

Kaheawa Wind Power II
Habitat Conservation Plan
Annual Report: FY 2018



Kaheawa Wind Power II, LLC 3000 Honoapi'ilani Highway
Wailuku, Hawai'i 96768

August, 2018

ITL-15 and ITP TE27260A-0

I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate and complete.

A handwritten signature in cursive script, reading "Mitchell King". The signature is written in a dark ink and is positioned above the printed name.

Hawai'i HCP Manager
Terraform Power, LLC

Table of Contents

Executive Summary.....	1
Introduction.....	3
Downed Wildlife Monitoring.....	3
Search Area Density Weighted Proportion of the Predicted Fall Distribution.....	5
Nēnē.....	5
Hawaiian Petrel and Newell’s Shearwater.....	6
Hawaiian Hoary Bat.....	7
Search Interval.....	8
Canine Interactions with Wildlife.....	8
Downed Wildlife Incidents.....	8
Searcher Efficiency Trials.....	9
Carcass Retention Trials.....	9
Scavenger Trapping.....	10
Estimating Adjusted Take.....	12
Hawaiian Hoary Bat Monitoring.....	13
Wildlife Education and Observation Program.....	15
Vegetation Management.....	15
Mitigation.....	16
Hawaiian Hoary Bat-Research.....	16
East Maui Seabird Survey.....	16
Hawaiian Petrel and Newell’s Shearwater- Makamaka’ole.....	16
Nēnē – Maui Predator Control.....	22
Adaptive Management.....	22
Agency Visits, Reporting and Permit Amendment Request.....	23
Expenditures.....	23
Citations.....	24
Appendices.....	25

Figures

Figure 1. KWPII WTG locations and current search areas.	4
Figure 2. The cumulative fall distribution of nēnē by distance from WTG at KWP and KWPII compared to the ballistics model of Hull and Muir (2010) for large bird/small height turbines.	6
Figure 3. The cumulative fall distribution of medium sized fast-flying birds by distance from WTG at KWP and KWPII compared to the ballistics model of Hull and Muir (2010) for medium bird/ <i>medium</i> height turbines.	7
Figure 4. The cumulative fall distribution of bats by distance from WTGs at KWP and KWPII compared to the ballistics model of Hull and Muir (2010) for bats/small height turbines.	8
Figure 5. Location of KWPII predator traps during FY 2018.	11
Figure 6. Bat nightly presence at KWPII by month during FY 2013 through 2018.	14
Figure 7. Hours with Detections at KWPII in FY 2018 (n = 206).	15

Tables

Table 1. SEEF results for KWPII during FY 2018.	9
Table 2. Carcass retention trial results at KWPII during FY 2018.	10
Table 3. Hawaiian hoary bat nights with detections and total detection nights by WTG at KWPII in FY 2018.	14
Table 4. Makamaka'ole trapping data by species and location for FY 2018.	17
Table 5. Makamaka'ole rodent presence/absence summary, as the number of tracking tunnels with paw prints out of 10 total tunnels deployed.	17
Table 6. Nights per month NESH photographed at burrows 26A, 43A and 50A in calendar years 2017 and 2018. NESH eggs collected in 2017 and 2018 (so far).	18
Table 7. Nights per month NESH photographed at burrows 22B, 50B, 42B and the "Uluhe" burrow near to 22B in calendar years 2017 and 2018. BUPE egg collected in 2017 and none in 2018 (so far).	20
Table 8. Expenses by category for KWPII during FY 2018.	23

Appendices

Appendix 1. Density weighted proportion searched for Hawaiian hoary bat, Hawaiian petrel and Hawaiian goose at KWP II in FY 2018.....	25
Appendix 2. Downed wildlife monitoring dates at KWPII during FY 2018.....	26
Appendix 3. Downed Wildlife Found at KWPII in FY2018.....	28
Appendix 4. Hawaiian Goose Downed Wildlife Report at KWPII on November 22, 2017.....	29
Appendix 5. Hawaiian Goose Downed Wildlife Report at KWPII on January 15, 2018.	39
Appendix 6. Hawaiian Goose Downed Wildlife Report at KWPII on February 6, 2018.	43
Appendix 7. Hawaiian Goose Downed Wildlife Report at KWPII on May 29, 2018.	50
Appendix 8. Hawaiian Goose Downed Wildlife Report at KWPII on May 29, 2018.	53
Appendix 9. Wedge-tailed Shearwater Downed Wildlife Report at KWPII on October 11, 2017.	58
Appendix 10. SEEF trials at KWPII during FY 2018.	66
Appendix 11. CARE AI-AL trial results at KWPII during FY 2018.	67
Appendix 12. Standardized Protocols for Incidental Finds.....	71
Appendix 13. Fatality estimation input parameters and results for Hawaiian goose at KWPII through FY 2018..	74
Appendix 14. Fatality estimation input parameters and results for Hawaiian hoary bat at KWPII through FY 2018.	75
Appendix 15. Nēnē lost productivity and indirect take at KWPII through FY 2018..	76
Appendix 16. Indirect take calculations for Hawaiian hoary bat at KWPII through FY 2018.	77
Appendix 17. Hawaiian Goose Permit Term Projected Take at KWPII.....	78
Appendix 18. Hawaiian Hoary Bat Permit Term Projected Take at KWPII.....	79
Appendix 19. 2017 Special Use Permit Report and Renewal Request West Maui Natural Area Reserve: Kahakuloa Section West Maui Forest Reserve (Makamaka’ole Section – Enclosure B) Makamaka’ole Seabird Mitigation site.	80

Executive Summary

Kaheawa Wind Power II, LLC (KWPII) has been implementing a Habitat Conservation Plan (HCP) since approval December 2011. The HCP supports the Federal Incidental Take Permit TE-27260A- 0 and State of Hawai'i Incidental Take License ITL-15, both issued in January 2012. KWPII was commissioned to begin operating on July 2, 2012. Species covered under the HCP include the Hawaiian petrel (HAPE), Newell's shearwater (NESH), Hawaiian goose (nēnē), and the Hawaiian hoary bat (bat). This report is for State of Hawai'i fiscal year (FY) 2018, July 1, 2017 through June 30, 2018.

In FY2018 the downed wildlife search area consisted of graded roads and wind turbine generator (WTG) graded pads found within a 70-meter radius circle centered on each turbine. Teresa Gajate has been contracted since October 2015 to conduct canine assisted searching with her dog Makalani. Staff HCP biologists visually searched when Ms. Gajate was not available. Visual searches were 5.9% of the all KWPII WTG searches in FY2018. The search interval mean and standard deviation (SD) in days for KWPII was 7.12 (SD = 0.86). High wind speeds prohibited searching at KWPII during the week of January 17, 2018. The FY2018 search area density weighted proportion (DWP) of the predicted total fall distribution for the nēnē, seabirds and bat is approximately 37.2%, 24.6% and 55.9%, respectively.

Five nēnē (one gosling and four adults) and no other HCP covered species were found in FY2018. Of the four adult nēnē, three were found outside of the search area. The one gosling was apparently unable to climb out of the WTG 6 transformer spill containment receptacle after recent rains. Wire-mesh ramps were subsequently installed in each spill containment receptacle and the receptacles drained more often. Since the operations began in July 2012 five adult nēnē, one nēnē gosling and three bats have been observed within the search areas and included in the total take estimated since the permit period began in 2012. Other than the goslings reported this FY no other covered species were found outside of the formal search area or considered incidental to formal searches. Neither HAPE nor NESH have been found at KWPII since operations began.

The total estimated direct take at the 80% credibility level for KWPII HCP covered species is 13 and 12 adults for nēnē and bats, respectively. Therefore, unobserved direct take as adults is eight nēnē and nine bats. Indirect take (IDT) converted to adult take is one and one for nēnē and bats, respectively, plus one gosling (considered indirect take). Total estimated take as adults therefore is 14 and 13 for nēnē and bat, respectively. The total estimated take as adults reported in the FY2017 HCP annual report was 11 and 13 for nēnē and bat, respectively. The 20-year permit term total estimated projected take, including direct and indirect take, assuming search conditions were like those reported for FY2018 is 37 adult bats and 42 adult nēnē plus one gosling. Lost future productivity as fledglings accrued for nēnē is 3.7.

Independent contractor Kristin Mack has conducted searcher efficiency trials (SEEF) trials at KWPII since October 2015. The SEEF results for large, medium, and small size carcasses were 100% (N = 10), 100% (N = 12), 95.3% (N = 43), respectively. Four 28-day carcass retention (CARE) trials, each conducted quarterly, used four large, four medium, and 20 small size carcasses. The CARE mean and standard deviation (SD) in days for large, medium, and small carcasses were 28.0 (SD = 0), 28.0 (SD = 0) and 11.0 (SD = 10.3), respectively.

Wildlife Acoustics SM2BAT+™ bat detectors with one SMX-U1™ microphone each recorded nightly bat detections at all eight WTG associated ground locations at KWPII during 7.7% of total detector nights (161 of 2103). The overall rate for KWPII in FY2017 was 8.3%. Feeding buzzes were detected on six nights in FY2018. Bats were detected in every month of the year ground height detectors were operating with peak per cent nights with detections in September (30%), October (14%) and April (8%) and at WTG 1 (9%), 5 (9%), 13 (9%) and 14 (10%).

A total of 45 site personnel and 67 off-site MECO employees received Wildlife Education and Observation Program trainings in FY 2018.

Vegetation management of the search plots at KWPII for FY 2018 treated 20 acres of total search plot area using hand-held weed whackers and herbicide.

Seabird mitigation for Tier 1 estimated take for KWPII continues at the Makamaka'ole seabird enclosures

and includes trapping and monitoring for potential predators, maintenance of enclosure fences, erosion control and monitoring seabird activity within the Makamaka'ole Stream drainage area and near artificial burrows within the enclosures. HCP required alternative seabird mitigation site surveys in East Maui were completed in FY 2016.

Nēnē mitigation contracted to DOFAW for Tier 1 estimated take has been funded for two years and began March 2017 as nesting area predator control and vegetation management at the Pi'iholo Ranch nēnē release pen on Maui. Three nēnē fledglings have been produced at this pen. These three fledglings have mitigated for part of the lost productivity accrued through FY2018.

Mitigation for Tier 1 and Tier 2 estimated bat take has been completely funded and continues as habitat management at Kahikinui State Forest Reserve. Mitigation for higher estimated take has been contracted and begun in FY2018 on Hawai'i Island with U.S. Geological Survey Hawaiian hoary bat research group as bat ecological research intended to better inform future bat habitat restoration and conservation.

State and federal take permit amendment processes are underway and include proposed mitigation and an increase in take requested for nēnē and bats. An Environmental Impact Statement Preparation Notice for KWPII was published in the Office of Environmental Quality Control *Environmental Notice* on February 23, 2017 and the draft state SEIS will be available for public comment once the federal draft EIS has been prepared. A draft state HCP amendment was offered publicly for comment in the *Environmental Notice* on October 8, 2017. The Notice of Intent to draft a federal EIS relating to KWPII request for additional bat and nēnē take was published in the June 1, 2018 *Federal Register*. Public scoping for the draft federal EIS occurred in June 2018 including a meeting on Maui on June 20, 2018. The draft federal EIS, state SEIS and draft federal HCP amendment are expected to be available for public comment in November 2018. The Endangered Species Recovery Committee has formally reviewed drafts of the state HCP amendment on September 8, 2015 and again on October 19, 2017 and made a site visit to KWPII and to the Makamaka'ole seabird mitigation project on February 22, 2018.

KWPII provided DOFAW and USFWS abbreviated quarterly summary reports for FY 2018 quarters 1-3 and met with these agencies periodically. The Endangered Species Recovery Committee reviewed the FY 2017 annual HCP report on January 24, 2018.

Introduction

In July 2012 Kaheawa Wind Power Phase II, LLC (KWPII) began commercial operation to meet the growing need for renewable energy across the island of Maui. The State Board of Land and Natural Resources approved a Conservation District Use Permit (CDUP) for the facility, which is situated on state conservation lands, in August 2010.

In fulfillment of the Endangered Species Act and Chapter 195-D, Hawai'i Revised Statutes, KWPII developed a project-specific Habitat Conservation Plan (HCP) in cooperation with the U.S Fish and Wildlife Service (USFWS), the Department of Land and Natural Resources- Division of Forestry and Wildlife (DOFAW) ("the agencies") and the Hawai'i Endangered Species Recovery Committee (ESRC). Upon final approval of the HCP, the federal Incidental Take Permit (ITP# TE-27260A-0) and state Incidental Take License (ITL# 15) were issued in January 2012, each with a duration of twenty years. The ITP and ITL cover four federally-listed and endangered species: the Hawaiian petrel or 'ua'u or HAPE (*Pterodroma sandwichensis*), Newell's shearwater or 'a'o or NESH (*Puffinus newelli*), Hawaiian goose or nēnē (*Branta sandvicensis*), and the Hawaiian hoary bat or 'ope'ape'a or bat (*Lasiurus cinereus semotus*).

KWPII has previously submitted annual HCP progress reports for FY 2013 through FY 2017 to the agencies (Kaheawa Wind Power II 2013, 2014, 2015, 2016 and 2017). This report summarizes HCP related activities for KWPII during the State of Hawai'i fiscal year (FY) 2018 (July 1, 2017 through June 30, 2018).

Downed Wildlife Monitoring

KWPII HCP biologists have implemented a year-round intensive monitoring program to document downed (i.e., injured or dead) wildlife incidents involving HCP-listed and non-listed species on the project site since operations began in July 2012. At the March 31, 2015 ESRC meeting, after review of monitoring data for KWPII, members agreed to "encourage the applicant to work with the statistical experts and researchers to develop an alternative more efficient and focused monitoring strategy which still meets the committees expressed preference for continuation of annual monitoring".

Beginning in July 2015 with agreement from the agencies and after three years of weekly monitoring of 75 meter (m) circular plots centered on each wind turbine generator (WTG), the area searched weekly includes only graded roads and WTG graded pads found within a 70m radius circle centered on each WTG (Figure 1).

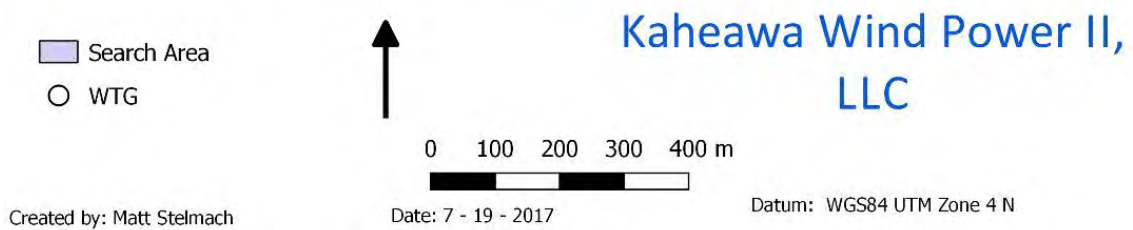


Figure 1. KWPII WTG locations and current search areas.

Search Area Density Weighted Proportion of the Predicted Fall Distribution

The density weighted proportion (DWP) of the predicted total fall distribution is one of the measured variables used to estimate the total take for each HCP listed species (see Estimated Adjusted Take). The DWP has also been called the density weighted area (DWA). The FY 2018 search area DWP of the predicted total fall distribution for the nēnē, seabirds and bat is approximately 37.2%, 24.6% and 55.9%, respectively (Appendix 1).

More birds or bats are expected to and do fall closer to the WTG and the distribution of fatalities is not uniform, becoming less dense per acre as distance increases from the WTG. To determine the DWP as distance increases, the 70m circle is divided into six circular adjacent bands around the WTG and the 71-100m area into three 10m bands. The first, closest band encompasses the area from the WTG out to 20m radius and each band farther from the WTG has a 10m radius. The total area in square meters is calculated for each band. The portion of the total area in each band that was searched (roads and pads) was determined using ARCGIS (Appendix 1). The product of the portion of area searched per band and the predicted fatality distribution per band are determined for each band for each carcass size class (large, medium and small) and the results summed for all bands to derive the DWP of the entire fall distribution of each carcass size class searched (Appendix 1). The fall distribution is assumed to be uniform around the turbine.

Nēnē

The DWP of the predicted total fall distribution between 0 and 70m radius was calculated for all 32 observed nēnē fatalities from turbine strikes at KWP I and KWP II. To account for hypothetical takes that would have been expected, based on the ballistics modelling of Hull and Muir (2010) for large birds around “small” turbines, but not observed, six individuals (approximately 20% of the observed nēnē) were added to create the fall distribution between 70m and 100m. The KWP I and KWP II nacelle heights are 68m and 72m, respectively, and the maximum height of the rotor swept zones are 90m and 100m, respectively. These are considered small turbines by Hull and Muir (2010). Since the heights at KWPI and KWPII are similar, all the observed nēnē take from both sites has been used in creating the observed fall distribution.

The entire 70m circle centered on each WTG is modeled to include 84.2% of all nēnē carcasses expected to fall from turbine strikes (Figure 2). The Hull and Muir (2010) ballistics model for large size birds at small size turbines is shown in Figure 2 for comparison. The reduced area of graded roads and pads within 70m radius circles searched in FY2018 is estimated to encompass 37.2% of all potential nēnē fatalities (Appendix 1).

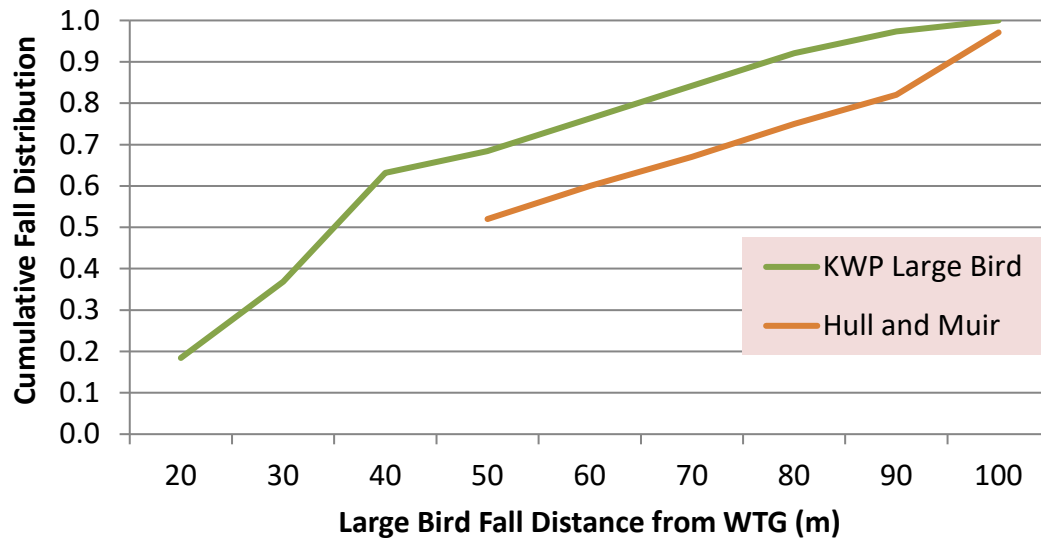


Figure 2. The cumulative fall distribution of nēnē by distance from WTG at KWP and KWP II compared to the ballistics model of Hull and Muir (2010) for large bird/small height turbines.

Hawaiian Petrel and Newell's Shearwater

The DWP of the predicted total fall distribution between 0 and 70m radius was calculated for all 28 observed seabird fatalities from turbine strikes at KWP I and KWP II that were found within 70m of the WTGs (two HAPE and three white-tailed tropicbirds have been found beyond 70m). The observed seabirds included only HAPes, white-tailed tropicbirds and WTSHs; i.e. the “fast-flying” birds. Game-birds, owls and great frigatebirds were not considered to be “fast-flying”. To account for hypothetical takes that would have been expected, based on the ballistics modelling of Hull and Muir (2010) for medium birds around “small” turbines, but not observed, six individuals (approximately 22% of the observed seabirds) were added to create the fall distribution between 70m and 100m.

The entire 70m circle centered on each WTG is modeled to include 82.4% of all seabird carcasses expected to fall from turbine strikes (Figure 3). The Hull and Muir (2010) ballistics model for medium size birds at medium sized turbines is shown in Figure 3 for comparison. The model data for medium birds at small turbines is not easily extracted from Hull and Muir (2010) but would be expected to show more birds falling closer to turbines (skewed left of the distribution line in Figure 3). The reduced area of graded roads and pads within 70m radius circles searched in FY2018 is estimated to encompass 24.6% of all potential seabird fatalities (Appendix 1).

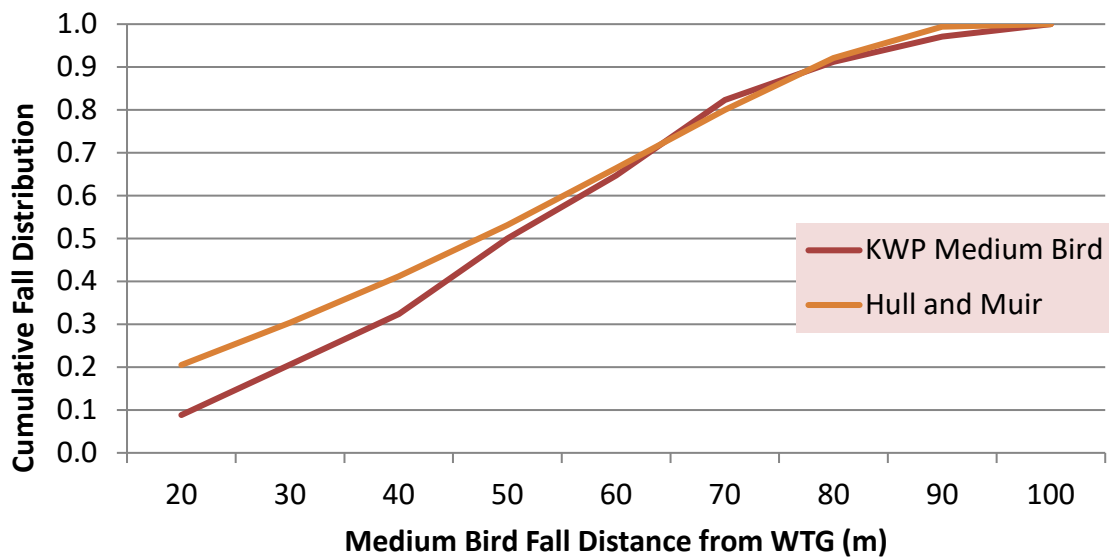


Figure 3. The cumulative fall distribution of medium sized fast-flying birds by distance from WTG at KWP and KWP II compared to the ballistics model of Hull and Muir (2010) for medium bird/*medium* height turbines.

Hawaiian Hoary Bat

The DWP of the predicted total fall distribution was calculated using all 14 observed bat fatalities from turbine strikes at KWP I and KWP II. Hull and Muir (2010) modelled that only 1% of bats would be expected to fall beyond 50m.

A 70m radius circle centered on each WTG is modeled to include 100% of all bat carcasses expected to fall from turbine strikes (Figure 4). The Hull and Muir (2010) ballistics model for bats at small size turbines is shown in Figure 4 for comparison. The reduced area of graded roads and pads within 70m radius circles searched in FY2018 is estimated to encompass 55.9% of all bat fatalities (Appendix 1).

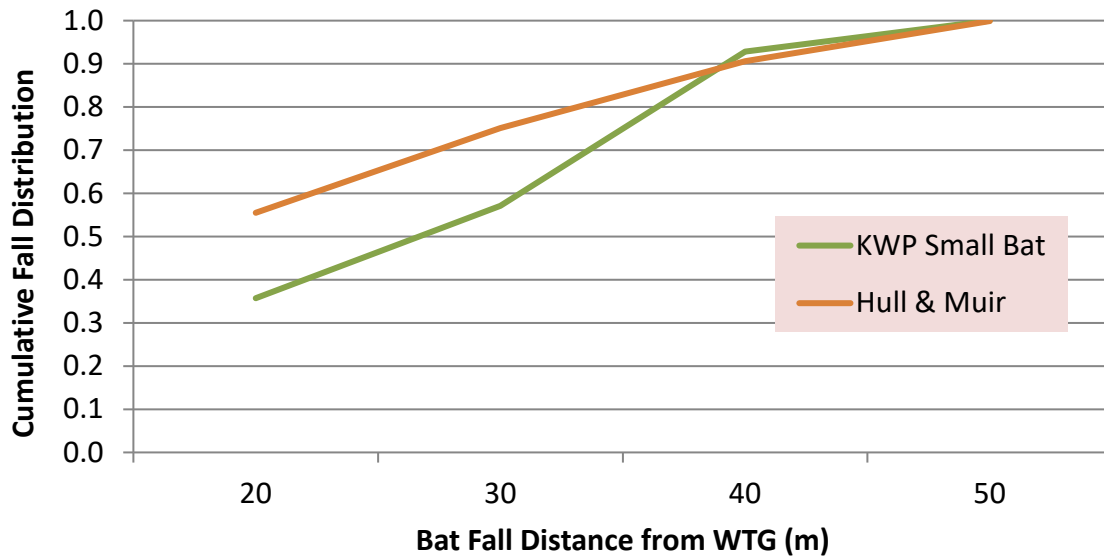


Figure 4. The cumulative fall distribution of bats by distance from WTGs at KWP and KWP II compared to the ballistics model of Hull and Muir (2010) for bats/small height turbines.

Search Interval

The FY2018 search interval mean and standard deviation (SD) in days for KWPII downed wildlife monitoring was 7.12 (SD = 0.86) (Appendix 2). For the safety of the HCP staff, monitoring was halted during periods when wind speeds were reported higher than 15 meters per second (m/s). During FY 2018 one monitoring schedule interruption occurred during the week of January 17, 2018 and no searches of KWPII occurred during that week.

Teresa Gajate and her canine Makalani provided canine-assisted searching in FY 2018. Canine-assisted searching was the primary search method, with visual searching by HCP staff when canine-assisted searching was not available. In FY 2018 only 5.9% of searches were visually conducted by humans (Appendix 2).

Canine Interactions with Wildlife

Special precautions have been taken to eliminate any potential canine interaction with wildlife. The handler has been directed to immediately retrieve Makalani if nēnē were observed and to temporarily skip WTGs if nēnē were present within the WTG search area or vicinity. Skipped WTGs were preferentially searched later the same day or the next day with either canine assistance or visual search.

Canine searches were postponed or skipped in favor of visual searches if nēnē were present at the turbine or if WTG repairs were necessary. Nēnē presence halted no WTG searches. No canine wildlife interactions were observed.

Downed Wildlife Incidents

Appendix 3 summarizes all downed wildlife incidents documented at KWPII during FY 2018 including non-listed incidents. Five nēnē (one gosling and four adults) and no other HCP covered species were found in FY 2018 (Appendices 4, 5, 6, 7 and 8). Of the four adult nēnē, three were found outside of the search area during

formal searches. The one gosling was apparently unable to climb out of the WTG 6 transformer spill containment receptacle after recent rains. Wire-mesh ramps were subsequently installed in each spill containment receptacle and the receptacles drained of rain water more often. Since the operations began in 2012 five adult nēnē, one nēnē gosling and three bats have been observed within the search areas and included in the total take estimated since the permit period began. Other than the gosling and three nēnē reported this FY no other covered species were found outside of the formal search area or considered incidental to formal searches. Neither HAPE nor NESH have been found at KWPII since operations began.

Migratory Species Treaty Act (MBTA) protected species found include one Wedge-tailed shearwater (Appendix 9). All incidents were reported to the agencies within 24 hours and downed wildlife incident reports submitted within three days of each discovery.

Searcher Efficiency Trials

In FY 2018, independent contractor Kristin Mack (the SEEF proctor) conducted searcher efficiency (SEEF) trials. The SEEF proctor used randomly selected points within the reduced search area for SEEF locations. The schedule for placing carcasses was pre-determined for each week and unavailable to HCP staff and the canine handler. HCP staff would inform the SEEF proctor of the planned weekly search schedule to ensure SEEFs were put out for scheduled search days. At the end of each search day HCP staff would communicate to the SEEF proctor what was found. If any SEEF carcasses were missed a different HCP staff member (typically the HCP manager) would attempt to recover the carcass and report to the SEEF proctor if the carcass was still present. If the carcass was not found that carcass trial would be considered lost and not included in SEEF results.

The SEEF results for large, medium, and small size carcasses were 100% (N = 10), 100% (N = 12), 95.3% (N = 43), respectively. (Table 1, Appendix 10). The two small SEEF's were missed by Makalani the canine assistant.

Table 1. SEEF results for KWPII during FY 2018.

Carcass Size	Result (%)	Trials
Large	100	10
Medium	100	12
Small	95.3	43

Carcass Retention Trials

Carcass retention (CARE) trials are used to estimate how long a carcass remains detectable to searchers before complete removal or obscuring by scavengers or weather conditions (wind blowing a carcass out of a search area). Trials proctored were conducted using Rhode Island Red crossed chickens as surrogates for nēnē, WTSHs for HAPE and NESH, and commercially produced rats for bats. The chickens were from Maui farmers. WTSH carcasses were fledglings and adults found dead by the public and delivered to Sea Life Park on Oahu or collected by DOFAW on Maui. Rat carcasses were purchased from Layne Laboratories, Inc. in California, a pet food company. These rats are brown and/or black and are the Layne Laboratory "Small Colored" size category (approximately 11.4 cm in body length not including the tail) and have been chosen to mimic the body size of Hawaiian hoary bats. The HCP listed species are not available to use in CARE trials. Our state and federal wildlife collection permits for WTSH use for KWPII are numbers WL 15-05 and MB24151B-0, respectively, through 2016, and WL18-09 and MB22098C-0, respectively, during 2017 and 2018. Any take of MBTA species is also reported annually through these permits.

In FY2018 four 28-day carcass retention (CARE) trials, one per quarter, used a total of four large, four

medium, and 20 small size carcasses (Appendix 11). The CARE mean and standard deviation (SD) in days for large, medium, and small carcasses were 28.0 (SD = 0), 28.0 (SD = 0) and 11.0 (SD = 10.3), respectively (Table 2).

Table 2. Carcass retention trial results at KWPII during FY 2018.

Carcass Size	Count	Mean Retention (days)	SD (days)
Large	4	28.0	0
Medium	4	28.0	0
Small	20	11.0	10.3

Scavenger Trapping

We initiated scavenger trapping near the WTGs in August 2015 in response to a decreasing average persistence during CARE trials. Trapping is intended to decrease scavenging of any downed wildlife and may improve nēnē fledgling survival and nesting success. All traps were designed to minimize inadvertent interaction with nēnē.

Trapping in FY 2018 included six DOC250™ body grip kill traps, and six cage live traps distributed near WTGs (Figure 5). During FY 2018, 29 mongooses, one rat and 12 cats were caught using the approved trapping protocol and monitoring frequency. Two Gray Francolins were also trapped and released alive. Beginning in January 2018 trapping was discontinued to determine if decreasing CARE average retention for rat carcasses was being affected by constant availability of scavenger food sources. The CARE trial average persistence time for rat carcass trials in quarters three and four at KWPII increased noticeably after trapping ceased (Appendix 11).

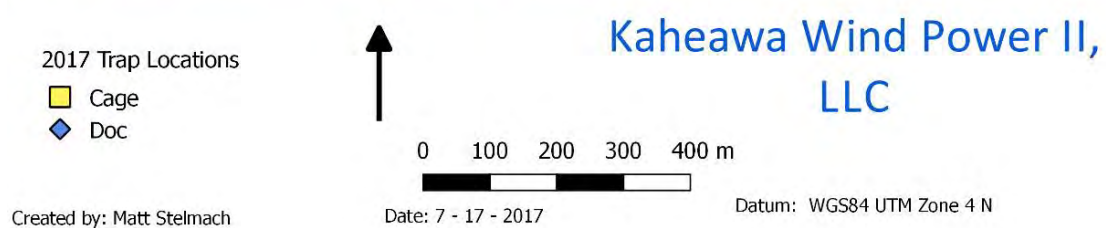


Figure 5. Location of KWPII predator traps during FY 2018.

Estimating Adjusted Take

The estimators used in this report were developed by the USGS (Huso *et al.* 2015 and Dalthorp *et al.* 2017) and have been recommended by the agencies. The USGS Evidence of Absence estimator's output is a value that represents the number of fatalities that has not likely been exceeded during the survey period. Values can be generated for varying levels of "credibility" (confidence) and expressed as a percentage (e.g., 50%, 80%, etc.). The higher the desired level of credibility the more conservative (higher) the estimated value. At the request of the agencies, the more conservative 80% credibility level is reported.

A stipulation of the estimator model is that only fatalities observed within the designated search area are included in the take estimation. Fatalities observed outside of the designated search area or incidental to searches are considered in the estimation calculation to have already been represented in the un-searched portion of the total expected fatality distribution. Beginning in FY 2018 the USFWS provided a formal protocol to determine whether a downed wildlife incidentally found in the formal search area should be included in the same way that observed fatalities found in search areas during formal searches are included (Appendix 12).

Five nēnē (one gosling and four adults) and no other HCP covered species were found in FY 2018. Of the four adult nēnē, three were found outside of the search area during formal searches. The nēnē gosling was attributed to wind site operations and is considered indirect take. The total estimated direct take at the 80% credibility level for KWPII HCP covered species is 13 and 12 adults for nēnē and bats, respectively, plus one gosling (Appendix 13 and 14). Therefore, unobserved direct take as adults is eight nēnē and nine bats (Appendix 13 and 14). Observed direct take (ODT) is the only take that has been documented and confirmed at the site. However, for the purposes of estimating potential take for permitting and mitigation, the Evidence of Absence estimator calculates additional take that may have occurred but that was not observed. This unobserved direct take (UDT) attempts to account for fatalities that may have fallen outside of search plots, were missed by searchers within search plots, or were removed by scavengers or environmental factors such as high winds.

In addition to ODT and UDT, indirect take (IDT) is estimated separately for ODT and UDT and is the possible or known take of offspring that have been negatively affected by the direct take of their parents. Both parents of nēnē and the seabird species exhibit equal responsibility for care of young until fledging while only the female bat cares for their offspring. All four HCP covered species have seasonal breeding periods as described in the KWPII HCP and the point during the breeding season when an adult is taken determines to what extent the offspring is affected (i.e. the chance of survival of an offspring without one or both parents may vary).

IDT for nēnē is detailed in Appendix 15 and the calculation depends on what time of year the adult take was observed. Total IDT (for ODT and UDT) for nēnē is 0.88 fledglings. IDT converted to adult take for nēnē is one (rounded up, $0.88 \times 0.512 = 0.45$) and assumes three years from fledging to adulthood at an annual survival rate of 0.8 (0.512 after three years).

The total estimated nēnē take (direct plus indirect take) at the 80% credibility level is not more than 14 adults and one gosling. Tier 1 take level is 18 adults and 3 fledglings (or 20 adults assuming three fledglings surviving to adult is 1.54 rounded up to 2). Fourteen adult nēnē is 70% of the Tier 1 level as adults. The established trigger value to begin Tier 2 planning, funding and implementation is 75%.

Accrued lost productivity for nēnē is 3.46 fledglings (Appendix 15). Accrued lost productivity for a given year for nēnē is determined by adding adult estimated take accumulated from all previous years (not yet mitigated for) and multiplying that adult total by 0.1 as proscribed in the KWPII HCP. Each year's lost productivity is accumulated until estimated adult take is mitigated for.

IDT estimated from bat ODT is calculated for adult female bats or bats of unknown sex (conservatively assumed to be female), found between April 1 and September 15, the bat breeding season designated by the wildlife agencies (Appendix 16). Any ODT of adult female or sex unknown bats found during the breeding season are assumed to have dependent young, and a loss of 1.8 juveniles is calculated per female or unknown sex ODT (2 pups per female * 0.9 survival rate to weaning per pup = 1.8 juveniles). For KWPII no female bats and no bats whose sex has not yet been determined were observed during the breeding period through FY 2018. The

sex of all bats found during the breeding period, if any, will be determined in FY 2019 and IDT recalculated.

IDT estimated from bat UDT assumes 50% of the UDT would be female and that for each female there is an average probability that she would be pregnant or lactating for three months in a year. Bats fly through the project area throughout the year and the probability of an individual female bat having dependent young during a 12-month period is assumed to be 25% (three out of 12 months). The average period of dependence is determined considering that Hawaiian hoary bats have one brood a year, and that hoary bats in North America have an average 56-day gestation period followed by parental care to weaning averaging 34 days or approximately three months for gestation and parental care (Hayssen *et al* 1993, Hayes and Wiles 2013, and NatureServe 2015 for *Lasiurus cinereus*). There is not enough information for hoary bats from Hawai'i to determine the gestation and pre-weaning dependent period. Consequently, IDT is assessed to bats lost from female UDT at the rate of 0.225 juveniles/adult female bat ($0.5 \times 0.25 \times 1.8 = 0.225$). The IDT for the UDT considering the direct take estimate at the 80% credibility level is 2.03 juveniles ($12 \text{ estimated} - 3 \text{ observed} = 9 \text{ unobserved} \times 0.225 = 2.03$) (Appendix 16).

The estimated rate of survival of young to reproductive age (the next year after birth) assumed from available data is 0.30 (extrapolated from little and big brown bats (*Myotis lucifugus* and *Eptesicus fuscus*; Humphrey 1982, Humphrey and Cope 1976). Bat total IDT of 2.03 converts to 0.61 or one adult rounded up ($2.03 \times 0.3 = 0.61$) (Appendix 16). The total estimated bat take at the 80% credibility level therefore is not more than 13 adult bats. The Tier 2 amended take limit of 11 adult bats is exceeded and a take amendment is in process.

Hawaiian Hoary Bat Monitoring

To better understand variations in bat activity specifically near the ground close to the WTGs, we have operated eight Wildlife Acoustics SM2BAT+™ ultrasonic bat detectors with one SMX-U1™ microphone (mic) each since October 2013 throughout KWPII. Prior to October 2013 Titley Anabat™ detectors had been deployed around the site near WTGs beginning in 2012 (KWP II 2012). The detector mics are mounted at 6.5 meters' height. Six are placed near the WTGs while two are placed near a gulch edge (near WTG 3 and 14); each mic is positioned horizontally, pointing SW (away from the prevailing NE trade winds).

Detectors recorded bat activity in FY2018 at all eight ground locations at KWPII during 7.7% of total detector nights (161 of 2103) (Table 3). The overall rate for KWPI in FY2017 was 8.3%. Bats were detected in every month of the year ground height detectors were operating with peak per cent nights with detections in September (30%), October (14%) and April (8%) and at WTG 1 (9%), 5 (9%), 13 (9%) and 14 (10%) (Figure 6). Feeding buzzes were detected on six nights in FY2018, three at WTG 13 (one in August and two in September) and one each at WTGs 2, 5 and 1, in September, September and April, respectively. A bat was detected at the most WTGs in one night on October 1 at six different locations and on September 4, 10, 13 and 30 at five different locations. Bat activity occurred throughout the night in a slightly left-skewed normal distribution peaking at 2200h, with very few detections after 0300h (Figure 7). Bat activity assessment at nacelle height locations ended in December 2017.

Table 3. Hawaiian hoary bat nights with detections and total detection nights by WTG at KWPII in FY 2018.

WTG	Nights	Detections	Rate
1	325	29	0.09
2	324	22	0.07
3	264	14	0.05
5	191	17	0.09
9	49	1	0.02
11	331	20	0.06
13	323	28	0.09
14	296	30	0.10
	2103	161	0.077

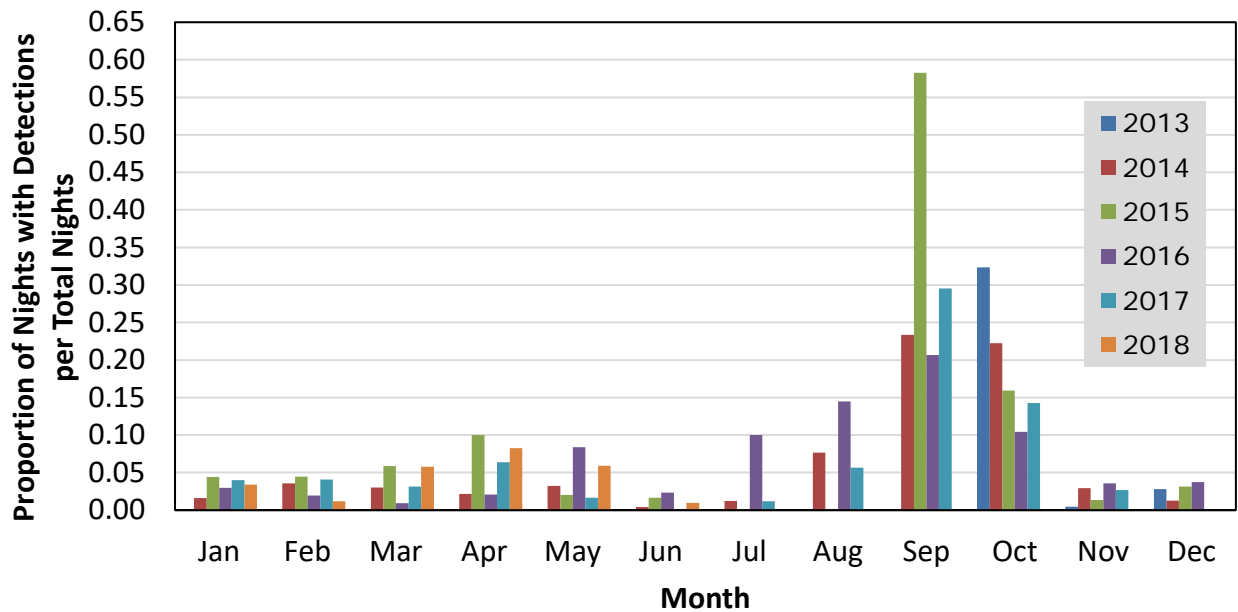


Figure 6. Bat nightly presence at KWPII by month during FY 2013 through 2018.

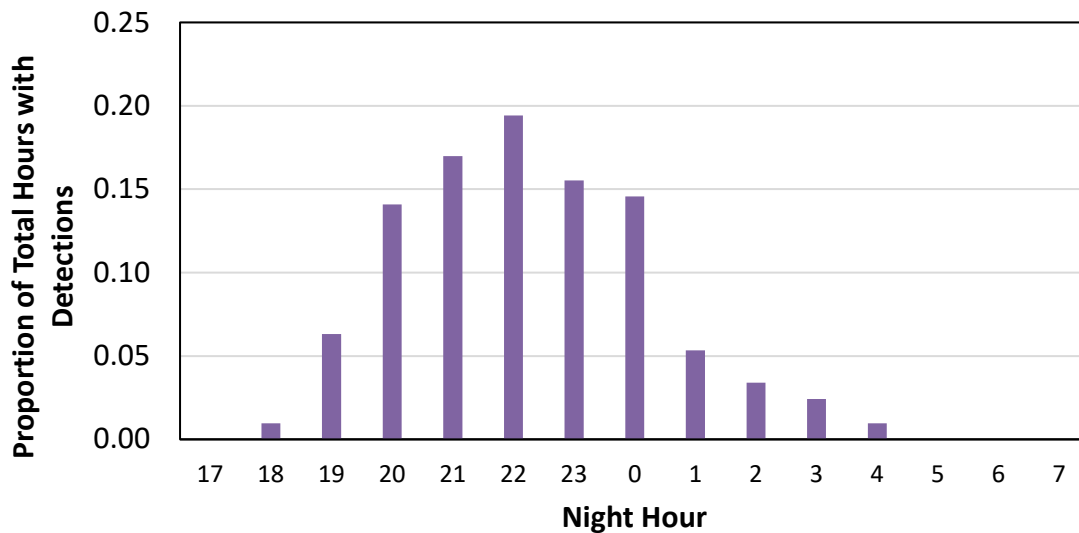


Figure 7. Hours with Detections at KWPII in FY 2018 (n = 206).

Wildlife Education and Observation Program

The wildlife education and observation program (WEOP) helps to ensure the safety and well-being of native wildlife in work areas and along site access roadways. The training provides useful information to assist staff, contractors, and visitors to be able to conduct their business in a manner consistent with the requirements of the HCP, CDUP, land use agreements and applicable laws. Records of wildlife observations by WEOP-trained staff are also used by the HCP program to identify the patterns of wildlife use of the site.

WEOP trainings were given to 45 personnel who were on-site regularly for two days or more and 67 MECO employees off-site. The personnel were trained to identify covered and non-covered species of wildlife that may be found on-site and what protocol to follow, as determined in the HCP, when a downed wildlife is found. The trainees were also made aware of driving conditions and received instruction on how to drive and act around wildlife.

Vegetation Management

The HCP team manages ground cover at a low stature that will improve monitoring efficiency and minimize impacts to native plants without compromising soil stability. An overall site vegetation management plan was approved via letter from DOFAW dated November 15, 2010. Prior to 2010 no vegetation management was authorized. Nēnē nesting season restricts vegetation management activities within the search plots to only occur from April 1 through October 31. In November 2016, Stephanie Franklin of DOFAW-Maui verbally approved using hand management tools (spray packs and weed whackers) during nesting season if activity was within the current search area and did not disturb wildlife. Treatment for search plot areas was conducted in September and June. Primary vegetation management involve herbicide application and weed whackers. Approximately 20 acres were treated with glyphosate-based herbicide in FY 2018; this area consisted of roads and pads primarily within the search area.

Mitigation

Hawaiian Hoary Bat-Research

Mitigation for Tier 1 and Tier 2 estimated bat take has been completely funded and is ongoing as habitat management at Kahikinui State Forest Reserve. Mitigation for Tier 3 estimated take (34 bats) has been contracted to the U.S. Geological Survey Hawaiian hoary bat research group as bat ecological research on Hawai'i Island intended to better inform future bat habitat restoration and conservation and will begin in FY 2018 quarter 1. The contract funding will be \$1,832,000 by the end of 2021 and will be funded by KWPI, KWPII and Kahuku Wind Power. Assuming the current take rate and search conditions is similar, Tier 4 take mitigation will not be necessary.

East Maui Seabird Survey

In the unlikely event the initial five-year mitigation targets at Makamaka'ole for the NESH will not be met, surveys of East Maui for potential additional mitigation sites was funded and completed in September 2015 (KWPII 2016). These surveys evaluated potential colony locations, estimated the numbers of birds present, assessed predator activity, and provided for management feasibility assessment.

Hawaiian Petrel and Newell's Shearwater- Makamaka'ole



Figure 8. Two completed enclosures on the Makamaka'ole Seabird Mitigation site in northern West Maui (Enclosure B is left and Enclosure A is right).

Weekly site visits to Makamaka'ole, now by the contractor Aloha Environmental Services, LLC, continue and focus on predator trapping and tracking, ongoing maintenance of both enclosures, artificial burrow checks, and game camera operation (Figure 8). The annual calendar year report to Hawai'i Division of Forestry and the Natural Area Reserve System for 2017 which spans the entire 2017 nesting season is included as Appendix 17. Monitoring checklists recorded via IForm™ have been created to ensure consistent oversight. These checklists include sound system battery checks, game camera operation and download, burrow checks for erosion damage, signs of bird activity (visual, scent, and game camera) and ongoing perimeter checks of fences and culverts. The

Victor™ rat snap kill traps, DOC 200™ body grip kill traps (all encased in bird-safe boxes), and cage live traps are routinely maintained. Experimentation with bait and trap types have been ongoing.

The enclosures have shown to be an effective but not impermeable barrier to rats (Table 4).

Table 4. Makamaka'ole trapping data by species and location for FY 2018.

Trap Location	Trap Type	Quantity Deployed	Number Caught
Outside A	Cage	1	0
	Victor Rat Snap	13	53 rats, 4 mice, 3 mongooses
	DOC 200 Body Grip	13	27 mongooses, 4 rats
Inside A	Victor Rat Snap	10	10 rats, 13 mice
	Cage	1	0
	DOC 200 Body Grip	4	2 rats
Outside B	Cage	1	0
	Victor Rat Snap	10	20 rats, 1 mouse
	DOC 200 Body Grip	5	19 mongooses, 9 rats
Inside B	Victor Rat Snap	10	4 rats, 4 mice
	Cage	1	0
	DOC 200 Body Grip	5	0

This year we saw an average of 7 rats per enclosure (N = 14). This translates to an average ingress rate of one rat every 45-50 days. Ingress tend to be clustered and appear to have been related to breaches in the enclosure associated with heavy rain events and temporary fence or culvert degradation.

Ten tracking tunnels inside each enclosure have been inked and baited November, January and May to assess small mammal activity (Table 5). Since January 24, 2014 no mongoose have been detected or trapped inside either enclosure. On January 7, 2015, we received our approved protocol to continue using Diphacinone bait blocks (KWP 2015). Twenty-five and 22 bait stations using Diphacinone bait blocks are currently deployed inside enclosure A and enclosure B, respectively. Bait stations within both enclosures continue to be checked biweekly, and re-baited as needed.

Table 5. Makamaka'ole rodent presence/absence summary, as the number of tracking tunnels with paw prints out of 10 total tunnels deployed.

	November 2017		January 2017		May 2018	
	% Enclosure A	% Enclosure B	% Enclosure A	% Enclosure B	% Enclosure A	% Enclosure B
Mouse/Rat	0	60	30	0	20	0
Mongoose	0	0	0	0	0	0

Barn owl control contracted to DOFAW began at night in March 2017 and continued through September 2017. Through the 2017 calendar year nesting season DOFAW contractors removed three barn owls during 25 night visits. Terraform Power continues to renew its USFWS depredation permit (MB 19697C-0) and has obtained a DOFAW wildlife control permit (WCM 18-43) to continue barn owl control with Aloha Environmental Services, LLC.

Erosion inside and outside of enclosures continues to be monitored closely. Specially fabricated hydrologic flumes are still attached to the outflow sections of two culverts at enclosure A. These flumes direct water away from the enclosure, preventing erosion directly outside of the culvert tube and at the fence line. 'Uki (*Machaerina augustifolia*), propagated by Maui Native Nursery were out-planted around the approved irrigation ditches dug in December 2017 to stabilize soil in the disturbed areas. As specified by the NARs permit, regular herbiciding and weeding without motorized tools occurred each quarter. Target species for removal were *Clidemia hirta*, *Tibouchina spp.*, *Melinus minutiflora* and *Psidium spp.*

Acoustic attraction systems broadcast social calls year-round at night. Additional HAPE calls recorded from Waikamoi, Maui in 2015 were added to enclosure B and NESH calls recorded on Kaua'i from Pohakea in Hono O Nā Pali as well as from Upper Limahuli were added to enclosure A. After a brief period when calls were mixed in both enclosures, the enclosures contain only HAPE calls in enclosure B and NESH calls in enclosure A. KWP Biologists have been periodic night surveys to ensure the sound systems work correctly and to monitor bird activity in the area.

Since our first sighting during the 2015 calendar year breeding season on June 22, 2015 three species of seabird, HAPE, NESH, and Bulwer's petrel (*Bulweria bulwerii*), have frequented burrows within both enclosures between the months of March and October. Generally NESH and BUPE nesting activity in 2018 has been like the 2017 season. Unfortunately, in 2018 no HAPE have been photographed on the ground in either enclosure. HAPE activity on the ground also decreased considerably during the 2017 calendar year nesting season compared to 2016.

The first bird activity for 2018 recorded on March 26 was a NESH exiting burrow 26A (enclosure A) (Table 6). Since the first sighting of 2018 the same two burrows that showed the most activity in 2017 also have been showing the most activity again in 2018 (26A, and 43A) (Figure 9 and 10). The first activity inside enclosure B this season on May 4 was a Bulwer's petrel entering burrow 50B (Table 7). Since May 4 there have been visits from both Bulwer's petrel and NESH at three burrows and one natural area near burrow 22B named the "Uluhe" burrow (Figure 11, 12, 13 and 14).

Table 6. Nights per month NESH photographed at burrows 26A, 43A and 50A in calendar years 2017 and 2018. NESH eggs collected in 2017 and 2018 (so far).

Month	26A				43A			50A
	2017		2018		2017		2018	2017
	Photo Nights (nights w/2 birds)	Egg ¹	Photo Nights	Egg ¹	Photo Nights (nights w/2 birds)	Egg ¹	Photo Nights	Photo Nights
Mar			3					
Apr			16				10	
May	12		6	1	8		1	
Jun	14 (2)		11		6		15 ²	
Jul	25 (10)		17	egg			19	
Aug	23 (2)	egg			28 (2)	egg		1
Sep	18				13			
Oct								
Nov		egg						
¹ collected					² NESH with egg "stuck" to brood patch			



Figure 9. Two NESH at burrow 26A entrance (with NESH decoy in background) inside enclosure A on April 19, 2018.



Figure 10. A NESH in burrow 43A on July 2, 2018

Table 7. Nights per month NESH photographed at burrows 22B, 50B, 42B and the “Uluhe” burrow near to 22B in calendar years 2017 and 2018. BUPE egg collected in 2017 and none in 2018 (so far).

	22B					50B				Uluhe			42B			
	2017			2018		2017		2018		2017		2018	2017	2018		
	NESH	BUPE	HAPE	NESH	BUPE	NESH	BUPE	NESH	BUPE	NESH	HAPE	NESH	BUPE	BUPE	NESH	
	Photo Nights (nights w/2 NESH), Egg = collected															
Mar																
Apr				1?					2			1				
May	1	2		12 (4)	1			3	2			4		5	1	
Jun	7 (1)	3		20 (12)				5	1			6				
Jul	7 (1)		1	10 (5)		3	1	3		15	4	2				
Aug	16	Egg	6							9	9		1			
Sep	11		2							1	1					
Oct																
Nov																



Figure 11. A BUPE in front of burrow entrance 42B inside enclosure B on May 4, 2018.



Figure 12. Two NESH near the burrow entrance for 22B inside enclosure B on May 31, 2018.



Figure 13. A NESH in front of burrow 50B on July 3, 2018.



Figure 14. A NESH in the “Uluhe” burrow in enclosure B on July 4, 2018.

Nēnē – Maui Predator Control

Two years of funding (\$162,750) was provided by KWPII to DOFAW in FY 2017 to begin predator control at locations with high nēnē activity and/or nesting on Maui. During FY 2018 DOFAW decided to focus only on the existing Pi’iholo Ranch nēnē release pen. Increases in fledgling survival rates resulting from implementing predator control, vegetation management and fence maintenance will determine the net benefit provided by the KWPII funded mitigation actions. DOFAW began mitigation activities in March 2017. No goslings successfully fledged in FY 2017. In FY2018 three fledglings attributed to KWPII funding were produced at the Pi’iholo Ranch pen. These fledglings would mitigate for part of the accrued lost productivity through FY2018.

Adaptive Management

In accordance with the KWPII HCP, low wind speed curtailment (LWSC) up to wind speeds of 5 m/s was initially implemented at all WTGs when operations began and was scheduled for the months of April through November. LWSC is expected to reduce bat take as explained in the KWPII HCP. This curtailment period was extended to begin mid-February and continue through December 15, 2014 in response to bat fatalities documented at KWPII on March 13, 2013 and February 26, 2014, and at KWPI on December 14, 2013. On June 6, 2014 KWPII offered an adaptive management proposal to the USFWS and DOFAW to increase take minimization for bats and on July 29, 2014 the LWSC was raised to 5.5 m/s between February 15 and December 15 from sunset to sunrise. annually. KWPII continues site-wide bat activity assessment after the required initial three-year period.

Agency Visits, Reporting and Permit Amendment Request

During FY 2018, KWPII attended meetings with agencies to discuss a variety of topics related to HCP implementation and the pending HCP amendment. Abbreviated summary reports for FY 2018 quarters 1-3 were provided to USFWS and DOFAW. The Endangered Species Recovery Committee reviewed the FY 2017 annual HCP report on January 24, 2018.

State and federal take permit amendment processes are underway and include proposed mitigation and an increase in take requested for nēnē and bats. An Environmental Impact Statement Preparation Notice for KWPII was published in the Office of Environmental Quality Control *Environmental Notice* on February 23, 2017 and the draft state SEIS will be available for public comment once the federal draft EIS has been prepared. A draft state HCP amendment was offered publicly for comment in the *Environmental Notice* on October 8, 2017. The Notice of Intent to draft a federal EIS relating to KWPII request for additional bat and nēnē take was published in the June 1, 2018 *Federal Register*. Public scoping for the draft federal EIS occurred in June 2018 including a meeting on Maui on June 20, 2018. The draft federal EIS, state SEIS and draft federal HCP amendment are expected to be available for public comment in November 2018. The Endangered Species Recovery Committee has formally reviewed drafts of the state HCP amendment on September 8, 2015 and again on October 19, 2017 and made a site visit to KWPII and to the Makamaka'ole seabird mitigation project on February 22, 2018.

Expenditures

The total KWPII HCP related expenditures in FY 2018 is \$377,631 (Table 8).

Table 8. Expenses by category for KWPII during FY 2018.

Category	Cost (\$)
Permit Compliance	11,475
Bat Mitigation	288,881
Seabird Mitigation	15,282
Vegetative Management	200
Fatality Monitoring	19,793
Equipment and Supplies	1,000
Terraform Power Labor	41,000
Total Cost	377,631

Citations

- Dalthorp, D., M. M. P. Huso, and D. Dail. 2017. Evidence of absence (v 2.0) software user guide: U.S. Geological Survey Data Series 1055, 109p. <https://doi.org/10.3133/ds1055> .
- Hayes, G. and G. J. Wiles. 2013. Draft Washington bat conservation plan. Washington Department of Fish and Wildlife, Olympia, Washington. 158+ vi pp.
- Hayssen, V., A. van Tienhoven, and A. van Tienhoven. 1993. Asdell's Patterns of Mammalian Reproduction: A Compendium of Species-Specific Data. Cornell University Press, Ithaca, New York, viii+1023 pp.
- Hull, C. L. and S. Muir. 2010. Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model. *Australasian Journal of Environmental Management*. 17:77-87.
- Humphrey, S.R. 1982. Bats, Vespertilionidae and Molossidae. Pp 52 – 70 in *Wild mammals of North America: biology, management, and economics* (J.A. Chapman and G.A. Feldhamer, eds.). Johns Hopkins University Press, Baltimore, MD.
- Humphrey, S.R. and J.B. Cope. 1976. Population ecology of the little brown bat, *Myotis lucifugus*, in Indiana and north-central Kentucky. *American Society of Mammalogists*. Stillwater, OK.
- Huso, M. M. P., D. H. Dalthorp, D. A. Dail, and L. J. Madsen. 2015. Estimating wind-turbine caused bird and bat fatality when zero carcasses are observed. *Ecological Applications*. <http://dx.doi.org/10.1890/14-0764.1>
- Kaheawa Wind Power II, LLC. 2012. Kaheawa Pastures Wind Energy Generation Facility: Phase 2 Habitat Conservation Plan FY-2012 Year 1 Annual Report. First Wind Environmental Affairs Division Portland, MA. 13 pp. + apps.
- Kaheawa Wind Power II, LLC. 2013. Kaheawa Pastures Wind Energy Generation Facility Phase II Habitat Conservation Plan FY-2013 Annual Report: Year 1 HCP Implementation. First Wind Energy, LLC, Wailuku, HI 96793. 21 pp. + apps.
- Kaheawa Wind Power II, LLC. 2014. Kaheawa II Habitat Conservation Plan FY 2014 Annual Report: Year 2. First Wind Energy, LLC, Wailuku, HI 96793. 33 pp. + apps.
- Kaheawa Wind Power II, LLC. 2015. Kaheawa II Habitat Conservation Plan Annual Report: FY 2015. First Wind Energy, LLC, Wailuku, HI 96793. 27 pp. + apps.
- Kaheawa Wind Power II, LLC. 2016. Kaheawa Wind Power II Habitat Conservation Plan Annual Report: FY 2016. SunEdison, LLC, Wailuku, HI 96793. 28 pp. + apps.
- Kaheawa Wind Power II, LLC. 2017. Kaheawa Wind Power II Habitat Conservation Plan Annual Report: FY 2017. SunEdison, LLC, Wailuku, HI 96793. 26 pp. + apps.
- NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. NatureServe, Arlington, Virginia. Available at: <http://www.explorer.natureserve.org/> . Accessed: July 23, 2016.

Appendices

Appendix 1. Density weighted proportion searched for Hawaiian hoary bat, Hawaiian petrel and Hawaiian goose at KWP II in FY 2018.

Radius Band (m)	Total Area (m²)	Search Area (m²)	Portion searched	Small Size Distribution	Small DWP	Medium Size Distribution	Medium DWP	Large Size Distribution	Large DWP
0-20	17584.0	15745.8	0.895	0.357	0.320	0.091	0.081	0.139	0.124
30	21980.0	12284.1	0.559	0.214	0.120	0.091	0.051	0.194	0.109
40	30772.0	9141.1	0.297	0.357	0.106	0.121	0.036	0.278	0.083
50	39564.0	7621.3	0.193	0.071	0.014	0.182	0.035	0.056	0.011
60	48356.0	5914.9	0.122	0.000	0.000	0.152	0.019	0.083	0.010
70	57148.0	4491.8	0.079	0.000	0.000	0.182	0.014	0.083	0.007
Total				1.00	0.559	0.818	0.236	0.833	0.343

Appendix 2. Downed wildlife monitoring dates at KWPII during FY 2018.

Search Date	Search Type	Turbine #													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
28-Jun	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5-Jul	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12-Jul	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19-Jul	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26-Jul	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2-Aug	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9-Aug	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16-Aug	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23-Aug	Visual	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30-Aug	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6-Sep	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13-Sep	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20-Sep	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27-Sep	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4-Oct	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11-Oct	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18-Oct	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25-Oct	Visual	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1-Nov	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8-Nov	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15-Nov	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22-Nov	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29-Nov	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6-Dec	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13-Dec	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20-Dec	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27-Dec	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3-Jan	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10-Jan	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17-Jan	NO SEARCH- High Wind Speed														
23-Jan	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1

30-Jan	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6-Feb	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13-Feb	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21-Feb	Visual	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27-Feb	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6-Mar	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13-Mar	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20-Mar	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27-Mar	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3-Apr	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10-Apr	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17-Apr	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24-Apr	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1-May	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8-May	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15-May	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22-May	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29-May	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5-Jun	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12-Jun	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19-Jun	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26-Jun	Canine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Intervals		51	51	51	51	51	51	51	51	51	51	51	51	51	714
Mean		7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12	7.12
SD		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86

Appendix 3. Downed Wildlife Found at KWPII in FY2018.

Discovery Date	Common Name	Age	Sex	Animal Condition	Search Type	Search/ Incidental	WTG	Distance to	Bearing from	Ground Cover
12-Jul	Ring-Necked Pheasant	Sub-adult	Male	Dead	Visual	Incidental	2	36	262	Grass/shrub
31-Jul	Gray Francolin	Adult	Unknown	Dead	Visual	Incidental	7	1	0	Gravel
9-Aug	Gray Francolin	Juvenile	Unknown	Dead	Canine	Search	11	60	94	Gravel
9-Aug	Gray Francolin	Adult	Unknown	Dead	Canine	Search	12	1	0	Gravel
28-Sep	Eurasian Skylark	Adult	Unknown	Dead	Visual	Incidental	9	65	43	Gravel
11-Oct	Wedge-tailed Shearwater	Adult	Unknown	Dead	Canine	Search	4	30	204	Dense grass
1-Nov	Spotted Dove	Adult	Unknown	Dead	Canine	Search	6	32	215	Grass
22-Nov	Hawaiian Goose	Adult	Unknown	Dead	Canine	Search	4	58	193	Low grass
29-Nov	Japanese White-eye	Adult	Unknown	Dead	Canine	Search	13	45	193	Bare
15-Jan	Hawaiian Goose	Juvenile	Unknown	Dead	Visual	Incidental	6	3	250	Bare
6-Feb	Hawaiian Goose	Adult	Unknown	Dead	Canine	Search	1	10	52	Bare
24-Apr	Gray Francolin	Adult	Unknown	Dead	Canine	Search	9		20	Gravel
1-May	Spotted Dove	Adult	Unknown	Dead	Canine	Search	4	1	20	Rocks
29-May	Hawaiian Goose	Adult	Unknown	Dead	Canine	Search	6	24	300	Rocks
29-May	Hawaiian Goose	Adult	Unknown	Dead	Canine	Search	12	58	340	Tall grass

Appendix 4. Hawaiian Goose Downed Wildlife Report at KWPII on November 22, 2017.

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Hawaiian Goose (*Branta sandvicensis*) 11/22/2017**

Observer Name: Teresa Gajate
Date of Incident: 11/22/2017
Date of Report: 11/22/2017
ID Number: 20171122_KWPII_T04_HAGO
Species (Common Name): Hawaiian Goose
Age: Adult
Sex (if known): Unknown
Incidental or Routine Search: Search
Time Observed (HST): 09:41
Time initially Reported (HST): 10:26
Time Responders Arrive (HST): NA
General Location: 60m south of pad in low vegetation
GPS Coordinates: Latitude:20.798320,
Longitude:-156.539436,
Altitude:489.7
WGS 84 Hawaii State Plane Zone 2
Date Last Surveyed: 11/15/2017
Closest Structure (eg Turbine #): WTG 4
Distance to base of closest structure: 58 m
Bearing from base of closest structure (degrees): 193°
Ground Cover Type: Low grass
Wind Direction and Speed: NE 10 mph
Cloud Cover (%): 95 %
Cloud Deck : Medium
Precipitation: Drizzle
Temperature: 70 °F
Condition of Specimen: Down, body and primary feathers spread over 8 meters.
Wing with feathers and bare leg bones present.
Desiccated. No insects present. Scavenged
Probable Cause of Injuries: Unknown
Other Notes: Outside of search area

Actions Taken

22-Nov-17	9:41	Teresa Gajate, Spencer Engler and Makalani locate the Hawaiian goose downed wildlife incident. M. Stelmach notified.
22-Nov-17	10:26	M. Stelmach arrives to confirm identity of the Hawaiian goose. Voice mail notification of the fatality are left for Stephanie Franklin and John Medeiros. Data recorded and specimen left in place.
22-Nov-17	11:00	Stephanie Franklin calls Matt Stelmach. Matt Stelmach instructed to collect specimen.
22-Nov-17	11:20	Spencer Engler collects the specimen
22-Nov-17	13:00	USFWS and DOFAW notified via email.



Figure 1. A photo of the location of the Hawaiian goose downed wildlife incident relative to the turbine. The two flags indicate the extent of the feather pile and the arrow indicates the approximate area where the feathers were found.



Figure 2. A photo of the wing and desiccated bones as found, relative to a 12" tape measure.



Figure 3. A photo of both wings spread out, note the wear at the ends of the feathers.



Figure 4. A photo of the ventral side of both wings.



Figure 5. A photo of the feathers spread out to the northeast of where the wings were located.



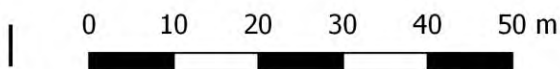
Figure 6. A photo of the feathers spread out across approximately 1m, relative to a 24" tape measure.



Figure 7. A photo of the NE most feather pile found, relative to a 10" tape measure.



- Hawaiian goose central figure
- Feather pile
- Search Area



Project: Kaheawa Wind Power II
Created By: M. Stelmach
Date : 11/22/2017

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Hawaiian Goose (*Branta sandvicensis*) 1/15/2018**

Observer Name: Luke Javier
Date of Incident: 1/15/2018
Date of Report: 1/15/2018
ID Number: 20180115_KWPII_T06_HAGO
Species (Common Name): Hawaiian Goose
Age: Juvenile
Sex (if known): Unknown
Incidental or Routine Search: Incidental
Time Observed (HST): 7:10AM
Time initially Reported (HST): 8:01AM
Time Responders Arrive (HST): NA
General Location: Transformer catchment turbine 6
GPS Coordinates: Latitude: 20.795772,
Longitude: -156.537917,
Altitude: 433.0
WGS 84 Hawaii State Plane Zone 2
Date Last Surveyed: 1/10/2018
Closest Structure (eg Turbine #): WTG 6
Distance to base of closest structure: 3 m
Bearing from base of closest structure (degrees): 250°
Ground Cover Type: Bare
Wind Direction and Speed: NE 11 mph
Cloud Cover (%): 10 %
Cloud Deck : High
Precipitation: None
Temperature: 70 °F
Condition of Specimen: Gosling floating in water in transformer catchment, no injuries, bloating, eyes bulging, portion still dry
Probable Cause of Injuries: Unknown
Other Notes: DOFAW Stephanie Franklin contacted, gave permission to collect and freeze.

Actions Taken

15-Jan-18	7:10	Luke Javier notified HCP of dead gosling
15-Jan-18	8:10	Mitch Craig arrives to record data, DOFAW called to collect
15-Jan-18	8:28	Stephanie Franklin gave permission to collect and store
15-Jan-18	10:00	Gosling collected and stored in freezer on site
15-Jan-18	14:30	Report sent to USFWS and DOFAW



Photo 1. Gosling as found in catchment.



Photo 2. Catchment area near Turbine 6 KWP II.



Photo 3. Gosling dorsal view.



Photo 4. Gosling ventral view.

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Hawaiian Goose (*Branta sandvicensis*) 2/6/2018**

Observer Name: Teresa Gajate

Date of Incident: 2/6/2018

Date of Report: 2/7/2018

ID Number: 20180206_KWPII_T01_HAGO

Species (Common Name): *Branta sandvicensis* (Hawaiian Goose)

Age: Adult

Sex (if known): Unknown

Incidental or Routine Search: Search

Time Observed (HST): 13:16

Time initially Reported (HST): 13:38

Time Responders Arrive (HST): N/A

General Location: T01, NE of turbine, in two parts

GPS Coordinates: Part 1 (head):

Latitude: 20.802800,

Longitude: -156.539497,

Altitude: 572.4m

Part 2 (body):

Latitude: 20.802581,

Longitude: -156.539278,

Altitude: 585.2m

WGS84, Zone 4

Date Last Surveyed: 1/30/2018

Closest Structure (eg. Turbine #): WTG 01

Distance to base of closest structure: 10.3m and 38.2m

Bearing from base of closest structure (degrees): 52° and 60°

Ground Cover Type: Bare and medium grass

Wind Direction and Speed: SW 5 mph

Cloud Cover (%): 100 %

Cloud Deck: Low

Precipitation: Drizzle

Temperature: 75 °F

Condition of Specimen: Head found on gravel, remainder of carcass at 38.2m
Probable Cause of Injuries: Collision suggested

Other Notes: DOFAW Stephanie Franklin contacted 13:38, gave permission to retrieve the bird. In freezer at KWP.



Photo 1. Nēnē head as found.



Photo 2. Nene head with WTG 1 in the background.



Photo 3. Nēnē as found northeast of WTG 1 (without head).



Photo 4. Nēnē with WTG 1 in background.



Photo 5. Ventral side of nēnē.

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Hawaiian Goose (*Branta sandvicensis*) 5/29/2018 #1**

Observer Name: Teresa Gajate
Date of Incident: 5/29/2018
Date of Report: 5/31/2018
ID Number: 20180529_KWPII_T12_HAGO1
Species (Common Name): *Branta sandvicensis* (Hawaiian Goose)
Age: Adult
Sex (if known): Unknown
Incidental or Routine Search: Search
Time Observed (HST): 09:35
Time initially Reported (HST): 09:40
Time Responders Arrive (HST): 10:35 (DOFAW)
General Location: Nearest T12, S of turbine (127m from T13, next nearest)
GPS Coordinates: Latitude: 20.7889
Longitude: -156.5325
WGS84, Zone 4
Date Last Surveyed: 5/22/2018
Closest Structure (eg. Turbine #): WTG 12
Distance to base of closest structure: 52m
Bearing from base of closest structure (degrees): 180°
Ground Cover Type: long and medium grass, rubble
Wind Direction and Speed: N 4 mph
Cloud Cover (%): 100 %
Cloud Deck: Low
Precipitation: None
Temperature: 83 °F
Condition of Specimen: Scavenged, desiccated, beak and part of head about 2m otherwise intact
Probable Cause of Injuries: Collision suggested
Other Notes: Found outside of formal search area, DOFAW Sasha collected



Photo 1. Nēnē below pink flagging with T12 in the background.



Photo 2. Nēnē as found.

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Hawaiian Goose (*Branta sandvicensis*) 5/29/2018 #2**

Observer Name: Teresa Gajate
Date of Incident: 5/29/2018
Date of Report: 5/31/2018
ID Number: 20180529_KWPII_T12_HAGO2
Species (Common Name): *Branta sandvicensis* (Hawaiian Goose)
Age: Adult
Sex (if known): Unknown
Incidental or Routine Search: Search
Time Observed (HST): 09:35
Time initially Reported (HST): 09:40
Time Responders Arrive (HST): 10:35 (DOFAW)
General Location: Nearest T12, in two parts
GPS Coordinates: Latitude: 20.7889
Longitude: -156.5320
WGS84, Zone 4
Date Last Surveyed: 5/22/2018
Closest Structure (eg. Turbine #): T12
Distance to base of closest structure: 18m and 34m, approximately 30m apart
Bearing from base of closest structure (degrees): 185° (wing) and 180° (body)
Ground Cover Type: long and medium grass
Wind Direction and Speed: N 4 mph
Cloud Cover (%): 100 %
Cloud Deck: Low
Precipitation: None
Temperature: 83 °F
Condition of Specimen: Scavenged, desiccated, head and neck present, no lower body and feet (dog returned specifically to search again)
Probable Cause of Injuries: Collision suggested
Other Notes: Both parts outside of formal search area, DOFAW Sasha collected



Photo 1. Nēnē below pink flagging with WTG 12 in the background.



Photo 2. Nene as found.



Photo 3. Nēnē wing below pink flagging southwest of T12.



Photo 4. Nēnē wing as found.

Appendix 9. Wedge-tailed Shearwater Downed Wildlife Report at KWPII on October 11, 2017.

**Kaheawa Wind Power Phase II, LLC
Habitat Conservation Plan, Downed Wildlife Report
Wedge-tailed Shearwater (*Puffinus pacificus*) 10/11/2017**

Observer Name: Teresa Gajate
Date of Incident: 10/11/2017
Date of Report: 10/11/2017
ID Number: 20171011_KWPII_T04_WTSH
Species (Common Name): Wedge-tailed Shearwater
Age: Adult
Sex (if known): Unknown
Incidental or Routine Search: Search
Time Observed (HST): 08:14
Time initially Reported (HST): 08:39
Time Responders Arrive (HST): 12:15
General Location: 35m south of the turbine off the edge of the pad
GPS Coordinates: Latitude:20.798656,
Longitude:-156.539410,
Altitude:494.7
WGS 84 Hawaii State Plane Zone 2
Date Last Surveyed: 10/4/2017
Closest Structure (eg Turbine #): WTG 4
Distance to base of closest structure: 35 m
Bearing from base of closest structure (degrees): 204°
Ground Cover Type: Dense grass
Wind Direction and Speed: S 2 mph
Cloud Cover (%): 30 %
Cloud Deck : High
Precipitation: None
Temperature: 80 °F
Condition of Specimen: Distal portion of the right wing found with a feather pile.
Remains are aged. No insects present
Probable Cause of Injuries: Location suggests collision with a turbine
Other Notes: Outside of search area

Actions Taken

11-Oct-17	8:14	Teresa Gajate locates a wing just off of the pad of KWP II turbine 4. Matt Stelmach notified.
11-Oct-17	8:34	Matt Stelmach arrives to confirm fatality. Stephanie Franklin contacted via phone. Jay Penniman scheduled to pick up.
11-Oct-17	12:15	Jay Penniman arrives on site. Jay provides species ID as Wedge-tailed shearwater. Specimen collected by Jay Penniman.
11-Oct-17	14:00	USFWS and DOFAW notified via email.



Figure 1. A photo of the wedge-tailed shearwater relative to the turbine.



Figure 2. A photo of the wedge tailed shearwater wing as found relative to a 12" tape measure. The humorous is folded below the metacarpals.



Figure 3. A photo of the dorsal side of the wing.



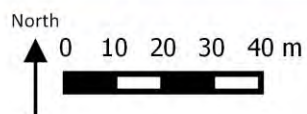
Figure 4. A photo of a clump of breast feathers



Figure 5. A detailed view of the dorsal portion of the wing. The feather coloration indicates wedge-tailed shearwater.



● Wedge-tailed Shearwater
 Search Area



Project: Kaheawa Wind Power II
Created By: M. Stelmach
Date : 10/11/2017

Appendix 10. SEEF trials at KWPII during FY 2018.

Trial date	WTG	Carcass type	Found	Searcher	Trial date	WTG	Carcass type	Found	Searcher
12-Jul	2	Large Bird	1	K9	12-Jul	10	Rat	1	K9
23-Aug	8	Large Bird	1	Human	12-Jul	2	Rat	1	K9
27-Sep	5	Large Bird	1	K9	12-Jul	5	Rat	1	K9
29-Nov	13	Large Bird	1	K9	12-Jul	6	Rat	1	K9
29-Nov	4	Large Bird	1	K9	23-Aug	4	Rat	1	Human
20-Dec	11	Large Bird	1	K9	13-Sep	1	Rat	1	K9
30-Jan	14	Large Bird	1	K9	13-Sep	11	Rat	1	K9
27-Mar	3	Large Bird	1	K9	13-Sep	11	Rat	1	K9
10-Apr	3	Large Bird	1	K9	13-Sep	5	Rat	1	K9
10-Apr	11	Large Bird	1	K9	13-Sep	8	Rat	1	K9
23-Aug	3	Med Bird	1	Human	27-Sep	3	Rat	1	K9
23-Aug	4	Med Bird	1	Human	27-Sep	4	Rat	1	K9
27-Sep	3	Med Bird	1	K9	27-Sep	6	Rat	1	K9
27-Sep	4	Med Bird	1	K9	29-Nov	1	Rat	1	K9
27-Sep	9	Med Bird	1	K9	29-Nov	13	Rat	1	K9
29-Nov	4	Med Bird	1	K9	29-Nov	6	Rat	1	K9
29-Nov	8	Med Bird	1	K9	20-Dec	12	Rat	1	K9
30-Jan	11	Med Bird	1	K9	20-Dec	14	Rat	1	K9
27-Mar	9	Med Bird	1	K9	20-Dec	2	Rat	1	K9
1-May	1	Med Bird	1	K9	20-Dec	3	Rat	1	K9
29-May	8	Med Bird	1	K9	30-Jan	2	Rat	1	K9
12-Jun	13	Med Bird	1	K9	30-Jan	5	Rat	1	K9
					30-Jan	9	Rat	1	K9
					13-Feb	10	Rat	1	K9
					13-Feb	11	Rat	1	K9
					20-Feb	13	Rat	1	Human
					27-Mar	2	Rat	1	K9
					27-Mar	3	Rat	0	K9
					27-Mar	5	Rat	1	K9
					27-Mar	5	Rat	1	K9
					10-Apr	2	Rat	1	K9
					10-Apr	9	Rat	0	K9
					24-Apr	1	Rat	1	K9
					24-Apr	7	Rat	1	K9
					24-Apr	8	Rat	1	K9
					1-May	1	Rat	1	K9
					1-May	12	Rat	1	K9
					1-May	13	Rat	1	K9
					29-May	4	Rat	1	K9
					12-Jun	2	Rat	1	K9
					12-Jun	2	Rat	1	K9
					12-Jun	8	Rat	1	K9
					12-Jun	14	Rat	1	K9

Appendix 11. CARE AI-AL trial results at KWPII during FY 2018.

CARE AI FY2018		Trial 1-8		Trial 2-9		Trial 3-10		Trial 4-11		Trial 5-12		Trial 6-13		Trial 7-14	
Carcass Type		Large Bird		Medium Bird		Rat		Rat		Rat		Rat		Rat	
WTG		3		8		8		9		9		9		10	
Vegetation		Bare													
Distance (m)		60		11		75		7		70		30		70	
Day	Date	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes
0	31-Jul	P		P		P		P		P		P		P	
1	1-Aug	P		P		P		P	L	P	L	P		A	
2	2-Aug	P		P	A	P	L	P		A		P			
3	3-Aug	P	F,L	P		P	A	P	H,A			P	H,L		
4	4-Aug	P	SCAV,M	P	L	A		P				P			
5	5-Aug	P		P				P				P			
6	6-Aug	P	S	P				P				A			
7	7-Aug	P		P				P	D						
8	8-Aug	P	M	P				P							
9	9-Aug	P		P				P							
10	10-Aug	P		P				P							
11	11-Aug	P		P				P							
12	12-Aug	P	M	P				P							
13	13-Aug	P		P				P	S						
14	14-Aug	P		P	M			P							
21	21-Aug	P		P				A							
28	28-Aug	P		P	M										
Retention (days)		28		28		3		14		1		5		0	

hair loss	A	ants	H
fly larvae	B	body feathers	L
moved	C	dirt covered	M
skeleton	D	desiccated	S
wing feathers	F	feathers	W
	Scav	Scavenged	

CARE AJ FY2018		Trial 1		Trial 2		Trial 3		Trial 4		Trial 5		Trial 6		Trial 7	
Carcass Type		Rat		Rat		Rat		Medium Bird		Rat		Rat		Large Bird	
WTG		1		6		6		9		10		13		13	
Vegetation		Bare													
Distance (m)		34		44		25		46		48		7		74	
Day	Date	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes
0	10-Oct	P		P		P		P		P		P		P	
1	11-Oct	P		P		P		P	SCAV,M	P		P		P	
2	12-Oct	P		A		P		P		P		P	L	P	A
3	13-Oct	P				A		P		A		P		P	
4	14-Oct	A						P				P		P	
5	15-Oct							P				P		P	F
6	16-Oct							P	B,W			P	H	P	S,D
7	17-Oct							P				P		P	
8	18-Oct							P				P		P	
9	19-Oct							P				P		P	
10	20-Oct							P				P		P	
11	21-Oct							P				P		P	
12	22-Oct							P	M,S			P		P	
13	23-Oct							P				P	S	P	
14	24-Oct							P				P		P	
21	31-Oct							P				P		P	
28	7-Nov							P				P		P	B,W
Retention (days)		3		1		2		28		2		28		28	

CARE AK FY2018		Trial 1-8		Trial 2-9		Trial 3-10		Trial 4-11		Trial 5-12		Trial 6-13		Trial 7-14	
Carcass Type		Rat		Large Bird		Rat		Rat		Rat		Medium Bird		Rat	
WTG		1		2		2		5		6		8		8	
Vegetation		Bare													
Distance (m)		20		22		28		16		44		24		24	
Day	Date	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes
0	13-Mar	P		P		P		P		P		P		P	
1	14-Mar	P		P		P		P		P		P		P	
2	15-Mar	P		P		P		P	L	P		P		P	L
3	16-Mar	P	L,S	P		P	L	P	A	P	L	P	L	P	A
4	17-Mar	P	D	P		P	A,S,D	P	S,D	P	S,D	P		P	D
5	18-Mar	P		P		P		P		P		P		P	S
6	19-Mar	P		P		P		P		P		P		P	
7	20-Mar	P		P		P		P		P		P		P	
8	21-Mar	P		P	L	P		P		P		P		P	
9	22-Mar	P		P		P		P		P		P		P	
10	23-Mar	P		P		P		P		P		P		P	
11	24-Mar	P		P	F	P		P		P		P	F	P	
12	25-Mar	P		P		P		A		P		P		P	
13	26-Mar	P		P		A				P		P		P	
14	27-Mar	P		P	S,D					P		P	S	P	
21	3-Apr	P	SCAV	P						A		P	D	P	
28	10-Apr	A		P								P		P	
Retention (days)		21		28		12		11		14		28		28	

CARE AL FY2018		Trial 1-8		Trial 2-9		Trial 3-10		Trial 4-11		Trial 5-12		Trial 6-13		Trial 7-14	
Carcass Type		Rat		Large Bird		Rat		Rat		Rat		Medium Bird		Rat	
WTG		1		4		10		11		12		13		13	
Vegetation		Bare													
Distance (m)		23		15		65		8		50		47		27	
Day	Date	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes	P/A	Notes
0	31-May	P		P		P		P		P		P		P	
1	1-Jun	P		P		P		P		P	A	P		P	
2	2-Jun	P		P		P		P		P		P		P	
3	3-Jun	A		P	H	P		P		P		P		P	A
4	4-Jun			P		P	H,S	P	H,D	P	H,D	P		P	H,D
5	5-Jun			P	L	P		P		P		P		P	
6	6-Jun			P		P	D	P		P		P	L	P	
7	7-Jun			P		P		P		P		P	D,F	P	
8	8-Jun			P	D	P		P		P		P		P	
9	9-Jun			P		A		P		A		P	M	P	
10	10-Jun			P				P				P		P	
11	11-Jun			P				P				A		P	
12	12-Jun			P				P				A		P	
13	13-Jun			P				P	S			A		P	
14	14-Jun			P				P				A		P	
21	21-Jun			P				P				A		P	
28	28-Jun			P	S			P	S			P	SCAV,M	P	S
Retention (days)		2		28		8		28		8		28		28	

Wildlife agency standardized protocols for wildlife fatalities found outside the designated search area or discovered incidentally outside of a routine search

Evidence of Absence software (Dalthorp et al 2017; <https://pubs.er.usgs.gov/publication/ds1055>) utilizes the number of observed carcasses and the detection probability to produce a probability distribution of the number of fatalities that may have occurred based on imperfect detection. The number of carcasses entered as “Observed” assumes that the carcasses were found in the designated search area and during a routine search. In January 2018, the wildlife agencies discussed the need for establishing a standardized protocol for fatalities of protected wildlife species that are modeled with Evidence of Absence Ver. 2.0.6. but fail to meet the input criteria required by the model. Such exceptions may include carcasses found outside of the designated search area during a routine search, or carcasses incidentally discovered outside of a routine search day. “Rules” for treating these exceptions in the Evidence of Absence model should recognize and encumber the best science in order to maintain the validity of the software’s output and not purposefully violate the basic mathematical assumptions that drive the model.

To best accommodate these types of Observed carcasses, the wildlife agencies provide the following standardized guidance. For the purposes of this guidance, assume the carcass found is of the species you are modeling.

Fatality found outside of the designated reduced search area

This situation would only apply to projects that have a carcass search area that has been reduced below where a carcass could potentially fall.

The Downed Wildlife Protocol and accompanying reporting procedures should be followed for carcasses found outside of the reduced routine search area. The carcass will be considered accounted for in the Unobserved take by the Evidence of Absence model. The report should clearly note the measured location of the carcass and relationship to the area searched in addition to the standard data required on the downed wildlife report. Measurements reported in meters will be based on distance from the turbine base or nearest structure. Such measurement should be conducted with a tape measure and with GPS. Project reports should also clearly identify the carcasses that fall in this category.

Fatality found outside of the designated “full” search area.

This situation would imply that the initial monitoring and search area based on turbine height and carcass size may have been undersized and will require expanding the area.

A designated “full” search area is expected to account for all carcasses. The lack of project specific data for small carcass sizes as resulted in the general adoption of the standards presented in Hull and Muir (2010). The wildlife agencies recommend an additional buffer zone of 20% be added to account for the wind effect on carcass fallout and uncertainty until adequate data is gathered for a site. The additional 20% buffer zone would need to be included in the routine searches. The buffer should be located on the down-wind side of the project if the wind is predominantly from one direction. The calculated area based on Hull and Muir plus the buffer area is designated as the “full” search area. Fatalities found during a routine search of the “full” search area (Hull & Muir predicted + 20% buffer zone) would be treated as an Observed fatality in the model.

If the carcass is found beyond this “full” monitoring area, the Downed Wildlife Protocol and accompanying reporting procedures should still be followed. In addition, the permittee should contact the appropriate wildlife agency personnel listed in the Downed Wildlife Protocol to discuss adjusting the size of the fall out area and if expanding the area searched is needed to account for all potential fallout.

Fatality found incidentally (not during a routine scheduled search) in the designated search area

The model takes into account the frequency of searches. If a carcass is found incidentally, then it must be determined if the carcass would have been found on the next routine search day and therefore counted as Observed, or if the carcass would have been missed or be gone on the next routine search and accounted for in the Unobserved portion of fatalities.” The Hawaiian hoary bat carcasses are important to ongoing genetic research, so leaving the listed carcass in place is not in the best interest for the species. If a carcass is found incidentally, in the designated search area the Downed Wildlife Protocol and reporting should be followed. The report should clearly indicate who found the carcass, and under what circumstances (turbine maintenance, weeding, mowing, etc). The report should also indicate the method of determining how to categorize the carcass. The three methods are:

- 1) Permittee chooses to include the carcass as Observed in the model, regardless of searcher efficiency.
- 2) Wildlife agencies will include the carcass as Observed in the model when the documented detection probability is sufficiently high so as to reasonably assume the carcass would have been found on a subsequent scheduled search. Specifically, this method makes the assumption that the search efficiency and k value are such that there is a high probability that the carcass would have been found on a subsequent search. This method will be used for all large and medium carcasses found. This method will also be used for smaller carcasses when it is reasonable to assume the carcass or carcass trace would have been found on a subsequent search. The wildlife agencies will assume a carcass would have been found when the documented searcher efficiency $\geq 75\%$ and k value ≥ 0.7 .

In the case of small carcasses where the searcher efficiency is less than 75% (based on permittee’s documented efficacy), a double-blind search with a replacement surrogate should be conducted to determine how the recovered carcass shall be categorized: Observed or Unobserved. That trial shall include the following criteria:

- a. The surrogate (typically a rat) should be identical to that used for search efficacy trials and similar in size to the carcass found.
- b. The surrogate carcass should be labeled as a surrogate for the specific carcass it is representing, and placed by a third party in the proximity of where the carcass that was recovered was found with label hidden.
- c. The placement of this carcass should be conducted by the same party responsible for placing carcasses for efficiency trials, whenever possible.

- d. Under no circumstances should the searcher conducting the routine search, be the one placing the surrogate or have knowledge of the surrogate's location or the timing of the placement.
- e. Routine fatality searches should be carried out following standard search procedures.
- f. The outcome of the trial should be reported in the compliance report and include the date the surrogate was placed and the date the carcass was found. If the carcass was never found, the third party should check on the status of the carcass. If the carcass is still present, leave it in place for subsequent searches. Include this information in the compliance report.
- g. If the surrogate was found, the original carcass should be reported as Observed. If the surrogate was not found, the original carcass should be reported as Unobserved.

Note: The wildlife agencies expect the permittee's to conduct thorough, fair, and impartial searches and not to purposefully conduct searches for carcasses outside of the scheduled routine fatality searches in an attempt to manipulate fatality documentation or calculation of take. The agencies also acknowledge the amount of effort it takes to conduct the thorough routine fatality searches and trials necessary to measure carcass retention and searcher efficiency. If a carcass is found outside of a routine search and a searcher efficiency trial is scheduled to be conducted within the next 30 days, it may be possible to include option 3 within that searcher efficiency trial. However, you must contact the wildlife agencies for approval.

Literature Cited

Dalthorp, Daniel, Huso, Manuela, and Dail, David, 2017, Evidence of absence (v2.0) software user guide: U.S. Geological Survey Data Series 1055, 109 p., <https://doi.org/10.3133/ds1055>.

Hull, C. L. and S. Muir (2010). Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model. *Australasian Journal of Environmental Management* 17: 77-87.

Appendix 13. Fatality estimation input parameters and results for Hawaiian goose at KWPII through FY 2018.

									SEEF							
Period	FY	Dates		Period length	% year (rho)	Search interval in days	Period searches - 1	Observed fatality (X)	Found	Placed	%	95%CI				
1	FY13	7/1/2012	6/30/2013	364	1.00	7	51	1	6	9	0.67	0.348	0.896			
2	FY14	7/1/2013	6/30/2014	364	1.00	7	51	0	5	5	1.00	0.621	1			
3	FY15	7/1/2014	6/30/2015	364	1.00	7	51	2	23	28	0.82	0.652	0.928			
4	FY16	7/1/2015	6/30/2016	365	1.00	7	51	1	11	11	1.00	0.8	1			
5	FY17	7/1/2016	6/30/2017	364	1.00	7	51	0	12	12	1.00	0.815	1			
6	FY18	7/1/2017	6/30/2018	364	1.00	7	51	1	10	10	1.00	0.783	1			
	CARE										g			B		M*
	Distr	Scale	95% CI for scale		r	r lwr	r upr	l r	K	DWA	g	min	max	Ba	Bb	
1	EXP	1000	45.9	237000	0.999	0.998	1	7	1	0.7	0.654	0.503	0.791	26.321	13.906	3
2	EXP	593	27.3	152000	0.999	0.998	1	7	1	0.7	0.653	0.474	0.812	18.936	10.050	3
3	EXP	1900	86.7	362000	0.999	0.998	1	7	1	0.7	0.681	0.583	0.771	62.805	29.462	6
4	EXP	844	38.7	207000	0.999	0.998	1	7	1	0.34*	0.327	0.255	0.403	49.594	102.085	9
5	EXP	1280	58.7	434000	0.999	0.998	1	7	1	0.34*	0.33	0.271	0.391	76.790	156.174	10
6	EXP	1040	47.6	246000	0.997	0.93	1	7	1	0.34*	0.329	0.272	0.389	81.634	166.538	13

Appendix 14. Fatality estimation input parameters and results for Hawaiian hoary bat at KWPII through FY 2018.

										SEEF							
Period	FY	LWSC	Dates		Period length	% year	Search interval	Period searches - 1	Observed fatality (X)	Found	Placed	%	95%CI				
1	FY13	5.0 m/s	7/1/2012	6/30/2013	364	1.00	7	51	1	8	19	0.42	0.223	0.641			
2	FY14	5.0 m/s	7/1/2013	6/30/2014	364	1.00	7	51	2	26	50	0.52	0.384	0.654			
3	FY15	5.5 m/s	7/1/2014	6/30/2015	364	1.00	7	51	0	21	56	0.38	0.257	0.505			
4	FY16	5.5 m/s	7/1/2015	6/30/2016	365	1.00	7	51	0	34	42	0.81	0.673	0.906			
5	FY17	5.5 m/s	7/1/2016	6/30/2017	364	1.00	7	51	0	40	43	0.93	0.825	0.98			
6	FY18	5.5 m/s	7/1/2017	6/30/2018	364	1.00	7	51	0	41	43	0.95	0.859	0.99			
	CARE											g			B		M*
	Distr.	Shape	Scale	95% CI for scale		r	rlwr	rupr	lr	K	DWA	g	min	max	Ba	Bb	
1	LogN	0.613	2.1382	1.629	2.647	0.847	0.71	0.972	7	0.7	1	0.4	0.241	0.656	9.080	11.412	5
2	LogN	1.077	1.426	0.915	1.936	0.609	0.455	0.754	7	0.7	1	0.4	0.235	0.493	18.503	33.022	12
3	EXP		9.4159	3.85	23.03	0.706	0.461	0.862	7	0.7	1	0.3	0.187	0.504	10.953	21.675	12
4	LogN	9.214	2.589	1.056	4.122	0.695	0.51	0.841	7	1*	0.559*	0.4	0.27	0.46	35.087	61.842	12
5	LogN	3.209	2.629	1.815	3.444	0.795	0.658	0.894	7	1*	0.559*	0.4	0.374	0.511	87.960	111.122	11
6	LogN	4.474	2.123	1.0605	3.186	0.689	0.528	0.838	7	1*	0.559*	0.4	0.287	0.467	41.223	68.772	12

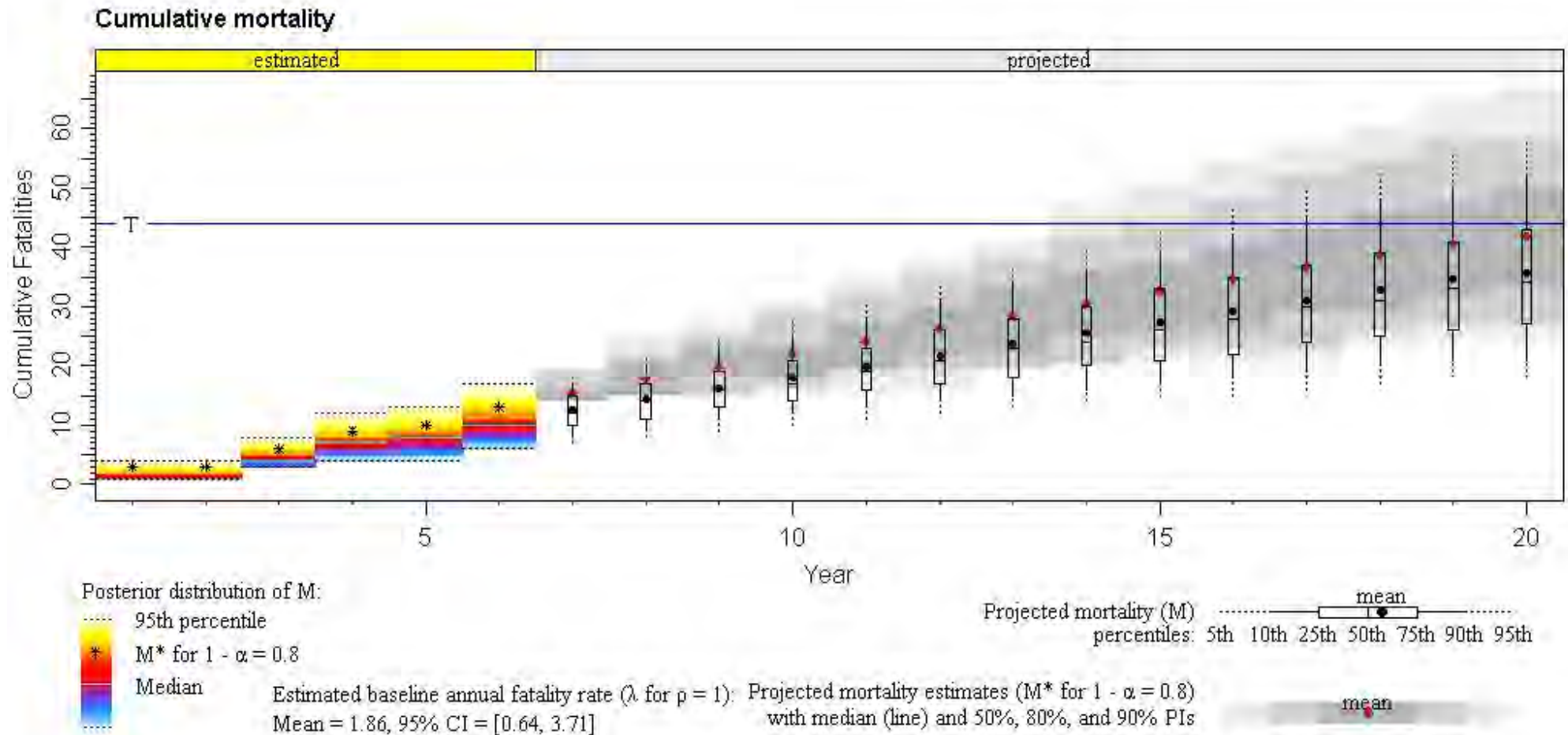
Appendix 15. Nēnē lost productivity and indirect take at KWPII through FY 2018.

Component	Description	Fiscal Year					2018	Total
		2013	2014	2015	2016	2017		
A	Observed Take	1	0	2	1	0	1	5
B	Estimated Take Multiplier (13/5= 2.6)	2.60		2.60	2.60		2.60	
C	Estimated Direct Take (A x B)	2.60		5.20	2.60		2.60	13
D	Observed Indirect Take Multiplier (Season defined)	0.04		0.09	0.09		0.09	
E	Observed Indirect Take (A x D)	0.04		0.18	0.09		0.09	0.40
F	Unobserved Direct Take (C - A)	1.60		3.20	1.60		1.60	8.00
G	Unobserved Indirect Take (F x 0.06)	0.10		0.19	0.10		0.10	0.48
H	Accrued Adult Take (Previous Years Accrued C + H+K)		2.60	2.71	8.12	11.24	12.05	
I	Lost Productivity from accrued adult take (Current year's H x 0.1)-fledglings		0.26	0.27	0.81	1.12	1.21	3.67
J	Current Year's Indirect Take + Lost Productivity (E + G + I)- fledglings	0.14	0.26	0.64	1.00	1.12	1.39	
K	Indirect Take + Lost Productivity as Adult (2 year's previous J x 0.9 ² (annual survival rate is 0.9)			0.11	0.21	0.52	0.81	
Total Lost Productivity (Total I)								3.67
Total Indirect Take (Total E + Total G)								0.88

Appendix 16. Indirect take calculations for Hawaiian hoary bat at KWPII through FY 2018.

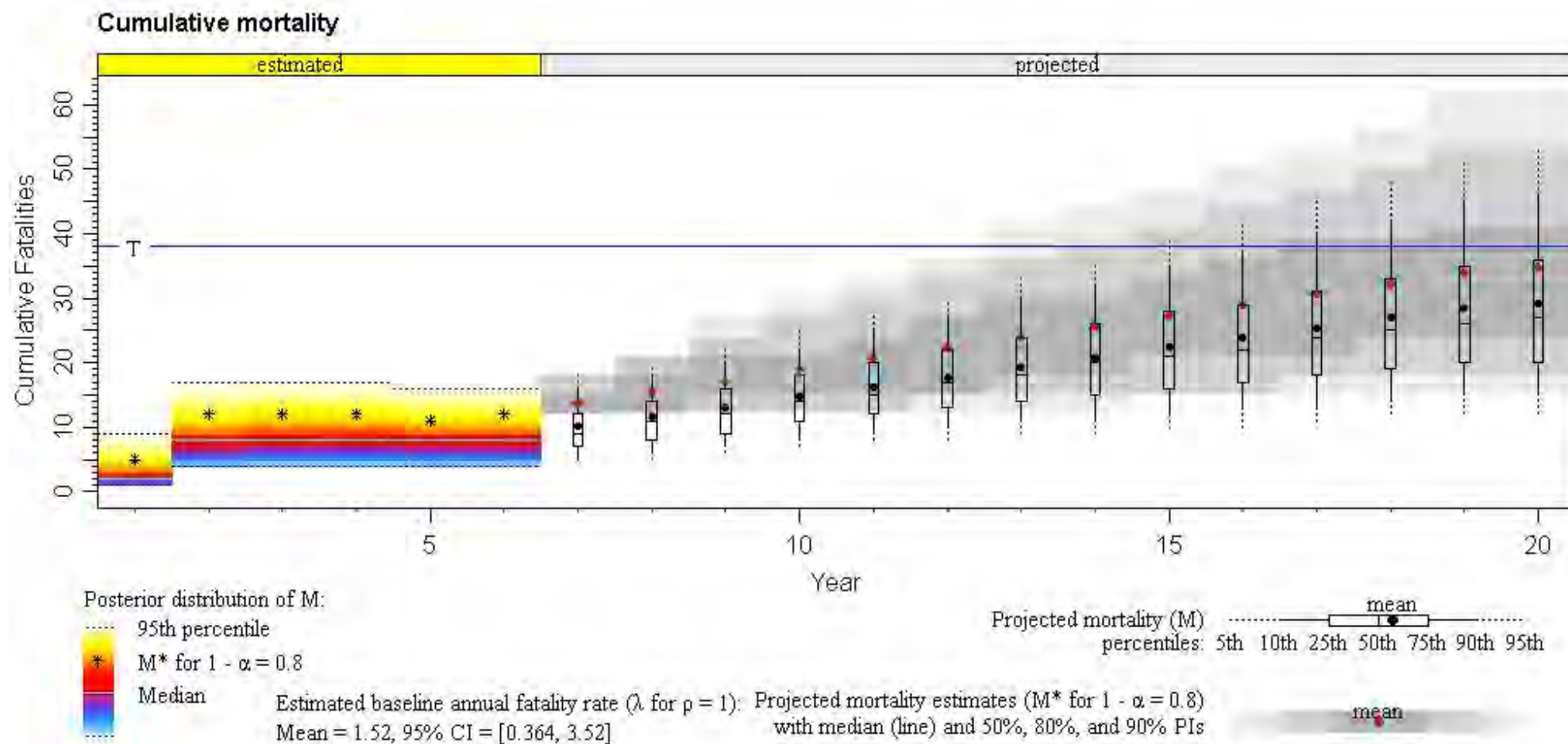
Component	Input	Value
A	Total Estimated Direct take	12
B	Observed direct take (ODT)	3
C	Unobserved direct take (UDT) (A - B)	9
D	ODT female or unknown during Apr 1- Sep 15 (0 female, 0 unknown) (B x F)	0
E	Proportion of UDT that could be female and probability a female is pregnant or lactating (0.5 x 3/12)	0.125
F	Survival of twin pups to weaning (0.9 x 2 pups)	1.8
G	ODT IDT (D x F)	0
H	UDT IDT (C x E x F)	2.03
I	IDT total (G + H)	2.03
J	Survival of juvenile to adult	0.3
K	IDT as adults (I x J)	0.61
Total IDT rounded up		1

Appendix 17. Hawaiian Goose Permit Term Projected Take at KWPII.



Note: The projected take displayed in Appendices 17 and 18 represents *only the direct take* and does not include any additional indirect take. The number of years displayed in these Appendices represents the number of unique periods used in the projection, not necessarily the number of years. In each Appendix the length of time displayed equals 19.5 years, the expected time operating turbines through the 20-year permit. The direct take estimate at the 80% credibility level is presented as M*(symbol * and \blacklozenge). The shaded gray bars are the probability intervals (PI) around the estimate at the 80% credibility level and do not represent any user chosen credibility level. The horizontal blue line (with a T) represents the total permitted take (including both direct and indirect take) for nēnē (Appendix 17) and the Hawaiian hoary bat (Appendices 18).

Appendix 18. Hawaiian Hoary Bat Permit Term Projected Take at KWPII.



Appendix 19. 2017 Special Use Permit Report and Renewal Request West Maui Natural Area Reserve: Kahakuloa Section West Maui Forest Reserve (Makamaka’ole Section – Enclosure B) Makamaka’ole Seabird Mitigation site.



2017 Special Use Permit Report and Renewal Request

West Maui Natural Area Reserve: Kahakuloa Section

West Maui Forest Reserve (Makamaka’ole Section – Enclosure B)

Makamaka’ole Seabird Mitigation site

This permit report and renewal request will update the Board of Land and Natural Resources or authorized representatives, on the accomplishments at Makamaka’ole for 2017 and review the requirements necessary to renew the NARS Special Use Permit and the DOFAW Special Use Permit.

Introduction

TerraForm Power LLC owns the Kaheawa Wind Power (KWPI and KWPII) facilities at Kaheawa Pastures, West Maui. In accordance with the State and Federally approved Habitat Conservation Plans (HCPs) for both projects, a final mitigation plan was approved on January 2012 to establish two artificial nest sites protected by separate predator resistant enclosures. The enclosed nesting sites are located across the northwestern edge of NARS land, the adjacent leased ranch area and a portion of the West Maui Forest Reserve (Figure 1 and 2). These nest sites are intended to attract Hawaiian petrels (*Pterodroma sandwichensis*) and Newell’s shearwaters (*Puffinus newelli*) and provide a net conservation benefit to mitigate for the estimated take of both species at KWPI and KWPII.



Figure 1. Two completed enclosures on the Makamaka'ole Seabird Mitigation site (Enclosure B: left, Enclosure A: right).

On September 5, 2013 KWPI/KWPPI completed construction of the two enclosures whose area encompasses approximately 7.9 acres. Both enclosures were constructed using guidelines established in collaboration with the NARS and DOFAW. Maui Feral Animal Removal Experts (FARE) constructed the enclosures with consultation from Steve Sawyer of EcoWorks Global.

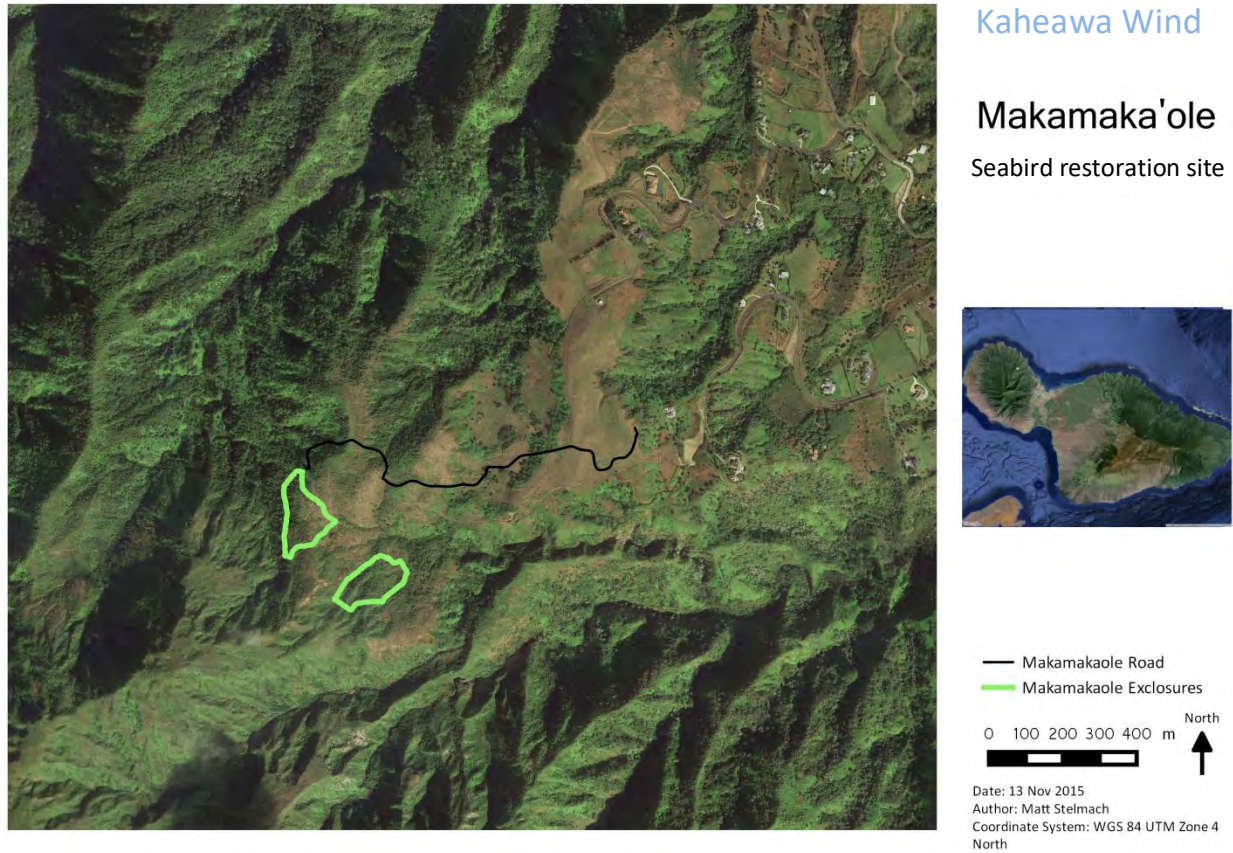


Figure 2. Map of the enclosures relative to the site access. Unit A is west and unit B is east.

Glossary of species names:

Common Name	Scientific name	Species Code
Bulwer's Petrel	<i>Bulweria bulwerii</i>	BUPE
Hawaiian Petrel	<i>Pterodroma sandwichensis</i>	HAPE
Newell's Shearwater	<i>Puffinus newelli</i>	NESH
'uki	<i>Machaerina angustifolia</i>	MACANG
'ohi'a	<i>Metrosideros polymorpha</i>	METPOL
Naupaka kuahiwi	<i>Scaveola gaudichaudiana</i>	SCAGAU
Manono	<i>Kadua affinis</i>	KADAFF
Kupukupu	<i>Nephrolepis cordifolia</i>	NEPCOR
Akia	<i>Wikstroemia uva-ursi</i>	WIKUVA
Hame	<i>Antidesma pulvinatum</i>	ANTPUL
Uluhe	<i>Dicranopteris linearis</i>	DICLIN
Strawberry Guava	<i>Psidium cattleianum</i>	PSICAT
Guava	<i>Psidium guajava</i>	PSIGUA
Koster's Curse	<i>Clidemia hirta</i>	CLIHIR
Molasses Grass	<i>Melinis minutiflora</i>	MELMIN
Glory Bush	<i>Tibouchina urvilleana</i>	TIBURV
Wild Sage	<i>Lantana camara</i>	LANCAM
Branched Porterweed	<i>Stachytarpheta australis</i>	STAAUS

Table 1. A reference list of species of note for the Makamaka'ole Seabird Restoration site, with scientific names and species codes.

On February 24, 2016, Kaheawa Wind biologists met with Fern Duvall and Peter Landon of NARs. The meeting resulting in the following decisions by NARs:

1. Kaheawa Wind biologists could submit a water management plan to NARs for approval
2. Kaheawa Wind biologists Matt Stelmach and Spencer Engler are approved to conduct vegetation control within 1m of the fence before the birds return as an interim measure. NARs would like to see us come up with a long-term solution that would be low maintenance and effective. The primary concerns of NARs are:
 - a. Continual disturbance of the vegetation, which allows non-native species to grow
 - b. Damage to native species, specifically uluhe surrounding burrows.
3. NARs has approved the completion and removal of the following permit condition subject to the findings of an independent survey of the site:

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC take responsibility for the introduction of rye grass to the project area and must provide all measures to ensure that it does not become established within the NAR. The rye grass is expected to die out on its own, but Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC will continue to monitor it. If the rye grass persists, the removal will be the responsibility of Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC.

4. NARs approved the use of burrow covers as outlined in the 2016 Makamaka'ole annual report.
5. NARs suggested that alternative trapping methods may be approved on a case-by-case basis.

Results:

1. On March 1, 2017, Fern Duvall authorized the implementation of the KWP Makamaka'ole Ditching Proposal 20170227 (see Appendix A). We have implemented the plan and the attached photos show the results (See Figure 3):



Figure 3. A photo of the ditching from top (right) and bottom (left) after the ditching and outplanting.

2. Stainless chain-link to retrofit the fence is estimated to cost over \$200,000. Adding the cost of labor to rebury the skirt makes this option too expensive. We request as a standard permit condition that quarterly vegetation maintenance includes weed whacking within 1m of the fence line and digging to rebury as necessary to maintain an effective barrier.
3. Kaheawa Wind contracted Starr Environmental to complete the vegetation survey of unit A (see Appendix B). No rye grass was found. NARs has approved the removal of this permit condition.
4. Burrow covers have been implemented on a limited basis to cover the active burrows. NARs suggested that alternative trapping methods may be approved on a case-by-case basis.
5. No alternate trap methods for mammals have been implemented.

*NARS Permit conditions appear in **BOLD GREEN** text.*

*DOFAW permit conditions appear in **BOLD BLUE** text.*

Kaheawa Wind responses will appear in plain text.

Seabird restoration:

NARS:

Besides conditions stipulated here, the permit holder will adhere to project specifications given in the permit application.

Access to monitor burrows that have been selected as nesting sites must be determined by consultation with experts on Kauai, Oahu and Maui (Andre Raine, Lindsay Young, and Jay Penniman, respectively).

In the predator-free enclosed area, biologists will establish artificial burrows with nesting material, and deploy them along with audio recordings that will specifically attract these species of seabirds.

Sea bird surveys will be conducted by qualified trained specialists familiar with NESH and HAPE nesting ecology.

Social Attraction and Artificial Burrows

Artificial burrows and species-specific song playback and decoys have been designed to encourage the Newell's shearwater and Hawaiian petrel to nest within predator-free enclosures. The playback system broadcasts pre-recorded songs of each species through external, weather resistant speakers (four speakers in A and two speakers in B). NESH songs in enclosure A and HAPE songs in enclosure B are broadcast daily from dusk until dawn. On October 27, 2015, NARS (Fern Duvall) approved year-round playback, as recommended by Steve Sawyer. Previously we broadcast songs from March through November. In 2016, at the suggestion of Steve Sawyer, we added song files provided by Maui Nui Seabird Restoration Project (MNSRP) to increase diversity to the playback with additional 'local dialect'.

Constructed nest boxes that measure 40cm x 50cm x 50cm and use 1.27cm marine-grade plywood have been fitted into carefully prepared excavations. Substrate removed during the excavation was used to fill in around the nest boxes and burrow passages. Artificial burrow entrances attached to the nest boxes are flexible, ribbed irrigation tubing (approximately 15cm diameter and 1.5 to 2m long) that allows the passage to include a 90° bend, a configuration found in naturally excavated petrel and shearwater burrows. The nest box lid enables easy inspection of the nest box and is even with or slightly above the ground level.

We placed all the burrows within 25m of the playback speakers and at higher elevations within the enclosures where vegetation is denser. Birds are expected to be most attracted to the immediate vicinity of the speakers as has occurred at other successful acoustic attraction projects. We have placed custom fabricated HAPE and NESH decoys to simulate adult birds resting or staging at nearby burrows (Figure 4).



Figure 4. NESH (left) and HAPE (right) decoys near burrow entrances.

In 2017, we recorded NESH, HAPE, and BUPE visitations to multiple burrows. Appendix B lists all game camera observations. The top two photos in Figure 5 show a NESH and a HAPE utilizing a burrow naturally created in nearby uluhe, and the bottom two photos show birds utilizing artificial burrows.



Figure 5. Game camera captures of seabird visitation over multiple nights in 2017.

Night Surveys

Appendix C lists monthly night survey observations. Night survey was conducted monthly to confirm activity as observed on the camera and get added clarity for bird activity. Birds of both species were observed circling over the enclosures and utilizing the nearby Makamaka'ole stream channel. Additionally, observation of barn owls was recorded to supplement the removal efforts.

Burrow Monitoring:

In 2017, we coordinated nest box assessment with the Maui Nui Seabird Restoration Project (MNSRP). On August 24th, MNSRP staff accompanied Kaheawa staff to scope and inspect all active nest boxes at Makamaka'ole. Burrows which did not have adults present and were known to have activity were opened. A total of four burrows were opened on August 24th, eggs were observed in three of the four burrows, with one burrow having a second egg. On November 9th, all burrows were examined for activity by Kaheawa Wind biologists and MNSBRP biologists. Results of all burrow monitoring can be found in Appendix D. This season three NESH eggs and one BUPE egg were recorded from Makamaka'ole. Full reports on collections can be found in Appendix E.

Acoustic Playback:

In 2015, NARS approved year-round song broadcasts that continued to be from 10 minutes after sunset to 10 minutes after sunrise. In February 2016, we received a call file from Jay Penniman, created by Jeff Schlueter of Conservation Metrics. The file is a mix of HAPE and NESH explained as "The HAPE sounds are pretty much all pulled from the 2015 recordings at SPID Waikamoi_9. The NESH sounds are from Kauai: some from Pohakea in Hono O Na Pali, and others from Upper Limahuli. We blended multiple clips together to get a higher density of calls and both species going at once."

We added these new acoustic playback recordings in February 2016 as every 5th sequence (i.e. four species-specific sequences of calls, then the mixed recording sequence). Throughout the breeding season, we observed and heard NESH responding to the vocalizations in the acoustic playback on night surveys. NESH also occupied burrows HAPE had visited in 2015.

In July 2016, there was a notable absence of HAPE circling above enclosure B (where HAPE only calls had been broadcast in previous years) during night surveys and ground based video recordings at burrows in enclosure B. we were unsure if the mixed sequence newly added could be interfering with HAPE attraction and therefore we removed the mixed calls from the acoustic playback in B in August 2016. Since August, the playback in enclosure B has only HAPE calls. Subsequently, we observed NESH circling the enclosure at A and on game cameras in A, while HAPE and NESH were observed circling at B.

Temperature:

NARS:

Temperature fluctuations inside of the burrow boxes must be reduced. This may take place after consultation with DOFAW-NARS staff and with MNSRP and Pacific Rim on workable suggestions that are not detrimental to the NAR site, and yet would allow nesting success.

In 2017 after consultation with NARS staff Fern Duvall and Peter Landon, approval was received to utilize the “Standard Box Cover” (as described in the 2016 report) as needed to maintain burrow temperatures. Box covers were installed on active burrows in A, all burrows in B have covers from 2016.



Figure 6. Final insulation box design in place over a burrow.

Easement:

DOFAW:

Because the State Forest Reserve is 'land locked', access through other land parcels (State Leased, subdivision and Natural Area Reserve) should be arranged between permittee and land/property managers, respectively.

We have contacted several land managers to formalize easements through the required access parcels including; Daniel Ornellas of the DLNR Land Division, Sunny Palmer of Commercial Properties of Maui Management Inc. representing the Maluhia Country Ranches Home Owners Association, and Kathleen Kensinger (the nearest neighbor to the state parcels). For private parcels, draft easements have been submitted to the homeowners for review, when the format has been approved we can finalize the agreements.

We have a "Meets and Bounds" legal description for the road through parcel TMK 231006003 shown in Figure 7. We continue to work with Daniel Ornellas to secure an easement for the parcels in question. We currently have verbal agreement with the land owners approving access to the site.

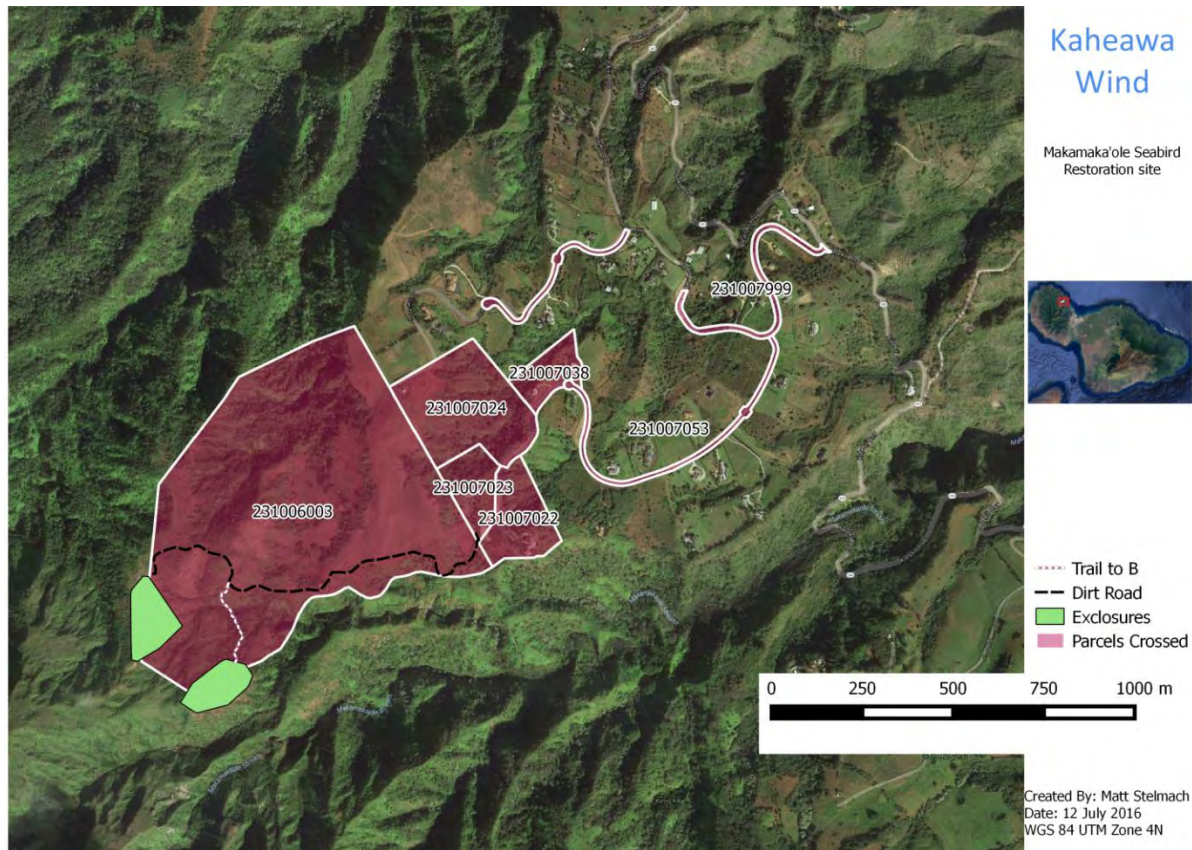


Figure 7. Parcels that must be crossed to access the Makamaka'ole Seabird Restoration site.

Vehicular Travel and Roadways:

NARS:

All vehicle traffic must stop at the NARS ungulate fence.

DOFAW:

Motor vehicles shall be used only on established roadways. Please carry a fire extinguisher and/or shovel in your vehicle while in State Forest Reserves. Vehicle catalytic converters have started wildland fires and you will be able to extinguish fires easily with these tools if fires are noticed early. Contact 911 if necessary. Please do not park in tall grass.

All vehicle traffic must stop at the NARS ungulate fence. Vehicular traffic prohibited to and from NARS ungulate fence to Enclosure B. Enclosure B may only be accessed on foot or by helicopter. A flight plan must be submitted and approved by the District Forest Manger Supervisor for all helicopter access into the State Forest Reserve.

All vehicle access stops at the NARS ungulate fence. Access to enclosure B is from the road via footpath.

Enclosure security:

NARS:

Doors to the two enclosures were revised so that they are more substantial than hinged plywood and can be self-locking. They will remain locked to protect decoy and acoustic equipment, nesting birds, and reduced the potential for ingress by predators.

DOFAW:

Doors to enclosure B will remain locked to protect decoy and acoustic equipment, nesting birds, and reduced the potential for ingress by predators. SunEdison will provide and maintain appropriate signs to create awareness for the project and identify contact person and/or number to gain access, if needed.

The doors to both enclosures have self-locking clasps and springs to ensure they remain closed. The doors are locked with padlocks and the combinations are changed regularly. When combinations are changed NARS and DOFAW staff are provided with updated combinations.

Predator control:

NARS:

Biologists will establish and maintain a predator control grid to initially remove all predators from inside the enclosures, utilizing traps specifically for each predator (mice, rats, mongoose, feral cats, dogs, barn owls) in the fenced areas. Traps used will be modified conibear-style and Doc-200 traps that will target cats and mongoose within the enclosure. These traps will be placed along landscape features such as ridgelines, near water sources, and in preferred microhabitats such as areas and tracks in which target species are most likely to travel, including a 100-meter buffer outside the enclosures.

The DOC-200 traps consist of spring-loaded clamps that are enclosed in wooden boxes with screen mesh sides; an animal must to pass through two successive small entry holes in order to access the bait and trap itself, thus discouraging non-target species (such as burrowing seabirds) from entering.

Conibear traps are body-grip traps that are not contained in a box, but are easily secured to a set point and also discourage non-target species. As an additional precaution, only snap traps and Doc-200 traps will be used during the nesting season inside the enclosures.

During the breeding season Doc-200 traps will be checked every week and maintained as necessary; Conibear traps will be checked daily. Signs alerting visitors entering the buffer areas to the presence of traps will be posted.

The locations for the 2017 traps are in Figure 8.

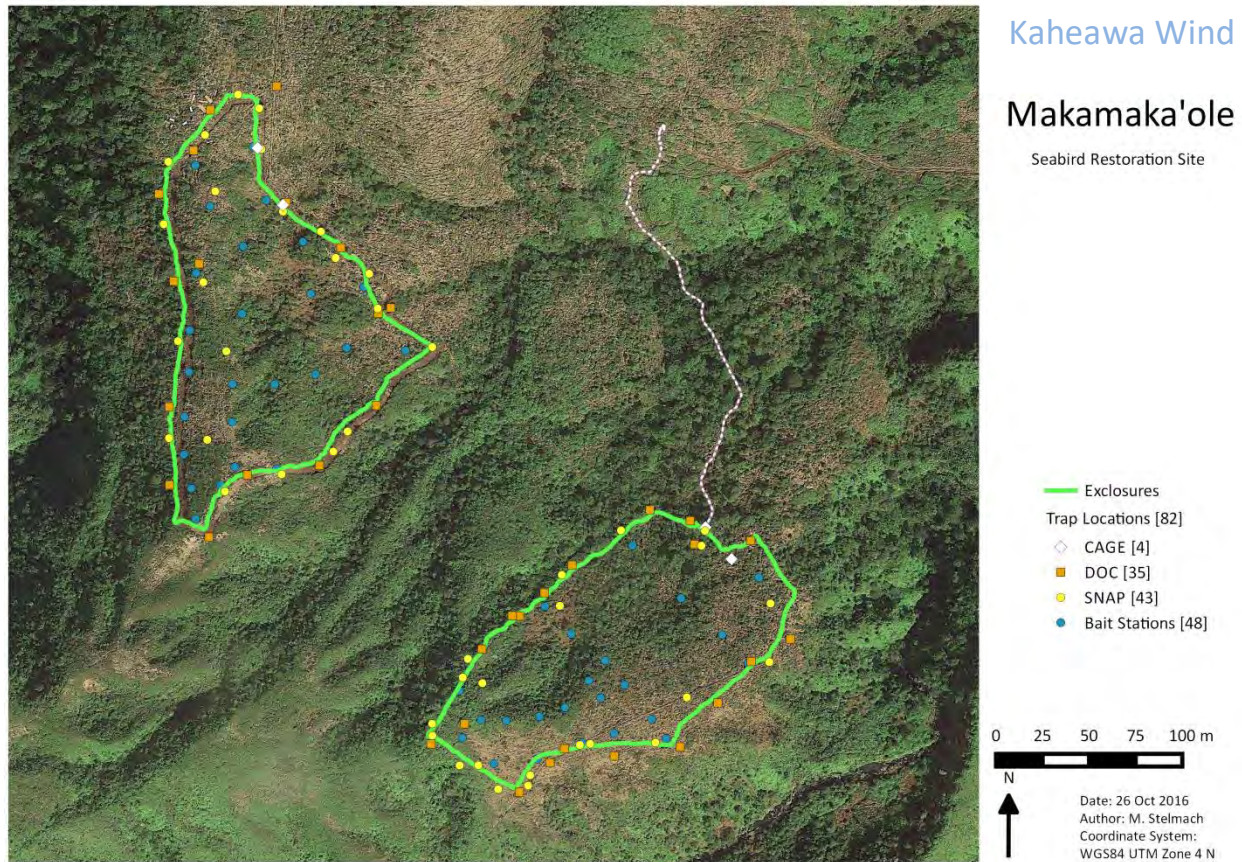


Figure 8. Locations of all predator control traps at the Makamaka'ole Seabird Restoration site (trap locations within 5m of actual location).

Trap Bait:

Peanut butter is the catchall bait for rats and mongoose. We have seen that it is an effective lure for these target species. However, the hot and humid climate at Makamaka'ole causes rapid molding of the bait, leading to an effective period of less than one week. Therefore, we have sought baits that will have a longer life.

Mustelids show a strong attraction to eggs. We have seen effective use of eggs for up to one month, with a peak attraction lasting up to two weeks. Some issues with longer bait life are non-target attraction of flies and ants.

We have communicated with Sean Moura who has been developing wax based baits. We tried bait he provided and modified his formulas to provide improved longevity. We tried a peanut butter based formula and a fish based formula. Each of these baits showed effective periods up to two weeks, with some blocks showing signs of chewing past two weeks. We have been pleased with this improvement and plan to continue to use wax baits (Table 2).

Trapping Summary			
Enclosure	Inside/outside	Species	Count
A	Inside	Mouse	9
		Rat	11
	Outside	Mongoose	31
		Mouse	7
		Rat	69
B	Inside	Mouse	2
		Rat	3
	Outside	Mongoose	18
		Mouse	1
		Rat	40

Table 2. Trapping success for 2017 by target and location.

We continue to deploy Ramik™ in trap boxes, checked bi-weekly, and changed as needed.

Tracking Tunnel Results:

In 2017, tracking tunnels were deployed inside enclosures, bi-monthly. Each enclosure contains 10 tracking tunnels. Tracking cards are deployed for three nights for mongoose and one night for rodents. The proportion of cards with activity can be found in Table 3.

Tracking Tunnel Summary								
Enclosure	Species	1	3	5	6	7	9	11
A	Mongoose	0	0	0	0.1	0	0	0
A	Rat	0	0	0	0.2	0	0.2	0
B	Mongoose	0	0	0	0	0	0	0
B	Rat	0	0	0	0	0	0	0

Table 3. Tracking tunnel activity by month for 2017.

Challenges:

Several issues have been challenging. Our goal continues to be exclusion of all predators and the fence does work as a strong deterrent. Nonetheless, the fence design is susceptible to erosion and soil movement and rats and mice can enter the smallest holes.

We continually improve the integrity of the fence. So far, we have:

1. Used rebar to stake down areas where the fencing skirt is exposed.
2. Used expansion foam to fill gaps formed in overlaps in the fence itself and around the culvert grates due to ground settling.
3. Repaired and replaced rusted hardware as needed.
4. Used a smoke machine to test holes found around the fence to determine if the holes dead end or create an opening to the exterior.

Despite these efforts we detected rodent activity inside of both enclosures. Our goal is to maintain the interior of the enclosures 100% rodent free.

We would like to modify the NARS permit condition to be “Weedeaters can be used quarterly within 1m of the fenceline. Only qualified staff trained in plant identification will be permitted to use weedeaters.” We would use weedeaters along the fence line (within 1m of the fence on either side) of both enclosures and outside the breeding season (November 1 to March 31). Our goal is to expose the skirt to be able to look for holes caused by rodent digging and erosion. Weedeaters are a fast and effective tool, removing the above ground vegetation while leaving the roots to stabilize the soil. DOFAW has already given permission to use weedeaters to clear the fence line in enclosure B.

We also request permission to rebury the skirt as needed to ensure that our fence line is secure. Currently the erosion along the fence line is our greatest concern, however rats can dig up to 3m tunnels which would be more than sufficient to get underneath the skirt. DOFAW has already given permission to rebury the skirt as needed to maintain the predator exclusion integrity.

We will continue to investigate the feasibility of additional trap types such as those outlined below:

- Drowning traps with bird exclusion: <https://www.youtube.com/watch?v=D47P1TgZ7ZE>
- Goodnature A24 traps: <http://www.goodnature.co.nz/products/rat-stoat/>
- Box/cage traps
- Nooski ring traps: <http://www.nooski.com/>
- Ka Mate traps: <http://www.kamatetraps.com/trap-introduction.html>

In summary, we are seeking permission to:

- 1. Use weedeaters adjacent to the fence within the NAR,**
- 2. Rebury the skirt along both enclosure fences.**

Barn Owl Control:

In 2016, Kaheawa Wind and the DLNR-DOFAW signed a Memorandum of Understanding to control barn owls at Makamaka’ole. While the combination of fencing and trapping has proven a strong deterrent to rats, cats, and mongoose, seabirds are still susceptible to avian predators. Dr. Andre Raine of the Kauai Endangered Seabird Recovery Project has documented barn owls preying on multiple seabird species. Barn owls are present at Makamaka’ole and therefore pose a threat to both Hawaiian petrel and Newell’s shearwater. DOFAW and Kaheawa Wind Biologists remove barn owls from the site to reduce the risk to our target restoration species. Our federal Migratory Bird Depredation permit MB19697C-1 allows all control work.

TERP provided funding to DOFAW in January 2017 and control work began in March 2017. In 42 nights of control attempts three owls were removed. Control methods involved placing visual lures (mice in cages) on T posts at various locations around a clear vantage point. Acoustic lures of mouse

distress calls proved to be effective at attracting owls in to control personnel. The control location was just off the trail to B where there is a clear view of the gulch and both enclosures.

We observed that owls frequent the gulch areas between and below the enclosures and follow this habitat feature to Makamaka'ole stream. Owls were most visible on clear nights with available moonlight. With clouds or no moon, it was difficult to spot owls. Additionally, ambient light from Kahului to the east made observation to the east difficult on moonless nights.

KWP staff set up two trial locations for trapping owls. One was just north of enclosure A and one was between the enclosures. Traps were constructed out of plywood and baited with visual and acoustic lures. Visual lures used were three live mice in a small cage, as well as a predator lure made by IcoTec. An acoustic lure was also used to play mouse and/or rat distress calls. In 28 nights of trapping, no owls were captured.

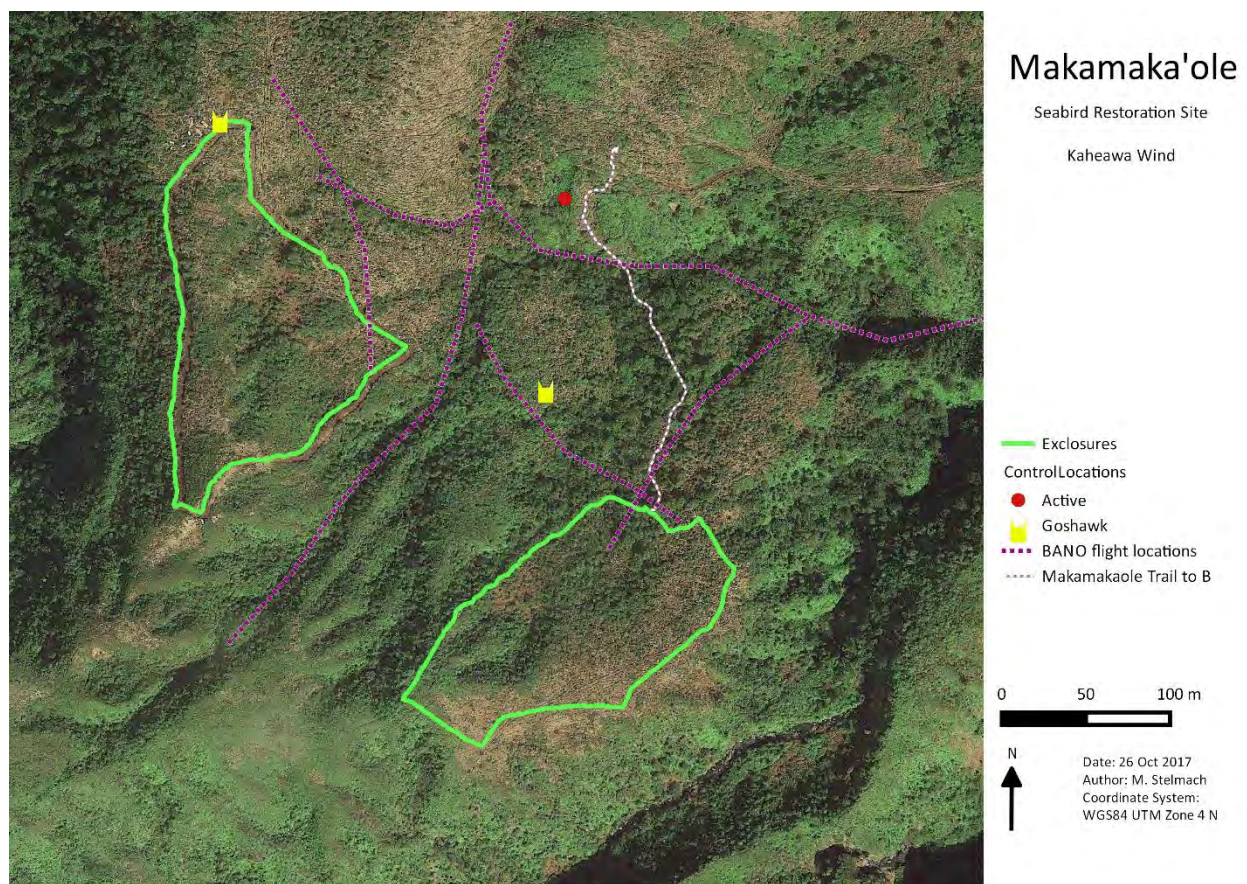


Figure 9. The map above shows approximate owl flight patterns and control locations.



Figure 10. The Swedish goshawk trap design is pictured above. Two doors close when downward pressure is applied to the central bar. Speakers below the trap broadcast an acoustic lure and caged mice inside the trap provide a visual lure.

Native Vegetation:

NARS:

Native plant species will continue to be propagated and will be used instead of non-native alternatives for future disturbance areas. Current disturbance areas will also be restored with native plant species where possible (i.e., fence scar, areas where excavator caused damage). A minimum of 500 native plants are to be planted during 2016.

Permit holder removed traps and listening stations from areas with uluhe [DICLIN] vegetation in 2015. No further disturbances will occur in the native uluhe areas or other native vegetation areas.

In areas where ground may be exposed, temporary erosion control mesh and/or low-statured non-invasive ground cover (preferably native species) will be used to fill in the cleared areas and stabilize the soils. Recommendations for appropriate species will be reviewed and approved by NARS staff prior to planting.

DOFAW:

SunEdison LLC must receive prior approval from the District Forest Management Supervisor for all outplanting projects. An outplanting plan consisting of plant species, number of plants, seed source, and location of planting sites must be submitted to the District Forest Management Supervisor.

Following the guidance of DOFAW and NARS and the 2011 Botanical Survey (Starr, 2011) we have prioritized the species in Table 4 for outplanting:

Hawaiian Name	Scientific Name
Maile	<i>Alyxia oliviformis</i>
Hame	<i>Antidesma playtyphyllum</i>
Kanawao	<i>Broussaisia arguta</i>
Uki	<i>Machaerina angustifolia</i>
Kupukupu	<i>Nephrolepis exatata</i>
Uluhe	<i>Dicranopteris linearis</i>
Kawau	<i>Ilex anomala</i>
Ieie	<i>Freycinetia arborea</i>
Kopiko	<i>Psychotria mariniana</i>
Naupaka kuahiwi	<i>Scaevola chammisoniana</i>
Hoi kuahiwi	<i>Smilax melastomifolia</i>
Ohe mauka	<i>Tetraplasandra hawaiiensis</i>
Akia	<i>Wikstroemia oahuensis</i>
Ohia	<i>Metrosideros polymorpha</i>
Manono	<i>Kadua affinis</i>

Table 4. Priority outplanting species.

In 2017, we planted species according to need and availability of seed collected from approved sources (Table 5).

Enclosure	Plant Species	Sum
A	<i>Machaerina angustifolia</i>	289
Total		289

Table 5. Native outplantings throughout 2017.

Non-native vegetation:

NARS:

Permit holder will control weed recruitment in disturbance areas. Regular herbiciding and weeding without motorized tools must occur once every 3 months. Weeding and herbiciding must occur in areas along the fence corridor inside and outside the enclosures, within the enclosures and to all disturbed areas that were created by First Wind (SunEdison). Weeds to target are clidemia [CLHIR], tibuchina [TIBURV], Molasses grass [MELMIN], and guava [PSICAT and PSIGUA].

DOFAW:

SunEdison LLC to control weed recruitment (mechanical and chemical) within disturbance areas (fence corridor, re-aligned ungulate fence corridor, access routes to and from Enclosure B, and burrow sites) and maintain zero tolerance for weed species.

We conducted quarterly weed removal (Table 6).

Makamaka'ole Weed Control			
Application Date	Product Applied	Target Species	Enclosure
19 January	Honcho	PSICAT	A
2 February	Honcho	PSICAT	A, B
3 February	Honcho	PSICAT	B
18 May	Honcho	PSICAT, TIBLON, CLHIR	B
25 May	Honcho	PSICAT, TIBLON, CLHIR	A
11 August	Honcho	TIBLON, CLHIR, MELMIN	A, B
14 December	Honcho	TIBLON, CLHIR, MELMIN	A, B

Table 6. Non-native plant management actions taken in 2017.

NARS:

First Wind (SunEdison) takes responsibility for the introduction of rye grass to the project area and must provide all measures to ensure that it does not become established within the NAR. The rye grass is expected to die out on its own, but First Wind (SunEdison) will continue to monitor it. If the rye grass persists, the removal will be the responsibility of First Wind (SunEdison).

We had used out planting of annual rye grass to stabilize soils exposed by fence construction and to prevent erosion. We had planted rye grass plantings along the exterior of the fence lines to provide short-term cover. We monitor for rye grass during regular fence checks and it is no longer detectable. No other control measures are required for the rye grass to be extirpated from the site.

Following our discussion on February 22nd, we contracted Starr Environmental to conduct a vegetation survey of the Makamaka'ole seabird restoration site. The target species was rye grass with additional instruction to monitor for additional new species which may have been introduced with the rye grass. I have attached a copy of the report (Appendix F) produced which states:

“No annual rye grass (*Lolium multiflorum*) was observed at or near the site. There is the possibility that seeds could exist in the soil and someday germinate, but we did not currently find this short-lived species in the areas surveyed.”

We would like to remove page 2 paragraph 5 from the Special Use Permit which states:

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC take responsibility for the introduction of rye grass to the project area and must provide all measures to ensure that it does not become established within the NAR. The rye grass is expected to die out on its own, but Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC will continue to monitor it. If the rye grass persists, the removal will be the responsibility of Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC.

Approval for this request was received on November 9, 2017 from Fern Duvall (Appendix G).

NARS:

Precautions will be taken to prevent introduction of plants or animals not naturally present in the area. Should an infestation develop that is directly or indirectly attributable to the project, the permit holder is responsible for eradication by methods to be specified by NARS – whether it occurs during or up to 10 years after the permit period. Permit Holder is responsible for ensuring that all clothing and gear is cleaned before entering any Natural Area Reserve.

DOFAW:

All equipment and work gear (hiking boots, clothing, etc.) will be cleaned at an off-site location (TBD) prior to entry of Forest Reserve to prevent the spreading of noxious weeds.

Cleaning procedures will include both high-pressure air and power washing. Additional inspections will be conducted by permittee and if deemed necessary, agency representative.

Kaheawa Wind staff use dedicated equipment, for use solely at Makamaka'ole to prevent the introduction of non-native species to the project site. Visitors are provided with the following instructions:

“The site we are visiting is a sensitive ecological area and a Natural Area Reserve. We will be responsible for any introduced non-native species, which is potentially very costly. **Please use a brush to scrub your boots, remove the laces and brush any seed out from under the tongue to help us prevent the spread of pest species.** This also applies to clothes; washed clothes should be sufficient to prevent seed transfer.”

In addition, Kaheawa staff received and implements BMPs provided by Lance DeSilva on 9/1/2016 for preventing the spread of Rapid Ohia Death.

Disturbance of vegetation and soils:

NARS:

Disturbance of vegetation and wildlife will be avoided as much as possible. Do not leave trails. With the exception of the enclosures being installed to protect nesting bird activities may not impede public access, where allowed.

Hand clippers will be used around entrances to bird burrows. Weedeaters are not allowed.

The remaining 18 bird burrows were installed within enclosure A in 2015. Any future ground disturbances must be approved by DOFAW-NARS staff.

DOFAW:

SunEdison LLC must receive prior approval from the District Forest Management Supervisor (in consultation with District Wildlife Manager) to install any additional bird burrows in Enclosure B during this permit period.

Each enclosure contains 50 burrows, the last of which were installed in 2015. No new burrows were installed in 2017. No additional burrows are currently planned. No weedeaters are used in burrow maintenance.

NARS:

Culverts in Enclosure A will continue to be monitored for effectiveness and necessity and may need to be modified, reduced in size, or restored based on the findings and recommendations of DOFAW staff. First Wind (SunEdison) will continue to maintain flumes and other infrastructure to ensure water or debris is not washing into the ungulate fence. Any ditching or water diversion action to take place must be approved by DOFAW-NARS staff.

Concrete will be allowed only to patch existing concrete forms for culverts. Retention basins will not be paved.

Culvert repairs are continuous and ongoing. To better target our efforts, we used a fog machine to detect holes that connect around the culverts. We used foam gap filler around the grates to ensure that all gaps were sealed. We made patches to holes as needed, and the retention basins remain unpaved. Photos of each of the culverts are shown in Figure 11. Flumes for each culvert are in place and are monitored regularly.



Figure 11. Current condition of various culverts inside enclosures A and B.

DOFAW:

Disturbance of vegetation and wildlife will be avoided as much as possible. Do not leave trails. Except for the enclosures being installed to protect nesting birds, activities may not impede public access, where allowed.

Potentially sensitive botanical, wildlife, or archeological features will be avoided.

In areas where ground may be exposed, temporary erosion control mesh and/or non-invasive ground cover will be maintained in areas to stabilize soils. Recommendations for appropriate species will be reviewed and approved by the District Forest Management Supervisor prior to outplanting.

NARS:

Potentially sensitive botanical, wildlife, or archaeological features will be avoided.

Kaheawa Wind staff, volunteers, and contractors use existing trails. We made no alterations of infrastructure that would affect botanical, wildlife, or archeological features. Erosion control measures implemented include outplanting (see Outplanting), water bar installation, and trials for non-invasive erosion control such as drip erosion prevention.

Photo points:

NARS:

Permit Holder established permanent photo points (four corners and one at the entrance of the enclosure) to show the condition of the enclosure per year.

Annual photo points were collected 10/26/2017, and can be seen in Figure 12 and 13.

Enclosure A:



Figure 12. Clockwise from upper left: Mauka west, Mauka east, Makai east, Makai west.

Enclosure B:



Figure 13. Clockwise from upper left: Entrance, Mauka west, Makai east, Mauka east.

Fire prevention, spill prevention, and liability:

DOFAW:

Permittee shall be liable for any wildfires due to his/her negligence. As a minimum, a shovel and fire extinguisher shall be on at least one vehicle while conducting this activity.

Permittee will be responsible for any damages to any improvements in the area, including existing county water lines, fences, and gates, poles and telephone lines.

All Trucks that visit the site are equipped with a fire extinguisher and a shovel.

DOFAW:

Permittee will adhere to Standard EPA prevention, safety, and spill containment protocol.

All staff follows standard EPA prevention, safety and spill containment protocol. All pesticides used on site are diluted, and only day use quantities are brought. All chemicals are transported inside secondary containment. Records for pesticide application are kept at 3000 Honoapiilani Hwy, Wailuku HI 96793.

Hours of activity:

DOFAW:

Per approved US Fish & Wildlife Depredation Permit #MB69469B-0, permittee is authorized to take twenty-five (25) barn owls as a management tool to protect threatened and endangered species. The depredation permit expires on January 31, 2017.

Hunting, open fires and littering are prohibited.

No overnight camping shall occur in the West Maui State Forest Reserve.

Permittee shall conduct fence and site repair work during daylight hours only. All other data collection/monitoring work may be permitted through all hours of the day.

Permittee shall minimize damage to the soil. Permittee shall minimize damage to the existing vegetation, with special care to the surrounding trees and adhere to all Best Management Practices.

KWP staff communicates scheduled tasks with DOFAW and NARS. All fencing activity is conducted during daylight hours. No overnight camping occurs in the project area. Planned barn owl control actions will occur after dark.

Communication:

NARS:

No work or site establishment may be done without prior approval of NARS Staff.

While the permit holder bears ultimate responsibility for carrying out this project under the terms of the permit, the following personnel may be directly or indirectly involved at some time in the predator control, social attraction, and long-term maintenance and monitoring: First Wind (Sun Edison): Mr. Dave Cowan, Mr. Mitch Craig; DOFAW: Dr. Scott Fretz, Dr. Fern Duvall, Mr. Lance DeSilva, Mr. Peter Landon; SWCA Consultants: Mr. Jaap Eijzenga, Dr. Ling Ong; Pacific Rim Conservation : Dr. Eric Vanderwerf, Dr. Lindsay Young; National Tropical botanical Garden: Mr. Ken Wood. Additional personnel may be added to the project as needed.

DOFAW:

To avoid conflict with other DOFAW programs, our office will be provided with at least two weeks notice of dates of planned helicopter activities within the State Forest Reserves via email to Lance.K.Desilva@hawaii.gov.

Kaheawa Wind staff notified NARS and DOFAW of planned activities.

NARS:

(A) A field report will be submitted within 5 weeks of the project's completion. (b) Results of the project, as published or unpublished reports, also will be submitted. (c) The reports will identify the Natural Area reserve as a project site and acknowledge the special use permit approved by the NARS Commission.

This report constitutes the annual report and permit renewal request.

Status of Permits and Authorizations

All the lands involved are in the Conservation District, and a Site Plan Approval for the project was issued by the DLNR/OCCL on January 11, 2012. The NARS requires issuance of a Special Use Permit while DOFAW must approve the project and issue an Access Permit that would enable the project to be implemented within the West Maui Forest Reserve. The initial NARS Special Use Permit was received on December 17, 2012 and is renewed annually. The current NARS Special Use Permit was issued for the period of February 17, 2017 to February 16, 2018. DLNR Forestry Access Permit was issued on December 10, 2012 and is also renewed annually. The current DLNR Forestry Access Permit was issued for the period of March 1, 2017 to February 28, 2018.

This project may span several years or even decades. Should the project be terminated or otherwise determined no longer practical or warranted, the fence and artificial nesting burrow materials would be removed and the disturbed areas stabilized in accordance with recommendations and guidance approved by the NARS and DOFAW.

Summary

This project promotes important conservation for both species and increases their potential for recovery in the West Maui ecosystem. In addition, this project also promotes public outreach and education.

Kaheawa Wind biologists, consultants, and collaborators will take all practical measures and follow prescribed protocols and procedures when working in the Natural Area Reserve and State Forest Reserve lands to minimize damage to natural, geological, or cultural resources. While temporary impacts occurred during clearing for fence construction and installation of artificial burrows, the areas disturbed are recovering.

Our staff controls the ingress of unwanted invasive species and minimizes the effect of erosion. Kaheawa Wind biologists continue to coordinate with DOFAW, Maui NARS, and USFWS personnel on the scope of the project.

Summary of proposed activities in the West Maui Kahakuloa Section and West Maui Forest Reserve:

Kaheawa Wind will continue to maintain the following protocols:

1. Social attraction of Hawaiian petrel and Newell's shearwater with acoustic playback and decoys.
2. Maintenance of artificial burrows to promote colony establishment.
3. Continued out planting of plants as needed to maintain soil stability.
4. Continued monitoring to evaluate the success of colony establishment.
5. Maintenance of the vertebrate predator exclusion fence.
6. Maintain the vertebrate pest control grid for rats, mongoose, and cats. Control methods include snap traps, DOC200 traps, Cage traps (outside only), and Diphacinone bait stations (inside only).
7. Maintain a barn owl control program using trapping and lethal control.

Kaheawa Wind also requests permission for the following actions:

1. Interested collaborators, colleagues, and/or volunteers not specifically listed here to participate in permitted activities when accompanied by at least one of the primary project personnel.
2. Rebury the skirt as needed to ensure that our fence line is secure.
3. Use weedeaters within 1m of the fence line while outside of the breeding season (November – March) at both enclosures.
4. ***Please note TerraForm Power, LLC owns KWP I and KWP II. We would like the permits in the name of TerraForm Power, LLC in 2017.***

Project Personnel:

Kaheawa Wind, Operations:

Spencer Engler

Mitch Craig

Collaborators:

DLNR/DOFAW

DLNR/NARS

USFWS

Maui Nui Seabird Restoration Project

Steve Sawyer

For any questions, comments, or concerns regarding this report please contact:

Mitch Craig

Kaheawa Wind I & II

HCP Manager

3000 Honopiilani Hwy

Wailuku, HI 96793

MCraig@TerraForm.com

Mobile: 808-633-3723

Literature Cited:

2006 Kaheawa Pastures Wind Energy Generation Facility, Habitat Conservation Plan

2011 Kaheawa Wind Power II Wind Energy Generation Facility, Habitat Conservation Plan

2012 Seabird Mitigation Plan for Kaheawa Wind Power Wind Energy Generation Facility and Kaheawa Wind Power II Wind Energy Generation Facility.

Appendix A. KWP Makamaka'ole Ditching Proposal.

Kaheawa Wind Power

Makamaka'ole Seabird Restoration Site

Kahakuloa Section of the West Maui Natural Area Reserve

Ditching proposal:

The Makamaka'ole Seabird restoration site provides two mammalian predator exclosures to establish breeding colonies of Hawaiian petrel (HAPE) and Newell's shearwater (NESH). Each exclosure protects 50 artificial nest boxes. Acoustic song broadcasts attract HAPE and NESH to the site. The site was operational in September 2013, first seabirds visited in 2014 and activity increased in 2015 and 2016. Figure 1 shows both exclosures and the land management responsible for oversight within each area.



Figure 1. Two exclosures at Makamaka'ole are shown in relation to the Makamaka'ole stream bed and overlaid on land ownership.

The predator proof fences protect nesting seabirds from known predators, rats, cats and mongoose (Jamie K. Reaser, 2007; Duffy, 2010). To achieve total predator exclusion, we use a variety of traps inside and outside the exclosures and conduct tracking tunnel monitoring to assess results of trapping. Regular monitoring revealed rodent activity inside enclosure A for several months in 2016. Rodent ingress could be under, thru, or over the fence. We believe predator ingress is under and through the fence.

The exclosures are on the windward side of West Maui and receive intermittent heavy rains that cause erosion under the fences. Culverts were installed with the initial fence construction; however other drainage pathways are not captured by these culverts leading to erosion under the fence.

We propose to dig a 20m long ditch at culvert two and a 34m ditch at culvert three (Figure 2). The ditches will be no larger than 30cm wide x 30cm deep, and constructed with hand shovels (not machinery). The ditches will divert excess water to the culverts. This will minimize erosion under the fence.

The ditches would be in areas free of native species, and dominated by broomsedge (*Andropogon virginicus*) and molasses grass (*Melinis minutiflora*) (Figures 3-6). We will outplant the ditching sites with native species to provide a net benefit to the NAR and minimize disturbance.

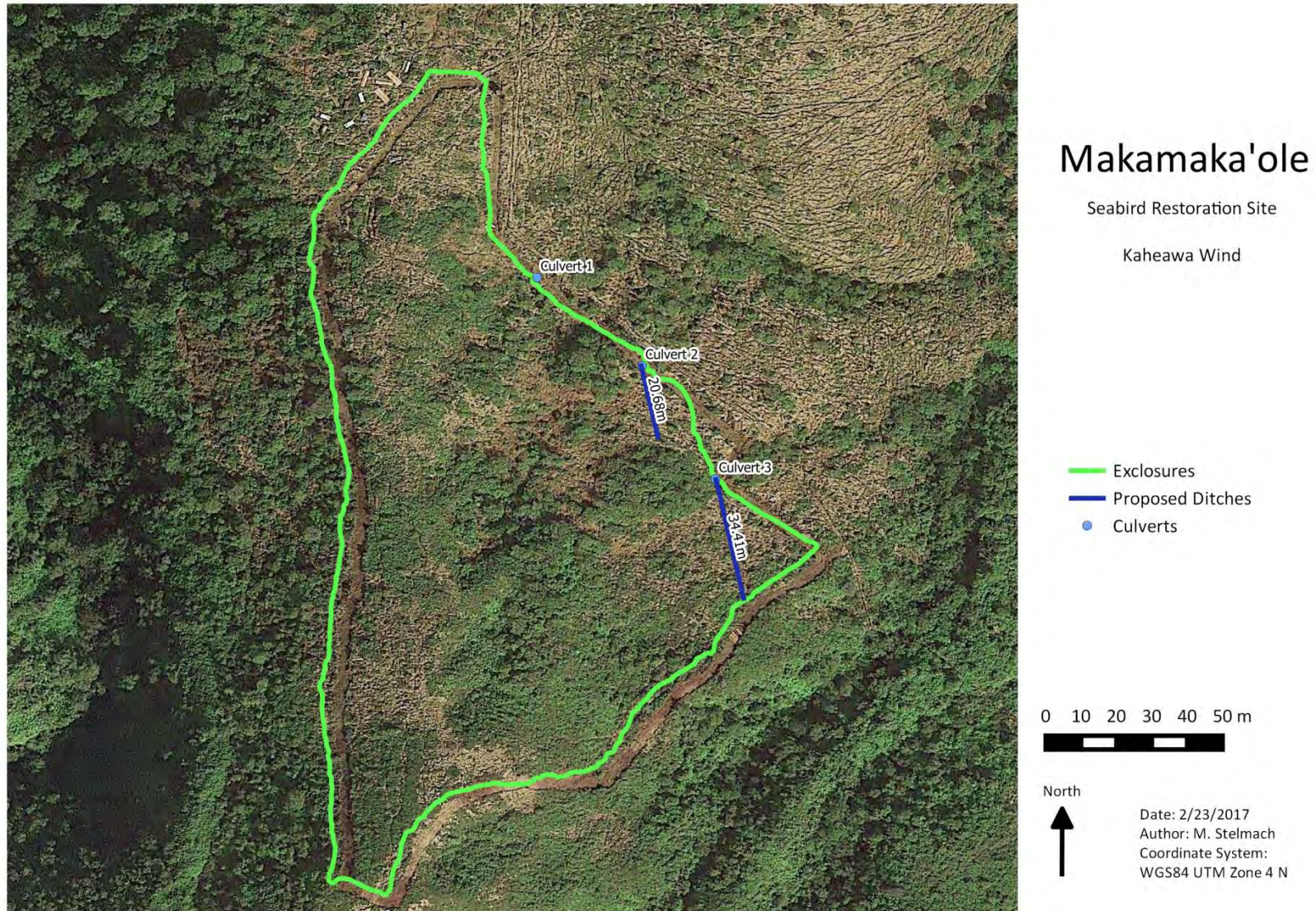


Figure 2. Proposed ditch locations are shown in blue at the second and third culverts.



Figure 3. A photo from the bottom of the proposed ditch at culvert 2 looking mauka. The predominant vegetation is broomsedge.



Figure 4. A photo from the top of the proposed ditch location at culvert 2.



Figure 5. A photo from the bottom of the proposed ditch at culvert 3. The dominant vegetation is broomsedge.



Figure 6. A photo from the top of the proposed ditch at culvert 3.

We met with NARs staff; Fern Duvall and Peter Landon on February 22, 2017 to discuss options for reducing erosion and predator ingress. This proposal is to construct an unlined ditch within the exclosure at the locations outlined in Figures 2-6. Final ditch locations and lengths may vary subject to on site needs and protection of native species. A diagram of a cross section of the hill slope with the proposed ditch design is shown in Figure 7.

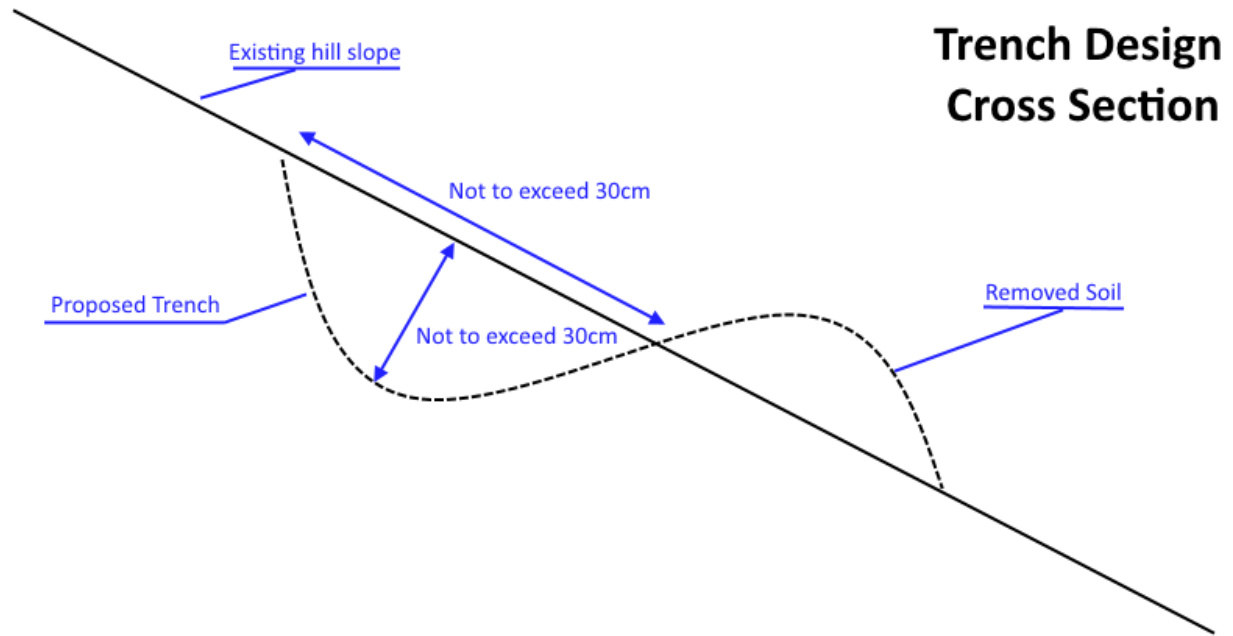


Figure 7. A cross section of the ditch design.

Literature Cited

- Duffy, D. (2010). Changing Seabird Management in Hawai'i: From Exploitation through Management to Restoration. *Waterbirds*, 33(2): 193-207.
- Reaser J.K., (2007). Ecological and socioeconomic impacts of invasive alien species in island ecosystems. *Environmental Conservation*, 34(2):1-14.

Appendix B. 2016 Seabird Activity at Makamaka'ole Seabird Mitigation Site.

Date	Enclosure	Burrow	Species	Notes
11-May	A	43A	NESH	entered burrow/ A first sighting of the year
12-May	A	43A	NESH	entered burrow
13-May	A	43A	NESH	entered burrow
14-May	A	43A	NESH	entered burrow
15-May	A	43A	NESH	entered burrow/scouting
15-May	A	26A	NESH	entered burrow/scouting
16-May	A	43A	NESH	entered burrow
17-May	A	43A	NESH	entered burrow/scouting
17-May	A	26A	NESH	entered burrow/scouting
18-May	A	26A	NESH	scouting
19-May	A	26A	NESH	entered burrow/scouting
20-May	A	26A	NESH	entered burrow/nest material collection
21-May	A	26A	NESH	entered burrow/nest material collection
21-May	B	22B	BUPE	entered burrow/ B first sighting of the year
22-May	A	26A	NESH	entered burrow/nest material collection
23-May	A	26A	NESH	entered burrow/nest material collection
23-May	B	22B	BUPE	scouting
24-May	A	26A	NESH	entered burrow/nest material collection
25-May	A	43A	NESH	entered burrow/nest material collection
25-May	A	26A	NESH	entered burrow/nest material collection
26-May	B	22B	NESH	entered burrow
1-Jun	A	26A	NESH	scouting
2-Jun	A	26A	NESH	entered burrow/nest material collection
3-Jun	B	22B	BUPE	entered burrow
6-Jun	A	26A	HAPE	scouting
14-Jun	B	22B	NESH	scouting
15-Jun	B	22B	NESH	scouting
19-Jun	B	22B	NESH	scouting
20-Jun	A	26A	NESH	scouting/entered burrow
21-Jun	A	26A	NESH	entered burrow/ nest material collection
22-Jun	A	26A	NESH	entered burrow/ nest material collection
23-Jun	A	26A	NESH	nest material collection/ two birds
24-Jun	A	26A	NESH	scouting/entered burrow
25-Jun	A	26A	NESH	scouting/entered burrow
25-Jun	B	22B	NESH/BUPE	scouting/entered burrow
26-Jun	A	26A	NESH	scouting/entered burrow
27-Jun	A	26A	NESH	scouting/entered burrow
28-Jun	A	26A	NESH	scouting/entered burrow

28-Jun	B	22B	NESH	scouting
29-Jun	A	26A	NESH	scouting/entered burrow
30-Jun	B	22B	NESH	entered burrow
30-Jun	A	26A	NESH	scouting/entered burrow
1-Jul	A	26A	NESH	scouting
1-Jul	B	22B	NESH	scouting
2-Jul	A	26A	NESH	scouting
3-Jul	A	26A	NESH	scouting/entered burrow
3-Jul	B	22B	NESH	scouting
4-Jul	A	26A	NESH	scouting/entered burrow/ two birds
4-Jul	B	22B	NESH	entered burrow
5-Jul	A	26A	NESH	scouting/entered burrow
5-Jul	B	22B	NESH	scouting/entered burrow
6-Jul	A	26A	NESH	scouting/entered burrow
7-Jul	A	26A	NESH	scouting/entered burrow
8-Jul	A	26A	NESH	scouting/entered burrow
9-Jul	A	26A	NESH	scouting/entered burrow
10-Jul	A	26A	NESH	scouting/entered burrow/ two birds
10-Jul	B	22B	NESH	scouting/entered burrow/ two birds
11-Jul	A	26A	NESH	scouting/entered burrow/ two birds
12-Jul	A	26A	NESH	scouting/entered burrow/ two birds
12-Jul	B	22B	NESH	scouting
13-Jul	A	26A	NESH	scouting/entered burrow
13-Jul	B	22B	HAPE	fly-by
14-Jul	A	26A	NESH	scouting/entered burrow/ two birds
15-Jul	A	26A	NESH	scouting/entered burrow/ two birds
16-Jul	A	26A	NESH	scouting/entered burrow/ two birds
17-Jul	A	26A	NESH	scouting/entered burrow/ two birds
18-Jul	A	26A	NESH	scouting/entered burrow/ two birds
19-Jul	A	26A	NESH	scouting/entered burrow/ two birds
20-Jul	A	26A	NESH	scouting/entered burrow/ two birds
21-Jul	A	26A	NESH	scouting/entered burrow/ two birds
21-Jul	B	22B	NESH	scouting/nest material collection
27-Jul	A	26A	NESH	scouting/entered burrow
28-Jul	A	26A	NESH	scouting/entered burrow
29-Jul	A	26A	NESH	scouting/entered burrow
29-Jul	B	22B	Unk.	fly-by
30-Jul	A	26A	NESH	scouting/entered burrow/ two birds
31-Jul	A	26A	NESH	entered burrow/nest material collection
1-Aug	A	26A	NESH	scouting/nest material collection
1-Aug	B	Uluhe 1	NESH	nest material collection

2-Aug	A	26A	NESH	scouting
2-Aug	B	Uluhe 1	NESH	scouting
3-Aug	A	26A	NESH	scouting/entered burrow
3-Aug	B	Uluhe 1	NESH	nest material collection
4-Aug	A	26A	NESH	scouting/entered burrow
4-Aug	A	43A	NESH	entered burrow/ two birds
4-Aug	B	Uluhe 1	HAPE	scouting
4-Aug	B	Uluhe 1	NESH	nest material collection
4-Aug	B	22B	NESH	scouting
5-Aug	A	26A	NESH	scouting/entered borrow/ two birds
5-Aug	A	43A	NESH	scouting/entered borrow/ two birds
5-Aug	B	22B	NESH	scouting
5-Aug	B	Uluhe 1	HAPE	nest material collection
5-Aug	B	Uluhe 1	NESH	nest material collection
6-Aug	A	26A	NESH	entered burrow
6-Aug	B	22B	NESH	scouting
6-Aug	B	Uluhe 1	NESH	nest material collection
7-Aug	A	26A	NESH	scouting/entered burrow
7-Aug	A	43A	NESH	entered burrow
7-Aug	B	Uluhe 1	HAPE	nest material collection
7-Aug	B	Uluhe 1	NESH	nest material collection
8-Aug	B	22B	HAPE	scouting
8-Aug	B	Uluhe 1	HAPE	nest material collection
9-Aug	A	43A	NESH	entered burrow
9-Aug	B	22B	NESH	entered burrow
10-Aug	A	43A	NESH	entered burrow
10-Aug	A	42B	BUPE	nest material collection
10-Aug	B	22B	NESH	entered burrow, nest material collection
11-Aug	A	43A	NESH	entered burrow
11-Aug	B	22B	NESH	entered burrow, nest material collection
12-Aug	A	26A	NESH	scouting/entered burrow
12-Aug	A	43A	NESH	entered burrow/ two birds
12-Aug	B	Uluhe 1	NESH	nest material collection
13-Aug	A	26A	NESH	entered burrow/nest material collection/ two birds
13-Aug	A	43A	NESH	entered burrow
14-Aug	A	26A	NESH	entered burrow/nest material collection
14-Aug	A	43A	NESH	entered burrow
15-Aug	A	26A	NESH	entered burrow/nest material collection
15-Aug	A	43A	NESH	entered burrow/ two birds
16-Aug	A	26A	NESH	entered burrow/nest material collection
16-Aug	A	43A	NESH	entered burrow/nest material collection

17-Aug	A	26A	NESH	entered burrow/nest material collection
17-Aug	A	43A	NESH	entered burrow
18-Aug	A	26A	NESH	entered burrow/nest material collection
18-Aug	A	43A	NESH	entered burrow
18-Aug	B	22B	NESH	entered burrow
19-Aug	A	26A	NESH	entered burrow/nest material collection
19-Aug	A	43A	NESH	entered burrow
19-Aug	B	22B	NESH	entered burrow, nest material collection
20-Aug	A	26A	NESH	entered burrow
20-Aug	B	22B	NESH	entered burrow, nest material collection
21-Aug	B	22B	HAPE	entered burrow, scouting
22-Aug	B	22B	HAPE	scouting
22-Aug	B	22B	NESH	entered burrow, nest material collection
22-Aug	B	Uluhe 1	HAPE	nest material collection
23-Aug	A	26A	NESH	entered burrow
23-Aug	B	22B	HAPE	scouting, nest material collection
23-Aug	B	Uluhe 1	HAPE	nest material collection
24-Aug	A	26A	NESH	entered burrow
24-Aug	B	Uluhe 1	HAPE	nest material collection
25-Aug	A	26A	NESH	entered burrow/nest material collection
25-Aug	B	Uluhe 1	HAPE	nest material collection
25-Aug	B	Uluhe 1	NESH	nest material collection
26-Aug	A	26A	NESH	entered burrow/nest material collection
26-Aug	B	Uluhe 1	NESH	nest material collection
27-Aug	A	26A	NESH	entered burrow
27-Aug	B	Uluhe 1	HAPE	nest material collection
28-Aug	A	26A	NESH	entered burrow/ two birds
28-Aug	B	Uluhe 1	HAPE	nest material collection
30-Aug	B	Uluhe 1	NESH	nest material collection
31-Aug	A	26A	NESH	entered burrow
31-Aug	A	50A	NESH	scouting
1-Sep	A	26A	NESH	scouting
1-Sep	A	43A	NESH	entered burrow
2-Sep	A	26A	NESH	entered burrow
2-Sep	A	43A	NESH	entered burrow
3-Sep	A	26A	NESH	scouting
3-Sep	A	43A	NESH	entered burrow
4-Sep	A	43A	NESH	entered burrow
5-Sep	A	43A	NESH	entered burrow
6-Sep	A	26A	NESH	entered burrow/scouting
6-Sep	A	43A	NESH	entered burrow

7-Sep	A	43A	NESH	entered burrow
8-Sep	A	43A	NESH	entered burrow
9-Sep	B	22B	NESH	entered burrow
9-Sep	A	26A	NESH	scouting
9-Sep	A	43A	NESH	entered burrow
10-Sep	B	22B	NESH	entered burrow/nest material collection
10-Sep	A	26A	NESH	scouting
10-Sep	A	43A	NESH	entered burrow
11-Sep	B	22B	NESH	entered burrow/nest material collection
11-Sep	A	26A	NESH	scouting
11-Sep	A	43A	NESH	entered burrow
12-Sep	B	22B	NESH	entered burrow/nest material collection
12-Sep	A	26A	NESH	entered burrow/scouting
12-Sep	A	43A	NESH	entered burrow
13-Sep	A	26A	NESH	entered burrow/scouting
15-Sep	A	26A	NESH	entered burrow
15-Sep	A	43A	NESH	entered burrow
16-Sep	A	26A	NESH	scouting
17-Sep	A	26A	NESH	scouting
18-Sep	B	22B	NESH	entered burrow
18-Sep	B	22B	HAPE	entered burrow/nest material collection
18-Sep	B	Uluhe 1	HAPE	scouting
18-Sep	A	26A	NESH	entered burrow/scouting
19-Sep	B	22B	NESH	entered burrow/nest material collection
19-Sep	B	Uluhe 1	HAPE	nest material collection
19-Sep	A	26A	NESH	entered burrow/scouting
20-Sep	B	22B	NESH	entered burrow/nest material collection
20-Sep	A	26A	NESH	entered burrow/scouting
21-Sep	B	22B	NESH	entered burrow/nest material collection
21-Sep	A	26A	NESH	entered burrow/scouting
22-Sep	B	22B	NESH	entered burrow/nest material collection
22-Sep	A	26A	NESH	entered burrow/scouting
22-Sep	B	Uluhe 1	NESH	entered burrow
23-Sep	B	22B	NESH	entered burrow/nest material collection
23-Sep	A	26A	NESH	entered burrow/scouting
24-Sep	B	22B	NESH	entered burrow/nest material collection
24-Sep	A	26A	NESH	entered burrow/nest material collection
25-Sep	B	22B	NESH	entered burrow
25-Sep	A	26A	NESH	entered burrow
29-Sep	A	26A	NESH	scouting
30-Sep	A	26A	NESH	scouting

Appendix C. Visual and Auditory Survey Results.

Night Survey 2017								
Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
30-Mar-16	17:40	19:30	Road High point	18:15	Barn Owl	1	Transit	
30-Mar-16	17:40	19:30	Road High point	18:20	Barn Owl	1	Circling	
30-Mar-16	17:40	19:30	Road High point	19:40	Hawaiian Petrel	1	Transit	Maybe 2?
20-Apr-16	17:50	20:00	Unit B Mauka	19:20	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:25	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:30	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:35	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:40	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:45	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:50	Hawaiian Petrel	1	Transit	
20-Apr-16	17:50	20:00	Unit B Mauka	19:55	Newell's shearwater	1	Transit	
16-May-16	17:30	20:15	Unit B Mauka	19:20	Newell's shearwater	1	Transit	
16-May-16	17:30	20:15	Unit B Mauka	19:27	Newell's shearwater	2	Transit	Clear view!
16-May-16	17:30	20:15	Unit B Mauka	19:30	Newell's shearwater	2	Transit	Hear calls, cloud cover low
16-May-16	17:30	20:15	Unit B Mauka	19:38	Newell's shearwater	2	Transit	Calls overhead
16-May-16	17:30	20:15	Unit B Mauka	19:41	Newell's shearwater	4	Circling	Circling in Makamaka'ole
16-May-16	17:30	20:15	Unit B Mauka	19:46	Newell's shearwater	1	Transit	Flies directly above burrows
16-May-16	17:30	20:15	Unit B Mauka	19:49	Newell's shearwater	3	Circling	Observed directly overhead

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
16-May-16	17:30	20:15	Unit B Mauka	19:52	Hawaiian Petrel	2	Transit	Fly within 5m of observation point
16-May-16	17:30	20:15	Unit B Mauka	19:52	Newell's shearwater	1	Transit	Fly within 5m of observation point
16-May-16	17:30	20:15	Unit B Mauka	19:54	Newell's shearwater	1	Transit	Calls from Stream
16-May-16	17:30	20:15	Unit B Mauka	20:05	Newell's shearwater	1	Transit	
20-Jun-16	18:20	20:30	Unit B Mauka	19:41	Newell's shearwater	1	Transit	
20-Jun-16	18:20	20:30	Unit B Mauka	19:46	Newell's shearwater	1	Transit	
20-Jun-16	18:20	20:30	Unit B Mauka	19:50	Newell's shearwater	1	Transit	
20-Jun-16	18:20	20:30	Unit B Mauka	19:53	Newell's shearwater	2	Transit	
20-Jun-16	18:20	20:30	Unit B Mauka	19:55	Newell's shearwater	2	Circling	
20-Jun-16	18:20	20:30	Unit B Mauka	19:56	Newell's shearwater	1	Circling	
20-Jun-16	18:20	20:30	Unit B Mauka	19:59	Newell's shearwater	2	Circling	1953-2030 NESH Calling back to sound system and circling burrow area aggressively
20-Jun-16	18:20	20:30	Unit B Mauka	20:30	Barn Owl	1	Transit	Barn owl flushed from roost on fence post inside of enclosure B as we were packing out.
20-Jul-16	18:17	21:00	Unit B Makai	19:00		4	Transit	4 Unknown birds fly overhead
20-Jul-16	18:17	21:00	Unit B Makai	19:38	Newell's shearwater	1	Transit	
20-Jul-16	18:17	21:00	Unit B Makai	19:46	Newell's shearwater	1	Circling	
20-Jul-16	18:17	21:00	Unit B Makai	19:50	Newell's shearwater	1	Circling	
20-Jul-16	18:17	21:00	Unit B Makai	19:56	Newell's shearwater	2	Circling	

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
20-Jul-16	18:17	21:00	Unit B Makai	20:06	Newell's shearwater	2	Circling	
20-Jul-16	18:17	21:00	Unit B Makai	20:10	Newell's shearwater	2	Courtship	2 NESH circling together
20-Jul-16	18:17	21:00	Unit B Makai	20:20	Newell's shearwater	1	Courtship	
20-Jul-16	18:17	21:00	Unit B Makai	20:26	Newell's shearwater	1	Ground Call	call from what sounded like inside burrow entrance 22B
20-Jul-16	18:17	21:00	Unit B Makai	20:33	Newell's shearwater	1	Other (notes)	NESH seen landing in thick Uluhe west of speaker and burrow 22B
10-Aug-16	18:30	21:00	Unit B Mauka	19:20	Newell's shearwater	1	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	19:20	Hawaiian Petrel	2	Transit	
10-Aug-16	18:30	21:00	Unit B Mauka	19:25	Hawaiian Petrel	2	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	19:33	Hawaiian Petrel	2	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	19:38	Hawaiian Petrel	2	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	19:42	Newell's shearwater	2	Transit	
10-Aug-16	18:30	21:00	Unit B Mauka	19:47	Newell's shearwater	2	Transit	
10-Aug-16	18:30	21:00	Unit B Mauka	19:50	Newell's shearwater	2	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	19:55	Hawaiian Petrel		Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	20:00	Barn Owl	2	Transit	loud screech from below
10-Aug-16	18:30	21:00	Unit B Mauka	20:07	Newell's shearwater	1	Circling	
10-Aug-16	18:30	21:00	Unit B Mauka	20:14	Newell's shearwater	1	Ground Call	Landed
19-Sep-16	17:30	19:30	Unit B Mauka	19:00	Newell's shearwater	1	Circling	

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
19-Sep-16	17:30	19:30	Unit B Mauka	19:07	Newell's shearwater	1	Circling	Observed
30-Mar-17	17:30	20:29	Top of B	19:27	Hawaiian Petrel	1	Transit	Call only (50% confidence)
04-May-17	18:00	21:00	Top of B	19:53	Hawaiian Petrel	2		
04-May-17	18:00	21:00	Top of B	19:45	Hawaiian Petrel	2		
04-May-17	18:00	21:00	Top of B	19:39	Hawaiian Petrel	2		
04-May-17	18:00	21:00	Top of B	19:29	Hawaiian Petrel	2		
04-May-17	18:00	21:00	Top of B	19:25	Hawaiian Petrel	1		
25-May-17	17:30	21:00	Observation platform	20:09	Hawaiian Petrel	1	Circling	Calls
25-May-17	17:30	21:00	Observation platform	19:56	Newell's shearwater	2	Circling	Circling and calling over A
25-May-17	17:30	21:00	Observation platform	19:43	Newell's shearwater	2	Transit	Continued calls
25-May-17	17:30	21:00	Observation platform	19:35	Hawaiian Petrel	1	Transit	Heard in gulch
25-May-17	17:30	21:00	Observation platform	19:34	Newell's shearwater	2	Circling	Flew past platform
25-May-17	17:30	21:00	Observation platform	19:29	Hawaiian Petrel	2	Circling	
25-May-17	17:30	21:00	Observation platform	19:21	Newell's shearwater	2	Circling	
15-Jun-17	17:30	21:00	Road	18:31	Newell's shearwater	1	Transit	Heard before sound systems turned on above B. Heard from truck by road
20-Jul-17	16:28	20:54	Unit B Mauka	20:10	Barn Owl	1	Circling	Circling above enclosure A below burrows
20-Jul-17	16:28	20:54	Unit B Mauka	20:03	Newell's shearwater	1	Transit	Auditory
20-Jul-17	16:28	20:54	Unit B Mauka	20:00	Newell's shearwater	1	Transit	Auditory

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
20-Jul-17	16:28	20:54	Unit B Mauka	19:57	Newell's shearwater	1	Circling	Landed in front of burrow 50b after circling
20-Jul-17	16:28	20:54	Unit B Mauka	19:48	Newell's shearwater	1	Circling	Circling and calling for minutes
20-Jul-17	16:28	20:54	Unit B Mauka	19:46		1	Transit	Unknown spp
20-Jul-17	16:28	20:54	Unit B Mauka	19:40	Newell's shearwater	1	Transit	Auditory
20-Jul-17	16:28	20:54	Unit B Mauka	19:28	Newell's shearwater	1	Transit	Still light, observed without NVG
26-Jul-17	17:00	21:30	Gulch/entrance of A	20:20	Barn Owl	1	Circling	John Neisman shots fired. Owl seen flying east after shot, no signs of shot contact
26-Jul-17	17:00	21:30	Gulch/entrance of A	19:55	Barn Owl	1		Heard screech from down in gulch
26-Jul-17	17:00	21:30	Gulch/entrance of A	20:10	Barn Owl	1	Circling	Seen again above bottom of A then flew further pasts A towards Kahakaloa
26-Jul-17	17:00	21:30	Gulch/entrance of A	19:50	Barn Owl	1	Transit	Came in from A side, saw him too late to make a shot, flew back over towards A entrance
29-Aug-17	17:20	20:21	Gulch	19:40	Newell's shearwater	1	Transit	Newell's call directly behind us near road. Very loud
27-Aug-17	17:00	20:30	Gulch	19:50	Barn Owl	1	Circling	Seen perched behind us in tree at 50 meters. Came flying down to the speaker and light was put on him. Angle was bad for the shot with spotters in the line of fire. No shots taken.
27-Aug-17	17:00	20:30	Gulch	19:40	Barn Owl	1	Transit	Seen between enclosures perched on a fence post

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
22-Aug-17	18:00	21:19	Gulch	20:20	Barn Owl	1	Circling	Barn owl came right in onto the mouse cage from between two enclosures. Spotlighted when came within 20 yards and shooters fired multiple rounds. Birds wing was injured and went down across gulch. John and John went to retrieve bird and found it at 8:30pm.
22-Aug-17	18:00	21:19	Gulch	20:10	Barn Owl	1	Circling	Barn owl came up from behind and came within 5 meters from my head. Spotlighted but there was no clear shot with spotters in between shooters and bird
22-Aug-17	18:00	21:19	Gulch	8:00	Barn Owl	2	Circling	Two barn owls together diving in and out of tall grass between the two enclosures.
22-Aug-17	18:00	21:19	Gulch	19:30	Barn Owl	1	Transit	Flew over mice from 3oclock to 9oclock. Many rounds fired but none took down owl
16-Aug-17	17:00	21:30	Gulch	19:40	Barn Owl	1	Transit	
16-Aug-17	17:00	21:30	Gulch	19:37	Newell's shearwater	2	Circling	Call only
16-Aug-17	18:57	20:27	A door	20:45	Barn Owl	1	Transit	Flew in close behind us from bottom of A then up to the road out of site. Did not see in time to get a light on it or a shot off
16-Aug-17	18:57	20:27	A door	19:45	Barn Owl	1	Transit	Heard screech and saw owl flying song bottom of A towards B. Never

Night Survey 2017								
Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
								came closer than 100 yards
15-Aug-17	17:00	21:03	Gulch	20:20	Barn Owl	1	Transit	Came from behind and flew over us. Was late to shine with light and by the time it was spotted it was 40 yards away. Shots fired but bird did not go down.
15-Aug-17	17:00	21:03	Gulch	19:38	Barn Owl	1	Transit	Owl spotted with night vision coming from road side behind us, headed towards enclosure A. Beamed with spotlight as when it flew in front at 20 yards. Shots fired, owl went down into gulch. Could not find owl after hunt was complete.
10-Aug-17	19:01	20:30	Top of B	19:56	Newell's shearwater	1		Call
10-Aug-17	19:01	20:30	Top of B	19:44	Hawaiian Petrel	1		Call only
10-Aug-17	19:01	20:30	Top of B	19:42	Newell's shearwater	1	Circling	Call only
10-Aug-17	19:01	20:30	Top of B	19:37	Newell's shearwater	2		Call only. Not seen
10-Aug-17	19:01	20:30	Top of B	19:33	Newell's shearwater	1		Call only not observed
10-Aug-17	18:30		Top of A between upper and lower burrows	20:15	Barn Owl	2	Circling	Two barn owls seen circling at corner edge of enclosure A. One screeched and dive bombed the other.
10-Aug-17	19:01	20:30	Top of B	20:00	Barn Owl	1		Barn owl flying out of grass inside of B, gulch.
08-Aug-17	17:00	20:03	Gulch	19:25	Barn Owl	1	Circling	Owl flew in from between enclosure down to mice and

Night Survey 2017

Survey Date	Start Time	End Time	Sub-Location	Time	Common Name	Count	Behavior	Notes
								speaker set up within 20 yards of shooters. Three shooters stations above speaker and mice. All three shooters took shots and owl fell into gulch to the right. Owl recovered.
06-Aug-17	17:00	21:45	Gulch	9:00	Barn Owl	1	Transit	Saw flying along lower section of enclosure B. Last sighting of the night. Saw owl 5 times more between first sighting and last. All were between enclosures or below about 100 yards away.
06-Aug-17	17:00	21:45	Gulch	19:51	Barn Owl	1	Circling	Below and between enclosures. Heading east. First sighting
18-Sep-17	18:03	19:36	Top of B	19:10	Newell's shearwater	1	Circling	Circling A
18-Sep-17	18:03	19:36	Top of B	19:07	Hawaiian Petrel	1	Circling	No calls
18-Sep-17	18:03	19:36	Top of B	19:16	Newell's shearwater	2	Transit	Two heard calling to each other from Makamakaole
11-Sep-17	18:48	21:00	Between A and B	19:40	Barn Owl	1	Transit	
17-Sep-17	17:30	20:15	Gulch	19:35	Barn Owl	1	Circling	BANO flew in and perched within 20 yards behind us. Took off as I flashed with beam light, Neisman took 3 shots as it flew away northwest but owl never went down. @7:35PM
17-Oct-17	18:00	19:45	Top of B	19:22	Barn Owl	1		Call
17-Oct-17	18:00	19:45	Top of B	19:05	Barn Owl	1		Call

Appendix D. Visual Burrow Inspection

Burrow Monitoring										
ID	Burrow #	Check Date	Enclosure	Toothpick Activity	Feathers	Chick	Nest Material	Other Activity	Ants	Notes
101	43	8/24/2017	A	False	True	False	True	True	False	NESH Egg
102	26	8/24/2017	A	False	True	False	True	True	False	NESH Egg
103	50	8/24/2017	A	False	True	False	True	True	False	Fresh poop
104	22	8/24/2017	B	False	True	False	True	True	False	BUPE Egg
105	1	11/9/2017	A	False	False	False	False	False	True	
106	2	11/9/2017	A	False	False	False	False	False	True	
107	3	11/9/2017	A	False	True	False	False	False	True	Ants, Feathers
108	4	11/9/2017	A	False	False	False	False	False	False	wall rot
109	5	11/9/2017	A	False	False	False	False	False	True	moisture
110	6	11/9/2017	A	False	False	False	False	False	True	
111	7	11/9/2017	A	False	False	False	False	False	False	none
112	8	11/9/2017	A	False	False	False	False	False	False	moisture
113	9	11/9/2017	A	False	False	False	False	False	False	none
114	10	11/9/2017	A	False	True	False	False	False	True	ants, feathers
115	11	11/9/2017	A	False	True	False	False	False	True	
116	12	11/9/2017	A	False	False	False	False	False	False	none
117	13	11/9/2017	A	False	False	False	False	False	False	none
118	14	11/9/2017	A	False	True	False	False	False	False	Feather
119	15	11/9/2017	A	False	True	False	False	False	True	moisture
120	16	11/9/2017	A	False	False	False	False	False	True	none
121	17	11/9/2017	A	False	False	False	False	False	False	none
122	18	11/9/2017	A	False	False	False	False	False	False	moisture
123	19	11/9/2017	A	False	False	False	False	False	False	T6, moisture
124	20	11/9/2017	A	False	False	False	False	False	True	moisture
125	21	11/9/2017	A	False	False	False	False	False	False	moisture
126	22	11/9/2017	A	False	False	False	False	False	False	moisture, 70F thermometer
127	23	11/9/2017	A	False	False	False	False	True	False	moisture, temp 20C, dead mouse
128	24	11/9/2017	A	False	False	False	False	False	True	ants

Burrow Monitoring										
ID	Burrow #	Check Date	Enclosure	Toothpick Activity	Feathers	Chick	Nest Material	Other Activity	Ants	Notes
129	25	11/9/2017	A	False	True	False	False	False	False	Moisture
130	26	11/9/2017	A	False	True	False	True	False	False	Egg collection
131	27	11/9/2017	A	False	False	False	False	False	False	T5
132	28	11/9/2017	A	False	False	False	False	False	False	T4
133	29	11/9/2017	A	False	False	False	False	False	False	moisture
134	30	11/9/2017	A	False	False	False	False	False	False	None
135	31	11/9/2017	A	False	False	False	False	False	True	Moisture
136	32	11/9/2017	A	False	False	False	False	False	False	None
137	33	11/9/2017	A	False	False	False	False	False	False	moisture
138	34	11/9/2017	A	False	False	False	False	False	False	moisture
139	35	11/9/2017	A	False	False	False	False	False	False	New lid
140	36	11/9/2017	A	False	False	False	False	False	False	None
141	37	11/9/2017	A	False	False	False	False	False	True	Ants, T3
142	38	11/9/2017	A	False	False	False	False	False	False	Moisture
143	39	11/9/2017	A	False	False	False	False	False	False	Needs lid
144	40	11/9/2017	A	False	False	False	False	False	False	new lid
145	41	11/9/2017	A	False	False	False	False	False	False	None
146	42	11/9/2017	A	False	False	False	False	False	True	ants
147	43	11/9/2017	A	False	True	False	True	False	False	Feathers, nest material
148	44	11/9/2017	A	False	False	False	False	False	False	None
149	45	11/9/2017	A	False	False	False	False	False	False	Perlite, T1
150	46	11/9/2017	A	False	False	False	False	False	False	moisture, new lid
151	47	11/9/2017	A	False	False	False	False	False	True	T2
152	48	11/9/2017	A	False	False	False	False	False	True	
153	49	11/9/2017	A	False	False	False	False	False	False	Needs screws and repair box
154	50	11/9/2017	A	False	False	False	False	False	False	Moisture
155	1	11/9/2017	B	False	False	False	False	False	False	None
156	2	11/9/2017	B	False	False	False	False	False	False	None
157	3	11/9/2017	B	False	False	False	False	False	False	None
158	4	11/9/2017	B	False	False	False	False	True	True	Mouse poop
159	5	11/9/2017	B	False	False	False	False	False	False	None
160	6	11/9/2017	B	False	False	False	False	False	False	Moisture

Burrow Monitoring										
ID	Burrow #	Check Date	Enclosure	Toothpick Activity	Feathers	Chick	Nest Material	Other Activity	Ants	Notes
161	7	11/9/2017	B	False	False	False	False	False	False	none
162	8	11/9/2017	B	False	False	False	False	False	False	mouse poop
163	9	11/9/2017	B	False	False	False	False	False	False	None
164	10	11/9/2017	B	False	False	False	False	False	False	none
165	11	11/9/2017	B	False	False	False	False	False	False	Moisture
166	12	11/9/2017	B	False	False	False	False	False	False	Moisture
167	13	11/9/2017	B	False	False	False	False	False	False	Moisture
168	14	11/9/2017	B	False	False	False	False	False	False	Moisture
169	15	11/9/2017	B	False	False	False	False	False	False	Dead mouse
170	16	11/9/2017	B	False	False	False	False	False	False	None
171	17	11/9/2017	B	False	False	False	False	False	False	None
172	18	11/9/2017	B	False	False	False	False	False	True	
173	19	11/9/2017	B	False	False	False	False	False	False	none
174	20	11/9/2017	B	False	False	False	False	False	False	none
175	21	11/9/2017	B	False	False	False	False	False	False	none
176	22	11/9/2017	B	False	True	False	True	False	False	previously active
177	23	11/9/2017	B	False	False	False	False	False	False	none
178	24	11/9/2017	B	False	False	False	False	False	False	none
179	25	11/9/2017	B	False	False	False	False	False	False	none
180	26	11/9/2017	B	False	False	False	False	False	False	none
181	27	11/9/2017	B	False	False	False	False	False	False	none
182	28	11/9/2017	B	False	False	False	False	False	False	None
183	29	11/9/2017	B	False	False	False	False	False	False	Needs tag
184	30	11/9/2017	B	False	False	False	False	False	False	Moisture
185	31	11/9/2017	B	False	False	False	False	False	False	None
186	32	11/9/2017	B	False	False	False	False	False	False	Moisture
187	33	11/9/2017	B	False	False	False	False	False	False	mouse poop on top, moisture
188	34	11/9/2017	B	False	False	False	False	False	False	None
189	35	11/9/2017	B	False	False	False	False	False	False	Moisture
190	36	11/9/2017	B	False	False	False	False	False	False	none
191	37	11/9/2017	B	False	False	False	False	False	False	rodent activity on top
192	38	11/9/2017	B	False	False	False	False	False	False	none

Burrow Monitoring										
ID	Burrow #	Check Date	Enclosure	Toothpick Activity	Feathers	Chick	Nest Material	Other Activity	Ants	Notes
193	39	11/9/2017	B	False	False	False	False	False	False	none
194	40	11/9/2017	B	False	False	False	False	False	False	none
195	41	11/9/2017	B	False	False	False	False	False	False	none
196	42	11/9/2017	B	False	True	False	True	False	False	wasps
197	43	11/9/2017	B	False	False	False	False	False	False	rodent material on roof
198	44	11/9/2017	B	False	False	False	False	False	False	none
199	45	11/9/2017	B	False	False	False	False	False	False	None
200	46	11/9/2017	B	False	False	False	False	False	False	None
201	47	11/9/2017	B	False	False	False	False	False	True	Needs new lid
202	48	11/9/2017	B	False	False	False	False	False	False	none
203	49	11/9/2017	B	False	False	False	False	False	False	None
204	50	11/9/2017	B	False	True	False	True	False	False	needs tag

Appendix E. Endangered and MBTA protected species collections reports:

Endangered Species Collection

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC

Makamaka'ole Seabird Restoration Site

ID

1

Collector Name

Matt Stelmach

Collector Affiliation

TerraForm

Species

Newell's shearwater

CollectionDate

7/27/2017

CollectionTime

14:00

Life Stage

Egg

Location Found

Latitude: 20.9558401596, Longitude: -156.5525280998

Observations

An egg was located outside of burrow 43A at the Makamaka'ole Seabird Restoration site. Burrow 43A has been recorded as active with a Newell's shearwater. The egg had a significant odor as well as fly larvae present. Feathers were attached to the egg.

Notifications

USFWS and DOFAW notified via email

Notes

Actions Taken

7/27/2017	11:00	Spencer Engler locates an egg outside of burrow 43A at Makamaka'ole. M. Stelmach notified.
7/27/2017	14:00	M. Stelmach arrives on site to collect the specimen and record data. Burrow scope verification that NESH is inside the burrow.
7/27/2017	15:00	Egg returned to KWP for refrigerated storage.
7/28/2017	11:10	USFWS and DOFAW Notified via email.
8/3/2017	10:00	Egg contents examined by Fern Duvall of DLNR - NARS. "The egg, clear white colored, was intact except for multiple hairline fractures. It was candled: Aircell space showed desiccation of the egg had begun; the yolk still moved freely inside the coagulating albumen, no blood vessels apparent. It may have been outside the burrow for several days causing the water loss. It was not weighed due to desiccation status.

The egg dimensions 61.43 mm x 39.04 mm clearly place it as a NESH egg.

Egg was opened on the side, to preserve egg shell for BPBM accession, to view the yolk surface. It was clearly an egg with early stage embryo visible (10.5X magnification picture taken – attached). It indicated the female had mated and egg fertilization was successful. The egg may not have been incubated, or for only a couple days max.

The shell fragments removed and the dark feather were also retained for the museum.

It is possible that the egg was inadvertently knocked out of the burrow by the birds, or competitor birds. No evidence of rodent biting of the egg.

The shell and feather and fragments will be dried out and sent to Bishop Museum as accession from Matt Stelmach. NARs retains possession of the egg for transfer to Bishop Museum.



Figure 1. A photo of the egg as found relative to the burrow.



Figure 2. A close-up photo of the egg as found.



Figure 3. A photo of the egg with backlighting on 28 July 2017.



Figure 4. A photo of the contents of the egg under 10.5x magnification, taken by Fern Duval during egg examination. Shape and coloration of the embryo indicate early fertilization.



Makamaka's

Seabird Restoration Site

Kaheawa Wind

- Exclosures
- Egg Collection
- Burrow Locations

0 10 20

North



Date: 7/31/2017
Author: M. Stelmach
Coordinate System:
WGS84 UTM Zone

For additional information or questions please contact:

Matt Stelmach
Kaheawa Wind
HCP Manager
808-294-9239
MStelmach@terraform.com

Figure 5. Map of location where egg was found.

Endangered Species Collection

Thursday, August 24, 2017

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC

Makamaka'ole Seabird Restoration Site

ID

2

Collector Name

Matt Stelmach

Collector Affiliation

TerraForm

Species

Collection Date

Collection Time

Newell's shearwater

8/24/2017

8:30

Life Stage

Egg

Location Found

Latitude: 20.9558401596, Longitude: -156.5525280998

Observations

An egg was located inside of burrow 43A. The egg was located near the burrow entrance the egg was cracked and caked with blood and feathers. No contents remained inside the egg.

Notifications

USFWS and DOFAW notified via email

Notes

This is the second egg collected from this burrow this season, the first egg was recorded on 7/20/2017.

Actions Taken

8/24/2017	8:30	Matt Stelmach, Spencer Engler, Jay Penniman, Jenny Learned, and Che Frausto were on site to monitor burrows at Makamaka'ole. After scoping burrow 43A and finding no bird present, the burrow was opened. A partially crushed egg was located inside the burrow near the entrance. Photos were taken and the egg was collected.
8/24/2017	12:30	The egg shell was transported to KWP for refrigerated storage.
8/24/2017	17:00	USFWS and DOFAW notified via email.



Figure 1. A photo of the egg as found relative to a Leatherman. Approximate length of 2".



For additional information or questions please contact:

Matt Stelmach

Kaheawa Wind

HCP Manager

808-294-9239

MStelmach@terraform.com

Figure 2. Map of location where egg was found.

MBTA Species Collection

Thursday, August 24, 2017

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC

Makamaka'ole Seabird Restoration Site

ID

3

Collector Name

Matt Stelmach

Collector Affiliation

TerraForm

Species

Collection Date

Collection Time

Bulwer's Petrel

8/24/2017

9:30

Life Stage

Egg

Location Found

Latitude: 20.95406500, Longitude: -156.55129700

Observations

An egg was located inside of burrow 50B. The burrow was recorded as having Bulwer's petrel activity and contained feathers consistent with BUPE. The egg was located against the Makai wall of the burrow. It was crushed with no egg contents remaining.

Notifications

USFWS and DOFAW notified via email

Actions Taken

8/24/2017	9:30	Matt Stelmach, Spencer Engler, Jay Penniman, Jenny Learned, and Che Frausto were on site to monitor burrows at Makamaka'ole. After scoping burrow 50B and finding no bird present, the burrow was opened. A partially crushed egg was located inside the burrow near the makai wall. Photos were taken and the egg was collected.
8/24/2017	12:30	The egg shell was transported to KWP for refrigerated storage.
8/24/2017	17:00	USFWS and DOFAW notified via email.



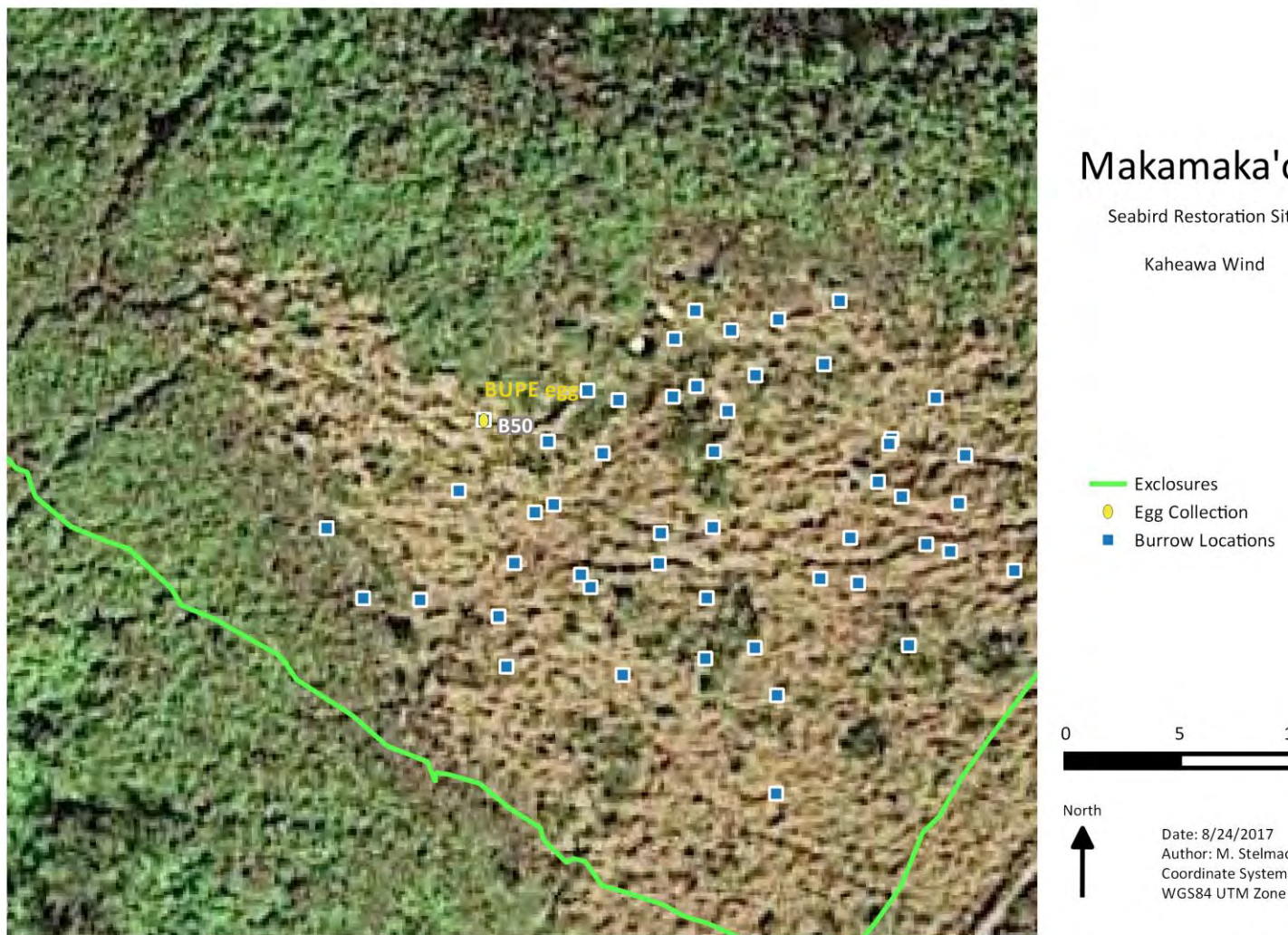
Figure 1. A photo of the burrow as found, the BUPE egg can be seen in the lower right. Several small black feathers suggest BUPE occupancy. Mauka/West is toward the top of the photo.



Figure 2. A photo of the egg with the rule markings on a Leatherman for scale. Egg length of approximately 1".



Figure 3. A photo of the underside of the egg as found.



For additional information or questions please contact:
Matt Stelmach
Kaheawa Wind
HCP Manager
808-294-9239
MStelmach@terraform.com

Figure 4. Map of location where egg was found.

Endangered Species Collection

Thursday, November 09, 2017

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC

Makamaka'ole Seabird Restoration Site

ID

4

Collector Name

Matt Stelmach

Collector Affiliation

TerraForm

Species

Newell's shearwater

Collection Date

11/9/2017

Collection Time

10:06

Life Stage

Egg

Location Found

Latitude: 20.95555700, Longitude: -156.55268100

Observations

An egg was located inside the burrow of 26A. The burrow was recorded as having Bulwer's petrel activity and contained feathers consistent with NESH. The egg was buried inside the nest material. The egg was intact with a solid mass inside. This egg was previously noted on 8/24 but not collected to minimize disturbance to an active burrow.

Notifications

USFWS and DOFAW notified via email

Actions Taken

11/9/2017	10:06	M. Stelmach, S. Engler, M. Craig and representatives from MNSBRP were on site to check burrow contents at the Makamaka'ole Seabird Restoration site. Burrow A26 was opened to check contents and the egg was
11/9/2017	14:49	The egg was transported to KWP for freezer storage.
11/9/2017	15:30	USFWS and DOFAW notified via email.



Figure 1. A photo of the egg as found inside burrow A26.



Figure 2. A photo of the Newell's shearwater egg after it was extracted. An 8" Leatherman is provided for reference.



Makamaka'o

Seabird Restoration Site

Kaheawa Wind

- Exclosures
- Egg Collection
- Burrow Locations

0 5 10 m



Date: 11/9/2017
Author: M. Stelmach
Coordinate System:
WGS84 UTM Zone 4

For additional information or questions please contact:

Matt Stelmach

Kaheawa Wind

HCP Manager

808-294-9239

MStelmach@terraform.com

Figure 3. Map of location where egg was found.

BOTANICAL SURVEY
MAKAMAKA'OLE PREDATOR-FREE
ENDANGERED SEABIRD ENCLOSURE UNIT A
KAHAKULOA, MAUI



Prepared by:
FOREST & KIM STARR
STARR ENVIRONMENTAL

Prepared for:
KAHEAWA WIND

JULY 2017

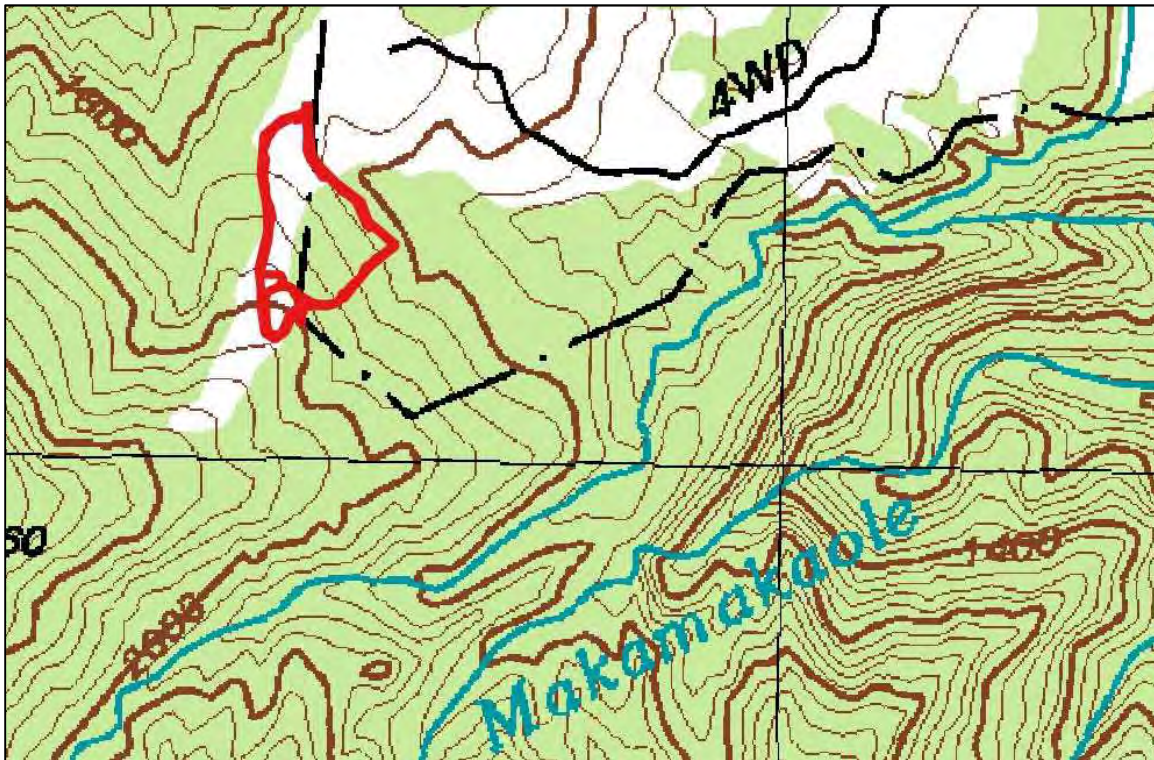
**BOTANICAL SURVEY
MAKAMAKA'OLE PREDATOR-FREE
ENDANGERED SEABIRD ENCLOSURE A
KAHAKULOA, MAUI**

INTRODUCTION

The Makamaka'ole Predator-free Endangered Seabird Enclosures project is situated on about 10 acres of land in Kahakuloa, West Maui on TMK parcels 231006001 and 231006003. The site is on land owned by the State of Hawaii, and is partly within both the West Maui Natural Area Reserve and the West Maui Forest Reserve. Two fenced enclosures in the area were constructed to exclude predators and benefit Endangered native ground nesting seabirds. This botanical survey was undertaken to determine if annual rye grass (*Lolium multiflorum*) or any new weeds were established at the western enclosure (Unit A), which encompasses about 2 hectares.

SITE DESCRIPTION

The site is comprised of mostly open ridges, located in a transition zone between predominantly native vegetation mauka and pasturelands makai. The vegetation is a mix of mesic to wet grasslands, shrublands and forest, with the ridges mostly open non-native grasses and sedges and the gullies and less disturbed areas predominantly native plants.



Area surveyed, predator free Endangered seabird enclosure Unit A.

BIOLOGICAL HISTORY

The area was once diverse native mesic to wet forest. Over the past two centuries, grazing, fire, and invasion by non-native species has converted much of the native plant cover into aggressive non-native pasture and wet forest weeds. Despite this, many native plants persist on the site, especially in gullies. Recently, two predator-free enclosures were constructed, which resulted in some ground disturbance. Annual rye grass (*Lolium multiflorum*) and native plants were planted at the site to help stem the erosion. The site is currently actively managed, including regular predator control.

SURVEY OBJECTIVES

The objectives of the survey were to:

- Provide a list of vascular plant species present.
- Determine the presence or absence of annual rye grass (*Lolium multiflorum*).
- Survey for new weed species in the target area.

SURVEY METHODS

A walk-through botanical survey method was used following the fenceline and a few main trails through predator proof seabird restoration enclosure Unit A and adjacent land. To minimize disturbance, the entire unit was not intensively surveyed, just the inside and outside of the fenceline, nearby areas, and a few main trails. Notes were made on plant species, distribution and abundance. The site was surveyed on July 27, 2017.



Surveying plants within enclosure Unit A.

RESULTS & DISCUSSION

ANNUAL RYGRASS

No annual rye grass (*Lolium multiflorum*) was observed at or near the site. There is the possibility that seeds could exist in the soil and someday germinate, but we did not currently find this short-lived species in the areas surveyed.



Annual rye grass (*Lolium multiflorum*) seeded in Kula Forest Reserve after 2007 fire.



Annual rye grass (*Lolium multiflorum*) seedhead, Kula Forest Reserve.

NEW NON-NATIVE PLANTS

Eight new non-native plant species were observed that were not observed in 2011.

- *Elephantopus mollis* (Soft elephant's foot)
- *Emilia* sp. (Pualele)
- *Erechtites valerianifolia* (Fireweed)
- *Juncus planifolius* (Broadleaf rush)
- *Mimosa pudica* (Sensitive plant)
- *Nephrolepis multiflora* (Sword fern)
- *Polygala paniculata* (Root beer plant)
- *Rhynchospora caduca* (Anglestem beaksedge)

All of these are common non-native weeds known from the general area that appeared in areas of disturbance, mostly along the fenceline and where weed control had recently occurred. Some of these could have been overlooked in 2011, but most of the new species were not apparent in nearby less disturbed vegetation.

It seems likely that many of these species will go away in areas of the site where the disturbance from construction is done and the areas are revegetating. Over time, more aggressive species will likely fill in the area, inhibiting these disturbance species that require more bare soil. However, a subset will likely continue to persist in areas where disturbance will continue, such as along trails and where weed control is done.

Most of the species should be of no concern to the seabirds. However, the thorny vines of *Mimosa pudica* (Sensitive plant) could possibly present a hazard for the birds and may warrant keeping an eye on and possibly controlling. It appears sensitive plant seeds were in the soil and germinated as disturbance and control measures occurred, as it was only found in recently disturbed areas, and mostly in areas where herbicide work had been done. It is hoped that as disturbance declines the sensitive plant will also decline, but if over time that appears to not be the case, it may warrant looking at different control techniques that could help keep this thorny species from covering more of the site.



Mimosa pudica (Sensitive plant)

NEW NATIVE PLANTS

Two new native plant species were encountered that were not observed in 2011.

- *Paspalum scrobiculatum* (Ricegrass)
- *Scaevola gaudichaudii* (Naupaka kuahiwi)

Paspalum scrobiculatum (Ricegrass) was along trails and prefers disturbed open sites. This questionably indigenous grass was likely in the general area and took advantage of the soil disturbances.

What appears to be a young *Scaevola gaudichaudii* (Naupaka kuahiwi) was observed near a culvert along the makai boundary. It was apparently planted to help revegetate the area. Generally found in drier areas, it was suggested perhaps this naupaka may have been originally destined for plantings at the Kaheawa Wind Farm above Maalaea, and somehow made its way to the Makamaka'ole plantings. Assuming it wasn't collected from material nearby, and it is indeed what we think it is, it could be left to see how it does, or it could be removed to keep the native genetics more locally sourced.



What appears to be a young *Scaevola gaudichaudii* (Naupaka kuahiwi).

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999) and updates.

For each species, the following information is provided:

- Scientific name
- Common English or Hawaiian name.
- Bio-geographical status. The following symbols are used:
 - Endemic = Native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
 - Indigenous = Native to the Hawaiian Islands and also to one or more other geographic area(s).
 - Non-native = All those plants brought to the islands intentionally or accidentally after western contact.
- Abundance of each species within the project area:
 - Dominant = Forming a major part of the vegetation within the project area.
 - Common = Widely scattered throughout the area or locally abundant within a portion of it.
 - Occasional = Scattered sparsely throughout the area or occurring in a few small patches.
 - Rare = Only a few isolated individuals within the project area.

PLANT SPECIES LIST

Scientific Name	Common Name	Status	Abundance
<i>Ageratum conyzoides</i>	Maile honohono	Non-native	Occasional
<i>Andropogon virginicus</i>	Broomsedge	Non-native	Dominant
<i>Arundina graminifolia</i>	Bamboo orchid	Non-native	Occasional
<i>Axonopus fissifolius</i>	Narrow-leaved carpetgrass	Non-native	Common
<i>Blechnum appendiculatum</i>	Blechnum	Non-native	Occasional
<i>Bobea elatior</i>	Ahakea	Endemic	Rare
<i>Centella asiatica</i>	Asiatic pennywort	Non-native	Occasional
<i>Christella dentata</i>	Downy wood fern	Non-native	Rare
<i>Cibotium glaucum</i>	Hapuu pulu	Endemic	Occasional
<i>Clidemia hirta</i>	Koster's curse	Non-native	Occasional
<i>Conyza bonariensis</i>	Hairy horseweed	Non-native	Rare
<i>Coprosma pubens</i>	Pilo	Endemic	Rare
<i>Cuphea carthagenensis</i>	Colombian cuphea	Non-native	Occasional
<i>Dicranopteris linearis</i>	Uluhe	Indigenous	Dominant
<i>Diplopterygium pinnatum</i>	Uluhe lau nui	Endemic	Occasional
<i>Elaphoglossum crassifolium</i>	Laukahi nunui	Endemic	Rare
<i>Elephantopis mollis</i>	Soft elephant's foot	Non-native	Rare
<i>Emilia sp.</i>	Pualele	Non-native	Rare
<i>Erechtites valerianifolia</i>	Fireweed	Non-native	Occasional
<i>Fimbristylis dichotoma</i>	Fimbristylis	Indigenous	Dominant
<i>Ilex anomala</i>	Kawau	Indigenous	Rare
<i>Juncus planifolius</i>	Broadleaf rush	Non-native	Rare
<i>Kadua affinis</i>	Manono	Endemic	Occasional
<i>Lycopodiella cernua</i>	Wawaeiole	Indigenous	Occasional
<i>Machaerina angustifolia</i>	Uki	Indigenous	Occasional
<i>Machaerina mariscoides</i> subsp. <i>meyenii</i>	Uki	Endemic	Occasional
<i>Melinis minutiflora</i>	Molasses grass	Non-native	Common
<i>Metrosideros polymorpha</i>	Ohia	Endemic	Common
<i>Mimosa pudica</i>	Sensitive plant	Non-native	Occasional
<i>Nephrolepis exaltata</i> subsp. <i>hawaiiensis</i>	Kupukupu	Endemic	Rare
<i>Nephrolepis multiflora</i>	Sword fern	Non-native	Occasional
<i>Odontosoria chinensis</i>	Palaa	Indigenous	Occasional
<i>Paspalum conjugatum</i>	Hilo grass	Non-native	Common
<i>Paspalum dilatatum</i>	Dallis grass	Non-native	Occasional
<i>Paspalum scrobiculatum</i>	Ricegrass	Indigenous?	Common
<i>Pluchea carolinensis</i>	Sour bush	Non-native	Rare
<i>Polygala paniculata</i>	Root beer plant	Non-native	Occasional
<i>Psidium cattleianum</i>	Strawberry guava	Non-native	Occasional
<i>Psidium guajava</i>	Guava	Non-native	Rare

Scientific Name	Common Name	Status	Abundance
<i>Psychotria mariniana</i>	Kopiko	Endemic	Occasional
<i>Rhynchospora caduca</i>	Anglestem beaksedge	Non-native	Common
<i>Sacciolepis indica</i>	Glenwood grass	Non-native	Common
<i>Sadleria</i> sp.	Amau	Endemic	Rare
<i>Scaevola chammisoniana</i>	Naupaka kuahiwi	Endemic	Occasional
<i>Scaevola gaudichaudii</i>	Naupaka kuahiwi	Endemic	Rare
<i>Setaria parviflora</i>	Yellow foxtail	Non-native	Occasional
<i>Smilax melastomifolia</i>	Hoi kuahiwi	Endemic	Rare
<i>Spathoglottis plicata</i>	Philippine ground orchid	Non-native	Occasional
<i>Stachytarpheta cayennensis</i>	Vervain	Non-native	Occasional
<i>Syzygium cumini</i>	Java plum	Non-native	Occasional
<i>Tibouchina herbacea</i>	Cane tibouchina	Non-native	Common
<i>Triumfetta semitriloba</i>	Sacramento bur	Non-native	Rare
<i>Wikstroemia oahuensis</i> var. <i>oahuensis</i>	Akia kuahiwi	Endemic	Rare

REFERENCES

Starr, F. and K. Starr. 2011. Botanical Survey for The Makamaka'ole Predator-Free Endangered Seabird Enclosures, Kahakuloa, Maui, HI.

Wagner, W. L., D.R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawaii. Univ. of Hawaii Press and Bishop Museum Press, Honolulu, HI.



Makamaka'ole Predator-Free Endangered Seabird Enclosure Unit A.

Appendix G. Email approval for the removal of permit conditions from NARs SUP.

From: Duvall, Fern P [<mailto:fern.p.duvall@hawaii.gov>]
Sent: Thursday, November 09, 2017 7:41 AM
To: Matthew Stelmach (TERP) <mstelmach@terraform.com>
Cc: Mitchell Craig (TERP) <MCraig@terraform.com>
Subject: RE: Makamaka'ole Special Use Permit

Matt:

I'm so sorry about my untimely response – this simply got buried among my other work items.

Answers:

Yes to the requested changes you requested in the permit renewal. Thanks for the Starr report of their findings – and yes, removing the section on the rye grass is appropriate based on the findings.

Me ke aloha mai Maui-Nui

Fern

Dr. Fern P. Duvall II

Native Ecosystems Protection and Management - Maui Nui Program Manager

Department of Land and Natural Resources

Division of Forestry and Wildlife

1955 main Street, Room 301

Wailuku, HI 96793

Phone: (808) 873-3502, Fax: (808) 984-8114

Web Page: <http://dlnr.hawaii.gov/dofaw/>

Email: fern.p.duvall@hawaii.gov

From: Matthew Stelmach (TERP) [<mailto:mstelmach@terraform.com>]
Sent: Monday, October 30, 2017 11:31 AM
To: Duvall, Fern P <fern.p.duvall@hawaii.gov>
Cc: Mitchell Craig (TERP) <MCraig@terraform.com>
Subject: RE: Makamaka'ole Special Use Permit

Hi Fern,

I haven't heard back on this item. Can you let me know if this was received?

Thank you,

Matt Stelmach

Kaheawa Wind

HCP Manager

Office: 1.808.463.3005

Mobile: 1.808.294.9239

Email: mstelmach@TerraForm.com

Kaheawa Wind

3000 Honoapiilani Hwy

Wailuku, HI 96793

From: Matthew Stelmach (TERP)

Sent: Wednesday, September 20, 2017 8:58 AM

To: Duvall, Fern P <fern.p.duvall@hawaii.gov>

Cc: Mitchell Craig (TERP) <MCraig@terraform.com>

Subject: Makamaka'ole Special Use Permit

Hi Fern,

In the process of our permit review last year our legal team had a few requests for alterations to the permit. We would like to make two alterations to the permit conditions as follows:

Changes to the NARs permit condition as follows (page 2 paragraph 4):

Permit holder will control weed recruitment in disturbance areas through regular herbiciding and weeding without motorized tools which must occur once every 3 months.

Following our discussion Feb 22nd, we have conducted a vegetation survey of the Makamaka'ole seabird restoration site surveyed by Starr Environmental. The target species was rye grass with additional instruction to monitor for additional new species which may have been introduced with the rye grass. I have attached a copy of the report produced which states:

"No annual rye grass (*Lolium multiflorum*) was observed at or near the site. There is the possibility that seeds could exist in the soil and someday germinate, but we did not currently find this short-lived species in the areas surveyed."

We would like to remove page 2 paragraph 5 which states:

Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC take responsibility for the introduction of rye grass to the project area and must provide all measures to ensure that it does not become established within the NAR. The rye grass is expected to die out on its own, but Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC will continue to monitor it. If the rye grass persists, the removal will be the responsibility of Kaheawa Wind Power, LLC and Kaheawa Wind Power II, LLC.

Please let me know if there is any additional information I can provide.