egret are attracted to the Kekaha Landfill and adjacent shrimp ponds. They are known to roost up to 3 miles from the landfill and fly to and from the landfill throughout the day. In general, others have documented cattle egret flying 15 kilometers to access foraging areas (Paton et al. 1986). Cattle egret are abundant in the Ma'alo study area and currently make routine flights through the existing Ma'alo site to access roosting areas. It is likely that cattle egret in the Ma'alo area would utilize the proposed Ma'alo Landfill for foraging, if it was made available to them. Based on their flocking behavior and tendency to make long flights at high altitudes, cattle egret could cross LIH flight paths to access a landfill at the proposed Ma'alo site. Design elements and operational procedures to deter this species from the proposed landfill are recommended.
- Common myna are clearly attracted to Kekaha Landfill for foraging. However, the common myna do not appear to be traveling long distances to access the landfill. Common myna is currently widely distributed in the Ma'alo survey area. Similar to the Kekaha site, common myna were rarely observed making long flights in the Ma'alo study area; most movements were localized. Therefore, common myna near LIH are not anticipated to cross LIH movement areas to access the proposed Ma'alo site. However, their movements at the Ma'alo site could interfere with low flying (less than 100 feet) helicopter travel over the Ma'alo site. Due to the common mynas presence in the Ma'alo area and their attraction to landfills, inclusion of design elements and operational procedures to deter common myna from the proposed landfill are recommended.
- Based on the Kekaha Landfill and Ma'alo survey data, Pacific golden plover, ruddy turnstone, Hawaiian stilt, black-crowned night heron, and other water birds may have limited attraction to a leachate pond, stormwater basin, or short grass areas at the proposed landfill. They have not been observed to be attracted to the active face of the landfill. Since these species are known to make long flights that could interfere with aircraft, inclusion of design elements and operational procedures to deter these species from the proposed landfill are recommended.
- Owls are attracted to the Kekaha landfill and are currently present at the Ma'alo site. Procedures to reduce the small mammal prey base at the Ma'alo site are recommended.
- Hawaiian goose is attracted to the green waste piles at the closed Phase I Kekaha Landfill for refuge; there is no indication that Hawaiian goose is attracted to the active face of the Phase II Kekaha Landfill. This species currently utilizes an irrigation ditch and agricultural areas near the

proposed Ma'alo site for a night roost, and was observed flying through the site during the day. Design elements and operational procedures to deter these species from the proposed landfill are recommended.

The following species were observed at the existing Kekaha landfill or the proposed Ma'alo site, but are considered less likely to pose a potential risk to airport operations.

- Spotted doves and zebra doves are attracted to many features at the Kekaha Landfill, but these species are not making long flights to access the landfill. Rock pigeons did not show an attraction to the Kekaha Landfill features. The Ma'alo survey data indicates that rock pigeons make numerous long flights between urban areas, gulches, and trees in the Ma'alo study area. While rock pigeons are not currently attracted to the Kekaha landfill features, they could be attracted to features at the proposed Ma'alo landfill due to the abundance of rainfall on the windward side of the island (e.g., a leachate pond with permanent water). If this is the case, based on flight observations in the Ma'alo study area, rock pigeons could make long, high-elevation flights to access a landfill at the Ma'alo site; therefore, design elements and operational procedures to deter these species from the proposed landfill are recommended.
- Sparrows, finches, munias, gleaning birds, and ground feeding birds are present at the Kekaha Landfill. These species tend to stay close to the vegetated areas around the landfill and occasionally make short flights from the vegetated areas to forage for insects on the active landfill face. These species and other similarly behaving species are present in the Ma'alo study area and were rarely observed making long flights. Based on the survey data and the species' behaviors, species in these guilds are not expected to fly through LIH flight paths to access a landfill at the Ma'alo site.

4 RECOMMENDATIONS

Wildlife attractants near airports include food, water, cover, and perches. Solid waste landfills provide these resources in ways that allow wildlife to exploit them. Managing these resources is the most effective solution for reducing wildlife attraction because it minimizes or eliminates the attractants. SWCA has developed the following potential wildlife management options for the proposed Ma'alo site. These recommendations are based on data gathered from 1 year of surveys at the existing Kekaha Landfill and the proposed Ma'alo site. The County, in consultation with HDOT and other stakeholders, should evaluate and prioritize these recommendations based on feasibility with respect to effectiveness, personnel availability, permitting requirements, cost, and/or available resources, while keeping in mind the potential hazard to aircraft safety.

4.1 Landfill Design Alternatives

The presence of putrescible waste and other food materials attracts wildlife to landfills. The most effective means of reducing wildlife attraction to a waste management facility would be to design the facility in such a way that makes the waste inaccessible to wildlife. The following design recommendations are provided with the sole purpose of reducing wildlife attraction to a facility at the Ma'alo site. It is understood that practicability factors such as cost, resource availability, environmental considerations, site availability, and community considerations shape the decisions regarding facility designs. Although these are important factors, they are beyond the scope of this study and are not considered.

Since the presence of putrescible waste and water at the proposed Ma'alo site would likely attract cattle egret and other avian species that could be hazardous to aviation, the County should consider design

alternatives that would reduce or eliminate the wildlife accessibility to the waste and water features. Potential design considerations include:

1. **Putrescent Waste.** Controlling putrescent waste would be a key measure in mitigating hazards. Several options may be pursued.
 - a. **Source Separation.** Food waste and other organic material are the primary MSW constituents that attract wildlife to the landfill active face. Source separation involves providing a separate container at the curb for residents to place putrescible waste items. The putrescible waste container could be collected by an enclosed truck that is designated for putrescible waste. Some counties and municipalities have successfully imposed a ban on food waste in trash. This single measure would go a long way towards reducing the wildlife attractant at the active face of the landfill. The County is already planning a pilot study to evaluate the feasibility of source separation of non-greenwaste organics.
 - i. The putrescible waste truck could deliver the waste to a tipping floor or other enclosed structure. Waste that is deposited and stored in a completely covered structure is not accessible to wildlife. Wildlife attraction to odor from ventilation systems is a concern with depositing and sorting waste in covered structures. Masking odors, however, would not be sufficient for reducing wildlife attraction to a covered waste management structure. Rather, in order for this measure to be effective, the structure would need to include a system that filters or eliminates odors from the structure exhaust. There are a variety of commercially available products that neutralize odors via chemical processes. Potential systems include but are not limited to atomizers and misters. If the County pursues an indoor facility, the facility should include one or more systems that neutralize or otherwise filter out odors.
 - ii. The putrescible waste could be processed and stored in the covered structure until it can be deposited and immediately covered in the landfill active face, or taken to another site for processing. This may include bailing the putrescible waste and taking it to the landfill face at the end of the day, where it could be immediately dumped, compacted, and permanently covered.
 - b. **Landfill Gas Odors.** Decomposing waste produces carbon dioxide, methane, water vapors, carbon monoxide, hydrogen sulfide, and volatile organic compounds. The hydrogen sulfide and volatile organic compounds emit landfill gas odors that may attract wildlife. To reduce the potential wildlife attraction, the County should consider installing a system or systems designed to destroy odor-causing gases. Such technologies may include a gas collection and vacuum system that is connected to: 1) flares or other gas destroying devices; 2) a scavenger system that saturates raw landfill gas with water and passes it through a media bed that adsorbs and filters the hydrogen sulfide from the gas stream; 3) liquid-redox system that passes raw landfill gas through a catalyst solution and converts hydrogen sulfide to elemental sulfur; 4) the use of bacteria in biological treatments; 5) caustic scrubbers; or 6) activated carbon systems.
 - c. **Food Containers.** Many food products are delivered to restaurants, stores, and consumers in cardboard boxes. The cardboard boxes are often sorted for recycling in RRP's and retain the smell and small scraps of the food product. Based on observations at another RRP, the smell and remnant food scraps can attract avian species to the area where cardboard boxes are staged and processed. The attraction to the cardboard is eliminated after the cardboard is bailed. If the County intends to stage and sort cardboard

(or other recyclable containers) at the RRP site, the County should consider designating an enclosed structure at the RRP for cardboard processing and bailing.

- d. **Binding Agents and Protective Netting.** While source separation is preferred, it may also be possible to decrease the attractiveness of putrescent waste at the working face using a combination of continually spray-applied polymer mix materials or chemical additives and the use of protective netting or grid wires surrounding the working face. For example, many mainland landfill sites successfully use products such as Posi-Shell® (a blend of clay binders, reinforcing fibers, and polymers) as spray-applied mortars that dry in the form of a thin, durable stucco, eliminating waste exposure and odors. The additive would need to be frequently applied, driving up costs but increasing airspace.

A study at the Nanticoke Landfill near E.A. Link Airport in New York (now known as the Greater Binghamton Airport) concluded that applying binding agents alone was not sufficient to deter wildlife attraction to the landfill face (Curtis et al. 1993). Considering the findings of the Nanticoke Landfill study and currently accepted wildlife control procedures, binding agents alone should not be expected to completely deter wildlife, and would have to be combined with other design features and management procedures, such as those outlined below.

2. **Water Features.** At the Kekaha Landfill, the leachate evaporation pond, infiltration basin, and other manmade water features are typically dry and do not attract many water or wading birds. The Ma'alo area receives significantly more rain than the Kekaha area. Therefore, water features at Ma'alo would be more prone to have standing water. Standing water may attract Pacific golden plover, Hawaiian stilt, Hawaiian coot, or other wading and water bird species. The following design elements should be considered to deter avian attraction to any manmade waterbodies at Ma'alo.
 - a. Storm water basins should be designed for a maximum 48-hour detention period for the design storm and remain completely dry between storms (Cleary and Dolbeer 2005).
 - b. Design any drainage ditches or other waterbodies so that they are as deep as possible, have steep sides (approximately 2:1), side substrate of rock or concrete, no vegetation, and minimal water surface area (Cleary and Dolbeer 2005). This will deter wading birds from standing on the banks and water birds from landing on the water. Cattle egret and other wading birds are less likely to use deep drainages. Ensure that the design is easily maintained to be void of vegetation or covered. Drainpipes, culverts, and screens should be easily maintainable so they can be kept clear of debris and drainage is not impeded.
 - c. If standing water is expected to remain for more than 48 hours, consider the installation of physical barriers to waterbodies. Such barriers may include:
 - i. Floating balls, also known as Bird Balls or Bird Deterrent Balls. These are approximately 4-inch balls made of plastic, foam, or other buoyant material. The balls float on the water surface and deter birds from landing or wading into the water.
 - ii. Grid wire. Installation of a wire grid system above the water surface will deter birds from landing in the water. At Ma'alo, the birds of concern vary from medium to large in size. Installing the grid system so that it runs in various crisscross patterns at two elevations would form a non-penetrable grid. Many of the Hawaiian waterbirds are federally protected species. If a grid wire system is

- employed, the system should be designed to minimize the potential for entangling Hawaiian waterbirds.
- iii. **Fountain.** Install and continuously operate a large fountain in the waterbody. The fountain should disturb at least 30% of the water surface. This may deter water birds from landing in the waterbody.
3. **Landscaping.** Common mynas, cattle egret, and other avian species utilize the various trees and shrubs adjacent to the Kekaha Landfill for roosting and shelter. Design for the Ma'alo Landfill should avoid placing shrubs, ornamental trees, or hedgerows within 1,000 feet of the working face, and should avoid the use of species that produce fruit or berries, which may attract rose-ringed parakeets and gleaning birds. Avoid placing trees and shrubs in a way that will result in overlapping or closed canopies. Birds are less attracted to vegetation with open canopies. Additional landscaping considerations are provided in Section 4.2.4, below.
 4. **Structures.** Utilize structure designs that reduce perching and roosting opportunities. Columbids often roost on structures with overhanging ledges. Common myna and other small birds often perch on power lines, antennas, and other tall objects. Site designs should avoid structures that provide over hanging ledges or tall objects for roosting and perching.
 5. **Lighting.** Facility lighting should incorporate USFWS recommendations for minimizing attraction of seabirds. These recommendations can be found on the Kaua'i Seabird Habitat Conservation Program's website (<http://www.kauai-seabirdhcp.info>), and include:
 - a. Avoid up-lighting by shielding light fixtures and aiming the fixtures downward.
 - b. Utilize full cutoff fixtures, full shielded wall-pack and wall-mount fixtures, fully shielded walkway bollards, or other fully shielded light designs that meet the project needs.
 6. **Agriculture.** Currently the agricultural areas that are adjacent to the proposed site attract flocks of Hawaiian geese for loafing, foraging, and roosting, and parakeets, columbids, and gleaning birds for foraging. It is anticipated that the County would not utilize all the acquired lands for active landfill management at least in the early years of site operation. This would leave some lands in the landfill property open for other uses. The County should not consider or plan on utilizing undeveloped lands around the landfill for agriculture, grazing, or other activities that would attract wildlife to the area. Vegetated areas on the landfill property that are not actively managed for landfill uses should be subject to an active vegetation management program (refer to Section 4.2.4).

4.2 Operational Measures

4.2.1 Prepare and Implement a Landfill Wildlife Management Plan

Implementation of the above mentioned landfill design elements could reduce wildlife attraction to the landfill. However, the design elements must be reinforced with operational procedures that focus on continued wildlife abatement and monitoring. The County should prepare a Landfill Wildlife Management Plan (LWMP) that details operational procedures aimed at reducing wildlife attraction and abating nuisance wildlife. The LWMP should be a living document that is subject to regular evaluation and modifications to ensure its effectiveness at meeting the wildlife management goals. At a minimum, the following elements should be included in the LWMP:

- Identification of a Wildlife Coordinator, Wildlife Control Staff, and a Wildlife Working Group; their roles and responsibilities; and communication procedures.
 - Detailed communication procedures should include monitoring radio communications from LIH Air Traffic Control Tower (ATCT) to be informed of incoming helicopter traffic.
- A staff wildlife management training program.
- A list of prioritized wildlife management actions and their completion dates.
- A list of materials and supplies needed to implement the LWMP.
- Wildlife control permit(s) monitoring and reporting requirements and methods.
- Vegetation and landfill cover management and maintenance methods.
- Wildlife control procedures including cattle egret population control.
- Continued wildlife and wildlife control monitoring.
- Procedures for communicating with LIH and resource agencies in regards to wildlife control activities.
- A schedule for annual reevaluation of the LWMP and means of coordinating the reevaluations with USFWS, USDA, and LIH.

4.2.2 Designate a Wildlife Coordinator

The County should appoint a Wildlife Coordinator to manage all wildlife management activities at the landfill. The Wildlife Coordinator could be part of an existing staff position. A good candidate would be an individual that understands wildlife/habitat interactions and landfill operations. The Wildlife Coordinator should be responsible for the following activities:

- Forming and maintaining a working group that includes LIH, USDAWS, and HDOT staff who are responsible for airport wildlife hazard management on Kaua'i. This working group should establish lines of communication and meet regularly to discuss wildlife hazard abatement activities, trends in wildlife movements, and other topics related to wildlife damage control.
- Coordinate with neighboring land managers, such as the tree plantation managers, to address wildlife issues outside the landfill boundaries.
- Identify and coordinate cattle egret population reduction efforts at active roosts near the landfill.
- Conducting and/or coordinating all wildlife management activities at the landfill.
- Identify and designate safe “shooter positions” for cattle egret lethal control efforts.
- Ensuring that all individuals responsible for wildlife hazard management are properly trained.
- Ensuring that all landfill personnel are familiar with the requirements and procedures of abating wildlife at the landfill.
- Obtaining and maintaining all appropriate wildlife control permits and supplies, as necessary.
- Be responsible for continued wildlife monitoring to ensure the effectiveness of management actions. Identify and implement adjustments to the wildlife control measures, as appropriate

- Keep detailed records of wildlife management activities.

4.2.3 Maintain Appropriate Permits to Control Wildlife

The County will probably need to obtain a Migratory Bird Treaty Act (MBTA) Depredation Permit from USFWS and the state. Cattle egret and other species that can be expected to utilize a landfill at the Ma'alo site are protected under the MBTA. These birds are attracted to various landfill features and should be hazed to deter the attraction. However, hazing alone may prove to be ineffective over time. The County may consider augmenting the hazing with lethal removal of individuals. This would require a MBTA Depredation Permit unless alternative permission is obtained. The County should keep an active Depredation Permit at all times so that delays can be avoided if “take” of individuals or nest removal of a migratory bird is necessary.

At a minimum, the County should obtain an MBTA take permit for cattle egret. In November 2013, USFWS published a Proposed Rule for a Migratory Bird Permit Control Order for Introduced Migratory Bird Species in Hawai'i (USFWS 2013). If approved, the control order would provide a mechanism for USFWS to issue a MBTA take permit for the control of cattle egret to benefit Hawai'i's native wildlife species. The wildlife abatement activities conducted in accordance to a MBTA take permit at Hawai'i's landfills can further promote cattle egret population control, benefitting Hawai'i's native wildlife.

In addition, many of the species that could be attracted to the landfill are protected under the federal and Hawai'i Endangered Species Acts (ESAs); such species may include Hawaiian duck, Hawaiian coot, Hawaiian stilt, Hawaiian goose, and Hawaiian moorhen. These species could be attracted to water features at a landfill. Implementation of the recommended water feature design features would reduce the attraction. However, harassment or lethal take of these species would require an Incidental Take Permit from USFWS and/or an Incidental Take License from the state. More discussion of regulatory permits is provided in Section 5.

4.2.4 Active Face Management

To reduce available foraging opportunities, the active face of the landfill should be kept as small as possible and should be covered often. This will minimize exposed waste availability and reduce avian attraction to the active face. Putrescible waste is the main wildlife attractant at landfills. Therefore, the active face should be managed so that putrescible waste is not accessible to wildlife. This may be accomplished by bailing the waste prior to deposition; stockpiling, depositing, and immediately covering the waste at the end of the day; liberal application of spray-on binding agents; or some combination of these methods. Section 4.1 above discusses landfill design considerations that incorporate these methods.

4.2.5 Landfill Vegetative Cover Management

Habitat management is the most effective technique for reducing wildlife attraction to an area. Based on the current site conditions, it is anticipated that the inactive portions of the proposed landfill would likely be covered with guinea grass (*Megathyrsus maximus*) or a similar grass species. The following recommendations are provided for managing the vegetative cover on inactive portions of the landfill:

- Many bird species need grit, or very small rocks, to aid in digestion. They are often attracted to bare areas to forage for grit. Bare areas should be immediately vegetated with grasses or turf to reduce the amount of bare area on and around the landfill.
- Hawaiian goose and other species may be attracted to tall grass areas for nesting and short grass areas for loafing or grazing. To reduce these attractions, the grasses on and around the landfill should be maintained between 7 to 9 inches. Grasses below 7 inches may attract Hawaiian goose,

Pacific golden plover, cattle egret, and other species for loafing or grazing/foraging. Grasses that exceed 9 inches may attract Hawaiian goose and other species for nesting. The grasses and other herbaceous plants should be mowed before they develop seed heads, which provide food for wildlife and insects, or an alternative with less maintenance requirements, such as AstroTurf, may be considered.

- All engineered waterbodies should be maintained free of vegetation. Trees and shrubs should not be permitted to become established in waterbodies or drainage ways at or around the landfill.
- County managed lands that are not being used for landfill purposes should not be used for agricultural or grazing purposes.

4.3 Active Wildlife Control

Cattle egret, common myna, columbids, and other avian species are expected to be attracted to the landfill. The habitat management and operational measures discussed above will reduce the attraction. However, it is anticipated that some nuisance species will still attempt to capitalize on any foraging opportunities that are provided. The following active control measures are recommended to augment the designed operational measures discussed above. A successful wildlife control program would implement the habitat management and active controls in coordination with each other.

4.3.1 Implement Hazing

Cattle egret are a large flocking species that will likely be attracted to the landfill. When one or two individuals land at the landfill, it attracts more individuals, resulting in a rapid increase in birds. Due to their size and flocking behavior, cattle egret should be treated as a “zero tolerance” species at the landfill and should be hazed immediately upon their arrival. If groups of other bird species are observed near the landfill, they should be hazed immediately, as well. It is highly recommended that any landfill have the personnel, equipment, and permits required to conduct hazing measures on an immediate and as-needed basis. Potential options for hazing at the proposed Ma'alo Landfill are provided below.

4.3.1.1 COORDINATE HAZING ACTIVITIES WITH LIH

The proposed Ma'alo site is situated below one of the current LIH helicopter flight paths. If birds were hazed while a helicopter was in the area, the potential to disperse the birds into the helicopter's path exists. To avoid this potential, landfill staff conducting hazing must be aware of on-coming helicopters prior to hazing birds. This will require monitoring ATCT and pilot communications. The landfill operators must monitor LIH air operations radio channel(s) to ensure that birds are not hazed into oncoming air traffic.

Another means of avoiding helicopter and wildlife incursions would be to encourage helicopters to maintain higher altitudes in the vicinity of the site or modify their current flight paths to avoid the proposed site vicinity. Enforcement of the minimum required helicopter altitudes could mitigate a portion of the potential hazard. In general, the rules that govern tour flight heights in Hawai'i are found in Code of Federal Regulations Title 14, Part 136, Subpart C, Appendix A (*Special Operating Rules for Air Tour Operators in the State of Hawai'i*), which states that “no person may conduct an air tour in Hawai'i: (a) below an altitude of 1,500 feet above the surface over all areas of the State of Hawai'i, and (b) closer than 1,500 feet to any person or property.” However, it appears that helicopter tour companies in Hawai'i all have deviation authority from the FAA to fly as low as 500 feet in site-seeing areas and to transition between site-seeing areas at 1,000 feet. If helicopters maintain 1,500 feet in the vicinity of the landfill, the potential for dispersing birds into their flight path would be greatly reduced. Similarly, altering the current

helicopter flight paths, if possible, such that the helicopters don't use the "saddle" area of Kalepa Ridge near the proposed site, could also greatly reduce the potential risk.

4.3.1.2 PYROTECHNICS

Pyrotechnics are noise-producing devices that effectively disperse birds in most situations and can be used to flush and direct flocks of birds in a desired direction. Hand-held/launched pyrotechnic devices such as 15-millimeter screamers and bangers or 12-gauge shell-crackers can be acquired and employed for effective hazing operations. Pyrotechnics should be employed at the landfill multiple times a day, year-round, even if only small numbers of cattle egret are in the area. Pyrotechnics methods must be changed over time to maintain effectiveness.

4.3.1.3 LONG RANGE ACOUSTIC DEVICES

Long Range Acoustic Devices (LRADs) send potentially harmful tones long distances with remarkable accuracy. LRADs can be portable hand-held devices, vehicle-mounted devices, or coupled with avian radar systems. Hand-held and vehicle-mounted LRADs are similar to megaphones but project louder and clearer tones over a greater distance. These types of LRADs require personnel to identify the target wildlife then aim and activate the LRAD at the target. An LRAD coupled with an avian radar system can detect a potentially hazardous flock of birds and activate the LRAD. The LRAD can be remotely activated from a control center or automatically triggered by the radar.

Standard pyrotechnics are limited to producing a loud report that is audible to receptors in a general area. Unlike standard pyrotechnics, LRADs can project loud reports, human voices, or wildlife calls directly towards a targeted receptor. When broadcasting a wildlife distress call, the operator is utilizing bioacoustics to deter wildlife.

4.3.1.4 BIOACOUSTICS

Bioacoustic deterrents broadcast recorded bird distress or alarm calls. Depending on the species, the calls may create differing responses; while some are attracted to the calls, others may flee the area. For this reason, the sound source must be properly placed so the birds fly away from the landfill. In addition, bioacoustics must be supplemented with other techniques such as pyrotechnics. As with all hazing methods, use of bioacoustics may require consultation with USFWS.

Important considerations when using bioacoustic deterrents include:

- Identify the bird species in need of dispersal and use the distress call of that species. A variety of calls may be tried to determine the most effective selection for a particular species.
- Some bird species do not respond to distress calls.
- Vehicles broadcasting distress calls should remain idle to allow birds to identify the source of the disturbance before reacting.
- Distress calls should not be played indefinitely because birds can become habituated to them.
- The effectiveness of distress calls is dramatically increased when combined with other frightening techniques, especially pyrotechnics.

4.3.2 Lethal Control

In review of the Draft LWHA for the proposed Ma'alo project, both USDA and USFWS indicated that these agencies recommend lethal control of cattle egret (USDA 2015; USFWS 2016). Lethal control of cattle egret, rock pigeon, spotted dove, zebra dove, barn owl, and common myna should be implemented to reinforce the other design and management actions. At the proposed landfill, lethal control of cattle egret, common myna, columbids, and other non-native species would be necessary when the efficacy of the other control measures is reduced by habituation. Many species become habituated to pyrotechnics and other deterrents, thus reducing the efficacy of the deterrent. Lethal removal of an individual from a group of individuals that is strategically timed to correspond with other deterrents may reinforce the perceived threat of the deterrent. For example, shooting several cattle egrets simultaneously with launching a pyrotechnic can reinforce the cattle egrets perceived threat of the pyrotechnic. The County should be prepared to implement lethal control to augment their hazing efforts.

USFWS and state-issued depredation permits are required to implement lethal removal of migratory bird species including cattle egret. Typically, the permits specify the species, the numbers of birds that can be taken, and the technique to be used. Cattle egret are known to prey on Hawai'i's native wildlife and are a conservation concern on the islands. Implementing a cattle egret control program that includes lethal removal of cattle egret at the landfill could assist ongoing wildlife conservation efforts on Kaua'i. It is recommended that the Landfill Wildlife Coordinator work with USFWS, USDAWS, and Hawai'i DLNR to develop a cattle egret control program that is complementary to current wildlife conservation efforts in the area.

Under most depredation permit conditions, birds may only be lethally removed in conjunction with a continuing non-lethal control program. Unless otherwise directed, carcasses, nests, and eggs must be completely destroyed or incinerated. In addition, personnel participating in the depredation program must attend and receive certification through a hunter's safety or gun handling safety course. Many of the nonnative bird species on Kaua'i, including many of the birds identified as species of potential concern (Section 3-4), are not federally protected in the United States and do not require a federal depredation permit.

4.3.2.1 SMALL MAMMAL PREY BASE

Although rodents have not been observed during the surveys, roof rats (*Ratus ratus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), and Pacific rat (*Rattus exulans*) may occur at the proposed landfill site. These small mammals forage at landfills and are an important prey base for owls. The presence of small mammals at the proposed landfill may attract owls to the landfill for foraging. Owls often forage several miles from their nesting area. Therefore, there is the potential for owls to make long flights through LIH flight paths to access the proposed landfill site. To reduce the landfill's potential attraction to owls, the County should actively control the small mammal prey base on the property. Common small mammal control methods include trapping, fumigation, habitat modification, and use of toxic baits (University of California, Davis 2010). The method of control is dependent on the seasonal life cycle of the population.

4.3.3 Wildlife Control on Neighboring Properties

The proposed Ma'alo site is situated among agricultural fields, grazing lands, and a new eucalyptus plantation. Like the Ma'alo site itself, these land uses are wildlife attractants in their current state. Adding a landfill to the area would likely change the wildlife attraction, uses, and movements on and around the site. One conceivable change could be the creation of a new daytime cattle egret roost in the nearby eucalyptus plantation (cattle egret at the Kekaha Landfill utilize trees adjacent to the landfill for a daytime roost while foraging at the landfill). This situation could be created at the Ma'alo site when a landfill is

located next to a tree plantation. For this reason, the County should coordinate with neighboring land managers and implement active wildlife control measures on the neighboring lands. The County should make efforts to include cattle egret lethal control efforts at nearby roosts on neighboring properties, if practicable. These efforts will help reduce cattle egret use of the proposed landfill and serve to promote native species conservation efforts in the area.

5 REGULATORY IMPLICATIONS

The following sections evaluate the regulatory implications of the recommended management actions. These discussions provide a brief overview of the various federal and state regulations that the landfill should consider when designing and implementing a wildlife control program.

5.1 Federal Endangered Species Act

Section 9 of the federal ESA prohibits the “take” of any federally listed endangered species (16 U.S.C. 1538(a)). The federal ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (16 U.S.C. 1532(19)). If it is not possible to design an otherwise lawful land use activity in a manner that avoids take of a listed species, either directly or through habitat modification, Section 10(a)(1)(B) of the federal ESA (16 U.S.C. 1539(a)(1)(B)) authorizes USFWS to issue an “incidental take permit,” allowing take that is “incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.” Some federal agencies are also able to take endangered species in accordance with an “incidental take statement” issued under Section 7 of the federal ESA.

Hawaiian goose, Hawaiian stilt, Hawaiian coot, Hawaiian duck, and Hawaiian moorhen have been observed in the vicinity of the proposed Ma'alo Landfill site. Although they are not attracted to the active face of the Kekaha landfill, these species could be attracted to various other features of the proposed landfill, and could be subject to hazing or “harassment” under the wildlife control program. Since the recommended habitat management activities would reduce the potential of these species to occupy the area in large numbers, lethal take of the species’ should not be necessary. Implementation of wildlife attraction deterrents such as grass management, elimination of standing water on the proposed facility, and use of bird balls in waterbodies might be sufficient to avoid the need for take permits to cover harassment activities. The County should continue to coordinate with USFWS while preparing the LWMP so that the need for an Incidental Take Permit can be avoided. The LWMP should include a wildlife training program to ensure that all staff involved with lethal removal of cattle egret and other non-native avian species are trained in the identification and avoidance of ESA-protected species.

5.2 Hawai'i Revised Statutes

5.2.1 Chapter 195D

The purpose of Chapter 195D of the Hawai'i Revised Statutes (HRS) is “to insure the continued perpetuation of indigenous aquatic life, wildlife, and land plants, and their habitats for human enjoyment, for scientific purposes, and as members of ecosystems...” (HRS Section 195D-1). HRS Section 195D-4 states that any endangered or threatened species of fish or wildlife recognized by the federal ESA shall be so deemed by state statute. As under the federal ESA, the unauthorized “take” of such endangered or threatened species is prohibited (HRS Section 195D-4(e)). Under HRS Section 195D-4(g), the Board of Land and Natural Resources, after consultation with the state’s Endangered Species Recovery Committee, may issue a temporary Incidental Take License to allow a take otherwise prohibited if the take is incidental to the carrying out of an otherwise lawful activity.

As discussed above, Hawaiian goose, Hawaiian stilt, Hawaiian coot, Hawaiian duck, and Hawaiian moorhen have been observed in the vicinity of the proposed Ma'alo Landfill site. These species may be attracted to various features of the proposed landfill and could be subject to hazing or “harassment” under the wildlife control program. An Incidental Take License may be required to harass these species.

5.2.2 Chapter 183D-62

Chapter 183D-62 of the HRS states “Taking, injuring, or destroying wild birds [is] prohibited. Except as provided in section 183D-61 (take permits), no person shall intentionally, knowingly, or recklessly take, catch, injure, kill, or destroy, or attempt to take, catch, injure, kill, or destroy, any wild bird, or to keep or have possession of any wild bird, dead or alive, or to damage or destroy a nest of any wild bird.” Cattle egret and other bird species that may be subject to lethal removal under the recommended wildlife control program are protected under HRS Section 183D-62. The County must obtain the appropriate state permit before implementing the recommended lethal control program.

5.3 Migratory Bird Treaty Act

The MBTA of 1918 (implemented by 16 U.S.C. 703–712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by USFWS. Even though the MBTA does not have provisions for allowing unauthorized take, the MBTA recognizes that some migratory birds may be killed by aircraft despite implementing measures to avoid take of birds. Acknowledging that large populations of certain bird species can cause damage to aircraft and threaten human safety, USFWS, by regulation and permit, has provided for controlled take of certain species in specific areas at specified times. Before the County conducts any management activities that would result in take of birds protected by the MBTA, the County should obtain an MBTA take permit from USFWS.

In order to obtain an MBTA take permit, the County would submit the Final LWHA to USFWS with a completed application for a depredation permit (Form 3-200) and the \$50.00 filing fee. Prior to issuing the permit, USFWS may forward the application and LWHA to USDAWS for review. If USDAWS concurs with the need for a depredation permit, they will issue a letter of concurrence to USFWS. On some occasions, USDAWS may make additional recommendations for wildlife control to be included as stipulations on the permit. Once USFWS has received the USDAWS recommendations, they should issue the permit as requested. MBTA Depredation Permits are species specific.

5.4 Animal Control Act of 1931

Under this act, the United States Department of Agriculture (USDA) can manage wildlife injurious to agricultural interests, other wildlife, or human health and safety, including wildlife hazards to aircraft. This act permits USDA to manage wildlife that may pose hazards to aviation. The County may wish to discuss with USDA whether they may be able to perform the recommended wildlife control program.

5.5 Federal Insecticide, Fungicide, and Rodenticide Act

The United States Environmental Protection Agency oversees the registration, labeling, classification, and use of pesticides, as stated in the Federal Insecticide, Fungicide, and Rodenticide Act. Persons using restricted-use pesticides, applying any pesticides to the land of another, or applying any pesticides for hire, must be a Certified Applicator, or working under the direct supervision of a Certified Applicator, and then may only use pesticides covered by the Certified Applicator’s certification. If the County, for example, uses a rodenticide to eradicate small mammals or an herbicide to manage the vegetation, then the County and their contractor must comply with this act.

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**Appendix A.
List of Species Observed at the
Kekaha and Ma'alo Study Areas**

List of Species Observed at the Kekaha and Ma'alo Study Areas

Species	ALPHA Code	Guild	Sites Observed	
			Kekaha	Ma'alo
Unidentified finch	UNFI	Sparrows, Finches, and Munias		X
red avadavat <i>Amandava amandava</i>	REAV	Sparrows, Finches, and Munias	X	X
nutmeg mannikin <i>Lonchura punctulata</i>	NUMA	Sparrows, Finches, and Munias	X	X
Java sparrow <i>Padda oryzivora</i>	JASP	Sparrows, Finches, and Munias	X	X
house sparrow <i>Passer domesticus</i>	HOSP	Sparrows, Finches, and Munias	X	X
house finch <i>Carpodacus mexicanus</i>	HOFI	Sparrows, Finches, and Munias	X	X
chestnut munia <i>Lonchura atricapilla</i>	CHMU	Sparrows, Finches, and Munias	X	X
common waxbill <i>Estrilda astrild</i>	COMW	Sparrows, Finches, and Munias		X
African silverbill <i>Lonchura cantans</i>	AFSI	Sparrows, Finches, and Munias	X	X
rose-ringed parakeet <i>Psittacula krameri</i>	RRPA	Parakeets		X
rock pigeon <i>Columba livia</i>	ROPI	Columbids	X	X
spotted dove <i>Streptopelia chinensis</i>	SPDO	Columbids	X	X
zebra dove <i>Geopelia striata</i>	ZEDO	Columbids	X	X
unidentified dove	UNDO	Columbids	X	X
unidentified shorebird	UNSB	Wading Birds and Shorebirds	X	
Pacific golden-plover <i>Pluvialis fulva</i>	PAGP	Wading Birds and Shorebirds	X	X
ruddy turnstone <i>Arenaria interpres</i>	RUTU	Wading Birds and Shorebirds		X
Hawaiian stilt <i>Himantopus mexicanus knudseni</i>	HAST	Wading Birds and Shorebirds	X	X
black-crowned night-heron <i>Nycticorax nycticorax</i>	BCNH	Wading Birds and Shorebirds	X	X
cattle egret <i>Bubulcus ibis</i>	CAEG	Wading Birds and Shorebirds	X	X

Species	ALPHA Code	Guild	Sites Observed	
			Kekaha	Ma'alo
red junglefowl <i>Gallus gallus</i>	REJU	Game Birds	X	X
unidentified francolin	UNFR	Game Birds	X	
black francolin <i>Francolinus francolinus</i>	BRFR	Game Birds	X	
Erckel's francolin <i>Francolinus erckelii</i>	ERFR	Game Birds		X
gray francolin <i>Francolinus pondicerianus</i>	GRAF	Game Birds		X
ring-necked pheasant <i>Phasianus colchicus</i>	RNEP	Game Birds		X
Indian peafowl <i>Pavo cristatus</i>	INPE	Game Birds		X
Hawaiian coot <i>Fulica alai</i>	HACO	Water Birds		X
unidentified duck <i>Anatinae</i>	UNDU	Water Birds		X
Hawaiian duck <i>Anas wyvilliana</i>	HAWD	Water Birds	X	X
Hawaiian moorhen <i>Gallinula chloropus sandvicensis</i>	HAMO	Water Birds		X
white-tailed tropicbird <i>Phaethon lepturus</i>	WTTR	Seabirds		X
great frigatebird <i>Fregata minor</i>	GREF	Seabirds	X	
Laysan albatross <i>Phoebastria immutabilis</i>	LAAL	Seabirds	X	
unidentified owl	UNOW	Owls	X	
barn owl <i>Tyto alba</i>	BANO	Owls	X	X
short-eared owl <i>Asio flammeus sandwichensis</i>	SEOW	Owls	X	
common myna <i>Acridotheres tristis</i>	COMY	Sturnidae	X	X
Hawaiian goose <i>Branta sandvicensis</i>	HAGO	Geese	X	X
Canada goose <i>Branta canadensis</i>	CANG	Geese		X

Species	ALPHA Code	Guild	Sites Observed	
			Kekaha	Ma'alo
red-billed leiothrix <i>Leiothrix lutea</i>	RBLE	Gleaning Birds		X
Japanese bush warbler <i>Horornis diphone</i>	JABW	Gleaning Birds	X	X
Japanese white-eye <i>Zosterops japonicus</i>	JAWE	Gleaning Birds	X	X
northern cardinal <i>Cardinalis cardinalis</i>	NOCA	Ground Feeding Birds	X	X
northern mockingbird <i>Mimus polyglottos</i>	NOMO	Ground Feeding Birds	X	X
red-crested cardinal <i>Paroaria coronata</i>	RCCA	Ground Feeding Birds	X	X
western meadowlark <i>Sturnella neglecta</i>	WEME	Ground Feeding Birds		X
white-rumped shama <i>Copsychus malabaricus</i>	WRSH	Ground Feeding Birds		X
hwamei <i>Garrulax canorus</i>	HWAM	Ground Feeding Birds		X

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**Appendix B.
Regulatory Agency Comments on the
Draft Wildlife Hazard Assessment**



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2015-TA-0082

Frank Cioffi, P.E.
Senior Engineer
AECOM
1001 Bishop Street, Ste. 1600
Honolulu, Hawaii 96813

DEC 24 2014

Subject: Technical Assistance for the Proposed Maalo Landfill and Resource Recovery Park, Lihue, Kauai

Dear Mr. Cioffi:

The U.S. Fish and Wildlife Service (Service) received your letter, dated November 24, 2014, requesting our comments on the proposed Maalo Landfill and Resource Recovery Park (RRP) on the island of Kauai, as a pre-consultation for the associated draft Environmental Impact Statement (EIS). The County of Kauai (County) proposes to develop and operate a new Municipal Solid Waste Landfill (MSWLF) on 270 acres owned by the State of Hawaii (within TMK 4-3-9-002:020), near Maalo Road. The RRP may be constructed either on the MSWLF site or at a nearby property on 80 acres owned by a private landowner (within TMK 4-3-8-002:001), pending discussions between the County and the landowner. The MSWLF infrastructure includes access roads, utilities, an office shop area, stormwater infiltration basin, leachate aeration pond, scale house, drop-off area, and internal roadways. The RRP involves recycling, reuse, reduction, and other waste diversion components. In addition, AECOM, on behalf of the County of Kauai, is conducting a Landfill Wildlife Hazard Assessment (LWHA) to evaluate the potential hazard of the proposed landfill to air carrier operations at Lihue Airport and develop wildlife hazard mitigation recommendations for potential inclusion in the project description. The following comments are provided to assist the County of Kauai and AECOM in preparing the draft EIS and associated LWHA, in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*).

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitat. The following species are known to occur or transit through the proposed project area: the endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot

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(*Fulica alai*), Hawaiian duck (*Anas wyvilliana*) (hereafter collectively referred to as Hawaiian waterbirds); the endangered Hawaiian goose (*Branta sandvicensis*); the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the threatened Newell's shearwater (*Puffinus auricularis newelli*), and a candidate for listing the band-rumped storm-petrel (*Oceanodroma castro*) (hereafter collectively referred to as seabirds). There is no designated critical habitat within the vicinity of the proposed project area. We provide the following recommendations to avoid and minimize project impacts to listed species and candidate species.

Hawaiian Goose

In order to avoid impacts to Hawaiian geese, we recommend a biologist familiar with the nesting behavior of the Hawaiian goose survey the area prior to the initiation of any work, or after any subsequent delay in work of three or more days (during which birds may attempt nesting). If a nest is discovered, work should cease immediately and our office should be contacted for further guidance. Furthermore, all on-site project personnel should be apprised that Hawaiian geese may be in the vicinity of the project at any time during the year. If a Hawaiian goose (or geese) appears within 100 feet of ongoing work, all activity should be temporarily suspended until the Hawaiian goose (or geese) leaves the area of its own accord.

Hawaiian Hoary Bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Seabirds

Seabirds, including the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. Construction activities should only occur during daylight hours. We also recommend the lighting in the project area be fully shielded or full cut-off luminary fixtures, such that the bulb can only be seen from below using the lowest wattage bulbs possible. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.

Hawaiian Waterbirds

Our information suggests that your project may result in standing water or creation of open water, thus attracting Hawaiian waterbirds to the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g., any ponding water) if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and

reduced reproductive success, and thus the project may create an attractive nuisance. We recommend you continue to work with our office during project planning so that we may assist you in developing measures to avoid impacts to Hawaiian waterbirds (e.g., fencing, vegetation control, predator management).

The Service understands that AECOM, on behalf of the County, is conducting a LWHA to determine how the project could affect wildlife hazards at Lihue Airport. In addition to the work described in the LWHA Preliminary Study Plan, you stated that the AECOM is arranging to conduct aerial surveys for cattle egret (*Bubulcus ibis*) roosts. Additional information regarding proposed design modifications and management activities to address potential hazards is necessary to assess potential impacts to listed species. You stated that AECOM anticipates releasing a preliminary LWHA report, including the preliminary assessment of hazards and design and operational management measures, at the end of January 2015. We request to receive a copy of the preliminary LWHA report once it is available for release. You also stated a meeting is tentatively scheduled for February 17, 2015 with the State of Hawaii Department of Transportation (HDOT) to discuss the preliminary LWHA report. We look forward to coordinating with you on our availability and further details pertaining to meeting to discuss the report.

The draft EIS should address all potential impacts to federally listed species and candidate species, and should outline conservation measures to avoid and minimize these impacts. If it is determined that the proposed project may affect federally listed species, the County of Kauai should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to minimize and mitigate those adverse effects.

Additionally, we recommend you incorporate the attached best management practices into your project description to avoid and minimize impacts to water resources that have the potential to occur during grading, excavation, and other construction activities.

We appreciate your efforts to conserve endangered species. Please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261, email: adam_griesemer@fws.gov) should you have any questions pertaining to this response.

Sincerely,



for Aaron Nadig
Assistant Field Supervisor:
Oahu, Kauai, NWHI, Am.Samoa

Cc: Dennis Neves, HDOT
Larry Dill, County of Kauai

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service recommends that the measures below be incorporated into projects to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.
2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.
3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.
4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.
5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.
6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.
7. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see <http://www.haccpnrm.org/Wizard/default.asp>) to prevent attraction and introduction of non-native species.
8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored onsite, if appropriate, to facilitate the clean-up of accidental petroleum releases.
9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.
10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

JAN 26 2016

In Reply Refer To:
01EPIF00-2016-TA-0162

Mr. Frank Cioffi, P.E.
Senior Engineer
AECOM
1001 Bishop Street, Ste. 1600
Honolulu, HI 96813

Subject: Comments on the Maalo Landfill Project Wildlife Hazard Assessment, Kauai

Dear Mr. Cioffi:

The U.S. Fish and Wildlife Service (Service) received your email, dated December 15, 2015, requesting our comments on the Landfill Wildlife Hazard Assessment (LWHA) for the proposed Maalo Landfill and Resource Recovery Park (RRP) on the island of Kauai. The County of Kauai (County) proposes to develop and operate a new Municipal Solid Waste Landfill (MSWLF) on 270 acres owned by the State of Hawaii (within TMK 4-3-9-002:020), near Maalo Road. The RRP may be constructed either on the MSWLF site or at a nearby property on 80 acres owned by a private landowner (within TMK 4-3-8-002:001), pending discussions between the County and the landowner. The MSWLF infrastructure includes access roads, utilities, an office shop area, stormwater infiltration basin, leachate aeration pond, scale house, drop-off area, and internal roadways. The RRP involves recycling, reuse, reduction, and other waste diversion components. AECOM and SWCA, on behalf of the County, conducted the LWHA to evaluate the potential hazard of the proposed landfill to air carrier operations at Lihue Airport and develop wildlife hazard mitigation recommendations for potential inclusion in the project description. The County anticipates preparing a Landfill Wildlife Management Plan (LWMP) to select practicable design and operational measures to minimize the attractiveness of the proposed landfill to species of concern.

We provided comments during the early development of this project in December 2014 (Service File 2015-TA-0182) to assist the County in preparing the draft Environmental Impact Statement (EIS). In our letter, we provided the following to assist you in your project planning: (1) recommended measures to avoid and minimize impacts to federally listed species; and (2) Best Management Practices (BMPs) to preserve aquatic habitat function. In February 2015, we provided additional assistance regarding recommended measures to avoid impacts to the Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), and Hawaiian duck (*Anas wyvilliana*) (hereafter collectively referred to as Hawaiian waterbirds), and the Hawaiian goose (*Branta sandvicensis*). The following comments are provided to assist the County in the finalization of the LWHA and

preparing the LWMP and draft EIS, in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*).

Maalo Area Avian Surveys. This section provides information on the activity of avian species based on survey observations in the Maalo Study Area, including Hawaiian waterbirds and the Hawaiian goose. Additional information regarding survey observations is necessary to assess potential impacts to Hawaiian waterbirds and Hawaiian goose at the Maalo Site. Please provide the Service with point counts for survey locations M5 and M6 at the Maalo Site, and any observations of nests for each of the following species: the Hawaiian stilt, Hawaiian moorhen, Hawaiian coot, Hawaiian duck, and Hawaiian goose.

Landfill Design Alternatives. The LWHA incorporates the Service's recommendations, provided in our February 17, 2015 email, regarding the use of floating bird deterrent balls or grid system to minimize attraction of Hawaiian waterbirds to standing water features. The wire grid system should be designed to minimize potential for entanglement of Hawaiian waterbirds and/or Hawaiian geese, should these species attempt to land on the wires.

The design of structures should incorporate our recommendations regarding exterior lighting to avoid and minimize attraction of seabirds, including the Hawaiian petrel (*Pterodroma sandwichensis*), the Newell's shearwater (*Puffinus auricularis newelli*), and the band-rumped storm-petrel (*Oceanodroma castro*) to artificially-lighted areas. If lights cannot be eliminated due to safety or security concerns, then lighting should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off.

In addition, measures to avoid impacts to Hawaiian hoary bat (*Lasiurus cinereus semotus*) should be incorporated in the design of infrastructure. The Hawaiian hoary bat forages for insects from as low as three feet to higher than 500 feet above ground. When barbed wire is used for fencing, bats can become entangled. Barbed wire should not be used for fencing as part of the proposed project.

Operational Measures. The LWHA states the LWMP will be a living document that is subject to regular evaluation. The LWMP should include an adaptive management section that describes the process for making changes to operational measures, if necessary, based on the results of monitoring.

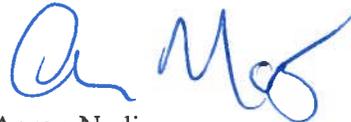
Active Wildlife Control. The LWHA recommends hazing of cattle egrets (*Bubulcus ibis*) attracted to the landfill waste features. Hazing activities for cattle egrets in areas where a Hawaiian waterbird(s) and/or Hawaiian goose (geese) are present may result in the injury or death of a waterbird(s) and/or goose (geese) due to collision with structures. Although design and operational measures described in the LWHA will minimize the attraction of Hawaiian waterbirds to water features and Hawaiian geese to grass areas, the implementation of these measures does not ensure that no Hawaiian waterbirds or Hawaiian geese will be attracted to the proposed landfill. Additionally, based on cattle egret movements in the Maalo Study Area as described in the LWHA, the hazing of cattle egrets attracted to the proposed landfill may increase the air traffic of cattle egrets in the direction of Kauai Lagoons, protected Hawaiian waterbird habitat.

Cattle egrets depredate the young of Hawaiian waterbirds, and on managed wetlands, increased cattle egret foraging behavior has been documented just as endangered waterbird chicks are hatching. In addition to cattle egrets, the landfill odors will attract other non-native predators of Hawaiian waterbirds and Hawaiian geese to the proposed landfill, such as feral cats and rats. We recommend implementing a predator control program at the Maalo site to remove feral cats, rats, and cattle egret to minimize predation and/or reduced breeding success of Hawaiian waterbirds and Hawaiian geese that may utilize surrounding areas. To further reduce the number of cattle egrets attracted to the landfill and help conserve Hawaiian waterbirds nesting in surrounding areas, we recommend the County coordinate with landowners of neighboring lands and the State of Hawaii Division of Forestry and Wildlife (DOFAW) to remove cattle egrets at nearby roost locations using lethal control. The County would need to obtain a Migratory Bird Treaty Act (MBTA) Depredation Permit and authorization from DOFAW to control cattle egrets.

The County should continue to coordinate with us while preparing the LWMP to incorporate measures to avoid impacts to listed species. Please provide a copy of the draft LWMP to the Service once it is available to be released.

We appreciate your efforts to conserve endangered species. Please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261, email: adam_griesemer@fws.gov) should you have any questions pertaining to this response.

Sincerely,



Aaron Nadig
Island Team Manager
Oahu, Kauai, Northwestern Hawaiian
Islands and American Samoa

cc: Mr. Ford Fuchigama, HDOT
Mr. Larry Dill, County of Kauai

DAVID Y. IGE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
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FORD N. FUCHIGAMI
DIRECTOR

Deputy Directors
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

IN REPLY REFER TO:

DIR 1.11161

August 5, 2016

Mr. Lyle Tabata
Acting County Engineer
Public Works Department
4444 Rice Street, Suite 275
Lihue, Hawaii 96766

Subject: New Landfill Wildlife Hazard Assessment

Dear Mr. Tabata:

We have reviewed the New Landfill Wildlife Hazard Assessment report that was submitted to the Hawaii Department of Transportation, Airports Division (HDOTA). While the report does confirm that the New Landfill will attach wildlife, the report does not address any mitigation plan of wildlife in this area. We are willing to conduct another review of your proposed project once we receive the mitigation plan.

The Federal Aviation Administration (FAA) and HDOTA has concerns with regards to possible project activities to airport compatible land uses and minimizing hazardous wildlife attractants to air and surface operations will assist us in making a better assessment.

Should you have any questions, please contact Mr. David Rodriguez, Special Assistant to the Director at (808) 587-2165 or email: david.j.rodriguez@hawaii.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Ford N. Fuchigami".

FORD N. FUCHIGAMI
Director of Transportation

