Kaheawa Pastures Wind Energy Generation Facility
Phase II
Habitat Conservation Plan

FY-2013 Annual Report: Year 1 HCP Implementation

State of Hawaii ITL No. ITL-15 and USFWS ITP No. TE27260A-0

Prepared by

First Wind
Kaheawa Wind Power, LLC
3000 Honoapiilani Highway
Wailuku, Hawaii 96768

August, 2013

KAHEAWA PASTURES WIND ENERGY GENERATION FACILITY
PHASE II
HABITAT CONSERVATION PLAN

YEAR 1 HCP IMPLEMENTATION
July 1, 2012 – June 30, 2013

FIGURES

TABLES

APPENDICES

Recommended Citation: Kaheawa Wind Power, Phase II LLC. 2013. Kaheawa Pastures Wind Energy Generation Facility, Habitat Conservation Plan: Year 1 Annual Report. First Wind Energy, LLC, Wailuku, HI 96793.

I. EXECUTIVE SUMMARY

Construction of the Phase II Kaheawa Wind Power Facility (KWPII) was completed in June, 2012. Operations and full-scale monitoring began July 2nd 2012. The State Board of Land and Natural Resources approved a Conservation District Use Application (CDUA) for the proposed facility, which is situated on State conservation lands, in August 2010. Pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, and under a similar program, Chapter 195-D, Hawai`i Revised Statutes, First Wind developed a project-specific Habitat Conservation Plan (HCP) similar to the Phase I Kaheawa HCP, in cooperation with the USFWS, DLNR and the Hawai`i Endangered Species Recovery Committee (ESRC). Upon final approval of the Phase II HCP, the federal ITP (TE-2760A-0) and State ITL (ITL-15) were issued in January 2012. This report summarizes how KWP II has implemented the provisions of the HCP during the second year of mitigation and first full year of project operations (July 2, 2012 through June 30, 2013), as specified under the HCP.

Direct take of one Nene and one Hawaiian Hoary Bat were documented at KWP II during Year 1. Applying the results of monitoring, including Searcher Efficiency (SEEF), Carcass Removal (CARE), and Indirect Take; we estimated adjusted take using Shoenfeld and Huso estimators for Nene to be 1.206-1.38 birds during Year 1. Similar adjustments were used to estimate take of 2.237-3.34 Hawaiian Hawaiian Hoary Bats in Year 1 of the project. No take of Newell's Shearwater or Hawaiian Petrels have been documented at KWP Phase II.

As part of the joint mitigation between Kaheawa Phase I and Phase II for Hawaiian Petrels and Newell's Shearwaters, construction of a predator-resistant fence at Makamaka'ole began January 2013. Mitigation planning for seabirds is ongoing and includes contingency field studies and monitoring at other locations on Maui. Mitigation for the Tier 1 level of take for Hawaiian hoary bats was provided in 2013 in the form of funding for DOFAW's implementation of the Kahikinui Forest Restoration Project. In addition, since June 3, 2009 KWP biologists have been conducting acoustic monitoring of bats at Kaheawa Phase II using remote acoustic data loggers. There were eight individual bat call sequences which qualified as "passes" documented from July 1, 2012 through June 30, 2013 on Phase II of Kaheawa Wind Power and a total of 24 passes throughout the entire KWP project site. Consistent with past years, bat activity in 2012-2013 appeared highest in the fall with the majority of bat passes documented during the months of August-October.

In addition to these specific mitigation measures for HCP covered species, KWP II maintains an active wildlife education and outreach program (WEOP) for all personnel on site including staff, contractors, and visitors. Throughout the KWP I and II project site, 52 WEOP orientations were given to personnel and visitors during FY 2012-2013.

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.

8/02/2013

Mitchell Craig
Hawaii HCP Manager
First Wind Energy, LLC

II. 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 Application (CDUA) for the proposed facility, which is situated on State conservation lands, in August 2010. Condition 15 of the CDUA (as amended in November 2010) requires that KWP II obtain both a federal Incidental Take Permit and state Incidental Take License prior to erecting turbines on the site.

Pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, the U. S. Fish and Wildlife Service (USFWS) may permit, under certain terms and conditions, the "taking" of a listed species that is incidental to, and not the purpose of, an otherwise lawful activity. To qualify for a federal Incidental Take Permit (ITP) an applicant must develop, fund, and implement a USFWS-approved Habitat Conservation Plan (HCP) to minimize and mitigate the effects of the incidental take. Under a similar program, Chapter 195-D, Hawai`i Revised Statutes authorizes the Hawai`i Department of Land and Natural Resources (DLNR) to issue an Incidental Take License (ITL).

In fulfillment of this condition, KWP II developed a project-specific HCP that is similar to, yet separate from, the KWP Phase I HCP. The HCP was prepared in consultation with the USFWS, DLNR and the Hawai`i Endangered Species Recovery Committee (ESRC). Upon final approval of the HCP, the Federal ITP (TE-2760A-0) and State ITL (ITL-15) were issued in January 2012, each with a duration of twenty (20) years.

As prescribed in Condition K(iii) of the USFWS ITP, annual reports summarizing the results of downed wildlife monitoring will be prepared and submitted to DLNR and the Service. These reports will identify: (1) actual frequency of monitoring of individual search plots; (2) results of searcher efficiency trails and carcass removal trials with recommended statistical analyses, if any; (3) directly observed and adjusted levels of take for each covered species; (4) whether there is a need to modify the mitigation for subsequent years; (5) efficacy of monitoring protocols and whether monitoring protocols need to be revised; (6) results of mitigation efforts and anticipated 20-year benefits of mitigation; (7) recommended changes to mitigation efforts, if any; (8) budget and implementation schedule for the upcoming year; and (9) evidence of KWPII's continued ability to fulfill funding obligations. The annual report will be submitted by August 1 each year along with electronic copies of HCP related data. The report will cover the period from June to July of the previous year. The Service and DLNR will have fifteen calendar days to respond to the report, after which a final report incorporating responses to the agencies will be submitted by September 1.

This report summarizes how KWP II has implemented the provisions of the HCP during the second year of project operations (July 1, 2012 through June 30, 2013). Year 1 activities have continued to include measures to monitor and minimize the risks of adverse effects (i.e., take) on the four listed species, and

mitigate for take to accomplish a net ecological benefit for each covered species. (Kaheawa Pastures II Year1 Annual Report)

III. AVIAN AND BAT FATALITY MONITORING

Monitoring Surveys to Document Downed Wildlife

KWP II biologists have implemented a year-round monitoring program to document HCP-listed and non-listed downed wildlife species throughout the project site. Intensive surveys on Phase II of Kaheawa Wind Facility began July 2012. Foot searches conducted by trained monitors as prescribed in the HCP have been the standard method used in site surveys throughout the facility. Searchers monitor all 14 wind turbines out to 75 meters from the base of the turbine by following parallel transects at 6 meter spacing. Steep pad cut/fill slopes are searched using rappelling equipment.

Downed wildlife monitoring in Year 1 consisted of systematic searches of all 14 WTGs on a weekly basis with a goal of maintaining an average search interval of not more than 7 days. The average search interval across all fourteen turbines was 7.62 days. Due to high winds occurring over 15 meters per second, search activities were restricted November 19-23, 2012 December 24, 2012- January 1, 2013, January 7-23 2013, and February 18-28 2013. Other periods of high winds occurred but did not last more than five days.

Searcher Efficiency Studies

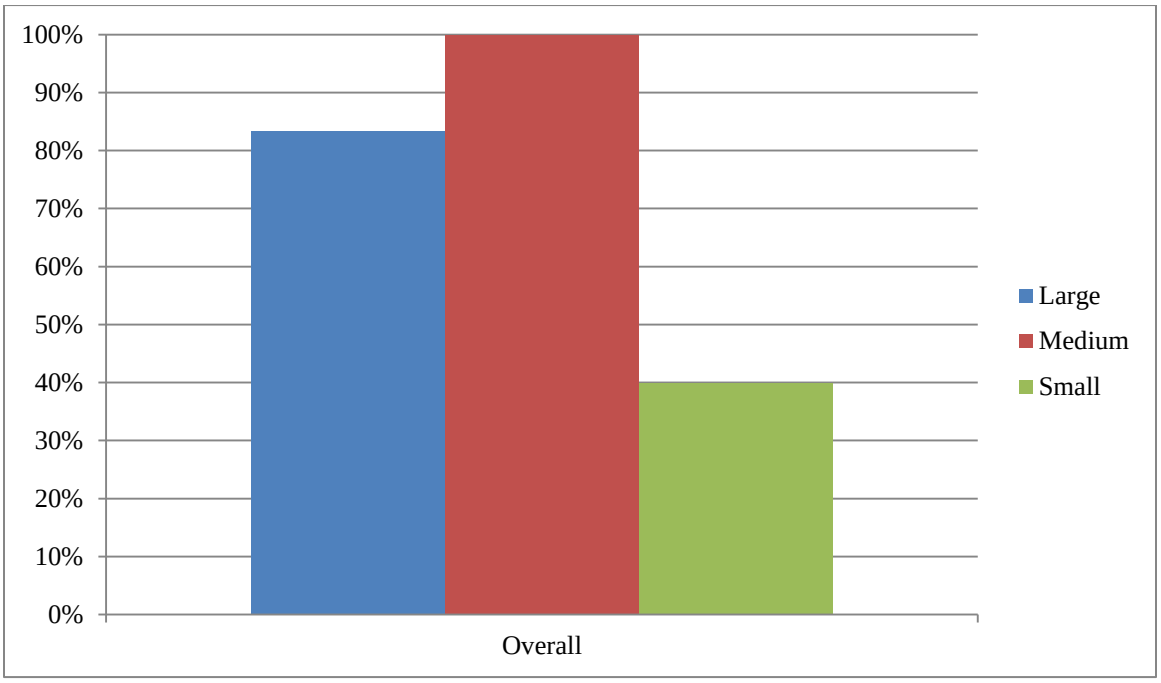
Searcher efficiency studies (SEEFs) are conducted to provide estimates of carcass detection probability. SEEF trials are controlled by a proctor. Large, medium and small carcasses of Canadian Geese (CAGO), Wedge-tailed Shearwaters (WTSH), and Norway Rats (NORA) or Domestic Mouse (DOMO) respectively, are used as surrogates for ESA species. Carcasses are placed using randomly generated points.. Searchers are not informed in advance of the trial. GPS waypoints of the surrogate's locations are taken and visibility/vegetation classes are documented.

Many environmental factors are known to affect the ability of a searcher to detect a fatality. At the recommendation of the USFWS and DOFAW, KWP developed a vegetation classification system for the ground cover displayed at each randomized point. Classifications are noted as bare and grass, ground cover is markedly different in contrast to KWPI and there was found to be no need for a shrub vegetation classification. Searcher efficiency is analyzed for each vegetation classification.

In Year 1 of KWP Phase II, 29 SEEF trials were performed at the site using large (N=6), medium (N=3), and small (N=20) as surrogates for HCP species. Results of the trials varied by vegetation class and by

surrogate. Generally, there is a decline in detection rate from bare to grass vegetation classifications. Though the sample size is too small to gather strong conclusions, medium-sized surrogates appear to have a higher detection percentage than the large-sized birds. It is possible this is due to the light coloration of the sea birds, allowing them to be more visible against the red dirt.

Figure 1. SEEF Trial Results



Carcass Removal Trials

Carcass Retention Trials (CARE) are studies used to estimate the time an avian or bat carcass remains detectable to searchers before being removed by scavengers or otherwise rendered undetectable. During Year 1 of Kaheawa Phase II, a total of 23 HCP surrogates were placed randomly throughout the site; eight small mammals (four DOMO and four NORA), seven medium-sized avian surrogates (WTSH), and four large-sized avian surrogates (CAGO) were observed for predation in bare, and grass vegetation classes. The length of time the carcasses remained visible to monitors was determined and recorded in days. Photographic evidence was also used to supplement scavenging and condition code classification. On each day the carcass was checked the status and condition of carcasses were assessed based on presence/absence, evidence of scavenging and/or decomposition, change in the location, and overall condition of the carcass. Mean carcass persistence time was calculated for each carcass size class by summing the retention time for each carcass and dividing by the total number of carcasses used in the trial (Table 1).

Table 1. Carcass Retention Trial Results

Size Classification	Large		Medium		Small	
	Average Retention Time (days)	Range (days)	Average Retention Time (days)	Range (days)	Average Retention Time (days)	Range (days)
Year 1	27	24-28	23.86	21-27	12.625	3-28

All trials were monitored for a minimum of 21days or until the carcass was no longer present; in the future KWPII carcass trials will be changed to a 30 day minimum monitoring period (Appendix 3). Towards the end of the fiscal year, biologists at KWP also found that the Norway Rat was a much closer surrogate to the Hawaiian Hoary Bat than the previously used surrogate, a mouse. Both surrogates were incorporated into the CARE trial data and retention times were averaged with the same weight.

Direct Observations of Incidental Take

Table 2. Documented wildlife fatalities at Kaheawa Wind Power II in Year 1

Species	Date	Location (WTG)	Distance to turbine (m)	Type of detection
HCP Covered Species				
Hoary Bat	03/13/13	6	17	Routine
Nene	04/22/13	1	31	Routine
MBTA and Other Non-Covered Species				
Apapane	12/22/12	6	60	Routine
Pigeon	07/30/12	14	300	Incidental
Eurasian Skylark	02/08/13	2	27	Incidental
Eurasian Skylark	03/05/13	2	7	Routine
Dove	03/07/13	Substation	1	Incidental

Downed wildlife incidents documented at KWP II during Year 1are summarized in Table 2. Two of these incidents involved HCP-covered species - one Hoary Bat and one Nene, each found during routine searches. These incidents were reported to DOFAW and USFWS within 24 hours and written reports detailing each incident were submitted to DOFAW and USFWS within 5-7 calendar days of discovery.

HCP Covered Species

Hoary Bat

The Hoary Bat fatality at WTG 6 was discovered on March 13, 2013 during a routine search. The last search date recorded was March 5, 2013. However, there were no insects present and minimal signs of

decomposition suggesting that the incident had occurred recently. The carcass was discovered in proximity to WTG 6, thus cause of death was likely due to collision with the turbine. Operations data indicated that turbines had been operating the previous night. The most recent recorded bat pass, on 10/19/12, was approximately 150 m southeast of WTG 6. Wind speed data gathered by meteorological instrumentation on site for the week preceding the fatality ranged between 3-12 m/s with variable wind direction

Nene

The Nene fatality at WTG 1 was discovered during a routine search on April 22, 2013, last day searched was April 15, 2013. The lower portion of the carcass was severed at the abdomen and legs; the right wing was also missing. The feathers were still intact and flesh was exposed near the abdomen. There were insects present on the carcass and the eyes were dried out. The injuries sustained by the bird and its proximity to WTG 1 suggest that the fatality was due to collision with the turbine. A profile of wind speed data gathered from meteorological instrumentation on WTGs was examined for seven days prior to discovery of the fatality. Wind speeds were variable but ranged between 3-11 m/sec over this period of time wind direction was WNW.

Estimating the Adjusted Take of Covered Species

The Observed Direct Take (ODT) is a fundamental variable that is adjusted by applying results of SEEF, Carcass Removal (CARE) Trials, and search frequency to estimate the Total Direct Take, as described in Section V of the HCP. In Year 1, there were two (2) occurrences of Observed Direct Take (ODT) of Covered Species documented at KWP II. In each case the cause of death is assumed to be project-related based on eye-witness reports and the proximity of the remains to project structures.

As presented in Section V of the HCP, the components that go into estimating the Adjusted Take are, a) Observed Direct Take, b) Unobserved Direct Take, c) Indirect Take, and d) Loss of Productivity. The SEEF and CARE results are used to estimate the Unobserved Direct Take (UDT). To calculate adjusted estimates of the number of Nene and Hawaiian Hoary Bat fatalities that occurred on KWPII in Year 1, based on one ODT of Nene and one ODT of a Hawaiian Hoary Bat, we used an estimator, *m*, as proposed by Shoenfeld (2004) and Kerns and Kerlinger (2003) to estimate fatality rates using the formula:

$$m = \left(\frac{N*I*C}{k*t*p}\right)\left(\frac{e^{I/t}-1+p}{e^{I/t}-1}\right)$$

where *I* (search interval), represents the number of days between plot searches, *N* is equal to the number of turbine search plots, *k* is the number of plots searched (in the case of KWP II, *N* and *k* are the same

value), *t* is the mean carcass retention time, *p* is used to represent the detection probability (searcher efficiency), $e^{I/t}$ is a logarithmic value, and *C* is the actual number of carcasses observed (ODT). As a comparison to the estimates provided by Shoenfeld (2004), an estimator proposed by Huso (2008) was also used to calculate take of covered species using the same adjustment variables for carcass retention, searcher detection efficiency, and search frequency.

Indirect take resulting from the loss of eggs or dependent young is taken into consideration on a species-specific basis and is dependent on the time of year in which the take occurs. Timing of each incident provides a basis for applying indirect take, while necropsy or examination reports are expected to provide information on cause of death, condition of the individual, gender, maturity, and reproductive status.

The Nene incident in late April, 2013 was documented during the end of the breeding season which normally lasts from August to April. At this time, it is possible that breeding birds would be provisioning newly hatched goslings. On this basis First Wind assumes there was potential for Indirect Take. Conversely, the Hawaiian Hoary Bat fatality documented on March 13, 2013 has a breeding season from to April to August, with the fatality occurring before the beginning of the breeding season. In this case, without further necropsy analysis, First Wind will assume there was no indirect take.

Table 4 (below) provides a summary of the variables used in the Shoenfeld (2004) mortality estimator for Nene and Hawaiian Hoary Bats in Year 1, where the search interval (I) corresponds to the mean inter-search interval during the month the take was observed (and which is fairly constant throughout the year) and the most-recently estimated carcass retention time (t) or an average of all retention times, whichever is more representative.

Table 4. Variables used in Shoenfeld (2004) to estimate Total Direct Take of Nene and Hawaiian Hoary Bats at Kaheawa Wind Power Phase II during Year 1.

Species	Date	C	N	K	I	t	p	$e^{t/I}$	Indirect take	m	Total est. take
NENE	April 22, 2013	1	14	14	7.62	27	.83	1.326	0.04	1.206	1.254
HOBA	March 13, 2013	1	14	14	7.62	12.625	.40	1.829	0	2.237	2.237

Estimating the total adjusted take for Nene and Hawaiian Hoary Bats in Year 1 using the Huso estimator (2008) yielded a slightly lower estimate of take for Nene than results using Shoenfeld (2004); however Huso's estimator yielded a higher estimate of take for Hawaiian Hoary Bats.

Table 5. Equation values used in the Huso (2008) estimator of mortality to estimate the Total Direct Take of Nene and Hawaiian Petrels at KWP in fiscal year 2012.

Parameter	**Nene**	**HOBA**	$\hat{m}_{ij} = \cdot$
Observed Direct Take (c_{ij})	1	1	
Carcasses Retained through *I* (r_{ij})	0.87	0.75	
Carcass Detection Probability (p_{ij})	0.83	0.40	
Search Interval (*I*)	7.69	7.69	
Proportion of Plots Searched	1.0	1.0	
Effective Search Interval (e_{ij})	1	1	
m_{ij} =	**1.38**	**3.34**	

Evidence of Absence

Created by the U.S. Geological Survey in 2013, Evidence of Absence software is an estimation tool for estimating bird and bat mortality at wind energy facilities when zero or very few carcasses are found during search periods. These low numbers or absence of fatality may or may not produce evidence that few downed wildlife events occur, depending on the quality of the searches.

KWP had the opportunity to discuss this new tool with the Agencies in June 2013. Tables resulting from the tool are located in Appendix 4. Results for Nene and Hawaiian Hoary Bats (HOBA) are shown in the table below.

Table 3. Evidence of Absence Estimates

Species	Overall Mean Estimate	Tier 1	Tier 2	Over Tier 1 Level of Take?
Nene	1.205	8 adults/ immatures and 1 fledgling	12 adults/immatures and 3 fledglings	No
HOBA	2.813	6 adults/immatures and 5 juveniles	9 adults/immatures and 5 juveniles	No

IV. MITIGATION INITIATIVES

Nene Mitigation

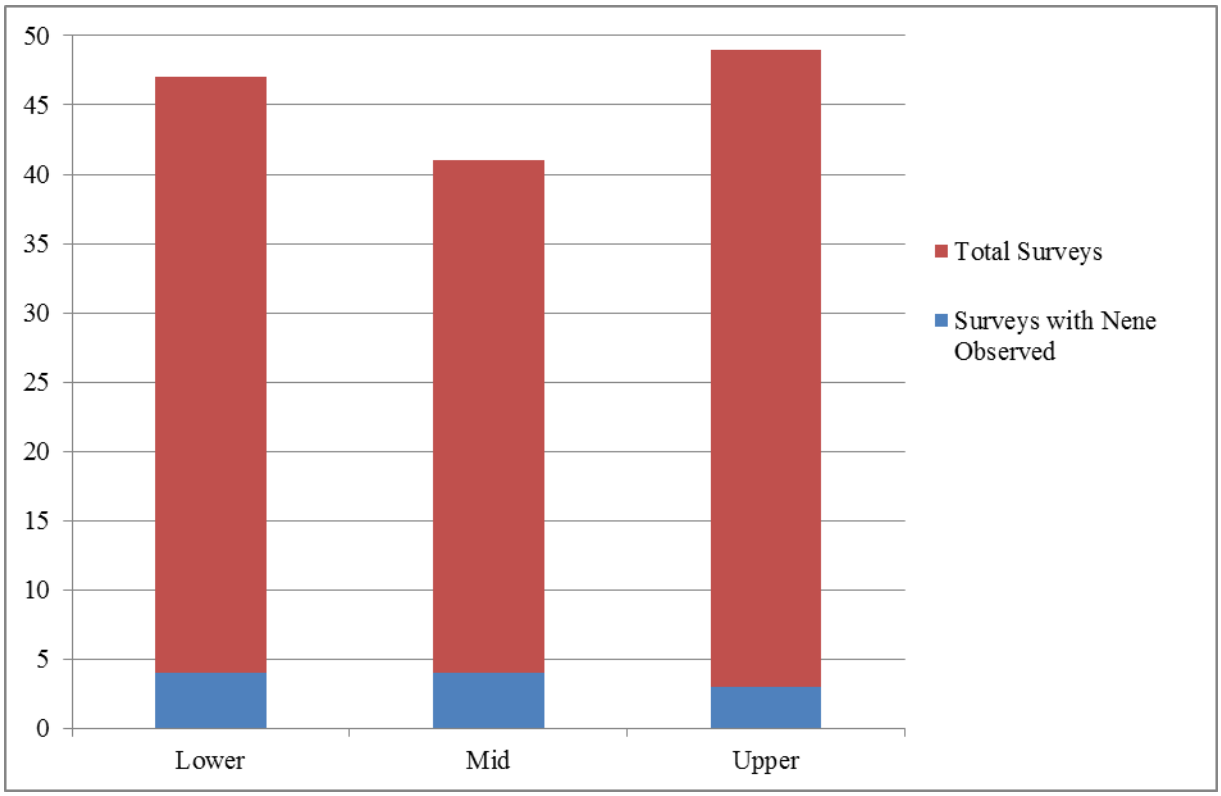
The KWP II HCP indicates that mitigation for Nene will occur in the form of a Nene release pen before June 2015 or earlier with six months notification from DOFAW. Management of the release pen during preconstruction and construction will also be responsibility of First Wind staff.

Intensive Nene Monitoring

In accordance with KWPII HCP, systematic visual observations of Nene were made at KWPII during Year 1. Nene activity was monitored from one turbine within upper, middle, and lower sections of the site for at least 3 hours each week. Monitoring times and locations were chosen at random. As prescribed in the HCP, "the objectives of these observations will be to document how Nene use the project area following construction and to record observations of Nene behavior and activity in the vicinity of the WTG's". The objective of these observations will be to document how Nene use the project area following construction and to record observations of Nene behavior and activity in the vicinity of the WTGs, including in-flight response to collision hazards (e.g., changing flight direction to avoid WTGs).

Observation data showed that Nene activity around KWP II is rather low. Out of the 126 observation periods, only 11 surveys reported seeing or hearing Nene. Due to the low numbers of observations it is difficult to assess how Nene use the area following construction. Additional data collection of Nene activity at KWPII will continue for the life of the project through the Wildlife Education Observation Program (WEOP).

Figure 2. Intensive Nene Monitoring Results



Seabird Mitigation at Makamaka'ole

Mitigation for the two seabird species (Hawaiian petrel and Newell's shearwater) is being implemented in conjunction with KWP I. The primary mitigation entails construction and management of two predator-free fenced enclosures (one for each species), provisioned with artificial burrows and social attraction, at the Makamaka'ole site in West Maui. Permits for the enclosures were obtained in late 2012/early 2013. Construction of Enclosure A (Newell's enclosure) began in early 2013 and was subsequently put on hold during the rainy season. Construction recommenced in April and enclosure A was completed in late May (see Figure 3).

Figure 3. Makamakole Enclosure "A"

Supplemental Seabird Mitigation Investigations

In accordance with the approved KWP II HCP, during the first 5 years following ITP issuance, First Wind will conduct surveys consisting of at least 14 survey nights, and no more than 20 nights, not necessarily consecutive, for each site where access is granted and evidence suggests birds are present in sufficient numbers between the months of May-August. Site surveys were initiated at Kahakuloa in June 2012, permits have been obtained permits to conduct the remaining surveys. Avian monitoring is scheduled to continue during Year 3 of the project. Due to survey and permitting restrictions, First Wind is currently exploring site options on East Maui.

Hawaiian Hoary Bat

Hawaiian Hoary Bats have been monitored via acoustic detection on KWPII since June 3, 2009. Two Anabat unit stations were added once operation of KWP Phase II commenced on June 29, 2012.

Summary data provided in Table 4 (below) include the total qualifying bat passes recorded for operating detectors in Year 1. Passes are defined as a call sequences containing two or more distinct pulses. Detection rates were calculated for each detector based on the number of bat passes and the number of nights during the deployment period in which the detectors were fully operational (also known as detector-nights). In order to assure a high rate of detection, units were pulled from the field for maintenance during various points in the year, slightly lowering the total number of detector nights. Environmental factors such as low amounts of sunlight affecting the solar chargers, and high wind levels causing possible equipment malfunction also influenced the number of total detection nights recorded.

Table 4. Frequency of Hawaiian Hoary Bat passes recorded by Anabat acoustic detectors at Kaheawa Wind Power, West Maui, July 2011 – June 2012.

Detector ID	Deployment Dates	Detector Nights	Passes	Total Detection Rate (passes/detector night)
14	7/1/2012-6/30/2013	213	4	0.019
18	7/1/2012-6/30/2013	203	4	0.020
27	6/29/2012-6/30/2013	143	0	0.000
28	6/29/2012-6/30/2013	140	0	0.000

Overall, eight qualifying bat passes were documented within the monitoring area from July 1, 2012 through June 30, 2013. The majority of the documented passes were recorded during the months of September and October, this has been the trend throughout the KWP project site since collection of acoustic data began.

V. WILDLIFE EDUCATION AND OBSERVATION PROGRAM

Personnel Orientations and Incidental Reporting

The Wildlife Education and Observation Program (WEOP) orientations include verbal and visual descriptions of the covered species, an overview of requirements and guidelines for minimizing interactions and disturbance to wildlife, and instructions for reporting observations. In addition, all staff and project personnel are given two laminated fact sheets explaining the natural history of each HCP covered species along with detailed procedures for promptly reporting any downed wildlife events. Throughout the year staff update the WEOP database. Data collected enables KWP and contractor personnel to anticipate the likelihood of encountering Nene on the site. These measures enable project personnel to report their observations and exchange important information with wildlife staff in a timely and proactive manner. During Year 1, 53 WEOP orientations were provided for various contractors, staff, and visitors (Table 3).

Table 5. Individuals provided WEOP orientation at KWP I and II

Date	Name	Affiliation
7/11/2012	[redacted]	GE
7/11/2012	[redacted]	GE
8/23/2012	[redacted]	Aloha International
9/7/2012	[redacted]	Ropeworks

9/7/2012	[redacted]	Ropeworks
9/7/2012	[redacted]	Ropeworks
9/7/2012	[redacted]	Outland
9/7/2012	[redacted]	Outland
9/10/2012	[redacted]	FW
9/24/2012	[redacted]	XP
10/25/2012	[redacted]	Ropeworks
10/29/2012	[redacted]	Ropeworks
11/12/2012	[redacted]	GE
2/13/2013	[redacted]	GBI
2/13/2013	[redacted]	GBI
2/13/2013	[redacted]	GBI
2/13/2013	[redacted]	GBI
2/13/2013	[redacted]	GBI
3/4/2013	[redacted]	Altres
3/7/2013	[redacted]	VIF
3/7/2013	[redacted]	VIF
3/8/2013	[redacted]	First Wind
3/8/2013	[redacted]	First Wind
3/8/2013	[redacted]	First Wind
3/25/2013	[redacted]	GE
4/10/2013	[redacted]	Altres
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	USEA
4/19/2013	[redacted]	USAID
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	MECO
4/19/2013	[redacted]	USAID Indonesia
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN
4/19/2013	[redacted]	PLN

4/19/2013	[redacted]	USEA
4/19/2013	[redacted]	JD DTG
4/19/2013	[redacted]	DU-WATTS Electric
5/16/2013	[redacted]	Kokomo Drywall
5/16/2013	[redacted]	First Wind
5/16/2013	[redacted]	Simplex Grinnell
5/16/2013	[redacted]	Zari Consulting Group
5/20/2013	[redacted]	First Wind
5/20/2013	[redacted]	First Wind
5/20/2013	[redacted]	First Wind
6/7/2013	[redacted]	GE
6/24/2013	[redacted]	First Wind

A Wildlife Observation Logbook is posted on site and enables all staff and contract personnel to record the details of their observations of HCP and non-HCP covered wildlife. The logbook contains fields for entering data that include:

- Observer Name, Date and Time of observations
- Species and Number of Individuals
- Location
- Proximity to Wind Turbine(s) and other Structures
- Apparent Behavior
- Estimated Height Above Ground (in meters) if observed in flight
- Flight Direction
- Pertinent Comments
- Weather

The Logbook has proven an effective means of obtaining observations that might otherwise have not been possible relying on verbal communication alone. The WEOP guidelines and protocols have significantly improved our ability to track and monitor the movements of Nene and other wildlife on site, even when environmental staff can not directly observe their presence. Throughout Year 1 of KWPII, 24 Nene sightings and one Short-eared Owl sighting were logged. WEOP data of Nene suggests that there is a positive correlation between elevation and Nene presence on KWPII. All sighting recorded in the WEOP logbook were found above WTG-7. Observations recorded for KWP in the WEOP logbook during Year 1 are summarized in Appendix 5.

VI. BOTANICAL RESOURCES

Minimizing and Managing Invasive Species

KWP continues to work actively with stakeholders, agency staff, construction teams and contractors, and several conservation groups on Maui to minimize the ingress of undesirable invasive plant species in the Kaheawa area. Most of the invasive and incipient species that dominate portions of the Kaheawa landscape also degrade the value of available habitat for species like Nene. Though most of these "pasture weeds" have been tolerated for years, KWP recognizes the need to identify and manage new ingress and to work pro-actively with the DLNR to manage invasive outbreaks as they arise.

Soon after Fireweed (*Senicio madagascariensis*) was first encountered at Kaheawa following the 2006 wildfires that swept through the region, KWP biologists co-established the Fireweed Working Group to address the Fireweed issue and its potential to affect the landscape of West Maui. The group is composed of representatives from the County of Maui, State of Hawaii, Maui Invasive Species Committee, Maui Cattleman's Association, USDA Rangeland Extension Office, State Plant Quarantine Division, KWP, and other concerned parties. Because fireweed typically first becomes established in disturbed areas at KWP (gravel areas, sides of roads, along swales) efforts to manage fireweed included spot treatments of plants on the bare turbine pads and along roadways, and manual removal of larger plants that may be responsible for seed dispersal. A noticeable reduction in the overall abundance of fireweed has been evident since more aggressive spot treatments have been implemented, but chemical treatments must continue alongside manual control in order to adequately manage fireweed in the project area. This species represents a considerable concern for rangeland managers throughout Hawaii because of its toxicity to livestock. KWP continues to welcome the support and collaboration we share with the Fireweed Working Group and others as advancements are made to control this invasive species.

Since the commercialization of KWPII, HCP staff have observed fireweed growth mainly of the turbine generator pads and along the collection line where the seed bed had been previously disturbed by construction activities. Both areas were spot treated with Garlon 3A and manually removed. These areas will be carefully monitored and treated as necessary to prevent further establishment of fireweed.

Revegetation Efforts

KWPII HCP states that restoration will include planting at least 5,000 native plants with a minimum of 3,750 surviving plants (a success rate of 75%). Toward this end, First Wind has collected over 2,500 native seeds throughout the project site that have been turned over to Kula Nursery for propagation. Three specific locations for planting have been identified and a proposal was submitted to DOFAW on April 30th, 2013 (Appendix 9).

VII. CHANGED OR UNFORESEEN CIRCUMSTANCES

There were no events or circumstances that would be considered changed or unforeseen circumstances during the Year 1 reporting period at the KWP site.

VIII. ADAPTIVE MANAGEMENT

Bat Curtailment

In accordance with the KWPII HCP, wind turbine generators have been implementing low wind speed curtailment at night by raising the cut-in speed of the project's wind turbines to 5m/s between April-November in avoidance of bats. These months were originally noted as the time of the year when bat activity is highest throughout the project site. Due to the fatality that occurred March 13, 2013, the curtailment period has been extended to March-November.

Backfeed

During the first year of operation KWP II, First Wind incurred significant cost due to bat curtailment. When the turbines are curtailed additional energy is required to keep the site operational. KWP II is proposing to run one turbine during periods of curtailment in order to avoid additional energy costs associated with the energy needed for operations. Appendix 7 contains the formal memo written by First Wind requesting changes in curtailment management in order to sustain a minimum level of energy for the facility during periods of curtailment.

VIII. AGENCY COORDINATION AND REPORTING

During Year 1, KWP II attended several meetings with Agencies to discuss a variety of topics. On March 8th, 2013 KWP participated in the ESRC meeting, updating the members on the status of Makamaka'ole. Quarterly progress reports to the agencies were discontinued due to lack of feedback and increased communication via phone and email. DOFAW and KWP are currently working on a Scope of Work that will include proctored SEEF and CARE trials for one year. Coordination has been ongoing and KWP looks forward to implementing the SOW with DOFAW. KWP has also discontinued providing full fatality reports for non-ESA/non-MBTA (i.e., non-native) species for consistency with reporting done for our Oahu projects. KWP still notifies the agencies of these fatalities via email.

Management of the Makamaka'ole Seabird project was transferred to a new KWP staff member in late March of 2013. Communication with DOFAW and USFWS regarding the construction activities associated with this project have improved and construction will be completed by the next breeding season.

IX. FUNDING

A summary of HCP-related expenditures for Year 1 is contained in Appendix 8. This summary lists costs (including staff labor) that KWP II has expended toward fulfilling the terms of the HCP in Year 1.

Spending on seabird mitigation has exceeded the originally-budgeted amounts due to the costs associated with assessment and planning at the Makamaka`ole site.

X. CONCLUSION

The HCP provides for a wide range of avoidance, minimization, and mitigation measures intended to result in a net conservation benefit for the four covered species. KWP anticipates implementing an MOU with DOFAW in Year 2 that will enable the agency to perform SEEF and CARE trial proctoring for compliance monitoring.

XI. LITERATURE CITED

Dulthop and Huso, 2013. Evidence of Absence. U.S. Geological Survey, Data Series (Draft).

Huso, M.M.P., N. Som, L. Ladd. 2011. Fatality Estimator. U.S. Geological Survey, Data Series (Draft).

Huso, M.M.P. 2010. An estimator of wildlife fatality from observed carcasses. Environmetrics. John Wiley & Sons, 19 pp.

Huso, M. 2008. Estimators of wildlife fatality: a critical examination of methods. In Proceedings of the NWCC Wind Wildlife Research Meeting VII. Milwaukee, WI October 28-29, 2008. Prepared for the Wildlife Workgroup of the National Wind Coordinating Collaborative by RESOLVE, Inc., Washington, DC, Susan Savitt Schwartz, ed. 116 pp.

Shoenfeld, P.S. 2004. Suggestions Regarding Avian Mortality Extrapolation. Prepared for the Mountaineer Wind Energy Center Technical Review Committee.

Appendix 1.Avian and Bat Fatality Monitoring Record

July, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
2-Jul	2-Jul	2-Jul	2-Jul										
16-Jul	16-Jul	16-Jul	18-Jul	18-Jul	18-Jul	18-Jul	19-Jul	19-Jul	19-Jul	19-Jul	19-Jul	19-Jul	19-Jul
23-Jul	23-Jul	23-Jul	23-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul
31-Jul	31-Jul	31-Jul	31-Jul	31-Jul	31-Jul	31-Jul	31-Jul						

August, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
6-Aug	6-Aug	6-Aug	6-Aug	7-Aug	7-Aug	7-Aug	7-Aug	7-Aug	8-Aug	8-Aug	8-Aug	8-Aug	8-Aug
14-Aug	14-Aug	14-Aug	14-Aug	14-Aug	14-Aug	17-Aug	17-Aug	17-Aug	17-Aug	17-Aug	17-Aug	17-Aug	17-Aug
20-Aug	20-Aug	20-Aug	20-Aug	20-Aug	20-Aug	20-Aug	22-Aug	22-Aug	22-Aug	22-Aug	22-Aug	22-Aug	22-Aug
27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	27-Aug	30-Aug	30-Aug	30-Aug	30-Aug	30-Aug	30-Aug	30-Aug

September, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
5-Sep	5-Sep	5-Sep	5-Sep	5-Sep	5-Sep	5-Sep	6-Sep	6-Sep	6-Sep	6-Sep	6-Sep	6-Sep	6-Sep
10-Sep	10-Sep	10-Sep	10-Sep	10-Sep	10-Sep	10-Sep	12-Sep	12-Sep	12-Sep	12-Sep	12-Sep	12-Sep	12-Sep
18-Sep	18-Sep	18-Sep	18-Sep	18-Sep	18-Sep	19-Sep	19-Sep	19-Sep	19-Sep	19-Sep	19-Sep	19-Sep	19-Sep
25-Sep	25-Sep	25-Sep	25-Sep	25-Sep	25-Sep	25-Sep	26-Sep	26-Sep	26-Sep	26-Sep	26-Sep	26-Sep	26-Sep

October, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1-Oct	1-Oct	1-Oct	1-Oct	1-Oct	1-Oct	1-Oct	3-Oct	3-Oct	3-Oct	3-Oct	3-Oct	3-Oct	3-Oct
11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct	11-Oct
17-Oct	17-Oct	17-Oct	17-Oct	17-Oct	17-Oct	17-Oct	18-Oct	18-Oct	18-Oct	18-Oct	18-Oct	18-Oct	18-Oct
23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct	23-Oct
30-Oct	30-Oct	30-Oct	30-Oct	30-Oct	30-Oct	30-Oct							

November, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
							2-Nov	2-Nov	2-Nov	2-Nov	2-Nov	2-Nov	2-Nov
5-Nov	5-Nov	5-Nov	5-Nov	6-Nov	6-Nov	6-Nov	5-Nov	5-Nov	5-Nov	5-Nov	6-Nov	6-Nov	6-Nov
16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov	16-Nov
HW	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**
26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov	26-Nov
Note: High winds occurred during the week of Nov. 18-24, affecting the search interval average													

December, 2012

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec	4-Dec
HW	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**
22-Dec	22-Dec	22-Dec	22-Dec	22-Dec	22-Dec	23-Dec	23-Dec	23-Dec	23-Dec	23-Dec	23-Dec	23-Dec	23-Dec
HW	**HW**	**HW**	**HW**	**HW**	**HW**	28-Dec	28-Dec	28-Dec	28-Dec	28-Dec	28-Dec	28-Dec	28-Dec
Note: High winds occurred during Dec. 9-22 and Dec. 24-27 affecting the search interval average													

January, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
2-Jan	2-Jan	2-Jan	2-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan	3-Jan
8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan	8-Jan
16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan	16-Jan
24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan	24-Jan
31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan	31-Jan

February, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb	7-Feb
14-Feb	14-Feb	14-Feb	14-Feb	14-Feb	14-Feb	14-Feb	14-Feb	14-Feb	15-Feb	15-Feb	15-Feb	13-Feb	13-Feb
HW	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**
HW	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**	**HW**
Note: High winds occurred during Feb. 18-22 and Feb. 25-28 affecting the search interval average													

March, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar	1-Mar
5-Mar	5-Mar	5-Mar	5-Mar	5-Mar	5-Mar	5-Mar	5-Mar	5-Mar	6-Mar	6-Mar	6-Mar	6-Mar	6-Mar
13-Mar	13-Mar	13-Mar	13-Mar	13-Mar	13-Mar	13-Mar	14-Mar	14-Mar	14-Mar	14-Mar	14-Mar	14-Mar	15-Mar
18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar	18-Mar
25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar	25-Mar

April, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1-Apr	1-Apr	1-Apr	1-Apr	1-Apr	1-Apr	1-Apr	1-Apr	2-Apr	2-Apr	2-Apr	2-Apr	2-Apr	2-Apr
8-Apr	8-Apr	8-Apr	8-Apr	8-Apr	8-Apr	8-Apr	8-Apr	9-Apr	8-Apr	8-Apr	8-Apr	8-Apr	9-Apr
15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	15-Apr	16-Apr	16-Apr
22-Apr	22-Apr	22-Apr	22-Apr	22-Apr	23-Apr	23-Apr	23-Apr	23-Apr	25-Apr	25-Apr	25-Apr	25-Apr	25-Apr
29-Apr	29-Apr	29-Apr	29-Apr	29-Apr	30-Apr	30-Apr	30-Apr	30-Apr					

May, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
									1-May	1-May	1-May	2-May	2-May
7-May	7-May	7-May	7-May	8-May	8-May	8-May	8-May	8-May	9-May	9-May	9-May	9-May	9-May
13-May	13-May	13-May	13-May	13-May	14-May	14-May	14-May	14-May	15-May	16-May	16-May	17-May	17-May
20-May	20-May	20-May	20-May	20-May	21-May	21-May	21-May	21-May	22-May	22-May	22-May	22-May	22-May
29-May	29-May	29-May	29-May	29-May	29-May	29-May	29-May	29-May	30-May	30-May	30-May	30-May	31-May

June, 2013

WTG Search Plot													
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
3-Jun	4-Jun	4-Jun	4-Jun	4-Jun	4-Jun	7-Jun	5-Jun	10-Jun	10-Jun	10-Jun	10-Jun	10-Jun	10-Jun
12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun
17-Jun	17-Jun	17-Jun	17-Jun	18-Jun	18-Jun	18-Jun	18-Jun	19-Jun	19-Jun	19-Jun	20-Jun	20-Jun	20-Jun
24-Jun	24-Jun	24-Jun	24-Jun	25-Jun	25-Jun	25-Jun	25-Jun	25-Jun	26-Jun	26-Jun	26-Jun	26-Jun	26-Jun

Appendix 2. Searcher Efficiency Trials

WTG	TERRAIN	FOUND?	DROP DAY	DROP DATE	SEARCH DAY	SEARCH DATE	SIZE CLASS
12	Bare	Y	Tuesday	8/21/2012	Wednesday	8/22/2012	Large
7	Bare	Y	Tuesday	9/4/2012	Wednesday	9/5/2012	Medium
7	Grass	Y	Tuesday	9/4/2012	Wednesday	9/5/2012	Medium
6	Bare	N	Tuesday	9/4/2012	Wednesday	9/5/2012	Small
5	Grass	Y	Wednesday	10/10/2012	Thursday	10/11/2012	Large
9	Grass	Y	Wednesday	10/17/2012	Thursday	10/18/2012	Medium
10	Grass	N	Wednesday	10/17/2012	Thursday	10/18/2012	Large
11	Grass	N	Wednesday	10/17/2012	Thursday	10/18/2012	Small
13	Bare	Y	Monday	4/6/2013	Tuesday	4/7/2013	Small
14	Grass	Y	Monday	4/6/2013	Tuesday	4/7/2013	Large
11	Grass	N	Wednesday	5/16/2013	Wednesday	5/16/2013	Small
14	Grass	N	Wednesday	5/16/2013	Wednesday	5/16/2013	Small
1	Grass	N	Tuesday	5/28/2013	Wednesday	5/29/2013	Small
2	Grass	N	Tuesday	5/28/2013	Wednesday	5/29/2013	Small
8	Bare	Y	Tuesday	6/4/2013	Wednesday	6/5/2013	Large
9	Grass	N	Tuesday	6/4/2013	Wednesday	6/5/2013	Small
10	Grass	N	Tuesday	6/4/2013	Wednesday	6/5/2013	Small
11	Grass	Y	Tuesday	6/4/2013	Wednesday	6/5/2013	Large
1	Grass	N	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
2	Grass	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
3	Grass	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
4	Bare	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
4	Bare	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
5	Bare	N	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
6	Grass	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
7	Bare	N	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
9	Grass	N	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
10	Bare	Y	Tuesday	6/12/2013	Wednesday	6/12/2013	Small
1	Grass	Y	Tuesday	6/12/2013	Monday	6/17/2013	Small
1	Grass	N	Monday	6/24/2013	Monday	6/24/2013	Small

Appendix 3. Carcasses Retention Trials

KWP II	1			2			3			4		
Carcass Type	CAGO			CAGO			CAGO			CAGO		
WTG	12			11			2			6		
Vegetation Type	Bare/Grass			Bare			Grass			Shrub		
Proctor	ED			AR			SE			SE		
	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes
day 0	P	8/7		P	2/6		P	3/11		P	3/11	
day 1	P	8/8		P	2/7		P	3/12		P	3/12	I
day 2	P	8/9		P	2/8		P	3/13		P	3/13	I,L
day 3	P	8/10	I		2/9	NC	P	3/14		P	3/14	I,L
day 4	P	8/11	I		2/10	NC	P	3/15	I	P	3/15	I,L
day 5	P	8/12	I		2/11	NC		3/16	NC		3/16	NC
day 6	P	8/13	I	P	2/12			3/17	NC		3/17	NC
day 7	P	8/14	I	P	2/13		P	3/18	I	P	3/18	I,L
day 8	P	8/15	I		2/14	NC	P	3/19	I	P	3/19	I,L
day 9	P	8/16	I	P	2/15		P	3/20	I,L	P	3/20	I,L
day 10	P	8/17	I		2/16	NC	P	3/21	I,L	P	3/21	I,L
day 11	P	8/18	I		2/17	NC	P	3/22	I,L	P	3/22	I,L
day 12	P	8/19	I,L		2/18	NC		3/23	NC		3/23	NC
day 13	P	8/20	I,L	P	2/19	M		3/24	NC		3/24	NC
day 14	P	8/21	I,L	P	2/20		P	3/25	I,L	P	3/25	I,L
day 15	P	8/22	I,L		2/21	NC	P	3/26	I,L	P	3/26	I,L
day 16	P	8/23	I,L		2/22	NC	P	3/27	I,L	P	3/27	I,L
day 17	P	8/24	I,L		2/23	NC	P	3/28	I,L	P	3/28	I,L
day 18		8/25	NC		2/24	NC	P	3/29	I,L	P	3/29	I,L
day 19		8/26	NC	P	2/25			3/30	NC		3/30	NC
day 20	P	8/27	I,L	P	2/26			3/31	NC		3/31	NC
day 21	P	8/28	I,L	P	2/27		P	4/1	I,L	P	4/1	I,L
day 22	P	8/29	I,L,F	P	2/28		P	4/2	I,L	P	4/2	I,L
day 23	P	8/30	I,L,F		3/1	NC	P	4/3	I,L	P	4/3	I,L
day 24	P	8/31	I,L,F		3/2	NC	P	4/4	I,L	P	4/4	I,L,F
day 25					3/3	NC	P	4/5	I,L	P	4/5	I,L,F
day 26					3/4	NC		4/6	NC		4/6	NC

A	ants	H	hair loss
B	body feathers	I	Insects
C	dirt covered	L	fly larvae
D	desiccated	M	moved
F	feather dispersal	S	skeleton
P/A	Present/Absent	W	wing feathers
NC	Not checked		

day 27				P	3/5			4/7	NC		4/7	NC	
day 28				P	3/6		P	4/8	I,L	P	4/8	I,L,F	
													Average
Retention (days)	***24***			***28***			***28***			***28***			**27**

KWP II	1			2			3			4			5			6			7		
Carcass Type	WTSH			WTSH			WTSH			WTSH			WTSH			WTSH			WTSH		
WTG	5			11			5			6			7			3			4		
Vegetation Type	Bare/Grass			Shrub/Grass			Bare/Grass			Grass/Bare			Grass/Bare			Bare			Grass/Bare		
Proctor	ED			ED			JV			JV			JV			AR			AR		
	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes
day 0	P	8/7		P	8/7		P	11/12		P	11/12		P	11/12		P	2/6		P	2/6	
day 1	P	8/8		P	8/8		P	11/13	D	P	11/13	D	P	11/13	D	P	2/7		P	2/7	
day 2	P	8/9	I	P	8/9		P	11/14	**D**	P	11/14	D,M	P	11/14	D	P	2/8		P	2/8	D
day 3	P	8/10	I	P	8/10	I	P	11/15	D	P	11/15	D	P	11/15	D		2/9	NC		2/9	NC
day 4	P	8/11	I	P	8/11	I	P	11/16	D	P	11/16	I	P	11/16	D		2/10	NC		2/10	NC
day 5	P	8/12	I	P	8/12	I		11/17	D		11/17	NC		11/17	NC		2/11	NC		2/11	NC
day 6	P	8/13	I	P	8/13	I,M		11/18	D,I		11/18	NC		11/18	NC	P	2/12		P	2/12	D
day 7	P	8/14	I	P	8/14	I	P	11/19	D,I	P	11/19	I	P	11/19	D	P	2/13		P	2/13	D
day 8	P	8/15	I	P	8/15	I	P	11/20	D,I,F	P	11/20	I	P	11/20	D	P	2/14		P	2/14	D
day 9	P	8/16	I	P	8/16	I	P	11/21	D,I,F	P	11/21	F,I	P	11/21	D	P	2/15		P	2/15	D
day 10	P	8/17	I	P	8/17	I		11/22	NC		11/22	NC		11/22	NC		2/16	NC		2/16	NC
day 11	P	8/18	I	P	8/18	I		11/23	NC		11/23	NC		11/23	NC		2/17	NC		2/17	NC
day 12	P	8/19	I	P	8/19	I		11/24	NC		11/24	NC		11/24	NC		2/18	NC		2/18	NC
day 13	P	8/20	I	P	8/20	I		11/25	NC		11/25	NC		11/25	NC	P	2/19	M	P	2/19	D
day 14	P	8/21	I	P	8/21	I	P	11/26	D,I,F	P	11/26	F,I	P	11/26	D	P	2/20		P	2/20	D
day 15	P	8/22	I	P	8/22	I	P	11/27	D,I,F	P	11/27	F,I	P	11/27	D		2/21	NC	P	2/21	D
day 16	P	8/23	I	P	8/23	I		11/28	NC		11/28	NC		11/28	NC		2/22	NC		2/22	NC
day 17	P	8/24	I	P	8/24	I		11/29	NC		11/29	NC		11/29	NC		2/23	NC		2/23	NC
day 18		8/25	NC		8/25	NC	P	11/30	F, S	P	11/30	F,I	P	11/30	D		2/24	NC		2/24	NC
day 19		8/26	NC		8/26	NC		12/1	NC		12/1	NC		12/1	NC	P	2/25		P	2/25	D
day 20	P	8/27	I	P	8/27	I		12/2	NC		12/2	NC		12/2	NC	P	2/26		P	2/26	D
day 21	P	8/28	I,F	P	8/28	I	P	12/3	F, S	P	12/3	F,I	P	12/3	D	P	2/27		P	2/27	D
day 22	P	8/29	I,F,M	P	8/29	I										P	2/28		P	2/28	D
day 23	P	8/30	I,F	P	8/30	I											3/1	NC		3/1	NC
day 24	P	8/31	I,F	P	8/31	I											3/2	NC		3/2	NC
day 25																	3/3	NC		3/3	NC
day 26																	3/4	NC		3/4	NC
day 27																P	3/5		P	3/5	D
day 28																P	3/6		P	3/6	D

A	ants	H	hair loss
B	body feathers	I	Insects
C	dirt covered	L	fly larvae
D	desiccated	M	moved
F	feather dispersal	S	skeleton
P/A	Present/Absent	W	wing feathers
NC	Not checked		

								Average
Retention (days)	***24***	***24***	***21***	***21***	***21***	***28***	***28***	**23.857**

KWP II	1			2			3			4			5			6			7			8			1			2			3			4		
Carcass Type	DOMO			DOMO			DOMO			DOMO			DOMO			DOMO			DOMO			DOMO			NORA			NORA			NORA			NORA		
WTG	5			12			13			1			2			3			9			14			12			13			13			14		
Vegetation Type	Bare/Grass			Grass			Bare/Grass			Bare			Grass			Bare/Shrub			Grass			Bare			Grass			Shrub			Bare			Bare		
Proctor	ED			ED			ED			DF			DF			DF			SE			SE			CG			CG			CG			CG		
	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes	P/A	date	Notes
day 0	P	8/7		P	8/7		P	8/7		P	9/10		P	9/10		P	9/10		P	3/11		P	3/11		P	6/7		P	6/7		P	6/7		P	6/7	
day 1	P	8/8		P	8/8	I	P	8/8		P	9/11	D	P	9/11	D	P	9/11	D	P	3/12	I	P	3/12			6/8	NC		6/8	NC		6/8	NC		6/8	NC
day 2	P	8/9	I	P	8/9	I	P	8/9	D,S	P	9/12	D,M	P	9/12	D,I	P	9/12	D	P	3/13	I	P	3/13			6/9	NC		6/9	NC		6/9	**NC**		6/9	NC
day 3	P	8/10	D,S	P	8/10	I	P	8/10	D,S	P	9/13	D	P	9/13	D,I	P	9/13	D,I	P	3/14	I	P	3/14		P	6/10	I	P	6/10		P	6/10		P	6/10	
day 4	P	8/11	D,S	P	8/11	I	A	8/11	A	P	9/14	D	P	9/14	D,I	P	9/14	D,I	P	3/15	I	P	3/15		P	6/11	I	A	6/11	A	P	6/11		P	6/11	
day 5	P	8/12	D,S	P	8/12	D,S				P	9/15	D	P	9/15	D,I	P	9/15	D,I		3/16	NC		3/16	NC	A	6/12	A				P	6/12	I,D	A	6/12	A
day 6	A	8/13	A	P	8/13	D,S				P	9/16	D	P	9/16	D,H,I	P	9/16	D,S		3/17	NC		3/17	NC							P	6/13	I,D			
day 7				P	8/14	D,S				P	9/17	D	P	9/17	D,H,I	A	9/17	A	A	3/18	A	P	3/18								P	6/14	I,D			
day 8				P	8/15	D,S				P	9/18	D,I	P	9/18	D,H,I							P	3/19									6/15	NC			
day 9				P	8/16	D,S				P	9/19	D,I	P	9/19	D,S							P	3/20									6/16	NC			
day 10				P	8/17	D,S				P	9/20	D,I	P	9/20	D,S							P	3/21								P	6/17	I,D			
day 11				P	8/18	D,S				P	9/21	D,I	P	9/21	D,S							P	3/22								P	6/18	S			
day 12				P	8/19	D,S				P	9/22	D,I	P	9/22	D,S								3/23	NC							A	6/19	A			
day 13				P	8/20	D,S				P	9/23	D,S	P	9/23	D,S								3/24	NC												
day 14				P	8/21	D,S				P	9/24	D,S	P	9/24	D,S							P	3/25													
day 15				P	8/22	D,S				P	9/25	D,S	P	9/25	D,S							P	3/26													
day 16				P	8/23	D,S				P	9/26	D,S	A	9/26	A							P	3/27													
day 17				P	8/24	D,S				P	9/27	D,S										P	3/28													
day 18				P	8/25	NC				P	9/28	D,S										P	3/29													
day 19				P	8/26	NC				P	9/29	D,S											3/30	NC												

day 20		A 8/27 A		P 9/30 D,S				3/31 NC					
day 21				P 10/1 D,S				P 4/1					
day 22								P 4/2					
day 23								P 4/3					
day 24								P 4/4					
day 25								P 4/5					
day 26								4/6 NC					
day 27								4/7 NC					
day 28								P 4/8					
													Average
Retention (days)	***5***	***19***	***3***	***21***	***15***	***6***	***4***	***28***	***4***	***3***	***11***	***4***	**12.625**

Appendix 4. Evidence of Absence spreadsheets

Nene

Carcass Count (X)	1	Sampling Dates	Prior distribution		Posterior Distribution	
Sampling coverage (phi)	0.83	0	m	P(M = m)	Mean	1.205
searcher proficiency (f)	0.83	7.6	0	0.680385	P(observe|arrive)	0.826359
k	1	15.2	1	0.090444	95th percentile	2
Sampling dates	Formula	22.8	2	0.048226	m	P(M = m)
interval	7.6	30.4	3	0.03215	0	0
span	365	38	4	0.023577	1	0.82147
persistence distribution	Weibull	45.6	5	0.018234	2	0.152117
a	14	53.2	6	0.014589	3	0.026413
b	50	60.8	7	0.01195		
arrival function	Uniform	68.4	8	0.00996		
a	NA	76	9	0.008411		
b	NA	83.6	10	0.007179		
prior distribution	Negative Binomial	91.2	11	0.006179		
a	0.1424	98.8	12	0.005356		
b	0.0665	106.4	13	0.00467		

Hawaiian Hoary Bat

Carcass Count (X)	1	Sampling Dates	Prior distribution		Posterior Distribution	
Sampling coverage (phi)	0.9	0	m	P(M = m)	Mean	2.813
searcher proficiency (f)	0.41	7.62	0	0.680385	P(observe|arrive)	0.339862
k	1	15.24	1	0.090444	95th percentile	7
Sampling dates	Formula	22.86	2	0.048226	m	P(M = m)
interval	7.62	30.48	3	0.03215	0	0
span	365	38.1	4	0.023577	1	0.335365
persistence distribution	Weibull	45.72	5	0.018234	2	0.236094
a	0.92924	53.34	6	0.014589	3	0.155849
b	9.413274	60.96	7	0.01195	4	0.100599

arrival function	Uniform	68.58	8	0.00996	5	0.0642
a	NA	76.2	9	0.008411	6	0.040689
b	NA	83.82	10	0.007179	7	0.025669
prior distribution	Negative Binomial	91.44	11	0.006179	8	0.01614
a	0.1424	99.06	12	0.005356	9	0.010123
b	0.0665	106.68	13	0.00467	10	0.006337
		114.3	14	0.004092	11	0.003961
		121.92	15	0.003602	12	0.002472
		129.54	16	0.003182	13	0.001542
		137.16	17	0.00282	14	0.00096

Appendix 5. Wildlife Education and Observation Program Logbook Entries

Date	Time	Sp.	# of Indv	Locale	Dist to Loc (m)	*Behavior	Fl Dir	Fl Alt (m)	Temp (°F)	Wind Sp (mph)	Wind Dir	Cl Cov (%)	Precip (%)	**Nene ID Band	Observation Comments
KWP II															
8/9/12	8:12	HAGO	2	Substation	5	F			74		NE	20		Y 571, Y 576 pair	
8/21/12	NA	HAGO	2	Substation	4	F			71	10	NE	20	0	R 614, Y	
8/28/12	10:16	HAGO	2	Substation		W			84			70	0	YS, O	
9/17/12	15:06	HAGO	2	WTG 1		B, S			80	15	NE	20	0	Y on Rt, unk	
9/17/12	15:06	HAGO	2	WTG 1											
10/9/12	8:52	HAGO	2	WTG 3	72	B, F, S			80	>5	SW	0		UB	E on WTG-3, inside plot
10/11/12	8:42	HAGO	2	WTG 1	55	B, F, S			81	15	NE	0		UB	
11/24/12	7:00	HAGO	2	WTG 2	20	W			68	25	SW	3	0	NA	Walking up road towards pad
12/22/12	10:45	HAGO	2	WTG 3	NA	NA			75	10	NE	5	0	NA	
01/02/13	9:45	HAGO	2	WTG 2	30	S, W	S	90	70	20	NE	80	0	NA	Wind pushed Nene towards towers
01/07/13	12:45	HAGO	2	WTG 7	60	B, F			75	15	NE	10	0	Y on Rt, unk	Seen btwn WTG 7-8
01/10/13	12:23	HAGO	2	WTG 2	NA	S			80	10	NA	10	0	NA	In tranformer trench (dry)
01/11/13	8:53	HAGO	2	WTG 7	50	S			NA	NA	NA	NA	NA	UB	NE of WTG7
1/15/2013	10:42	HAGO	4	WTG 6	35-62	B			85	>5	VAR	80	0	Y 534, 2 UB	Pair near WTG6, pair near WTG8

01/16/13	14:27	HAGO	3	WTG 1	NA	B			85	5	NE	75	0	552, 2 UB	N of WTG1 at riser pole
01/17/13	13:02	HAGO	2	WTG 1	>75	B, W			70	0	NA	75	0	NA	N of WTG-1 @ powerline
01/23/13	13:37	HAGO	2	WTG 8	40	B		30	NA	NA	NA	80	0	UB	Zigzaging through turbines
01/30/13	23:15	HAGO	4	WTG-4	100	W			65	5	SW	15	0	NA	
02/02/13	23:30	HAGO	2	WTG-7	100	W			65	30	SW	0	0	NA	
02/07/13	15:45	HAGO	2	WTG-3	20	B, F			75	15	SW	10	0	NA	
02/08/13	7:15	HAGO	2	WTG-10	30	W			70	20	SW	30	0	NA	
3/14/2013	15:40	HAGO	2	NA	10	W			80	10	WSW	-	0%	NA	One goose was limping
4/14/2013	15:10	HAGO	2	WTG-2	40	W			70	15	NW	80%	15%	UB	
4/20/2013	7:15	HAGO	3	WTG-2	100	S	NA	NA	70	0	NA	0	0	UB	
4/22/2013	5:30	PUE	1	WTG-2	35	FL		35	NA	NA	NA	NA	15%	NA	Stationary

Appendix 6. Intensive Nene Monitoring Reporting

Date	Monitors	Weather	Temperature °F	Observation Times	Location	Turbine Number	Nene Observed	Total Number of Observations
7/9/2012	DFD, JV	sunny, high winds	72	13:00-14:00	Upper	WTG-1	No	0
7/12/2012	DFD, JV	sunny, low/mid wind	82	13:06-14:06	Mid	WTG-7	No	0
7/13/2012	DFD, JV	misty	75	08:46-09:46	Upper	WTG-1	No	0
7/16/2012	DFD, JV	sunny	87	12:06-13:06	Lower	WTG-11	No	0
7/18/2012	DFD, JV	Windy	70	07:06-07:50	Lower	WTG-12	No	0
7/25/2012	JV, ET	windy, sunny	76	09:56-10:56	Upper	WTG-1	No	0
7/31/2012	DFD, JV	sunny,windy	76	10:38-11:38	Upper	WTG-4	No	0
7/31/2012	ED, DFD, JV	sunny, windy	81	14:20-15:20	Mid	WTG-9	No	0
8/6/2012	DFD, JV	sunny, calm	80	9:39-10:39	Mid	WTG-10	No	0
8/7/2012	DFD, JV	sunny, windy	80	13:25-14:25	Upper	WTG-5	No	0
8/8/2012	ET, DFD	sunny	73	13:12-14-12	Mid	WTG-6	No	0
8/14/2012	DFD, JV, CG	sunny, windy	79	14:30-15:30	Lower	WTG 14	No	0
8/15/2012	DFD, CG	Sunny	79	14:20-15:20	Lower	WTG-13	No	0
8/16/2012	DFD	Sunny	80	12:15-13:15	Mid	WTG-8	No	0
8/22/2012	ET	Sunny	81	08:14-09:16	Lower	WTG-2	No	0
8/23/2012	ET	Sunny	74	06:30-07:30	Mid	WTG-9	No	0
8/24/2012	ET	Sunny		09:53-10:53	Lower	WTG-12	No	0
8/27/2012	ET	Sunny		12:40-13:40	Upper	WTG-3	No	0
8/31/2012	CG	Sunny	80	08:32-09:35	Mid	WTG-7	No	0
9/6/2012	ET	Sunny		06:24-0:724	Lower	WTG-11	No	0
9/10/2012	ET	Sunny	84	10:44-11:44	Upper	WTG-2	No	0
9/11/2012	ET	Cloudy	74	06:41-07:41	Mid	WTG-6	No	0
9/18/2012	ET	Cloudy	85	13:20-14:20	Lower	WTG-14	No	0
9/18/2012	ET	Cloudy	83	14:25-15:25	Upper	WTG-5	No	0
9/21/2012	ET	Cloudy	82	11:12-12:12	Upper	WTG-3	No	0
9/25/2012	ET	Cloudy	86	14:01-15:01	Lower	WTG-12	No	0
10/1/2012	ET	Cloudy	71	08:06-09:10	Upper	WTG-1	No	0
10/10/2012	ET	Vog	88	12:10-13:10	Upper	WTG-5	No	0
10/10/2012	ET	Vog	85	14:13-15:13	Mid	WTG-7	No	0
10/10/2012	ET	Cloudy	83	15:19-16:19	Lower	WTG-13	No	0
10/16/2012	ET	Cloudy	75	09:40-10:40	Mid	WTG-9	No	0
10/16/2012	ET	Cloudy	75	08:33-09:33	Upper	WTG-4	No	0
10/18/2012	ET		85	13:50-14:50	Lower	WTG-11	No	0

Date	Monitors	Weather	Temperature °F	Observation Times	Location	Turbine Number	Nene Observed	Total Number of Observations
10/22/2012	ET	Clear	76	09:08-10:08	Upper	WTG-1	No	0
10/22/2012	ET	Partly Cloudy	81	14:22-15:22	Lower	WTG-13	No	0
10/23/2012	ET		84	14:23-15:23	Upper	WTG-5	No	0
10/30/2012	CG, ET	Partly Cloudy	82	10:16-11:16	Upper	WTG-5	No	0
10/31/2012	ET, JV	Sunny	83	13:03-14:03	Lower	WTG-11	No	0
11/2/2012	ET	Sunny	70	08:03-09:03	Mid	WTG-7	No	0
11/8/2012	ET, DFD	Partly Cloudy	75	12:35-13:35	Upper	WTG-3	No	0
11/8/2012	ET, DFD	Partly Cloudy	78	13:37-14:37	Mid	WTG -10	No	0
11/9/2012	ET, JV	Windy	82	12:53-14:05	Lower	WTG-13	No	0
11/14/2012	ET, DFD	Sunny	75	08:20-09:25	Upper	WTG-5	No	0
11/14/2012	CG, JV	Windy	82	08:27-09:30	Mid	WTG-8	No	0
11/20/2012	ET	Cloudy	77	12:53-13:55	Lower	WTG-14	No	0
11/21/2012	ET	Cloudy	67	07:29-08:31	Upper	WTG-1	No	0
11/21/2012	ET	Cloudy	72	08:37-09:39	Mid	WTG-6	No	0
12/3/2012	CG, JV, DFD	Voggy	86	13:02-14:02	Lower	WTG-12	No	0
12/7/2012	ET	Sunny		08:26-09:26	Upper	WTG-1	Yes	1
12/10/2012	ET	Sunny	73	09:36-10:37	Mid	WTG-6	No	0
12/10/2012	ET	Sunny	72	08:21-09:32	Upper	WTG-2	No	0
12/13/2012	CG, JV	Windy	78	13:20-14:20	Lower	WTG-14	No	0
12/17/2012	CG, JV	Windy	77	13:17-14:17	Mid	WTG-9	No	0
12/19/2012	CG	Windy	75	13:14-14:15	Mid	WTG-6	No	0
12/20/2012	CG	Fair	67	07:00-08:03	Lower	WTG-13	No	0
12/21/2012	CG	Fair	70	12:10-13:10	Lower	WTG-12	No	0
1/2/2012	CG	Windy	70	10:45-12:30	Upper	WTG-4	No	0
1/3/2013	ET	Low clouds, sunny	80	13:01-13:36	Mid	WTG-10	No	0
1/4/2013	CG	Windy, foggy	67	13:38-14:30	Upper	WTG-5	No	0
1/8/2013	ET, JV	Sunny	75	12:50-13:50	Upper	WTG-5	No	0
1/9/2013	ET	Cloudy	69	07:50-08:50	Mid	WTG-6	No	0
1/9/2013	AMR,CG	Sunny	83	13:30-14:30	Lower	WTG-14	No	0
1/16/2013	JV, AR	Sunny	80	11:31-12:34	Lower	WTG-12	No	0
1/17/2013	JV, SE	Sunny	81	09:36-10:36	Upper	WTG-7	No	0
1/18/2013	CG, SE	Sunny	75	09:05-10:05	Mid	WTG-6	Yes	1
1/22/2013	ET	Sunny	72	13:36-14:36	Upper	WTG-10	Yes	1
1/23/2013	ET	Partly Cloudy	68	08:20-09:23	Mid	WTG-7	No	0
1/24/2013	ET	Sunny	68	07:40-08:37	Lower	WTG-11	Yes	1
1/31/2013	ET	Rain	67	08:03-09:06	Mid	WTG-8	No	0

Date	Monitors	Weather	Temperature °F	Observation Times	Location	Turbine Number	Nene Observed	Total Number of Observations
2/1/2013	ET, JV	Sunny	75	13:43-14:43	Lower	WTG-11	No	0
2/1/2013	AR	Clear, high winds	75	13:35-14:20	Upper	WTG-1	No	0
2/4/2013	JV	high winds	70	13:02-14:02	Upper	WTG-1	Yes	1
2/6/2013	SE, JV	high winds	70	09:52-10:52	Lower	WTG-13	No	0
2/6/2013	ET	cloudy	70	13:02-14:02	Mid	WTG-8	No	0
2/11/2013	ET	Partly Cloudy	72	13:05-14:15	Upper	WTG-4	No	0
2/13/2013	ET, JV	Sunny	72	12:15-13:28	Mid	WTG-8	No	0
2/13/2013	ET, JV			13:29-14:31	Lower	WTG-12	No	0
2/19/2013	ET, AR	Sunny	76	08:59-09:59	Lower	WTG-11	No	0
2/20/2013	JV	high winds	68	08:50-09:50	Upper	WTG-1	No	0
2/20/2013	AR	sunny/high winds	75	12:20-13:20	Lower	WTG-11	No	0
2/22/2013	ET,AR	Cloudy		08:00-09:01	Upper	WTG-1	No	0
2/25/2013	ET,JV	Sunny	73	10:08-11:08	Upper	WTG-4	No	0
2/27/2013	JV, SE	high winds	70	10:22-11:22	Lower	WTG-11	No	0
2/28/2013	ET	sunny	76	15:45-16:45	Lower	WTG-13	No	0
3/4/2013	SE, JA	windy/sunny	67	08:40-09:40	Upper	WTG-3	No	0
3/5/2013	ET	sunny		08:46-09:53	Mid	WTG-7	No	0
3/8/2013	ET	sunny	73	11:23-12:32	Upper	WTG-2	No	0
3/13/2013	SE	partly cloudy/med. Wind	69	13:00-14:00	Lower	WTG-1	Yes	1
3/14/2013	JV	Cloudy	76	09:10-10:10	Lower	WTG-14	No	0
3/15/2013	JA	clear/partly cloudy	70	08:30-09:30	Upper	WTG-3	No	0
3/21/2013	JA	some clouds/vog	77	09:50-10:50	Upper	WTG-5	No	0
3/21/2013	JV	clear/sunny	79	10:35-11:45	Mid	WTG-7	No	0
3/29/2013	SE	cloudy/rainy	58	07:30-08:30	Mid	WTG-7	No	0
4/4/2013	JV,ET	clear	76	07:32-08:32	Lower	WTG-14	No	
4/5/2013	JV	low wind	84	13:16-14:16	Lower	WTG-14	No	0
4/5/2013	SE	clear/sunny	82	13:20-14:15	Mid	WTG-8	Yes	1
4/5/2013	JV	Low wind	84	13:16-14:16	Lower	WTG-14	No	0
4/5/2013	SE	Clear/Sunny	82	13:00-14:00	Mid	WTG-8	Yes	1
4/8/2013	ET	Sunny	76	15:45-16:45	Lower	WTG-13	No	0
4/12/2013	SE	clear/sunny	79	11:09-12:09	Mid	WTG-8	No	0
4/12/2013	ET,JV	clear/sunny	82	10:02-11:02	Upper	WTG-3	No	0
4/16/2013	JV	clear	82	10:28-11:28	Lower	WTG-14	No	0
4/17/2013	SE	clear/sunny	72	13:00-14:00	Upper	WTG-3	No	0
4/24/2013	JV,ET	clear/sunny	85	12:02-13:02	Upper	WTG-3	No	0
5/1/2013	ET	Clear	66	06:45-07:48	Lower	WTG-11	No	0

Date	Monitors	Weather	Temperature °F	Observation Times	Location	Turbine Number	Nene Observed	Total Number of Observations
5/2/2013	JV	clear/sunny	79	08:50-09:50	Upper	WTG-1	No	0
5/2/2013	ET	Clear	-	13:06-14:15	Mid	WTG-6	No	0
5/3/2013	AR	Sunny	75	08:55-09:47	Mid	WTG-7	No	0
5/7/2013	ET	Foggy	68	05:45-06:45	Lower	WTG-13	No	0
5/7/2013	JV	clear/sunny	79	07:32-08:54	Upper	WTG-1	No	0
5/10/2013	JV	Clear	-	12:24-13:24	Mid	WTG-6	No	0
5/13/2013	AR	Partly Cloudy	70	09:42-10:45	Lower	WTG-12	No	0
5/30/2013	AR	Sunny	75	11:50-12:52	lower	WTG-12	No	0
5/31/2013	SE	Clear	79	09:05-10:05	Mid	WTG-9	No	0
5/31/2013	JV			07:49-08:49	Upper	WTG-2	Yes	1
5/14/2013	JV			12:54-13:54	Upper	WTG-1	No	0
5/20/2013	ET, JV	sunny	77	07:18-08:20	Mid	WTG-9	No	0
5/23/2013	ET, JV			07:48-08:48	Lower	WTG-12	No	0
5/23/2013	ET, JV			08:50-09:50	Upper	WTG-6	No	0
6/4/2013	JV, ET			07:49-08:48	Lower	WGT-11	No	0
6/7/2013	CG	sunny/windy	85	10:53-11:55	Upper	WTG-5	No	0
6/7/2013	SE	clear/high winds	70	09:36-10:36	Upper	WTG-2	No	0
6/10/2013	JV			10:23-11:23	Upper	WTG-1	No	0
6/14/2013	AR	High winds/sunny	70	08:10-09:15	Mid	WTG-8	No	0
6/14/2013	AR	High winds/sunny	70	09:30-10:37	Upper	WTG-2	Yes	1
6/14/2013	SE	cloudy/clear	75	09:30-10:35	Lower	WTG-12	No	0
6/20/2013	SE	sunny/clear	75	13:08-14:08	Upper	WT- 2	No	0
6/21/2013	CG	fair/rainy	70	09:37-10:37	Lower	WTG-12	No	0
6/21/2013	CG	fair	75	07:30-08:30	Mid	WTG-8	No	0
6/24/2013	ET	clear	71	07:39-08:39	Upper	WTG-4	No	0
6/28/2013	CG	sunny		07:37-08:40	Upper	WTG-1	No	0

Appendix 7. Backfeed Adaptive Management Memo

Kaheawa Wind Power II HCP, ITL No. ITL-15 and ITP No. 27260A-0

June 17, 2013

To: Lasha Salbosa, Conservation Initiatives Coordinator State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife

Dawn Greenlee, Fish and Wildlife Biologist
U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

From: Erica Thoele, Supervisor HCP Compliance, First Wind Energy

Re: Adaptive management of KWP II bat curtailment

As recently discussed during our April 8th, 2013 meeting with DOFAW and USFWS, First Wind is requesting approval from DOFAW to operate one turbine during periods of bat curtailment as described in the Kaheawa Wind Power II (KWP II) Habitat Conservation Plan (HCP).

During periods of bat curtailment, the wind turbine generators (WTGs) are placed on standby and the blades are pitched to at least 82 degrees to minimize rotor movement. When all of the WTGs are on standby, they require power from the grid to keep the WTG subsystems and controls available to respond to an increasing wind event or new utility set point. While the turbines are in standby a large of amount of power is drawn from the grid for operation of the support buildings, the Battery Energy Storage System (BESS), and to keep the turbines on standby. The amount of power required for these facilities puts First Wind into a significantly higher rate bracket than residential customers. During normal WTG operations, the wind farm supplies all of the power for the facility (buildings, WTGs, battery system, etc.). First Wind proposes to operate one WTG during periods of bat curtailment. The power generated from one turbine will provide sufficient energy to keep the WTGs online and power the facilities on site. The following analysis identifies two to three WTGs with the lowest risk to bats.

Bat Detector Data

Bats have been monitored on the KWPII site since 2009 with SD1 and SD2 Anabat™ detectors. These bat detectors are listed below with their detector number, location, installation date, detector nights, number of calls and the average number of calls per detector night. The data shows that calls across the entire KWP site are variable. Overall average number of calls per night is very low.

Table 1. KWPII Anabat Acoustic Detector Data

Detector	Location	Installation Date	Detector nights	Number of calls	Average number of calls per night
14	E of WTG 14, gulch	6/3/09	1,373	55	0.04
18	SE of WTG 6, gulch	5/27/10	945	25	0.02
27	N of WTG 1, ridge	6/29/12	265	0	0

28	W of WTG 3, gulch	6/29/12	265	0	0

Table 2. KWPI Anabat Acoustic Detector Data

Detector ID	Location	Deployment Dates	Detector Nights	Passes	Total Detection Rate (passes/detector night)
1	KWP I	08/08/08-11/11/08	86	2	0.0000
2	KWP I	08/08/08-11/05/08	86	3	0.0349
3	KWP I	08/07/08-11/05/08	82	2	0.0244
4	KWP I	08/07/08-11/12/08	89	0	0.0000
5	KWP I	11/12/08-04/07/09	138	0	0.0000
6	KWP I	11/12/08-04/15/09	138	0	0.0000
7	KWP I	11/14/08-04/16/09	159	0	0.0000
8	KWP I	11/14/08-04/04/09	72	0	0.0000
9	KWP I	04/28/09-05/27/10	343	1	0.0029
10	KWP I	05/17/09-06/30/13	1084	51	0.0470
11	KWP I	05/07/09-05/27/10	307	0	0.0000
12	KWP I	04/28/09-05/27/10	366	4	0.0109
13	KWP I	06/02/09-05/27/10	324	1	0.0031
15	KWP II	06/03/09-05/27/10	314	2	0.0064
16	KWP I	06/03/09-10/23/09	66	0	0.0000
17	KWP I	06/24/10-06/30/10	634	14	0.0221
19	KWP I	06/27/10-06/30/13	727	12	0.0165
22	KWPI	07/01/10-06/30/13	523	7	0.0134
23	KWPI	07/01/10-06/30/13	310	6	0.0194
24	KWPI	07/01/10-06/30/13	322	1	0.0031
25	KWPI	07/01/10-06/30/13	43	0	0.0000
26	KWPI	05/03/12-06/30/13	65	1	0.0154

Fatalities

One bat fatality has been documented at KWP II since the turbines began running in June 2012. The fatality was found 3/13/2013, 17 meters northeast of WTG 6. After this bat fatality, the curtailment season prescribed in the HCP was amended from April through November to March through November.

Summary

Given the data available for bats First Wind is proposing to make available one of the WTGs 1, 2, or 3 for operation during periods of curtailment. Although three turbines are identified with potential to operate during periods of curtailment, First Wind will only operate one WTG at a time during periods of curtailment. Identifying more than one low risk WTG ensures that at least one turbine is available during periods of maintenance.

The WTG that operated during curtailment will be searched twice per week instead of the HCP obligated once per week. If bat detectors indicate that the proposed WTGs have higher call rates and are not the lowest risk, First Wind may identify alternative WTGs by submitting a letter in writing to DOFAW and USFWS, with rationale for selecting the alternative WTGs. If bat fatalities are found at the WTGs identified, the WTG will not be allowed to operate during periods of curtailment.

First Wind would like to begin this process immediately as it involves a significant amount of monetary resources. Assuming this matter will be presented at the upcoming ESRC meeting; First Wind is expecting to hear from DOFAW and USFWS on or before June 30th, 2013.

Appendix 8. 2013 HCP Implementation Budget

KWP II	2013Budget	Notes
Permit Compliance	$122,910	
Seabird Bird Management	$25,441	An additional $582,633 was spent between 2012 and 2013 for seabird mitigation at Makamaka'ole.
Vegetative Management	$7,421	
Fatality Monitoring	$9,584	
Equipment and Supplies	$26,692	
Subtotal	$192,048	
Labor	$91,020	
Total Budget	**$414,048**	

Appendix 9. KWP II Revegetation Memo

Kaheawa Wind Power II HCP, ITL No. ITL-5 and ITP No. 2760A-0

April 30, 2013

To: Lasha Salbosa, Conservation Initiatives Coordinator
State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife

Dawn Greenlee, Fish and Wildlife Biologist
U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office

From: Erica Thoele, Supervisor HCP Compliance Program, First Wind Energy

Re: Revegetation consultation for Kaheawa Wind Power II

Section 6.7 and Appendix 8 of the Kaheawa Wind Power II (KWP II) Habitat Conservation Plan (HCP) outline revegetation goals for the KWP II project. As specified in Appendix 8:

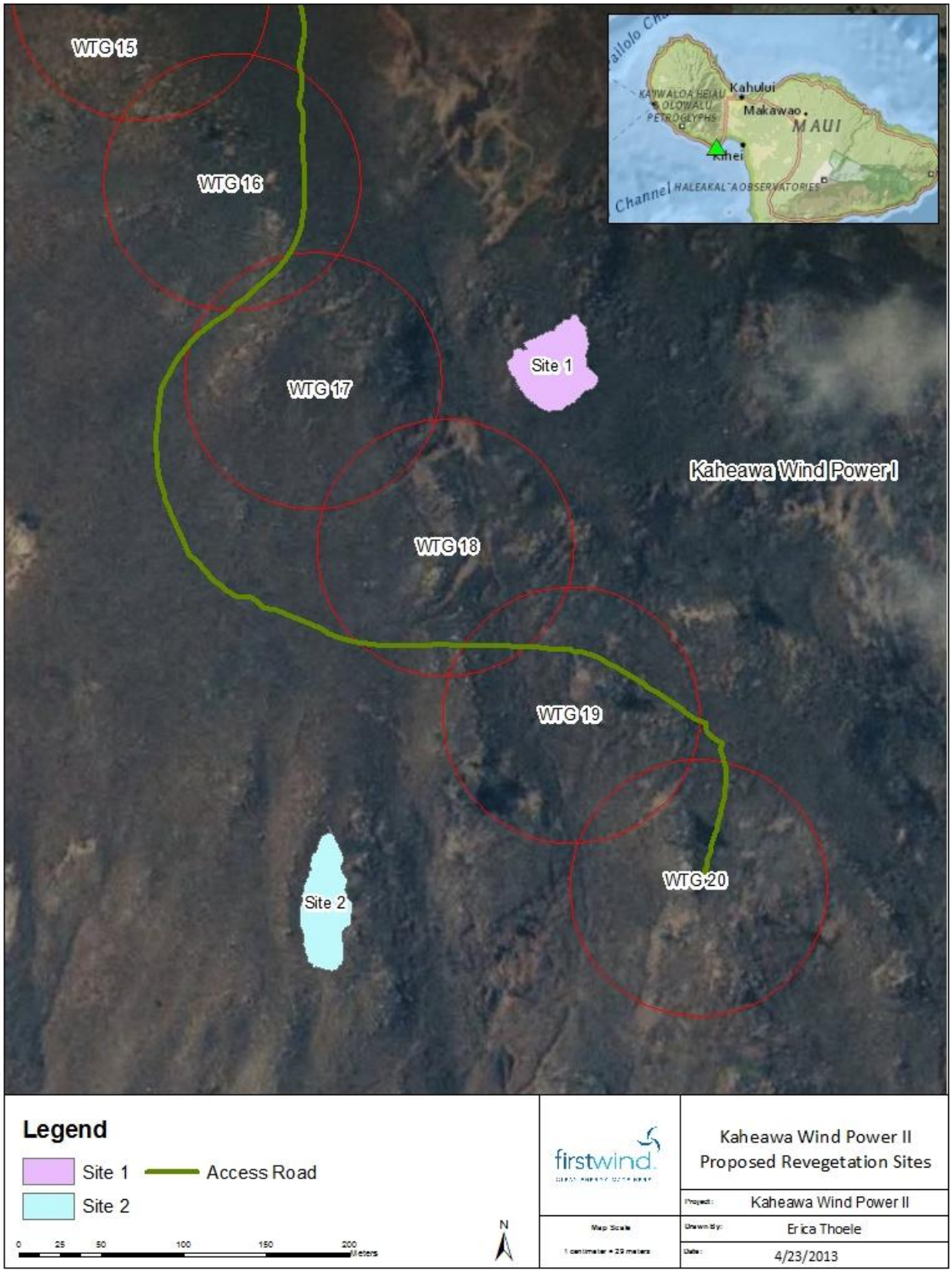
The proposed revegetation strategy for KWP II has two goals:

> *1. Address the immediate requirement of stabilizing exposed soils following construction activities at KWP II, in accordance with erosion and sedimentation control BMPs and NPDES stormwater discharge permitting requirements; and*
>
> *2. Re-introduce native plant species in selected areas throughout the site over the next several years, with the goal of re-establishing native plant species in areas that have been overgrown with non-native species for a century or more.*

Goal 1 was accomplished with hydroseeding and hardscaping potential erosion areas as prescribed in Appendix 8 of the HCP and completed shortly after construction ended. Goal 2 will be addressed in this memo. For Goal 2 a minimum of 5,000 individual plants are to be installed during the first three years following construction, in accordance with Appendix 8. In addition to the planting goal, the HCP specifies that the location of plantings will be determined in consultation with the Department of Land and Natural Resources (DLNR) and U.S. Fish and Wildlife Service (USFWS). First Wind has identified several areas adjacent to KWP II for the purpose of re-introducing native plants and is seeking acceptance of each location.

Site Selection

Site selection was based primarily on two factors: ease of access and surrounding vegetation. Other considerations included suitability of existing substrate for planting, potential susceptibility to fires, and exposure to prevailing winds. Two areas were identified and are shown in the map below.


WTG 15
WTG 16
WTG 17
WTG 18
WTG 19
WTG 20
Site 1
Site 2
Kaheawa Wind Power I
Kahului
Makawao
MAUI
Kihei
Channel
HALEAKALA OBSERVATORIES
Legend
Site 1
Access Road
Site 2
0 25 50 100 150 200 Meters
N
firstwind
Kaheawa Wind Power II
Proposed Revegetation Sites
Project: Kaheawa Wind Power II
Drawn By: Erica Thoele
Map Scale
1 centimeter = 29 meters
Date: 4/23/2013

Site 1 is south of a moderate sloping outcrop east of KWP I WTG 17 and south east of the KWP I access road. The proximity of the access road makes this area easy to access via foot or all-terrain vehicle. The area supports small quantities of native plants including `ilima (*Sida fallax*), `a`ali`i (*Dodonaea viscosa)*,`akia (*Wilkstroemea oahuensis*), `ohi`a (*Metrosideros polymorpha*), `uhaloa (*Waltheria indica*), `ulei (*Osteomelese anthyllidifolia*), ko`oko`olau (*Bidens micrantha*), naupaka kuahiwi (*Scaevola gaudichaudii*), pukiawe (*Leptecophylla tameiameiae*) and `akoko (*Chamaesyce celastroides*). Scattered throughout this site are seedlings and stands of mature ironwood (*Casuarina equisetifolia*). Other non-native vegetation includes lantana (*Lantana camara*), fireweed (*Senecio madagascariensis*), Jamaica vervain (*Stachytarpheta jamaicensis*), Plantain (*Plantago lanceolata*), Partridge pea (*Chamaecrista nictitans*).

The south facing slope offers protection from high winds and creates a bowl shaped area that may help in keeping plantings hydrated. This site is our preferred location as it already has a higher proportion of native plants compared to nonnative plants, making the removal of invasives less time consuming and increasing the overall success of the project.

Site 2 is located west of KWP I WTG 20 and south of the KWP I access road. This site is a slightly sloped area with good foot and vehicular access through slightly sloping grassland. Vegetation on this site is scattered native and non-native and generally lower in stature than the vegetation present at Area A. Vegetation at Area B consists of `ilima, `ūlei, ko`oko`olau, `akoko, naupaka kuahiwi, `a`ali`i, `akia, `iliahi alo`e (*Santalum ellipticum*), molasses grass (*Melinis minutiflora*) and a few ironwood trees. The openness of this area increases its exposure to high winds, which may decrease the potential for successful establishment of plantings. This may also cause the area to be more susceptible to fire.

Both sites may be used for planting depending on the results of seed propagation and the planting density of each plant species.

Species Selection

Seed collection began in March 2013. Seeds of `akia, `ohi`a lehua, naupka kuahiwi, `ilihahi a`loe and ko`oko`olau have been collected and are being prepared for propagation at Native Nursery in Kula, HI. The quantity of each species to be planted cannot be determined until seedling propagation and survivorship rates are known. First Wind would like to achieve at least 40 percent of plantings belonging to the following less abundant species: ‘akoko, ko’oko’olau, naupaka kuahiwi, `iliahi a`loe, `akia. If seed propagation this year does not achieve the criteria, seed collection and propagation will be repeated in 2014. A minimum of 2,500 plants are planned to be planted during the 2013 wet season, although all 5,000 may be planted if propagation is successful and enough seedlings emerge. The remaining plantings will consist of nursery grown stock of `a`ali`i, `ilima, `uhaloa, pili grass, and `ūlei.

Timeline

Plantings will occur as early as October of 2013 with the goal of planting during the wet season to take advantage of rainy weather.

Monitoring and Success

Monitoring and success criteria will proceed as described in Appendix 8 of the HCP.

> *This effort will be considered successful if a minimum of 5,000 individual plants are installed during the first three years following construction, with an average survival rate of greater than 75% (i.e. minimum of 3,750 surviving plants), for all plants one year after installation, as determined by representative sampling of planted areas. If mortality exceeds 25%, replacement plantings will be installed as needed to achieve the 75%.*

The timing of plantings should provide for natural watering of plants, however, if natural rain fall does not provide a suitable amount of water a watering system consisting of PVC pipe with attached sprinklers may be installed to ensure a higher survival rate. If watering is done it will be monitored very closely. If it is determined that Nene are attracted to the watering systems watering will cease or another form of watering will be employed (e.g., a drip system).