Kahuku Habitat Conservation Plan- FY-2014 Annual Report Year 4

Kahuku Wind Power, LLC

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Kahuku, Hawaii 96731

August, 2014

ITL 10/ BO# 2010-F-0190

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.

Hawaii HCP Manager
First Wind Energy, LLC

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Executive Summary

Kahuku Wind Power, LLC (KAH) has been implementing a Habitat Conservation Plan (HCP) since approval May 27, 2010. A federal Biological Opinion (2010-F-0190) and a Hawaii State Incidental Take License (ITL-10) were approved in May and June 2010, respectively. The project was constructed in 2010 and early 2011, and began commercial operations on March 23, 2011.

KAH submitted a report of progress made on fulfilling the terms of the HCP during Fiscal Year (FY) 2011, 2012 and 2013 to USFWS and DOFAW on August 15, 2011 (Kahuku Wind Power FY 2011 Progress Report), on August 9, 2012 (Kahuku Wind Power FY 2012 Progress Report), and August 1, 2013 (Kahuku Wind Power FY 2013 Progress Report).

Fatality monitoring search plots have been marked in straight line transects out to 64 and 96m from the wind turbine generator's (WTG) centers (50% and 75% of the maximum turbine height, respectively) and 50m from the permanent meteorological tower (50% of the tower height). We continually manage vegetation within all the fatality monitoring plots. KAH initiated the use of a trained dog in April 2013 to assist with fatality searches.

The FY 2014 50% plot mean and standard deviation (SD) in days for search intervals during Q1, Q2, Q3 and Q4 were 3.32 (SD = 0.93), 3.52 (SD = 1.35), 3.52 (SD = 1.09), and 3.48 (SD = 0.99), respectively. The FY 2014 75% plot mean and SD in days for search intervals during Q1, Q2, Q3, and Q4 were 12.88 (SD = 2.83), 14.00 (SD = 1.15), 14.00 (SD = 0.00), and 14.00 (SD = 0.00), respectively.

The overall FY 2014 50% and 75% plot mean and standard deviation in days for search intervals were 3.48 (SD = 1.13) and 13.89 (SD = 1.13), respectively.

We did not find any Hawaiian hoary bat fatalities nor any bird species listed in the Incidental Take License (ITL) and Incidental Take Permit (ITP) during FY 2014. The project total observed bat take is 3 through the end of FY 2014. We found 20 bird carcasses including 12 individuals of species protected under the Migratory Bird Treaty Act: five Cattle Egrets, six Great Frigatebirds and one Pacific Golden Plover. Other fatalities comprised non-native introduced species, including three Common Waxbills, three Spotted Doves, one Red Crested Cardinal and one Ring Necked Pheasant.

Using the Dalthorp et al (2013) "Evidence of Absence" estimator there is 50% credibility that with three observed adult bats the true mortality is not more than five adults. Although an appropriate credibility level has not yet been determined for Kahuku, at the request of USFWS and for illustrating a broader range, the 80% credibility level is also reported. With three observed adult bats the true mortality at the 80% credibility level is not more than 7 bats. Assuming five bats taken the indirect take is 0.6 or one rounded up (or 1.2 or 2 rounded up at 80% credibility). Rounded up the total estimated take are 6 (or 9 at 80% credibility).

Four 30-day carcass retention (CARE) trials were conducted in FY 2014 using 10 small (rat) and 2 medium (bird) size carcasses in short vegetation and 2 small (rat) and 10 medium (bird) size carcasses in medium vegetation. Considering only the first 14 days as the trial length in order to compare current trials to past trials that lasted only 14 days, the site CARE mean and standard deviation (SD) in days for all small carcasses is 9.92 (SD = 5.57) and for medium carcasses is 9.08 (SD = 6.07). In FY 2012 the site CARE mean and SD in days for all small carcasses after trapping commenced was 8.31 (SD = 5.24) and for medium carcasses was 13.50 (SD = 2.12).

The overall searcher efficiency (SEEF) in FY 2014 for small (N = 68) and medium size carcass trials (N = 7) combining both vegetation classes was 83.8% and 85.7%. The overall canine only SEEF in FY 2014 for small (N = 28) and medium size carcass trials (N = 3) combining both vegetation classes was 82.1% and 100%. The overall

human only SEEF in FY 2014 for small (N = 40) and medium size carcasses (N = 4) combining both vegetation classes was 85.0% and 75.0%. The overall SEEF in FY 2012 (WTG's did not operate in FY 2013) for small (N = 85) and medium size carcass trials (N = 57) combining both vegetation classes was 55.3% and 86.0%.

Twelve Wildlife Acoustics™ SM2BAT+ ultrasonic detectors (SM2) with two microphones (mics) each located 50m from the project's 12 WTG's at [height] detected Hawaiian hoary bats on 32 of 3700 detector nights (0.9% of detector nights) in FY 2014. Twelve SM2's in WTG nacelles with two mics each at 80m height detected bats on 3 of 985 detector nights (0.3% of detector nights) from January to June 2014, although not all detectors have been downloaded yet for this last quarter. These three detections occurred in April and May at WTG 2 and 3.

First Wind biologists issued 44 Wildlife Education and Observation Program (WEOP) trainings in FY 2014.

DOFAW representatives visited KAW on February 6 to show their new HCP Planning Associate the wind facilities. First Wind began monthly progress calls with the USFWS and DOFAW in June 2014. KAH contributed $118,500 to DOFAW on June 11, 2014 to fund the fourth year of the waterbird mitigation obligation at Hamakua Marsh. Mitigation for Newell's Shearwater and Hawaiian Petrel on Kauai will began in FY 2015 Q1. DOFAW was provided $219,500 in funding, equipment and helicopter time to fund a Barn Owl predator control project on Kauai. In addition to annual reports in FY 2011, 2012 and 2013 First Wind provided quarterly reports for Q1, Q2, and Q3 spanning FY 2011, 2012, 2013 and 2014.

Introduction

This report summarizes work performed by KAH under the terms of the approved Habitat Conservation Plan (HCP) dated May 27, 2010 and pursuant to the obligations contained in the project's Incidental Take License (ITL-10) and Biological Opinion (BO 2010-F-0190) at the conclusion of the 2013 State of Hawaii fiscal year (July 2012- June 2013, Year 2).

The BO and ITL were issued for the project in May and June, 2010, respectively. The ITL and BO cover seven federally-listed threatened and endangered species and one state-listed endangered species: the Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*), Hawaiian coot or 'alae ke'oke'o (*Fulica alai*), Hawaiian duck or koloa maoli (*Anas wyvilliana*), Hawaiian moorhen or 'alae 'ula (*Gallinula chloropus sandvicensis*), Newell's shearwater or 'a'o (*Puffinus auricularis newelli*), Hawaiian petrel or 'ua'u (*Pterodroma sandwichensis*), Hawaiian hoary bat or 'ope'ape'a (*Lasiurus cinereus semotus*) and the Hawaiian short-eared owl or Pueo (*Asio flammeus sandwichensis*), respectively.

KAH began construction shortly after issuance of the ITL and BO, including initiation of monitoring and mitigation measures as prescribed by the HCP. During construction KAH retained SWCA Environmental Consultants to assist with monitoring and compliance as prescribed under the HCP and consistent with other environmental permit requirements. The site Compliance Manager and HCP Compliance Technician conduct the HCP fatality monitoring program now. During the operation hiatus throughout FY 2013 the HCP program was maintained by only the site manager.

Fatality Monitoring

Searches are conducted by a team of trained HCP Compliance personnel and a canine employed by First Wind Energy, LLC and based at the project site. As of the end of FY 2014 one HCP Compliance Technician, one HCP Compliance Supervisor and one vegetation management contractor had been assigned to the site under the direction of the Hawaii HCP Compliance Manager.

Searches are conducted within circular plots centered on the WTGs and MET towers (Figure 1). At each WTG two concentric plots are marked: a "50% plot" with a radius equivalent to 50% of the maximum turbine height with the blade extended vertically (64m), and a "75% plot" with a radius equivalent to 75% of the maximum turbine height (96m). Each MET tower has a single circular plot with a radius of 40m (50% of the tower height). The 50% plots are searched twice per week and the 75% plots are searched every two weeks in accordance with the monitoring protocol prescribed in the HCP. To accomplish this, two rounds of searches are conducted each week. In the first round, the 50% plots are searched at all 12 WTG's and the one MET tower. For the second round the full 75% plots are searched at six WTGs, and the 50% plots are searched again at the remaining six WTG's and the one MET tower. The six WTGs searched out to 75% alternate each week, such that the full search protocol takes two weeks to complete.

Within each circular plot visual searchers follow parallel transects set at seven meter intervals, which they walk or drive by ATV. Transects every 14 m are staked in the field to guide systematic searches (Figure 2).

Search plots are classified into two searchable vegetation types, short and medium, and unsearchable (typically gulch). Short vegetation consists of bare ground, gravel and grass height fewer than 9 cm and is

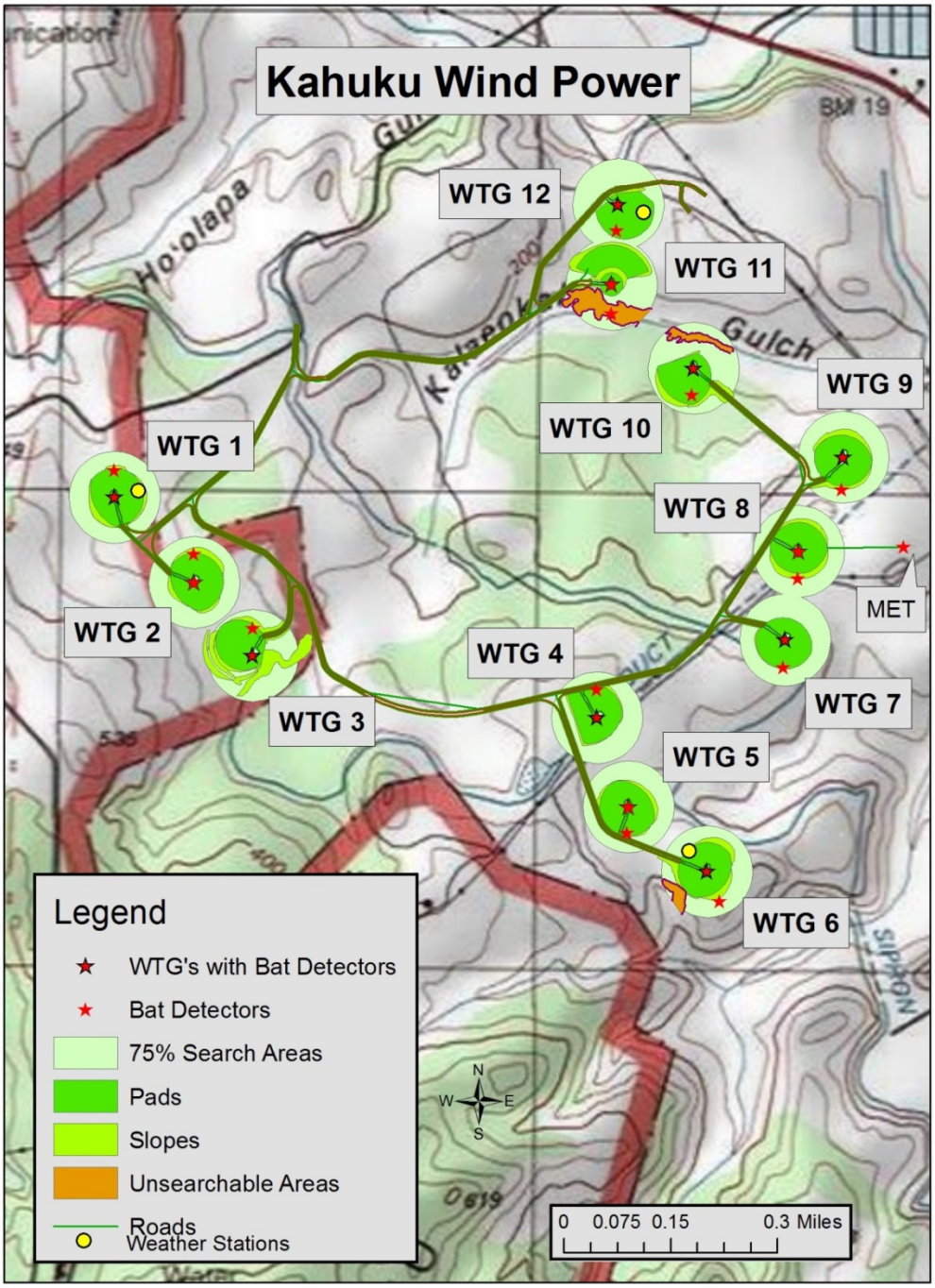

Figure 1. KAH roads, WTG's, MET tower, fatality monitoring plots and Bat detector locations.

typical of the 50% plots; medium is 10-50 cm height and typifies the outer 75% zone. The grass areas within the 50% are mowed once every two weeks, while the areas within the 75% ring are mowed 1-2 times every four weeks.

A canine assisted fatality monitoring program at KAH began in August 2012 with the purchase of Honey, a German shepherd. We implemented a training program in consultation with a Hawaii Civil Defense Search and Rescue team leader and with a contracted local dog trainer who specializes in odor training. After demonstrating high searcher efficiency finding rats and birds we received permission from DOFAW and USFWS to implement canine assisted fatality monitoring at Kahuku.

In early April of 2013, USFWS and DOFAW agreed to the use of a specially-trained detection dog to assist our search efforts. Dogs search the same plots but transects differ in width depending on temperature, wind and rain. Generally, dog transects are wider than humans' due to their superior detection capabilities.

As a result of the fire on August 1, 2012 the project was taken off-line; wind turbines sat idle, and did not generate power again until August 29, 2013. While off-line the blades of the non-operating turbines were kept in a "feathered" position; i.e., they don't catch the wind and rotation is minimal (note, however, that some rotation is necessary in order to properly circulate lubricating fluids within the gearboxes). By agreement with USFWS and DOFAW, starting in early September 2012 searches around the WTG's and MET tower were reduced to the 50% radius and once each week. This reduced search protocol continued through August 28, 2013.

On August 29, 2013 KAH was re-commissioned with a five MW generation limit and all WTG's began to be tested on a rotating schedule. From August 29, 2013 through January 29, 2014 the project was limited by HECO to generating a maximum of 5 MW of the possible 30 MW. Typically during this period fewer than 12 WTG's operated in high winds, although in low winds all WTG's may have operated. On August 29, 2013 we also resumed a full search protocol for fatality monitoring as each WTG became operational.

All collected data such as searcher information (WTG searched, weather, search time per plot, human or canine searched, etc.), CARE trial status and location, SEEF trial placement, bat detector status and date of download, and trap results is recorded on a field form or a field notebook, digitized as an Microsoft EXCEL spreadsheet, QA/QC'd by the originator of the data, the supervisor and finally the report author. CARE trial photos are downloaded, labeled and backed up on a central computer.

Bat detector data is collected on SD cards, downloaded to a central computer, backed up on external hard drives, and analyzed with Wildlife Acoustics™ Kaleidoscope software. The HCP supervisor confirms bat detections and detection file data is recorded and summarized on an EXCEL spreadsheet. Final detection numbers and detector nights are determined from the detection files and from the "status" file (that shows detector operation times) and QA/QC'd by the HCP supervisor and report author.

Figure 2. Transect marking stakes at KAH WTG 2. Staked rows are 14 meters apart. The yellow arrow shows the alignment of posts for one marked transect.

The FY 2014 50% plot mean and standard deviation (SD) in days for search intervals during Q1, Q2, Q3 and Q4 were 3.32 (SD = 0.93), 3.52 (SD = 1.35), 3.52 (SD = 1.09), and 3.48 (SD = 0.99), respectively. The FY 2014 75% plot mean and SD in days for search intervals during Q1, Q2, Q3, and Q4 were 12.88 (SD = 2.83), 14.00 (SD = 1.15), 14.00 (SD = 0.00), and 14.00 (SD = 0.00), respectively.

The overall FY 2014 50% and 75% plot mean and standard deviation in days for search intervals were 3.48 (SD = 1.13) and 13.89 (SD = 1.13), respectively.

Fatalities

There was no take of any of the eight species listed in the ITL in FY 2014. A total of three Hawaiian Hoary bat fatalities have been found at the site since operation began (Table 3). We found 20 bird carcasses including 12 individuals of species protected under the Migratory Bird Treaty Act: five Cattle Egrets, six Great Frigatebirds and one Pacific Golden Plover. Other fatalities comprised non-native introduced species, including three Common Waxbills, three Spotted Doves, one Red Crested Cardinal and one Ring Necked Pheasant.

As prescribed in the HCP, KAH had initiated adaptive management (see Adaptive Management, pg. 14 below) measures to reduce bat fatalities at the site prior to the August 1, 2012 operations shut down.

Age	Sex	Date Found	WTG	Distance from WTG (m)	Direction from WTG (^{o})
A	F	9/15/2011	1	38	352
A	U	4/16/2012	7	26	334
A	U	4/23/2012	6	49	0

Table 1. Hawaiian hoary bat fatalities at KAH.

Hawaiian Hoary Bat Take Estimation

A total of three Hawaiian Hoary bat fatalities have been found at the site since operation began (Table 3). Observed take 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, various statistical methods have been developed for estimating additional take that may have occurred but that was not observed. This "unobserved take" (UDT) attempts to account for fatalities that may have fallen outside of search plots, were missed by searchers, or were removed by scavengers or environmental factors such as high winds. Estimating UDT is an evolving science and no one method is universally accepted or valid in all situations. Further, use of different estimators can sometimes yield widely differing results. The estimators used in this report were developed by USGS and have been recommended by DOFAW and USFWS.

The Dalthorp (2013) estimator is a newer method introduced within the last year, specifically developed for situations where searching is intensive yet observed fatalities are very low, as is often the case with HCP-covered species in Hawaii. The 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), expressed as a percentage (e.g., 50%, 80%, etc.) - the higher the desired level of credibility, the more conservative (higher) the estimated value. An estimator value with 50% credibility has an equal chance of being higher or lower than the true value.

This method is being used for the first time at Kahuku this year, and discussions regarding how best to apply the method and interpret the output are ongoing. Although an appropriate credibility level has not yet been determined for Kahuku, at the request of USFWS and for illustrating a broader range, the 80% credibility level is also reported. Using the Dalthorp et al (2013) "Evidence of Absence" estimator there is 50% credibility that with three observed adult bats the true mortality is not more than five adults. The true mortality at the 80% credibility level is not more than 7 bats (Appendix 2).

The formula provided in the HCP for calculating indirect take (IDT) uses the unobserved direct take (UDT) (n = 2 for 50% credibility or n = 4 for 80% credibility) and multiplies the rate of 0.3 juvenile/UDT. Assuming five bats taken the indirect take is 0.6 or one rounded up (or 1.2 or 2 rounded up at 80% credibility). Rounded up the total estimated take are 6 (or 8 at 80% credibility).

The sex ratio of adult bats found during April through August during FY 2013 and 2014 at Kawailoa is five males to one female. If we assume the same sex ratio for the two adults at Kahuku whose sex is unknown (and the only two found during the breeding season) then there is a 0.17 chance the unknown adults are female. If any adult of unknown sex is assumed to be female and is found during the breeding season we apply a 0.75

chance of being pregnant or lactating. The rate of 0.75 is chosen to indicate that the average breeding rate of adult females is greater than 50% and less than 100%. The actual rate is not known.

If an adult is female and pregnant or lactating she loses 1.8 juveniles (2 pups X 0.9 survival rate) if killed. The IDT from the one observed adult whose sex was unknown and reproductive state unable to be determined could be 2 X 0.17 X 0.75 X 1.8 = 0.46. The total IDT therefore would be 1.06 or 1.66 or one or two juveniles when rounded. The total take is not more than 5 adults plus 1 juvenile at a 50% credibility level (or at 80% credibility is not more than 7 adults plus 2 juveniles). This estimated take of 6 or 9 is less than the Baseline 5-year permitted take of 18 bats.

During FY 2012 the search interval changed for six months from twice weekly to thrice weekly until scavenger trapping improved the carcass retention. The interval then reverted back to twice weekly. The proportion of the number of days each of the two different search protocols spanned is weighted in the estimation calculation.

The annual Baseline take allowed under the ITL is four adult and three juvenile bats; therefore the annual Baseline take for adult bats had been exceeded in FY 2012 and Adaptive Management had been triggered in accordance with the HCP. Low wind speed curtailment to 5 m/s was implemented in FY 2012 and continues.

The average take for two years (when WTG's were operational) is no more than 3.5 adults and 1 juvenile (at 80% credibility) which is less than an average annual Baseline take of 4 adults and 3 juveniles.

Carcass Retention Trials

For Carcass Retention (CARE) trials and Searcher Efficiency (SEEF) trials we assign carcasses to two size classes - small and medium. Rats are used as surrogates for bats and represent the small size class. Wedge-tailed shearwaters (WTSHs) and various ducks are used as surrogates for all bird species of the medium size class. WTSH carcasses are generally deceased fledglings that have been found by the public and delivered to Sea Life Park on Oahu and ducks are received from the USDA-APHIS in Alaska. Rats came 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 11.3 cm in body length) and were chosen to mimic body size of Hawaiian hoary bats (Figure 3). We possess state and federal wildlife collection permits for Kahuku, numbers WL 13-02 and MB40087A-0, respectively, to allow the use of migratory bird species as surrogates in our trials.

Figure 3. A Hawaiian hoary bat and a rat used as a bat surrogate in CARE and SEEF trials.

Four 30 day carcass retention trials occurred in FY 2014 using 10 small (rat) and 2 medium (bird) size carcasses in short vegetation and 2 small (rat) and 10 medium (bird) size carcasses in medium vegetation (Appendix 3). Considering only the first 14 days as the trial length, the site CARE mean and SD in days for all small carcasses is 9.92 (SD = 5.57) and for medium carcasses is 9.08 (SD = 6.07). In FY 2012 the site CARE mean and SD in days for all small carcasses after trapping commenced was 8.31 (SD = 5.24) and for medium carcasses was 13.50 (SD = 2.12). Table 2 shows the Mean and SD for each year, carcass size and vegetation type combination.

Carcass Size	Small (Rat)					
Vegetation Type	Short			Medium		
	N	Mean	SD	N	Mean	SD
FY2012	24	8.54	6.29	15	7.93	5.16
FY2014	10	12.8	7.13	2	2.5	0.71
Carcass Size	Medium (Bird)					
Vegetation Type	Short			Medium		
	N	Mean	SD	N	Mean	SD
FY2012	8	14.0	0.0	10	13.1	2.85
FY2014	2	10.0	5.66	10	10.3	8.76

Table 2. Post trapping rat CARE trial means and standard deviations (in days) at KAH, FY 2012 and FY 2014.

For bat fatality estimation however we only use CARE trials accumulated from COD, January 2011, through July 31, 2012 and from August 31, 2013 through June 30, 2014. Between July 31, 2012 and August 29, 2013 the WTGs were not operating and therefore bats were not at risk of being killed.

We considered an avian carcass "present" until < 10 of its body feathers and < 2 of its wing feathers remained (Young et al, 2012).

Scavenger Trapping

KAH has deployed 48 CMI Springs DOC 250™ kill traps for Indian mongoose control around the search plots to reduce downed wildlife scavenging. The DOC 250s have proven effective, minimize staff time in setting, re-baiting and cleaning, and are more reliable than the Conibear body-grip traps that have previously been used successfully around the site. Between January 1, 2014 and June 30, 2014 249 mongoose were trapped primarily with DOC250's (16 Mongoose were trapped with Goodnature A24's and Tomahawk live traps). Five cats were caught in live traps. Combing the number of days each trap was operating the total trap days for all traps used during this period was 342. Cats and pigs continue to be photographed in game cameras used to record CARE trials.

Searcher Efficiency Trials

SEEF trials at KAH are proctored by staff that does not search fatality monitoring plots. SWCA Environmental Consultants generated random GPS point locations for each vegetation class within all WTG search plots to direct carcass placement. Vegetation classes are On-Pad (short) and Off-Pad (medium). Short vegetation generally covers the flat, graded areas (pads) immediately around the WTGs. These pads are consistently mowed every 2-3 weeks to maintain grass as short as 5cm. The gravel and dirt roads are included in the short vegetation class. Medium vegetation covers all other areas outside the graded pads including graded slopes leading away from the pads and all other ungraded areas within the full plots. Medium vegetation ranges from 10 to 50cm when mowed consistently.

Proctors place carcasses (see CARE above) in random locations on-site in the early morning before KAH HCP Compliance Technicians and Manager arrive. On a trial day a searcher may have multiple carcasses on the plots they search or none at all. When a carcass is found searchers send a text message to proctors indicating the WTG number and approximate location. After searches are complete for the day proctors verify that carcasses are still in place. If a carcass is missing the trial is not counted.

The overall SEEF in FY 2014 for small (N = 68) and medium size carcass trials (N = 7) combining both vegetation classes was 83.8% and 85.7% (Appendix 4). The overall canine only SEEF in FY 2014 for small (N = 28) combining both vegetation classes and medium size carcass trials (N = 3) was 82.1% and 100%. The overall human only SEEF in FY 2014 for small (N = 40) and medium size carcasses (N = 4) combining both vegetation classes was 85.0% and 75.0%. The overall SEEF in FY 2012 and FY 2014 (WTGs did not operate in FY 2013) for small (N = 153) and medium size carcass trials (N = 72) combining both vegetation classes was 68.0% and 97.8% (Table 3).

Size Class	Total		Total Short Veg	Found	% Short	Total Med Veg	Found	% Med	% Overall
Small (rats)	Canine	28	27	23	85.2	1	0	0	82.1
	Human	125	91	68	74.7	34	13	38.2	64.8
	Overall	153	118	91	77.1	35	13	37.1	**68.0**
Medium (WTSH)	Canine	3	3	3	100	0	0	0	100
	Human	61	25	25	100	36	27	75.0	85.2
	Overall	72	30	30	100	36	27	75.0	**97.8**

Table 3. SEEF Trials at KAH in FY 2011-12 and FY 2014.

Hawaiian Hoary Bat Monitoring

KAH biologists have deployed 14 Titley Scientific Anabat™ SD-1s or SD-2s and 4 Wildlife Acoustics™ SM2+BATs (SM2) ultrasonic bat detectors on site between January 2011 and July 2013 (locations shown in Figure 1). In July 2013 all SD1/2s on the ground were replaced with Wildlife Acoustics SM2BAT+ detectors. During FY 2014 Q1 and Q2 twelve SM2s were deployed in each of the 12 nacelles with 2 mics for each detector. The 12 ground detectors are approximately 55 meters from each WTG, either north (facing southwest) or south (facing northwest), attached to metal poles and positioned 6.5 meters from the ground and the two mics attached to each detector are between 75 and 100m apart. The mics for the SM2 detectors mounted on the WTG nacelles are just above the rear door at 80 meters height and facing backwards (away from the rotor) and at the base of the nacelle facing vertically downward.

Twelve SM2 with two microphones (mics) each located 55m from 12 WTGs detected Hawaiian hoary bats on 32 of 3700 detector nights (0.9% of detector nights) in FY 2014 (Appendix 5). Twelve SM2s in WTG nacelles with two mics each at 80m detected bats on 3 of 985 detector nights (0.3% of detector nights) from January to June 2014, although not all detectors have been downloaded yet for this last quarter. The three detections at Nacelle height occurred in April and May at WTG 2 and 3. Appendix 6 summarizes bat detections at KAH from Jan 2011 to June 2014.

Wildlife Education and Observation Program

First Wind biologists began implementing WEOP trainings on February 15, 2011 for all permanent or transient personnel on site. Forty-four WEOP training orientations have been administered in FY2014.

Mitigation

Newell's Shearwater and Hawaiian Petrel

As part of KAH's seabird mitigation obligation First Wind funded the Kaua'i Endangered Seabird Recovery Project (KESRP) to deploy and then analyze data from 13 Wildlife Acoustics Songmeters™ at multiple locations in Kauai's remote mountains to survey for Newell's Shearwater and Hawaiian Petrel nesting colonies. These were deployed August 5, 2013 via helicopter and were retrieved in mid-November 2013. Songs have been analyzed and summarized by Conservation Metrics, Inc.

The results of this analysis have been used to choose 6 of the best locations based on seabird activity levels. Mitigation for Newell's Shearwater and Hawaiian Petrel on Kauai began in FY 2015-Q1. First Wind has funded DOFAW with $219,500 for direct funding, equipment and helicopter time to conduct a Barn Owl predator control project on Kauai at the chosen seabird colonies.

Waterbirds

In January 2013, KAH made the last of the minimum three total annual payments to DOFAW to provide support for waterbird mitigation funding as outlined in the HCP. DOFAW began to use these funds in July, 2011 and hired a biologist to conduct waterbird population monitoring, manage vegetation, and control predators at Hamakua Marsh State Wildlife Sanctuary and provide quarterly reports of vegetation management, predator trapping activity and fledgling numbers (Q4 FY 2014 is Appendix 7). USFWS and DOFAW have determined that the numbers of fledglings from the 2005 season at Hamakua shall be used as a baseline to determine how many more fledglings First Wind will have to produce to meet the mitigation obligation. On this basis they determined First Wind has completed its obligation for Hawaiian Stilts and Moorhens, and requested that KAH contribute $118,500 to DOFAW to fund a fourth year of waterbird mitigation at Hamakua to fulfill the remaining obligation for Hawaiian Coot. Payment was made on June 11, 2014. USDA-Aphis kills full green head male ducks only. No partial green, juveniles, or female ducks are removed from the system (K.Doyle, pers.comm.).

Pueo

The $25,000 provided in December 2010 to DOFAW to initiate Pueo research, as outlined in the HCP, is to be used on Oahu (personal communication from Lasha Salbosa, DOFAW, May 15, 2013). In July 2013 KAH contributed an additional $25,000, with DOFAW consent (Lasha Salbosa, pers comm, June 26, 2013), to the Hawaii Wildlife Rehabilitation Center on Hawaii Island. The final $25,000 obligation has been paid in July 2014.

Hawaiian Hoary Bat

KAH has paid the full obligation for Tier 1 bat mitigation to be conducted by DOFAW at Kahikinui, Maui. On September 16, 2011 $150,000 was paid to DOFAW. DOFAW has drafted a mitigation plan for the funds Kahuku provided (Appendix 8).

Vegetation Management

The HCP for KAH stipulates that the fatality monitoring plots around the WTG's and MET tower be mowed every month to facilitate downed wildlife detection. Areas around the WTG's that are well-graded and flat (On-pad) are mowed every 2-3 weeks to 5cm. Graded slopes that cannot be mowed are weed trimmed to 5-8cm. Other areas outside the pads and graded slopes (Off-pad) are mowed with the turf-mower at 5 to 10cm and /or brush cut-mowed with the Compact Track Loader to 5 to 15cm every 3 to 6 weeks. Herbicides have also been used to retard growth.

The Kalaheokahipu Gulch that passes through the WTG 10 and 11 fatality monitoring plots has been modified to limit erosion near WTG 11 and now is able to be managed more easily (Figure.

Figure 4. Reconstruction of Kalaheokahipu Gulch near WTG 11 at KAH.

Adaptive Management

The third Hawaiian hoary bat fatality occurred April 23, 2012. According to fatality estimate calculations the Baseline annual take of 4 was exceeded, triggering Adaptive Management. In accordance with the HCP, curtailment of all turbines up to a wind speed of 5 m/s began April 27, 2012 and is being implemented between sunset and sunrise from April through November.

Agency Site Visits and Reporting

Angela Amlin and Afsheen Siddiqi of DOFAW visited Kahuku on February 6, 2014. We provided quarterly reports for FY 2014 Q1, Q2 and Q3 on November 5, 2013, February 1, 2014, and May 1, 2014.

Expenditures

KAH executed two Letters of Credit (LCs) of $500,000 each on October 21, 2010 to fulfill the contingency fund requirements under the HCP. Both LCs name the State of Hawaii Division of Forestry and Wildlife (DOFAW) as the beneficiary. These LC's have been renewed through 2017.

First Wind fulfilled the initial 3 years of its waterbird mitigation obligation under the HCP with a Memorandum of Agreement and payments made in December 2010, January 2012, and January 2013 to DOFAW totaling for $341,500. KAH contributed $118,500 to DOFAW on June 11, 2014 to fund the fourth year of the waterbird mitigation obligation at Hamakua Marsh. Mitigation for Newell's Shearwater and Hawaiian Petrel on Kauai will began in FY 2015 Q1. DOFAW was provided $219,500 in funding, equipment and helicopter time for a Barn Owl predator control project on Kauai. Details for HCP expenditures are in Appendix 9.

Citations

Dalthorp D., M Huso, D Dail and J Kenyon. 2013. Evidence of Absence Users Guide: U.S. Geological Survey Data Series

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Appendix 1. Fatality Monitoring Plot Search Dates at KAH in FY 2014 Q1 (black colored dates are searches within the 50% perimeter, red are within the 75% perimeter, purple dates are searches 1X/ week in the 50 % area).

WTG												MET
1	2	3	4	5	6	7	8	9	10	11	12	
7/1	7/1	7/1	7/1	7/2	7/2	7/2	7/2	7/4	7/4	7/4	7/4	7/4
7/8	7/8	7/8	7/8	7/9	7/9	7/10	7/10	7/11	7/11	7/11	7/11	7/11
7/15	7/15	7/15	7/15	7/15	7/15	7/19	7/19	7/19	7/19	7/19	7/19	7/19
7/22	7/22	7/22	7/22	7/23	7/23	7/23	7/23	7/25	7/25	7/25	7/25	7/26
7/30	7/30	7/30	7/30	8/1	8/1	8/1	8/1	8/2	8/2	8/4	8/4	8/2
8/5	8/5	8/6	8/6	8/6	8/6	8/7	8/7	8/8	8/8	8/8	8/8	8/9
8/12	8/12	8/12	8/12	8/13	8/13	8/13	8/13	8/15	8/15	8/15	8/15	8/16
8/19	8/19	8/19	8/19	8/21	8/21	8/21	8/21	8/22	8/22	8/22	8/22	8/23
8/26	8/26	8/26	8/26	8/27	8/27	8/27	8/27	8/29	8/29	8/29	8/29	8/30
9/3	9/3	9/3	9/3	9/3	9/3	9/4	9/4	9/4	9/4	9/4	9/4	
9/5	9/5	9/5	**9/5**	**9/5**	**9/5**	9/6	**9/6**	**9/6**	**9/6**	9/6	9/6	9/6
9/9	9/9	9/9	9/9	9/9	9/9	9/10	9/10	9/10	9/10	9/10	9/10	9/9
9/12	**9/13**	9/12	9/13	**9/12**	**9/13**	9/12	9/13	**9/12**	**9/13**	9/12	9/13	9/12
9/16	9/16	9/16	9/16	9/16	9/16	9/17	9/17	9/17	9/17	9/17	9/17	9/17
9/19	9/20	**9/19**	**9/20**	9/19	9/20	**9/19**	**9/20**	9/19	9/20	**9/19**	**9/20**	9/20
9/23	9/23	9/23	9/23	9/23	9/23	9/24	9/24	9/24	9/24	9/24	9/24	9/23
9/26	**9/27**	9/26	9/27	**9/26**	**9/27**	9/26	9/27	**9/26**	**9/27**	9/26	9/27	9/26
9/30	9/30	9/30	9/30	9/30	9/30	10/1	10/1	10/1	10/1	10/1	10/1	9/30
10/3	10/4	**10/3**	**10/4**	10/3	10/4	**10/3**	**10/4**	10/3	10/4	**10/3**	**10/4**	10/4

Appendix 1 (cont). Fatality Monitoring Plot Search Dates at KAH in FY 2014 Q2 (black colored dates are searches within the 50% perimeter, red are within the 75% perimeter.

WTG												MET
1	2	3	4	5	6	7	8	9	10	11	12	
10/3	10/4	**10/3**	**10/4**	10/3	10/4	**10/3**	**10/4**	10/3	10/4	**10/3**	**10/4**	10/4
10/7	10/7	10/7	10/7	10/7	10/7	10/8	10/8	10/8	10/8	10/8	10/8	10/8
10/10	10/11	10/10	10/11	10/10	10/11	10/10	10/11	10/10	10/11	10/10	10/11	10/11
10/15	10/15	10/15	10/15	10/15	10/15	10/16	10/16	10/16	10/16	10/16	10/16	10/16
10/17	10/18	10/17	10/18	10/17	10/18	10/17	10/18	10/17	10/18	10/17	10/18	10/18
10/21	10/21	10/21	10/21	10/21	10/21	10/22	10/22	10/22	10/22	10/22	10/22	10/22
10/24	10/25	10/24	10/25	10/24	10/25	10/24	10/25	10/24	10/25	10/24	10/25	10/25
10/28	10/28	10/28	10/28	10/28	10/28	10/29	10/29	10/29	10/29	10/29	10/29	10/28
10/31	11/1	10/31	11/1	10/31	11/1	10/31	11/1	10/31	11/1	10/31	11/1	11/1
11/4	11/4	11/4	11/4	11/4	11/4	11/6	11/6	11/6	11/6	11/6	11/6	11/6
11/7	11/8	11/7	11/8	11/7	11/8	11/7	11/8	11/7	11/8	11/7	11/8	11/8
11/11	11/11	11/11	11/11	11/11	11/11	11/12	11/12	11/12	11/12	11/12	11/12	11/12
11/14	11/15	11/14	11/15	11/14	11/15	11/14	11/15	11/14	11/15	11/14	11/15	11/14
11/18	11/18	11/18	11/18	11/18	11/18	11/19	11/19	11/19	11/19	11/19	11/19	11/19
11/20	11/22	11/20	11/22	11/20	11/22	11/20	11/22	11/20	11/22	11/20	11/22	11/22
11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25	11/25
11/26	11/27	11/26	11/27	11/26	11/27	11/26	11/27	11/26	11/27	11/26	11/27	11/27
12/2	12/2	12/2	12/2	12/2	12/2	12/3	12/3	12/3	12/3	12/3	12/3	12/3
12/4	12/6	12/4	12/6	12/4	12/6	12/4	12/6	12/4	12/6	12/4	12/6	12/6
12/9	12/9	12/9	12/9	12/9	12/9	12/10	12/10	12/10	12/10	12/10	12/10	12/10
12/12	12/13	12/12	12/13	12/12	12/13	12/12	12/13	12/12	12/13	12/12	12/13	12/13
12/16	12/16	12/16	12/16	12/16	12/16	12/17	12/17	12/17	12/17	12/17	12/17	12/17
12/19	12/20	12/19	12/20	12/19	12/20	12/19	12/20	12/19	12/20	12/19	12/20	12/20
12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23	12/23
12/28	12/29	12/28	12/29	12/28	12/29	12/28	12/29	12/28	12/29	12/28	12/29	12/29
12/30	12/30	12/30	12/30	12/30	12/30	12/31	12/31	12/31	12/31	12/31	12/31	1/2

Appendix 1 (cont). Fatality Monitoring Plot Search Dates at KAH in FY 2014 Q3 (black colored dates are searches within the 50% perimeter, red are within the 75% perimeter.

WTG												MET
1	2	3	4	5	6	7	8	9	10	11	12	
12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30	12/30
1/2	1/3	1/2	1/3	1/2	1/3	1/2	1/3	1/2	1/3	1/2	1/3	1/2
1/6	1/6	1/6	1/6	1/6	1/6	1/7	1/7	1/7	1/7	1/7	1/7	1/7
1/9	1/10	1/9	1/10	1/9	1/10	1/9	1/10	1/9	1/10	1/9	1/10	1/10
1/13	1/13	1/13	1/13	1/13	1/13	1/14	1/14	1/14	1/14	1/14	1/14	1/14
1/16	1/17	1/16	1/17	1/16	1/17	1/16	1/17	1/16	1/17	1/16	1/17	1/17
1/21	1/21	1/21	1/21	1/21	1/21	1/22	1/22	1/22	1/22	1/22	1/22	1/21
1/23	1/24	1/23	1/24	1/23	1/24	1/23	1/24	1/23	1/24	1/23	1/24	1/24
1/26	1/26	1/26	1/26	1/26	1/26	1/28	1/28	1/28	1/28	1/28	1/28	1/28
1/30	1/31	1/30	1/31	1/30	1/31	1/30	1/31	1/30	1/31	1/30	1/31	1/31
2/3	2/3	2/3	2/3	2/3	2/3	2/4	2/4	2/4	2/4	2/4	2/4	2/5
2/6	2/7	2/6	2/7	2/6	2/7	2/6	2/7	2/6	2/7	2/6	2/7	2/7
2/10	2/10	2/10	2/10	2/10	2/10	2/12	2/12	2/12	2/12	2/12	2/12	2/12
2/13	2/14	2/13	2/14	2/13	2/14	2/13	2/14	2/13	2/14	2/13	2/14	2/14
2/18	2/18	2/18	2/18	2/18	2/18	2/19	2/19	2/19	2/19	2/19	2/19	2/18
2/20	2/21	2/20	2/21	2/20	2/21	2/20	2/21	2/20	2/21	2/20	2/21	2/21
2/24	2/24	2/24	2/24	2/24	2/24	2/25	2/25	2/25	2/25	2/25	2/25	2/25
2/27	2/28	2/27	2/28	2/27	2/28	2/27	2/28	2/27	2/28	2/27	2/28	2/28
3/3	3/3	3/3	3/3	3/3	3/3	3/4	3/4	3/4	3/4	3/4	3/4	3/4
3/6	3/7	3/6	3/7	3/6	3/7	3/6	3/7	3/6	3/7	3/6	3/7	3/7
3/10	3/10	3/10	3/10	3/10	3/10	3/11	3/11	3/11	3/11	3/11	3/11	3/11
3/13	3/14	3/13	3/14	3/13	3/14	3/13	3/14	3/13	3/14	3/13	3/14	3/14
3/17	3/17	3/17	3/17	3/17	3/17	3/18	3/18	3/18	3/18	3/18	3/18	3/18
3/20	3/21	3/20	3/21	3/20	3/21	3/20	3/21	3/20	3/21	3/20	3/21	3/21
3/24	3/24	3/24	3/24	3/24	3/24	3/25	3/25	3/25	3/25	3/25	3/25	3/25
3/27	3/28	3/27	3/28	3/27	3/28	3/27	3/28	3/27	3/28	3/27	3/28	3/28
3/31	3/31	3/31	3/31	3/31	3/31	4/1	4/1	4/1	4/1	4/1	4/1	

Appendix 1 (cont). Fatality Monitoring Plot Search Dates at KAH in FY 2014 Q3 (black colored dates are searches within the 50% perimeter, red are within the 75% perimeter.

WTG												MET
1	2	3	4	5	6	7	8	9	10	11	12	
3/31	3/31	3/31	3/31	3/31	3/31	4/1	4/1	4/1	4/1	4/1	4/1	3/28
4/3	4/4	**4/3**	**4/4**	4/3	4/4	**4/3**	**4/4**	4/3	4/4	**4/3**	**4/4**	4/3
4/7	4/7	4/7	4/7	4/7	4/7	4/8	4/8	4/8	4/8	4/8	4/8	4/8
4/10	**4/11**	4/10	4/11	**4/10**	**4/11**	4/10	4/11	**4/10**	**4/11**	4/10	4/11	4/11
4/14	4/14	4/14	4/14	4/14	4/14	4/15	4/15	4/15	4/15	4/15	4/15	4/15
4/17	4/18	**4/17**	**4/18**	4/17	4/18	**4/17**	**4/18**	4/17	4/18	**4/17**	**4/18**	4/18
4/21	4/21	4/21	4/21	4/21	4/21	4/22	4/22	4/22	4/22	4/22	4/22	4/22
4/24	**4/25**	4/24	4/25	**4/24**	**4/25**	4/24	4/25	**4/24**	**4/25**	4/24	4/25	4/25
4/28	4/28	4/28	4/28	4/28	4/28	4/29	4/29	4/29	4/29	4/29	4/29	4/29
5/1	5/2	**5/1**	**5/2**	5/1	5/2	**5/1**	**5/2**	5/1	5/2	**5/1**	**5/2**	5/2
5/5	5/5	5/5	5/5	5/5	5/5	5/6	5/6	5/6	5/6	5/6	5/6	5/6
5/8	**5/9**	5/8	5/9	**5/8**	**5/9**	5/8	5/9	**5/8**	**5/9**	5/8	5/9	5/9
5/12	5/12	5/12	5/12	5/12	5/12	5/13	5/13	5/13	5/13	5/13	5/13	5/13
5/15	5/16	**5/15**	**5/16**	5/15	5/16	**5/15**	**5/16**	5/15	5/16	**5/15**	**5/16**	5/16
5/19	5/19	5/19	5/19	5/19	5/19	5/20	5/20	5/20	5/20	5/20	5/20	5/20
5/22	**5/23**	5/23	5/22	**5/22**	**5/23**	5/23	5/22	**5/22**	**5/23**	5/23	5/22	5/23
5/27	5/27	5/27	5/27	5/27	5/27	5/28	5/28	5/28	5/28	5/28	5/28	5/28
5/29	5/30	**5/29**	**5/30**	5/29	5/30	**5/29**	**5/30**	5/29	5/30	**5/29**	**5/30**	5/30
6/2	6/2	6/2	6/2	6/2	6/2	6/3	6/3	6/3	6/3	6/3	6/3	6/3
6/5	**6/6**	6/5	6/6	**6/5**	**6/6**	6/5	6/6	**6/5**	**6/6**	6/5	6/6	6/6
6/9	6/9	6/9	6/9	6/9	6/9	6/10	6/10	6/10	6/10	6/10	6/10	6/10
6/12	6/16	**6/12**	**6/13**	6/12	6/13	**6/12**	**6/13**	6/12	6/13	**6/12**	**6/13**	6/13
6/16	6/16	6/16	6/16	6/16	6/16	6/17	6/17	6/17	6/17	6/17	6/17	6/17
6/19	**6/20**	6/19	6/20	**6/19**	**6/20**	6/19	6/20	**6/19**	**6/20**	6/19	6/20	6/20
6/23	6/23	6/23	6/23	6/23	6/23	6/24	6/24	6/24	6/24	6/24	6/24	6/24
6/26	6/27	**6/26**	**6/27**	6/26	6/27	**6/26**	**6/27**	6/26	6/27	**6/26**	**6/27**	6/27
6/30	6/30	6/30	6/30	6/30	6/30							

Appendix 2. Multi year fatality estimation for 3 bats at KAH using Dalthorp et al (2013) Evidence of Absence estimator.

Credibility level (1 - ?)						Posterior distribution for total fatality for 3 years.				
0.5						g = P(observe| arrive):	0.627795	95% CI:	0.577	0.677
Year	Mortalities	g	min(g)	max(g)	rel_wt	**50% credible maximum:**	**5**			
1	3	0.573	0.508	0.624	0.647	m	P(total = m)	P(total > m)		
2	0	0.603	0.548	0.645	0.353	0	0	1		
3	0	0.672	0.649	0.687	1	1	0	1		
						2	0	1		
						3	0.1559294	0.8440706		
						4	0.2302318	0.6138388		
						5	0.2134605	0.4003783		
						6	0.1590647	0.2413136		
						7	0.1041915	0.1371222		
						8	0.0626825	0.0744396		
						9	0.035513	0.0389267		
						10	0.0192474	0.0196792		
						11	0.010085	0.0095942		
						12	0.0051465	0.0044477		
						13	0.0025718	0.0018759		
						14	0.0012636	0.0006123		
						15	0.0006123	0		

Appendix 3. CARE Q at KAH in FY 2014.

CARE Q FY2014		**1**		**2**		**3**		**4**		**5**		**6**	
Carcass Type		Rat		Rat		Rat		Bird		Bird		Bird	
WTG		1		5		6		5		1		4	
Vegetation		Short		Short		Short		Short		Short		Short	
Distance (m)		12		39		13		15		41		41	
Trial Day	Date	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
day 0	9/9		Notes		Notes		Notes		Notes		Notes		Notes
day 1	9/10	P	L	P	L	P		P		P	A	P	
day 2	9/11	P	H,A	P		P	A,D,S	P	M,B,F,W,E	P	D	P	
day 3	9/12	P	D,S	P	A	P	M,H	P		P		P	
day 4	9/13	P		P		P	C	P		P		P	
day 5	9/14	P		P		P		P		P		P	
day 6	9/15	P		P		P		P		P		P	
day 7	9/16	P		P		P		P		P		P	D
day 8	9/17	P		P		P		P		P		P	
day 9	9/18	P		P		P		P		P		P	
day 10	9/19	P		**P**		P	D	P		P		P	
day 11	9/20	P		A		P		P		P		P	
day 12	9/21	P				P		P		P		P	
day 13	9/22	P				P		P		P		P	
day 14	9/23	P				P		P		P		P	
day 20	9/30	P				P		P		P		**P**	
day 30	10/9	**P**				**P**		**P**		**P**		A	
Retention (days)		***30***		***10***		***30***		***30***		***30***		***20***	

Appendix 3 (cont). CARE R at KAH FY 2014.

CARE R FY2014		**1**		**2**		**3**		**4**		**5**		**6**	
Carcass Type		Rat		Bird		Rat		Bird		Rat		Bird	
WTG		1		2		6		5		4		10	
Vegetation		Short		Short		Short		Short		Short		Medium	
Distance (m)		41		28		40		15		41		27	
SEEF ID pt #													
Trial Day	Date	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
day 0	12/9	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes
day 1	12/10	P	A	P	A	P	A	P		P	A	P	A
day 2	12/11	P	H,D,S	P		P	H	P		P	H,L	P	L
day 3	12/12	P	L	P		P	L,S	**P**		P	S	P	
day 4	12/13	P	C	P		P	D	A		P	D	P	
day 5	12/14	P		P		P				P		P	
day 6	12/15	P		P	L	P				P	C	P	F
day 7	12/16	P		P	B	P				P	M	P	
day 8	12/17	P		P	C	P				P		P	
day 9	12/18	P		P	F	P	C			P		P	
day 10	12/19	P		P		P				P		P	
day 11	12/20	P		P		P				P		P	
day 12	12/21	P		P		P				P		P	C,B
day 13	12/22	P		**P**		P				P		P	
day 14	12/23	**P**		A		P				P		P	
day 20	1/6	A				P				P		P	M,S
day 30	1/16					**P**				**P**		**P**	
Retention (days)		***14***		***13***		***30***		***3***		***30***		***30***	

Appendix 3 (cont). CARE S at KAH FY 2014.

CARE S FY2014		**1**		**2**		**3**		**4**		**5**		**6**	
Carcass Type		Rat		Bird		Rat		Bird		Rat		Bird	
WTG		3		4		6		7		9		11	
Vegetation		Short		Short		Short		Medium		Medium		Short	
Distance (m)		62		73		57		80		58		42	
SEEF ID pt#													
Trial Day	Date	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
day 0	3/10		Notes		Notes		Notes		Notes		Notes		Notes
day 1	3/11	P		P		P	A	P		P	A	P	
day 2	3/12	P	a	P	A	P	A	P	SCAV,M,F	P	H,S,D	P	A
day 3	3/13	P		P		P	ants	P	F,B,W	**P**		P	
day 4	3/14	P		P	A,F	P	H	P		A		P	
day 5	3/15	P	H,S	P		P	D	P				P	
day 6	3/16	P	A	P		**P**	SCAV	P				P	L
day 7	3/17	P	D	P		A		**P**				**P**	SCAV,B,W,F
day 8	3/18	P		P				A				A	
day 9	3/19	P		P									
day 10	3/20	P	M	P									
day 11	3/21	P		P									
day 12	3/22	P		P									
day 13	3/23	P		P									
day 14	3/24	P		P									
day 20	4/4	P	M,S	P	B,D,W								
day 30	4/14	**P**		**P**									
Retention (days)		***14***		***14***		***6***		***2***		***3***		***6***	

Appendix 3 (cont). CARE T at KAH in FY 2014.

CARE T FY2014		**1**		**2**		**3**		**4**		**5**		**6**	
Carcass Type		Rat		Rat		Bird		Bird		Rat		Bird	
WTG		1		5		7		9		9		9	
Vegetation		Short		Medium		Medium		Medium		Short		Medium	
Distance (m)		42		63		79		76		58		62	
SEEF ID pt#													
Trial Day	Date	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
day 0	5/30	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes
day 1	5/31	P		P		**P**	E,M,B,F	**A**		**A**		P	
day 2	6/1	P		**P**	E,H	A	<10 B					P	
day 3	6/2	P	A,H,S	A								P	L
day 4	6/3	P										P	
day 5	6/4	P										P	
day 6	6/5	P										P	
day 7	6/6	P										P	
day 8	6/7	P										P	
day 9	6/8	P										P	
day 10	6/9	P	D									P	C,A
day 11	6/10	P										P	
day 12	6/11	P										P	
day 13	6/12	P										P	
day 14	6/13	P										P	
day 20	6/20	P										P	
day 30	6/27	**P**										**P**	
Retention (days)		***30***		***2***		***1***		***0***		***0***		***30***	

Appendix 4. SEEF trials at KAH in FY 2013.

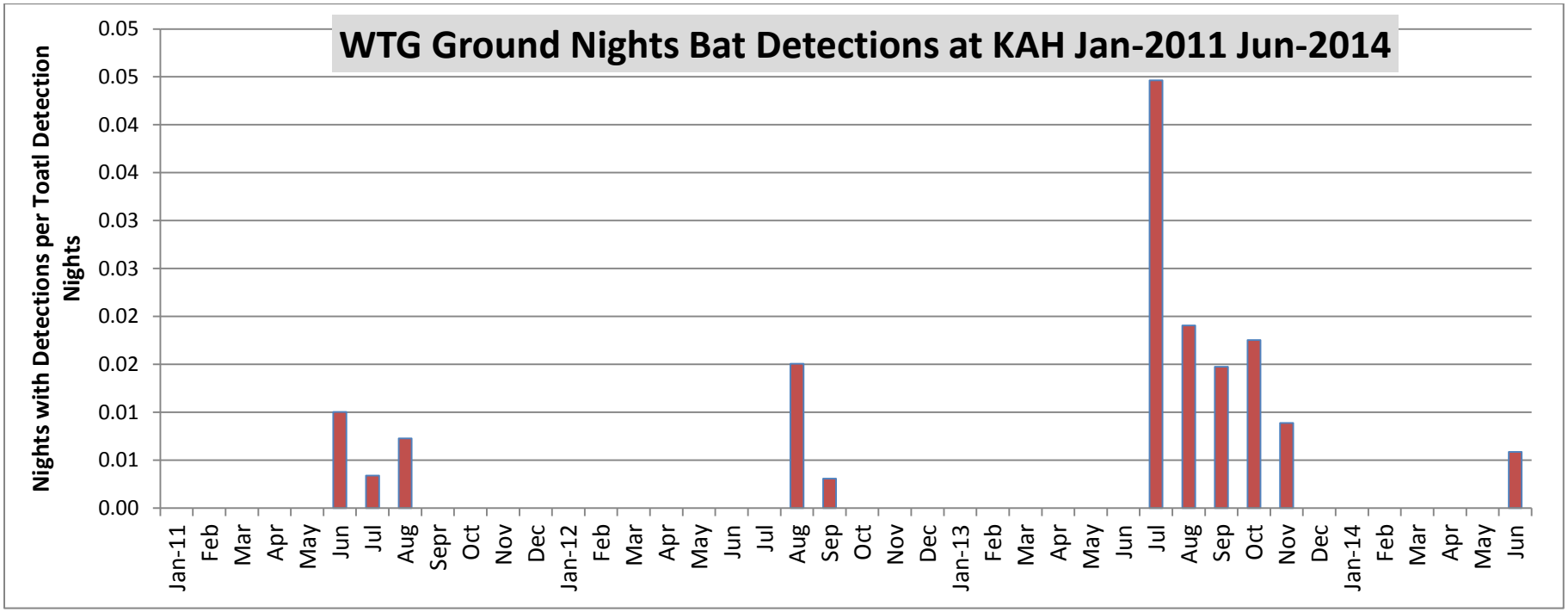
Date	WTG	Carcass Size	Carcass Type	Short Found	Medium Found	ID Point #	Human/ Dog
7/23/2013	5	short	rat	1		299	K9
7/23/2013	8	short	rat	0		293	K9
9/9/2013	5	short	rat	1		292	Human
9/9/2013	1	short	rat	1		392	K9
9/9/2013	6	short	rat	1		291	Human
9/16/2013	4	short	rat	1		287	K9
9/16/2013	1	short	rat	1		394	Human
9/24/2013	7	short	bird	1		295	K9
9/24/2013	7	short	rat	1		399	K9
9/24/2013	12	short	rat	0		280	Human
10/4/2013	2	short	rat	1		388	K9
10/4/2013	10	short	rat	1		381	K9
10/11/2013	2	medium	rat		1	281	Human
10/11/2013	2	short	rat	1		380	Human
10/25/2013	10	medium	rat		1	379	Human
10/25/2013	6	short	bird	1		296	Human
10/25/2013	4	short	rat	1		278	K9
11/8/2013	2	medium	bird		1	300	Human
11/8/2013	10	short	rat	1		391	Human
11/8/2013	8	medium	rat		0	385	K9
11/11/2013	1	short	rat	1		276	Human
11/11/2013	5	short	rat	1		290	Human
11/19/2013	12	medium	rat		1	371	Human
11/19/2013	7	short	rat	1		284	K9
11/19/2013	9	short	rat	1		281	K9
12/6/2013	10	short	rat	1			Human
12/9/2013	1	short	rat	1		290	Human
12/9/2013	3	short	rat	1		281	Human
12/19/2013	1	short	rat	0		371	Human
12/19/2013	3	short	rat	1		279	K9
12/19/2013	7	short	rat	1		364	K9
1/9/2014	5	short	rat	1		275	Human
1/9/2014	7	short	rat	0		283	K9
1/13/2014	1	short	rat	1		270	Human
1/13/2014	4	short	rat	1		265	K9
1/13/2014	4	short	rat	1		271	K9
1/23/2014	7	short	rat	1		273	Human
1/23/2014	7	short	rat	1		274	Human
1/23/2014	9	short	rat	1		269	Human

2/19/2014	12	short	rat	1		263	Human
2/19/2014	10	short	rat	1		267	K9
2/20/2014	1	short	rat	1		262	K9
2/20/2014	5	short	rat	1		265	K9
3/7/2014	8	short	rat	1		261	Human
3/7/2014	4	short	bird	1		282	K9
3/13/2014	***5***	short	rat	0		257	Human
3/13/2014	9	short	rat	1		256	Human
3/13/2014	7	short	bird	1		384	K9
3/25/2014	11	short	rat	1		252	Human
3/25/2014	9	short	rat	1		254	Human
3/25/2014	9	short	rat	0		251	Human
4/7/2014	2	short	rat	1		255	Human
4/7/2014	6	short	rat	1		253	K9
4/17/2014	7	medium	bird		0	383	Human
4/17/2014	3	short	rat	1		250	Human
4/17/2014	9	short	rat	0		249	K9
4/22/2014	12	short	rat	1		242	Human
4/22/2014	10	short	rat	0		245	Human
4/22/2014	8	short	rat	1		247	K9
5/8/2014	5	short	rat	1		248	Human
5/8/2014	5	short	rat	1		246	Human
5/8/2014	3	short	rat	1		240	Human
5/20/2014	10	short	rat	1		245	Human
5/20/2014	8	short	rat	1		247	K9
5/30/2014	4	short	rat	1		244	Human
5/30/2014	12	short	rat	1		242	Human
5/30/2014	2	short	rat	1		241	K9
6/3/2014	12	short	rat	1		235	Human
6/3/2014	7	short	rat	1		231	K9
6/3/2014	8	short	rat	0		260	K9
6/13/2014	4	short	rat	1		234	Human
6/13/2014	6	short	rat	0		237	Human
6/23/2014	1	short	bird	1		239	Human
6/23/2014	4	short	rat	1		233	K9
6/23/2014	5	short	rat	1		228	K9

Appendix 5. Hawaiian Hoary bat nights with detections from ground WTG detectors at KAH 2014.

WTG Location	Detection Nights	Nights with Detections	Ratio
1	349	4	0.011
2	352	5	0.014
3	337	5	0.015
4	306	4	0.013
5	302	5	0.017
6	292	4	0.014
7	234	1	0.004
8	273	1	0.004
9	303	0	0.000
10	299	0	0.000
11	313	1	0.003
12	340	1	0.003
Total	3700	31	0.008

Appendix 6. Nights with bat detections per total detections nights at 12 WTG ground detectors from January 2011- June 2014.



Appendix 7.

JUNE 2014 WATERBIRD NESTING ACTIVITY HAMAKUA MARSH

ISLAND OF OAHU

Prepared by: Katherine Doyle, Wildlife Biologist

Oahu Division of Forestry and Wildlife

INTRODUCTION

Since July 2011, the Division of Forestry and Wildlife (DOFAW), funded by the Kahuku Wind Power's Habitat Conservation Plan (HCP), has been actively managing Hamakua Marsh. Predator control and vegetation maintenance have been identified as key needs for maintaining and increasing waterbird productivity. Waterbird productivity is: nesting success, fledgling success, overall habitat utilization, and predator control success. Predator control has been contracted through the United States Department of Agriculture, Wildlife Services (USDA-WS). Predator control is conducted year-round to ensure enhanced waterbird nesting success. Vegetation maintenance is done by DOFAW personnel using herbicide, machinery, and hand tools. The Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Gallinule (*Gallinula chloropus sandvicensis*), and Hawaiian Coot (*Fulica alai*) are endemic and endangered Hawaiian waterbirds that utilize Hamakua Marsh for nesting, feeding, and loafing. There are also Black-crested night herons (*Nycticorax nycticorax)*, Mallard ducks (*Anas platyrhynchos*) and Mallard/Hawaiian Duck (*Anas platyrhynchos/Anas wyvilliana*) hybrids at Hamakua. A number of shorebirds also utilize this wetland as a loafing area. The Pacific golden plover (*Pluvialis fulva*), Ruddy turnstone (*Arenaria interpres*), Wandering tattler (*Tringa incana*), and Cattle Egret (*Bubulcus ibis*) are commonly seen and recorded. The main water source at Hamakua is the rainfall. There is a stream that runs adjacent to the marsh, but it plays a minor role for water in the interior mudflats, except when large amounts of water enter the system. Because the wetland's water supply is from the rain, flooding usually only occurs in the winter. This means the wetland dries out in the late summer, and after the nesting season is over, machinery and herbicides can be used for management. This quarter, there was 115% of the average precipitation for Hamakua Marsh (appendix 1).

OVERVIEW

This quarter was successful for gallinules which had an additional 32 chicks fledge. Coots also were successful with 6 chicks fledging. This can be attributed to a wet year, with fresh water filling the ponds in the marsh. With the heavy vegetation, the birds were able to nest closer together, without actually interacting. The batis was tall enough to work as a barrier between these two species, lessening conflicts. The ponds still had some water in June when the stilts started hatching. This water quickly dried up though, and the stilts moved close to the stream for foraging. Then, on June 23, the City and County of Honolulu removed the sand plugging Kaelepulu Stream. As the tide came in, the water rushed in the stream and filled the marsh. The six chicks that were more than 3 weeks old survived, but the 18 younger stilt chicks have not been seen since (appendix 5.b). The following is a breakdown of the annual fledging results. Every quarterly report, I will update these numbers.

	Coot	Moorhen	Stilt	Vegetation Maintenance	Predator Control
2005	1	13	1	Grass, limited tilling	During nesting season
2006	0	51	15	Tilling post breed 2005	During nesting season
2007	1	36	13	No tilling	Year round
2008	5	33	10	No tilling	Year round
2009	5	52	16	Tilling post breed	Year round
2011	8	30	2	No tilling, grass	Year round
2012	**1**	**10**	**4**	**Tilling post breed 2011, grass**	**Year round**
2013	**2**	**24**	**13**	**No tilling, grass**	**Year round**
2014	**6**	**69**	**6**	**Tilled along roadway, grass**	**Year round**

*bold denotes HCP activity years

METHODS

Survey Start Date: April 4, 2014
Survey End Date: June 30, 2014

Surveys are conducted following DOFAW protocol and have been repeated the same for every survey. Observers walked along the bank of the stream, on the shop side, away from the nesting areas, to avoid contact with birds, and survey the entire 22.7-acre wetland. This distance allows for observation of natural activity; most of the waterbirds in Hamakua are tame and expect to be fed when approached, so distance is needed to observe natural habits. The survey starts at the northwest corner of Kailua Road and Hamakua Drive, then continued southeast along the canal and marsh fence line. On each visit, the number of waterbirds and shorebirds in each of the four Basins were counted, native or non-native. Gallinule, coot and stilt numbers, habitat usage, nesting activity, banding information, predator control success, and overall wetland condition were the main focus in each of the surveys. Individuals were counted and mapped. Habitat usage was identified as: stream, stream bank, mudflat, mudflat/vegetated, 0”-3” water, 3”-6” water and >6” water (appendix 2a.-c.). Nesting activities of each species were also observed. Pairings, establishment of territory, and nesting activity was observed and recorded on maps. Survival rates of chicks and brood sized were also recorded.

NEST ACTIVITY AND REPRODUCTIVE SUCCESS

From April 2014 until June 2014, Hamakua Marsh had 39 bird surveys completed with observations recorded. During this time, a total of 97.5 hours was spent on monitoring the stilts, moorhens, coots, migratory birds, and their interactions. Also during this time, a total of 318 hours was spent on vegetation maintenance. The following table shows the monthly time allocation.

		April	May	June	Total
Survey	days	13	14	12	39
	hours	32.5	35	30	97.5
Vegetation	days	16	16	15	47
Maintenance	hours	112	101	105	318

WATERBIRD SUCCESS

The surveys found a range of numbers for all native and non- native birds. Generally, ducks seen were Mallards with the possibility of a few Koloa hybrids. The ducks were seen on the banks and in the parking lots behind the shops on Hamakua Drive, where they are feed by the public. There was an average of 22 Mallard/Koloa hybrids seen during surveys. Also seen along the shop banks were the Black Crested Night Heron, or Auku'u. There were an average of 48 adult 'Auku'u seen. Inside the marsh along the grasslands, Cattle Egrets were seen. On average there were 6 egrets within the wetland. The migratory shorebirds left early in April, and migrated to breed. Currently, there are no shorebirds at Hamakua.

'Alae Ke'oke'o

Since the fall of 2011, a University of Hawaii graduate student, Randi Rhodes, has been catching coots to study them. She takes vital information, collars them, and releases where she catches them. There are two resident collard coots in Hamakua: AAF, and AAA.

*Coot in A basin

* Coot chicks in A basin

Generally in this quarter, coot numbers ranged from 14 – 21 with 4 of these chicks. The rain continued through this quarter, and because of this, the ponds had low salinity until June 23. The ponds had a salinity below the stream, which ranged from 35-55ppt. The coots are the least salt tolerant of the 3 waterbirds, and prefer the interior ponds. There were 3 nests that successfully fledged 6 coots.

The coot nest in the northeast end of A basin, had 3 chicks fledge. This territory was the furthest from contact with humans, and also, the furthest from any gallinule nests. I believe this is why this nest had 75% survivorship. A nest on the northwest end of A basin had 1 chick fledge. This nest was harassed by gallinules and stilts. Only 2 chicks of the 3 eggs hatched, and of these, only 1 survived to fledge. The last nest was in a southern pond in the B basin. This pond has deep water, and supported multiple nests without confrontation. Of the 4 eggs, 2 chicks fledged.

By the middle of June, all the ponds had dried up, causing the coots to move back to the stream, or leave for another wetland. On June 23, the City and County of Honolulu removed the sand plug from Kaelepulu Stream. This feeds into Hamakua Stream, and into the marsh. The water level raised 1.5 feet, but then closed on a low tide two days later, leaving the interior with very little water.

During this quarter, coots were primarily seen in the interior of the A, B and C Basins (appendix 3, 4). Coots prefer to nest in locations that have robust emergent plants interspersed with open, fresh water which is

usually less than 3 feet deep. They look for an area with room for takeoff and landing, but still protected from the wind. Salinity levels were taken periodically throughout the quarter.

	Basin A	Basin B	Basin C	Basin D	Total
Stream	0	0	2	0	2
Stream Bank	0	0	0	0	0
Mudflat	0	0	0	0	0
Mudflat/Veg	0	0	0	0	0
0" - 3"	2	0	0	0	2
3" - 6"	4	6	6	0	16
> 6"	0	0	0	0	0

‘Alae ‘Ula

Gallinule had the largest population among the endemic waterbirds within the marsh. Surveys found population counts ranged from 60 to 90, with 32 fledged. Most often, birds were seen inside the mudflat vegetation, popping their heads out of the *Batis*, or on the grassy knoll abutting parking lot or within parking lot. Gallinules generally prefer to nest in locations above open water less than 3 feet, but may choose to nest in dry areas, which leave chicks more easily accessible to predation. Survivorship of gallinule chicks is difficult to ascertain because of their secretive nature.

*Gallinule with 3 chicks along stream in C basin

*Gallinule chick1.5 weeks

Only 10 nests were seen this quarter. They are very secretive birds, and it is common that they are not been seen until the chicks have hatched. With the abundance of water, emerging vegetation, and resources, it seems Hamakua has not reached its carrying capacity. It also seems we have had nesting almost continuously since October of 2012.

	Basin A	Basin B	Basin C	Basin D	Total
Stream	2	0	0	0	2
Stream Bank	0	22	12	0	34
Mudflat	0	0	0	0	0
Mudflat/Veg	0	24	16	8	48
0" - 3"	20	0	0	0	20
3" - 6"	0	0	0	0	0
> 6"	0	0	0	0	0

‘Ae’o

Stilt numbers were between 32 and 50 this quarter. There were an average of 34 adults, with 15 nesting. The first chicks hatched in the beginning of May, and the last in the beginning of June. It seemed like a good year for the stilts, with chicks in all basins. By the second week of June, almost all the water in the marsh had evaporated, and the stilts, gallinules, and coots moved to the stream. As all the birds tried to utilize the stream, they became more hostile. Then, on June 23rd, the City and County of Honolulu opened the sand plug in Kaelepulu Stream, and a flood of water came into the marsh. Some of the stilt chicks were only 1 week old. I was unable to find 18 chicks I had been watching (appendix 5.b) . The adults were still defending their territories, but I did not see the chicks. I may see them in July, but for now, only 6 fledged.

*Stilt chick in A basin – 4 days

*Stilt chick – 12 days

*Stilt chick – 15 days

*Stilt chick – 20 days

The stilts established territories in all basins. When the ponds were filled with water, the stilts utilized the southern areas of the marsh, except for A basin. This is the area furthest from human interaction, and also the least saline water. The batis was overgrown in all basins, but as the water evaporated, more mudflats opened creating more foraging grounds.

	Basin A	Basin B	Basin C	Basin D	Total
Stream	0	0	0	0	0
Stream Bank	0	0	0	0	0
Mudflat	0	0	0	3	3
Mudflat/Veg	12	10	15	0	37
0" - 3"	0	0	6	2	8
3" - 6"	0	0	0	0	0
> 6"	0	0	0	0	0

TRACKING TUNNELS RESULTS

Tracking tunnels are used by conservationists to check for the presence of pest species in a target area. Because predators are often nocturnal, and are not readily seen during daylight, tracking tunnels give an indication of the presence of predators in the area. Tracking tunnels were deployed once per month, from July to present, to monitor trapping success. The construction was compliant with commonly used tunnels, 4" x 5" x 21". This rectangular box had peanut butter bait in the middle, ink pads surrounding the bait, and tracking cards placed on the inside of the tunnel. The tunnels were placed in a variety of areas to get a better understanding of rat activity. At each different spot, the tunnels were deployed overnight to monitor animal activity. The following table shows the results for the quarter with the yearly data as appendix 7.

	4/16/2014	5/20/2014	6/18/2014
Rat signs	0	3	2
No signs	10	7	8
# tunnels	10	10	10
Rat tracks %	0%	30%	20%
Days elapsed	1	1	1

TRAPPING RESULTS

Live trapping, hunting and firearms were used throughout the quarter by the USDA-WS, to control predators in the Sanctuary. 20 traps are placed along the inner fenceline about 180 feet apart (appendix 6). The traps are baited and checked every 48 hours, except over holidays.

A total of 3 ducks, 4 cats, 29 mongooses, and 48 rats were euthanized this quarter. A total of 50 days were spent visiting the site, with 116 hours of field work completed.

	Killed Euthanized	Transfer Custody
Ducks	3	
Cats	4	
Mongooses	29	
Rats	48	

No snap-traps were set in this quarter.

VEGETATION

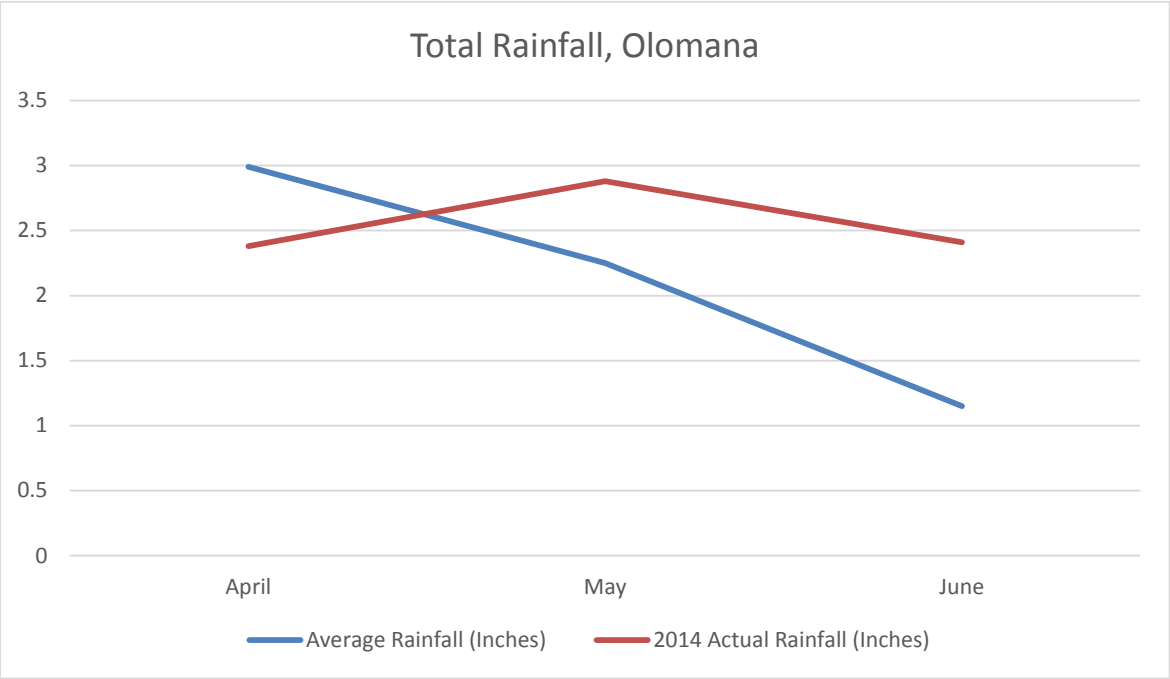
Since the October 2012, invasive species Indian fleabane (Pluchea indica) and koa haole (Leucaena leucocephala) have been targeted and are being removed. Non-native Guinea grass (Urochloa maxima) and California grass (Urochloa mutica) are also targeted for removal, so as to reduce biomass and encourage growth of native plants and non-native Bermuda grass (Cynodon spp.). Bermuda grass populations are encouraged on access roads, outplanting sites, and slopes, to reduce erosion and as foraging ground for native birds.

Mowing along grassy roads and surrounding marsh land has continued. This provides extra foraging grounds for stilts, moorhens, kolea and other birds. Keeping the grass cut low, 2.5", keeps California grass from growing and spreading. The inside of the marsh where the California grass was able to establish and grow during the nesting season, was sprayed, and cut. Weed-whacking the surrounding burms and roadways, has continued.

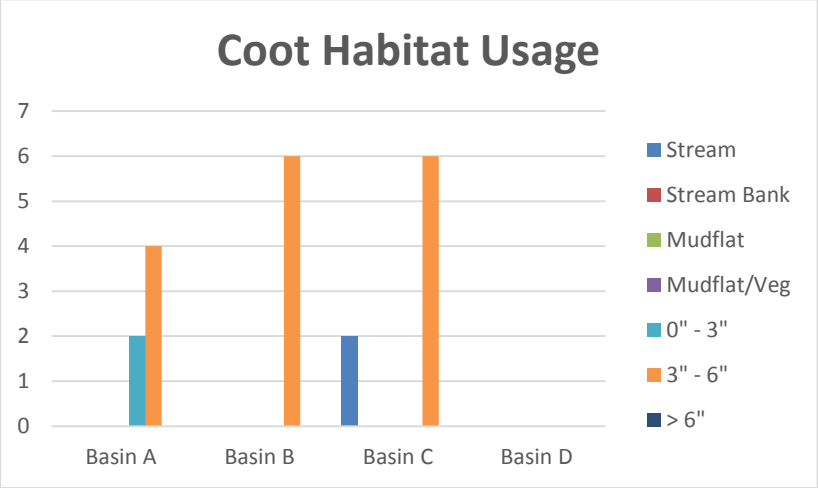
This quarter we also continued cutting and removing vegetation from the fence line on the mauka side of A basin. Clearing the fence line will give us an additional area for nesting and foraging. After the tree removal in June, the area was used by stilts and moorhens with test nests being built. I believe spraying the batis and keeping the surrounding area clear of bushes will create habitat that can support at least two more nests, if adequate water is available.

With nesting occurring in all basins, work within the marsh has stopped. I will be focusing on the fenceline and clearing the vegetation until I am certain there are no nests, and the chicks have fledged.

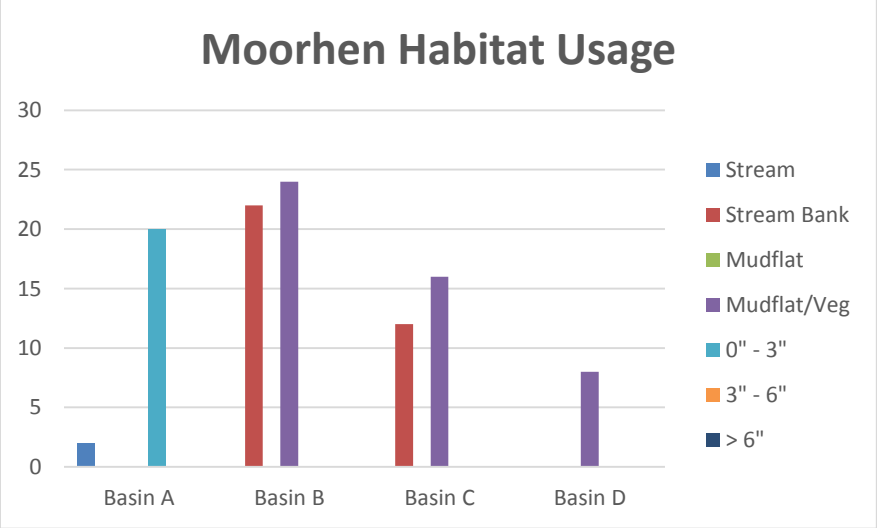
Appendix 1.


Total Rainfall, Olomana
3.5
3
2.5
2
1.5
1
0.5
0
April
May
June
Average Rainfall (Inches)
2014 Actual Rainfall (Inches)

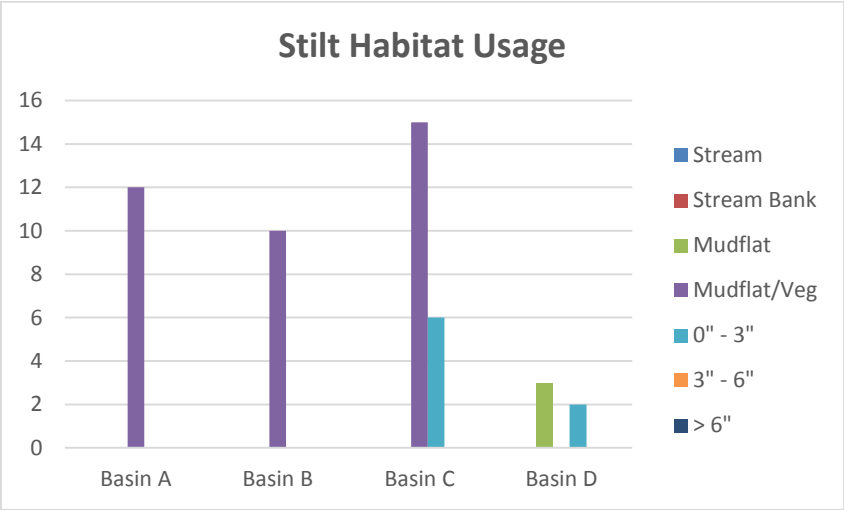
Appendix 2.a.



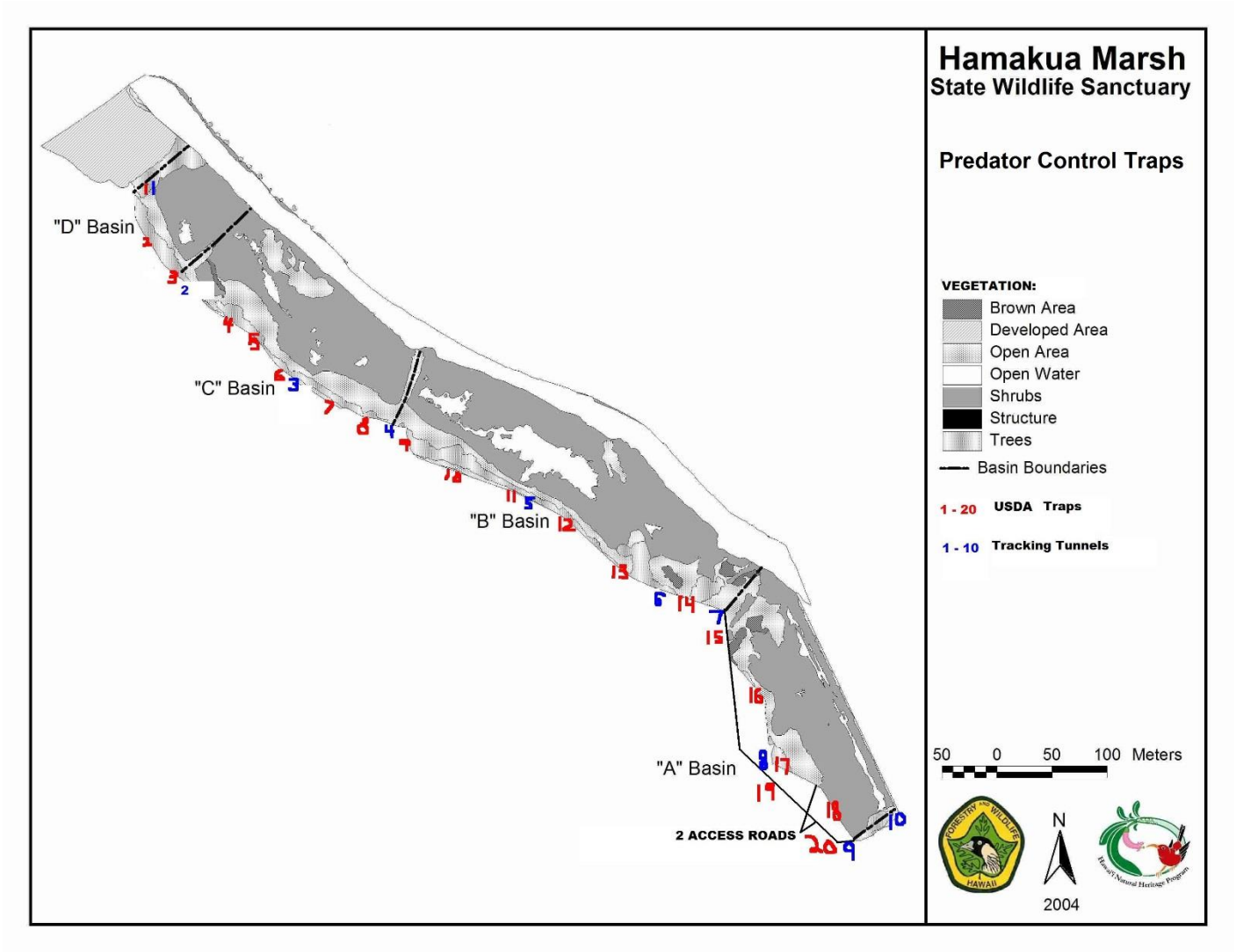
Appendix 2.b.



Appendix 2.c.


Stilt Habitat Usage
16
14
12
10
8
6
4
2
0
Basin A
Basin B
Basin C
Basin D
Stream
Stream Bank
Mudflat
Mudflat/Veg
0" - 3"
3" - 6"
> 6"

Appendix 6.


"D" Basin
"C" Basin
"B" Basin
"A" Basin
2 ACCESS ROADS
Hamakua Marsh
State Wildlife Sanctuary
Predator Control Traps
VEGETATION:
Brown Area
Developed Area
Open Area
Open Water
Shrubs
Structure
Trees
Basin Boundaries
1 - 20 USDA Traps
1 - 10 Tracking Tunnels
50 0 50 100 Meters
N
2004

Appendix 7.

2014 Tracking Tunnel Station

	1	2	3	4	5	6	7	8	9	10
1/22/2014	R	R	0	R	R	0	0	R	0	0
2/20/2014	0	R	R	R	0	0	R	0	0	0
3/19/2014	0	0	R	0	0	R	R	0	0	0
4/16/2014	0	0	0	0	0	0	0	0	0	0
5/20/2014	0	0	R	0	0	R	R	0	0	0
6/18/2014	0	0	0	R	0	0	R	0	0	0

R = mammal tracks present
0 = no tracks present

Appendix 8.

KAHUKU WIND POWER

HAWAIIAN HOARY BAT MITIGATION PLAN

Applicant

Kahuku Wind Power LLC
First Wind
33 Lono Avenue, Suite 380
Kahului, HI 96732

Prepared by

Hawai`i Department of Land & Natural Resources
Division of Forestry & Wildlife
1151 Punchbowl Street, Room 325
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May 2014

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1.0 INTRODUCTION

As per the mitigation requirements described in the Kahuku Wind Power (Kahuku) Habitat Conservation Plan (HCP) (SWCA, 2010), Kahuku Wind Power, LLC (Kahuku Wind) must provide funding for baseline (*i.e.*, Tier 1) mitigation for the authorized take of 12 adult bats and 9 juveniles (see section 6.3.6 of the HCP), which equates to a total of 15 adults (with an estimated 30% survival rate of juveniles to adulthood, see Appendix 5 of the HCP for life history information). According to the HCP, baseline mitigation must consist of, "implementation of bat habitat improvement measures to benefit bats as determined based on the results of ongoing research in consultation with DLNR, USFWS, and ESRC." The Hawaiian hoary bat is an endangered species once thought to be nearly extirpated on Oahu (DLNR, 2005). Current population estimates range from a few hundred to a few thousand, but remains essentially unknown. According to the state Comprehensive Wildlife Conservation Strategy, primary threats to persistence include habitat loss (especially tree cover), pesticides, predation, and roost disturbance (DLNR, 2005).

The HCP states that, "the core area for an adult bat is estimated to be 13.3 ac (5.4 ha, see section 3.4.8.4), therefore, a total area of approximately 200 ac (82.5 ha) may be required for 15 adults, assuming no spatial overlap and no empty territories." The HCP specifies that the approximately 200 acres must be restored at a cost of $150,000. Mitigation measures must contribute to, "preserving or enhancing foraging and/or roosting habitat capable of supporting a commensurate number of bats to achieve the mitigation requirement." Should take occur at a Higher level than baseline (but still within the total limit authorized by the HCP/ITL), then low-wind speed curtailment at the wind facility is required, plus an additional $15,000 - $75,000 towards habitat management. This plan does not outline specific actions to be performed with the additional level of funding, but provides guidance for expanding this project, or selecting a complementary effort that will adequately mitigate for the Higher level of take per the commitments outlined in the HCP (see Section 4.4 of this document).

Currently, there are multiple ongoing restoration efforts being conducted at Kahikinui through various sources of funding. In conjunction with existing monies dedicated toward ungulate removal and reforestation, this document provides a description of the proposed allocation of the $150,000 in mitigation funds to fencing a 254 acre section of the Kahikinui Forest Reserve (FR) and Nakula Natural Area Reserve (NAR) in order to achieve the baseline bat mitigation goals described in the HCP.

2.0 OBJECTIVE

The objective of the mitigation effort is to implement measures that will not only mitigate for the permitted take, but provide a net benefit to the species by increasing population numbers

of the Hawaiian hoary bat via the creation/restoration of available foraging and roosting habitat.

3.0 STUDY AREA

The proposed 254 acre project area is located between the 4,800 to 6,200 foot elevation contours in the Kahikinui FR (Mauka Unit) and the Nakula NAR (Figure 1). The upper reaches of this area are located just below the temperature inversion layer, which settles at about 6,500 feet in elevation. Currently, vegetation in this area consists of about 80 percent non-native grassland, and 20 percent remnant mesic koa-ohia forest with grass understory. Mesic forests are found in the transition zones between dry forest and rainforest in Hawai'i, receiving about 120-150 cm of annual precipitation. Mesic forests are home to a large number of endemic plant species, and provide important ecosystem services in the form of habitat for native animal species and watershed protection.

Over time, restoration efforts are intended to increase native vegetation cover and provide a forest structure suitable for bat foraging, roosting, and breeding. Additionally, the restoration of native forest within the parcel is expected to improve the functional connectivity of habitat within the greater Kahikinui area across the FR, NAR, and the adjacent Department of Hawaiian Home Lands (DHHL) lands.

4.0 PROPOSED MANAGEMENT ACTIONS

As mentioned above, multiple management efforts are occurring in Kahikinui, including efforts to control ungulates, restore and create native habitat, and increase native forest bird populations. The efforts funded by Kahuku mitigation funds will contribute to a broader restoration and conservation management effort in the region, and will not only benefit the Hawaiian hoary bat, but other native plant and animal species as well. This collaborative, concentrated management approach increases the likelihood of success as compared to a similar project that might be isolated and surrounded by conflicting land uses.

The following measures will be implemented using funds provided by First Wind and other sources in a collective effort to improve native habitat.

4.1 Fencing

Approximately 2,100 meters of fence will be constructed to enclose a 254 acre unit located in mesic koa-ohia forest habitat. Work will begin as soon as money and materials are in place. Materials will take 3-6 months to arrive once ordered, and fence installation is estimated to take 3-4 months. Any preliminary costs incurred before funding is in place will be initially covered by NARS and reimbursed with mitigation funding once received.

Cost & Source: $150,000 funded by Kahuku funds – $58,000 materials; $92,000 labor, basic monitoring of species planted, densities, and survivorship. An additional $59,000 will be sought from other sources.

4.2 Ungulate Control

DOFAW Forestry staff will conduct ACETA (aerial capture, eradication, and tagging of animals) missions to dispatch all feral ungulates within the Nakula NAR and Kahikinui FR. These missions will be completed by December 2014. Subsequent missions will be conducted to ensure that these units remain at 'zero tolerance'. Removal of ungulates from the fenced area allows for regrowth of existing native vegetation as well as outplantings planted through reforestation efforts.

Source: Ungulate control work in the fenced area will be conducted with other funding.

4.3 Reforestation

DOFAW has secured a State and Private Forestry grant for $225,000 to purchase roughly 70,000 trees, of which approximately half will go into this new fenced unit in winter of 2014-2015. DOFAW will also be funding weed surveys and control as well as monitoring outplantings. Species to be planted include koa, ohiʻa, mamane, ʻaʻaliʻi, and other native species as needed.

Source: Reforestation efforts will be supported by grant monies.

4.4 Mitigation for Higher Level of Take

Page 96 of the HCP states, "An additional negotiated amount of $15,000 up to a maximum of $75,000 will also be provided to implement appropriate Hawaiian hoary bat management measures when identified….This funding will be used to conduct mitigation measures that will be deemed appropriate to compensate for the requested take at the Higher tier."

Given that the timeframe for when/if bat take at the Kahuku facility will reach the Higher level is unknown, specific measures for implementation are not outlined here. Possibilities for mitigation include the following:

- Contributing all or a portion of the additional $59,000 needed to complete the fence around the 254 acre unit;
- Funding all or part of ungulate removal efforts within the unit;
- Contributing funding to support similar ungulate removal and reforestation efforts in other parts of Kahikinui as needed (*e.g.*, the Nakula 420 unit or the Kahikinui FR Mauka Unit);

- Contributing to USGS's (or another entity as appropriate) efforts to monitor bat activity in Kahikinui; or
- Another measure as determined in consultation with DLNR and USFWS.

5.0 SCHEDULE AND DURATION

Table 1 provides a tentative schedule for mitigation activities.

Table 1. Preliminary Schedule of Mitigation Activities*

Implementation Activities	Fiscal Year 2015				Entity Responsible
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	
Fence Construction	XX	XX			DOFAW Maui Nui Branch
ACETA Activities	XX	XX			DOFAW Maui Nui Branch
Plant Procurement		XX			Obtained from Native Nursery (or other approved vendor) by DOFAW
Initial Planting of Overstory Species		XX	XX		DOFAW Maui Nui Branch
Weed Surveys & Control		XX	XX	XX	DOFAW Maui Nui Branch

*This project will be completed within 6 months of the time the funds are available for encumbrance.

6.0 MONITORING & MEASURES OF SUCCESS

According to the HCP (page 97) management measures will be considered successful if, "…Kahuku Wind Power contributes $25,000 to $150,000 (for take at or below Baseline) within 6-months of beginning project operations, plus an additional $15,000 to $75,000, for take at a Higher tier within 6-months of the determination, to fund management that is commensurate with the requested take at the required ties, and the management is carried out and is agreed upon by USFWS and DLNR to provide a net benefit to the species."

While no specific measures pertaining to forest cover or bat activity are described in the HCP, monitoring will be conducted by DOFAW Forestry staff and/or Leeward Haleakala Watershed Restoration Partnership staff at least twice annually and potentially up to once a quarter, pending resource availability. An Annual Report will be produced by DOFAW at the end of each fiscal year describing the activities that took place during the year (*e.g.*, fence construction/ incursions, weed control, bat detections, etc.), documenting the

species present, visual assessment of canopy cover, and describing forest structure.

DOFAW, via a collaborative agreement, provided funding to USGS through a Section 6 Habitat Conservation Planning Assistance Grant to conduct pre-restoration baseline monitoring throughout Kahikinui, in order for the State to determine management options for net benefit for bats. Deliverables from USGS will include a species distribution map detailing areas of high, low, or zero bat occupancy; potential seasonal habitat use through an annual cycle; identification of bat foraging areas; and recommendations for management provisions for net benefit for bats. These deliverables are expected in early 2015.

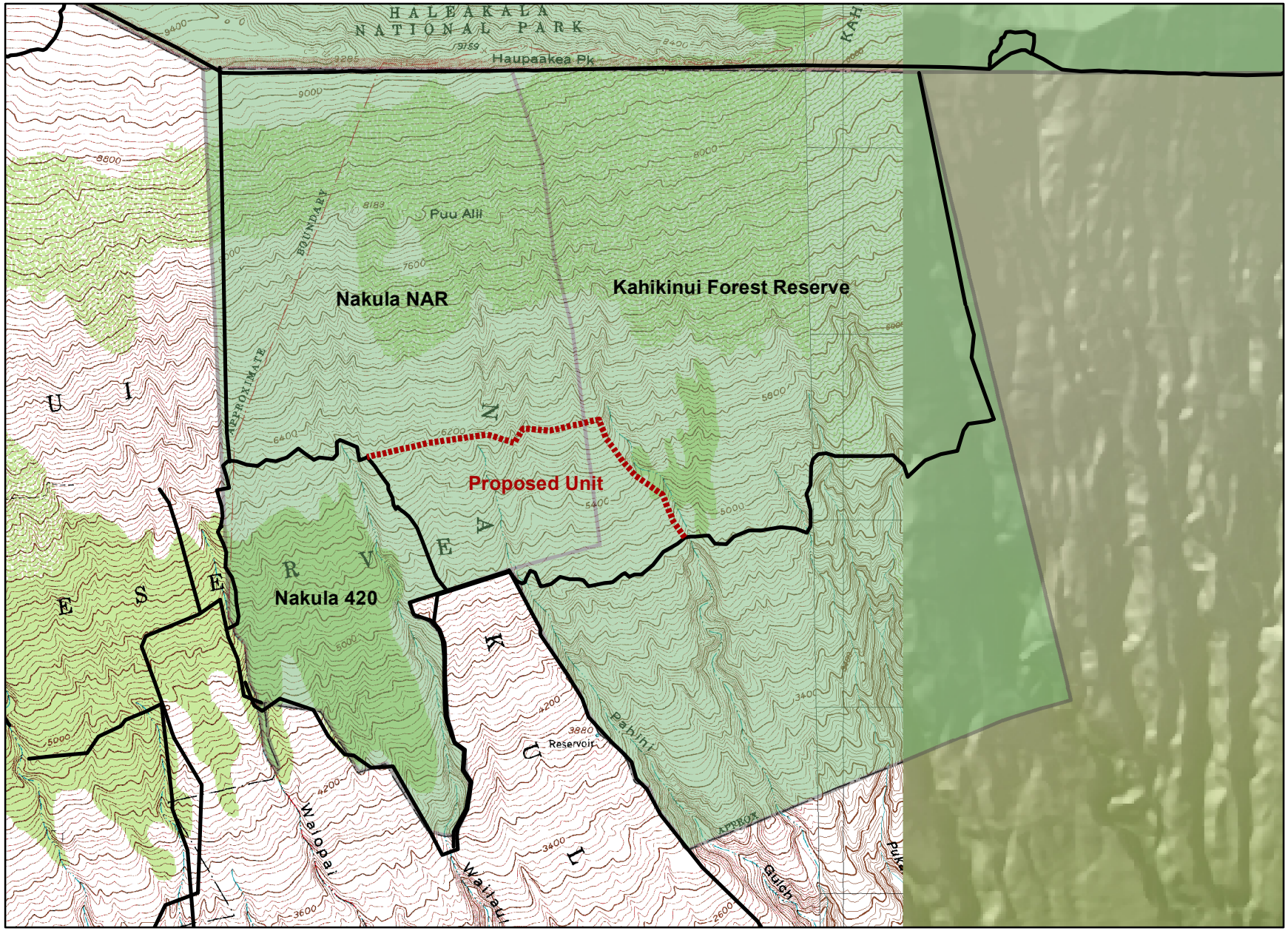
Although support from Kahuku mitigation funds is not required, subsequent surveys to monitor changes in bat activity levels over time in Kahikinui will be conducted through other sources of funding. As described in Section 4.4, some portion of Higher tier mitigation funding could contribute to this effort, if agreed upon by Kahuku Wind, DOFAW, and USFWS. Data gathered will aid in evaluating the success of collaborative restoration efforts in improving bat habitat in Kahikinui as a whole.

7.0 REFERENCES

DLNR. 2005. Hawaii's Comprehensive Wildlife Conservation Strategy. As submitted to the National Advisory Acceptance Team, October 1, 2005.

SWCA. 2010. Kahuku Wind Power Habitat Conservation Plan. Prepared for Kahuku Wind Power, LLC.

Figure 1. Fencing for Kahuku Bat Mitigation



Appendix 9. Expenditures at KAH in FY 2014.

Category	Amount ($)
HCP Labor	128,994
Fatality Monitoring	27,639
Permit Compliance	29,525
Mitigation	297,142
Equipment and Supplies	13,429
Travel	2,000
Total	498,729