Kahuku Wind Power, LLC

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Kahuku, Hawaii 96731

August, 2012

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.

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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 was commissioned to begin operating on March 23, 2011.

Fatality monitoring search plots have been marked in straight line transects out to 64 and 96 meters from the wind turbine generators' centers (50 % and 75 % of the maximum turbine and blade height, respectively) and 40 meters from the permanent meteorological tower (50 % of the tower height). The 50% areas are searched twice per week and the 75% areas are searched every two weeks, in accordance with the monitoring protocol prescribed in the HCP. The FY 2012-Q1 and Q4 50 % plot mean and standard deviation for search intervals were 3.51 days (SD = 0.78) and for FY 2012-Q2 and Q3 were 2.52 days (SD = 0.87). The FY 2012 75% plot mean and standard deviation for search intervals were 13.95 days (SD = 1.59).

We found 3 Hawaiian Hoary Bat fatalities but no bird species listed in the ITL and Biological Opinion (BiOp) through June 30, 2012. Fatalities of three Wedge-tailed Shearwaters, 6 Great Frigatebirds, 2 Cattle Egrets, 2 doves, and 1 Common Mynah were documented in FY 2012.

We've conducted 11 total carcass retention trials to date (9 total in FY 2012) using 28 birds and 51 rats and 46 searcher efficiency trials using 53 birds and 69 rats. The mean carcass retention On-pad for 35 rats was 6.49 days (SD = 4.93 days) and Off-pad for 16 rats was 5.44 days (SD= 5.21 days). The mean carcass retention On-pad for 20 birds was 13.50 days (SD = 2.01 days) and Off-pad for 16 birds was 10.88 days (SD= 5.14 days). The mean searcher efficiency for trials was 74% of 42 small carcasses On-pad, 33% of 27 small carcasses Off-pad, 100% of 23 medium carcasses On-pad and 80% of 30 medium carcasses Off-pad. In order to reduce carcass scavenging and increase carcass retention we trapped 250 Mongoose and 9 cats. We have also begun experimenting with a self-resetting rat and stoat trap.

Fourteen Anabat™ ultrasonic recorders detected 13 Hawaiian Hoary bat passes during 4830 detector nights in FY 2012.

First Wind biologists issued 24 wildlife education trainings in FY 2012. We observed 2 ducks loafing on the access road at the KAH site.

KAH contributed $92,500 and $150,000 to DOFAW on January 19 and April 19, 2012 as part of the waterbird and all of the bat mitigation obligations, respectively. Mitigation for Newell's shearwater began with an agreement between a private landowner, The Nature Conservancy and FW and an initial exploration of historical calling hotspots in Wainiha Valley, Kauai.

We continually manage vegetation within all the fatality monitoring plots at a frequency between 2-6 weeks using a combination of turf mowers, weed-whackers and herbicides.

Three agency site visits occurred, September 21, 2011; January 15, 2012 and March 6, 2012.

The Endangered Species Recovery Committee met June 28, 2012 and reviewed the Kahuku Wind Power FY 2011 HCP report.

In addition to the FY 2011 and FY 2012 annual reports, we also provided quarterly reports for FY 2011 Q2 and Q3 and FY 2012 Q1, Q2, and Q3.

We have initiated dog training in June in order to supplement or replace human fatality searches. We are also planning to trial goats as a supplement to our vegetation management activities.

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 (2010-F-0190) at the conclusion of the 2012 State of Hawaii fiscal year (July 2011- June 2012, Year 2).

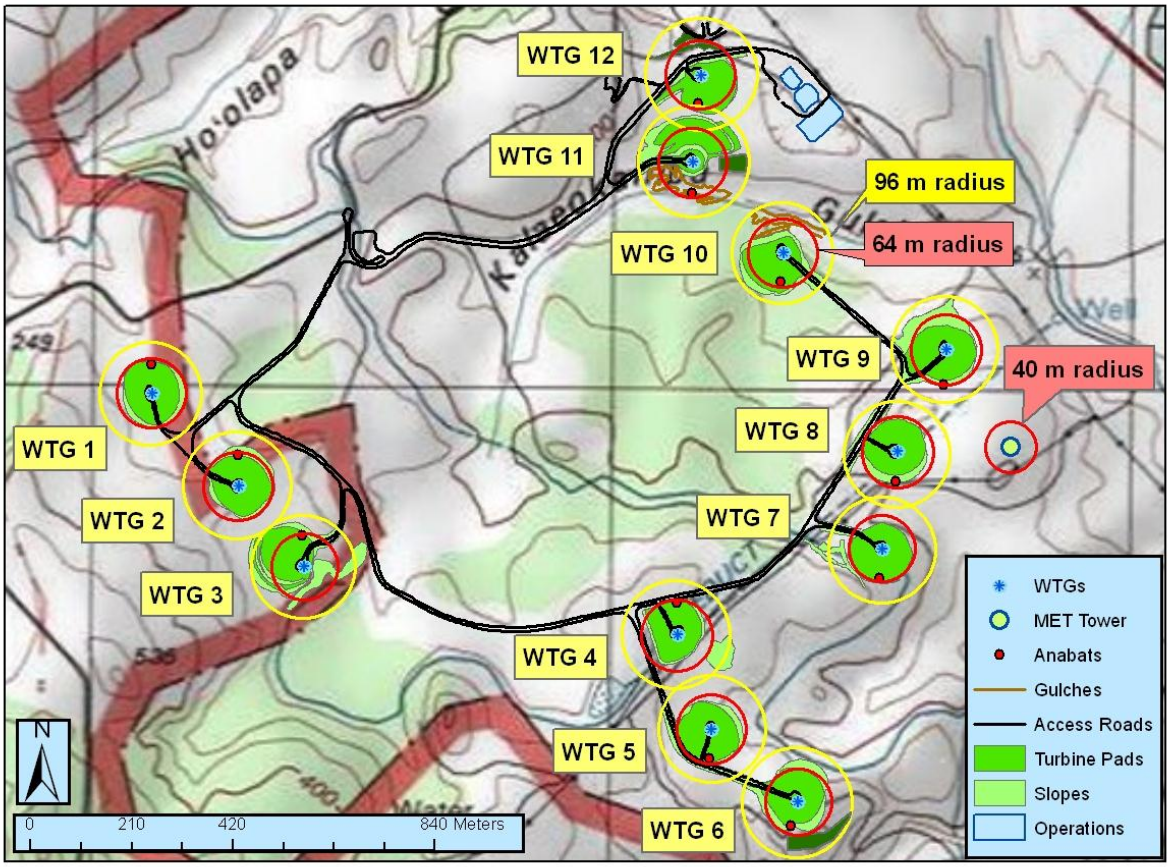
The BiOp and ITL were issued for the project in May and June, 2010, respectively. The ITL and biological opinion cover seven federally-listed threatened and endangered species and one state-listed endangered species: the Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*), Hawaiian coot or 'alae 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 BiOp, 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. First Wind hired a Senior Wildlife Biologist in December 2010 (Mitchell Craig), followed by a Wildlife Technician in January 2011 (Matthew Wickey), a second Wildlife Technician in January 2012 (Allysa Lapine), and a Senior Wildlife Technician in April 2012 (Scott Lynch).

KAH was commissioned for operation on March 23, 2011.

Fatality Monitoring

In January 2011 we established the perimeters of circular downed wildlife search plots around each turbine and the met tower, and set transect markers. WTG search plot perimeters have radii of 64 and 96 meters from the base of the turbines, corresponding to 50 % and 75 % of the maximum rotor-swept height of the WTGs. The permanent meteorological tower (MET) is searched to a distance of 40 meters from the base, which corresponds to 50 % of its height (Figure 1).



Kahuku Wind Power

Figure 1. KAH roads, operation's buildings, WTG's, MET tower, fatality monitoring plots and Anabat locations.

The fatality monitoring schedule, as stipulated by the HCP, is twice weekly for all WTG's and the MET tower. The full schedule takes two weeks to complete. In both weeks the first weekly search of all WTG's and MET tower plots is only within the 50 % perimeter. The second weekly search for both weeks is of 6 WTG's within the 50 % perimeter and the MET tower and 6 WTG's within the 75 % perimeter. In the second week of the two-week monitoring schedule and during the second weekly search the 6 WTG's that were searched only within the 50 % perimeter the previous week are now searched out to the 75 % perimeter and the 6 WTG's that had been searched out to the 75 % perimeter the previous week are now searched only within the 50 % perimeter. Using this search schedule all 12 WTG's and the MET tower are searched out to at least the 50 % perimeter twice a week, except 3 times a week between October 1, 2011 and March 31, 2012, and all 12 WTG's are searched out to the 75 % perimeter every 2 weeks.

The marked straight-line transects within the search plots are spaced every 14 meters (Figure 2). When searching plots we follow these transect markers and unmarked transects half way between these markers so that the maximum distance between searched transects is 7 meters. Searching is conducted either by foot or all-terrain vehicles (ATVs), by one or two persons. Slopes that are too steep to drive with ATV's are always walked horizontally along the slopes following transects that are also no greater than 7 meters apart.

Figure 2. Transect marking stakes at KAH WTG 2. Staked rows are 14 meters apart.

We began the full search schedule of all turbines January 18, 2011. Appendix 1 shows search dates of the 50 % and 75 % search plots for each WTG and the MET tower during each quarter of FY 2012 and Table 1 shows the mean and standard deviation for search interval during FY 2012-Q1 and Q4 (the quarters when searching was accomplished 2 times per week in the 50% plots) and also for the search interval during FY 2012 Q2 and Q3 (the quarters when searches occurred 3 times a week in the 50% plots). The FY 2012-Q1 and Q4 50 % plot mean and standard deviation for search intervals were 3.51 (SD = 0.78) and for FY 2012-Q2 and Q3 were 2.52 (SD = 0.87), respectively. The FY 2012 75% plot mean and standard deviation for search intervals were and 13.95 (SD = 1.59) days.

Table 1 shows inter-search intervals in days for the 50 % and 75 % search plots for each WTG and the MET tower search plot during the period between July 1, 2011 and June 30, 2012.

			WTG												MET
			1	2	3	4	5	6	7	8	9	10	11	12	
FY 2012 Q1 and Q4	50%	Mean	3.50	3.50	3.50	3.50	3.53	3.53	3.53	3.53	3.53	3.53	3.50	3.50	3.50
		Std.Dev.	0.70	0.64	0.70	0.50	0.61	0.67	0.72	1.26	1.30	0.67	0.70	0.64	0.64
FY 2012 Q2 and Q3	50%	Mean	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
		Std.Dev.	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
FY 2012	75%	Mean	13.73	13.77	14.00	14.00	13.69	14.04	13.96	14.32	14.56	14.00	13.69	13.73	
	75%	Std.Dev.	1.59	1.63	2.31	2.02	1.38	0.20	0.73	1.38	2.04	1.98	1.38	1.37	

Table 1. Inter-search Interval (in days) for 50 and 75 % fatality monitoring search plots in FY 2012 at KAH.

Fatalities and Injuries

Of the eight species listed in the ITL, take of only the Hawaiian Hoary Bat was documented during FY 2012 (Figure 4, Table 2). A total of three Hawaiian Hoary Bat fatalities have been found at the site since operation began. As prescribed in the HCP, KAH has initiated adaptive management (see Adaptive Management, pg. 15 below) measures to reduce bat fatalities at the site (Appendix 21).

Between July 1, 2011 and June 30, 2012 First Wind biologists found 13 carcasses of bird species and 1 set of feathers of a bird, all not listed as state- or federally- endangered or threatened (Table 2). These included 3 Wedge-tailed Shearwaters, 6 Great Frigatebirds, 2 Cattle Egrets, 2 doves and 1 Common Mynah. A local rancher associated with the KAH land lease found 1 injured Great Frigatebird (GRFR) 168 meters from WTG 1 (Table 2). This GRFR was delivered to a veterinary hospital for care. Veterinarians deemed this GRFR un-releasable and the GRFR currently lives at Sea Life Park on Oahu. Mean wind speed in meters/second and per cent operational for the 3.5 days prior to noon on the day found is listed.

Bird Type	Date	Location	Distance from WTG (m)	Direction from WTG (°)	3.5 Day Mean Wind Speed (m/s)	3.5 Day % operational	Condition
Great Frigatebird	7/10/2011	WTG 1	168	0	10.1	27	Alive
Cattle Egret	7/29/2011	WTG 11	34	118	8.5	50	Scavenged
Wedge-tailed Shearwater	8/7/2011	WTG 12	33.8	315	10.2	36	Not Scavenged
Great Frigatebird	8/16/2011	WTG 11	60	285	9.1	48	Scavenged
Great Frigatebird	8/30/2012	WTG 11	92	180	8.3	95	5 Feathers only
Hawaiian Hoary Bat	9/15/2011	WTG 1	37.5	352	6.3	99	Not Scavenged
Great Frigatebird	9/27/2011	WTG 10	52.5	210	3.9	67	Not Scavenged
Great Frigatebird	10/21/2011	WTG 11	38.5	242	5.8	73	Not Scavenged
Great Frigatebird	11/1/2011	WTG 2	45.8	250	7.3	99	Not Scavenged
Wedge-tailed Shearwater	12/5/2011	WTG 4	70.5	205	7.3	87	Scavenged
Wedge-tailed Shearwater	12/5/2011	WTG 1	43.5	218	7.3	87	Not Scavenged
Cattle Egret	12/7/2011	WTG 4	66	68	8.3	93	Scavenged
Dove	1/17/2012	WTG 3	1	48	5	84	Not Scavenged
Mynah	1/18/2012	WTG 8	94.4	225	6.2	96	Scavenged
Hawaiian Hoary Bat	4/16/2012	WTG 7	26.4	334	6.7	81	Not Scavenged
Hawaiian Hoary Bat	4/23/2012	WTG 6	48.8	0	9.26	91	Not Scavenged
Dove	5/10/2012	WTG 5	1	11	9.4	75	Not Scavenged

Table 2. Summary of fatalities found at KAH during FY 2012.

Hawaiian Hoary Bat Take Estimation

The estimated adjusted take for the 3 Hawaiian Hoary Bat fatalities found in FY 2012 using Huso's estimated take equation (Huso 2010) is 5.13 adult bats and 0.64 juvenile bats (Appendix 2). The annual baseline take allowed under the ITL is 4 adult and 3 juvenile bats; therefore the baseline take for adult bats was exceeded. The adjusted take estimate used the mean search interval for 3 separate periods and the mean for all of the CARE and the SEEF results through June 30, 2012. Each period was weighted according to the proportion of the total days between January 18, 2011 and June 30, 2012.

The estimated adjusted take for these 3 bats using Huso et al's R-software based estimator (Huso et al, 2011) with 95% confidence intervals, Lognormal extinction distribution, and 95 % searchable area in On-pad vegetation was 5 bats (CI = 5-6 bats) (Appendix 3).

Carcass Retention Trials and Scavenger Trapping

We possess state and federal wildlife collection permits for Kahuku, numbers WL13-02 and MB40087A-0, respectively. For Carcass Retention Trials (CARE) and Searcher Efficiency Trials (SEEF) we assign carcasses to two size classes - small and medium. Rats are used as surrogates for bats and represent the small size class. WTSH's are surrogates for Coots, Moorhens, Shearwaters and Petrels as the medium size class. Ducks such as Scaups and Mallards represent Pueo and Hawaiian/Mallard Ducks in the medium size class. WTSH carcasses originally came from Sea Life Park on Oahu. Rats came from Layne Laboratories, Inc. in California, a pet food company. We specifically request rats from Layne Labs that are brown and/or black and the small size category (up to 40 grams in mass and 4.5 inches in length) to approximate the body size and weight of Hawaiian Hoary Bats. Various species of ducks were provided by the USDA-APHIS in Alaska.

We conducted 9 CARE trials in FY 2012 (Appendices 4 through 12) and 2 in FY 2011, using a total of 53 rats, 14 WTSH's, and 14 ducks. The mean retention period for 35 rats placed On-pad was 6.49 days (SD = 4.93). The mean retention period for 16 rats placed Off-pad was 5.44 days (SD = 5.21). We considered an avian carcass "present" until < 10 of its body feathers and < 2 of its wing feathers remained (Young et al, 2012). The mean retention period for 20 birds placed On-pad was 13.50 days (SD = 2.01). The mean retention period for 16 birds placed Off-pad was 10.88 days (SD = 5.14).

Trapping for scavengers such as Mongoose and cat began in October 2011. Each plot was intensively trapped with 8 body-grip traps for a 2-3 week period then, as trap rate declined, reduced to 4-5 traps. Four live cat traps were moved around the site. Through June 30, 2012 we trapped a total of 250 Mongoose and 9 cats at all fatality monitoring plots (Figure 3).

Figure 3. Mongoose investigates a body-grip trap.

Trapping scavengers had a marked effect on retention of all carcasses, and especially for rats. For example, the mean retention period for 18 rats pre-trapping On-pad was 2.94 days (SD = 1.59) and for 17 rats post-trapping On-pad was 10.24 days (SD = 4.47). The mean retention period for 8 rats pre-trapping Off-pad was 1.75 days (SD = 1.91) and for 8 rats post-trapping Off-pad was 9.13 days (SD = 4.85) (Table 3). The mean retention period for 12 birds pre-trapping On-pad was 13.17 days (SD = 2.59) and for 8 birds post-trapping On-pad was 14.00 days (SD = 0.00). The mean retention period for 8 birds pre-trapping Off-pad was 8.88 days (SD = 6.10) and for 8 birds post-trapping Off-pad was 12.88 days (SD = 3.18) (Table 3).

Each bat fatality when found was partially eaten by ants. Rats used in CARE trials also have been heavily scavenged by ants. Once Mongoose were extensively trapped we found that ants were the main scavenger of rats causing the rats to be reduced to remains that were eventually considered "absent" in CARE trials. In an effort to reduce scavenging by ants, on July 2, 2012 we spread granulated insecticide bait, appropriate to the species of scavenging ants, on all 12 WTG pads.

	Rat				Bird			
	Days	Overall	Pre-Trap	Post Trap	Days	Overall	Pre-Trap	Post Trap
On-pad	Mean	6.49	2.94	10.24	Mean	13.50	13.17	14.00
	SD	4.93	1.59	4.47	SD	2.01	2.59	0.00
Off-pad	Mean	5.44	1.75	9.13	Mean	10.88	8.88	12.88
	SD	5.21	1.91	4.85	SD	5.14	6.10	3.18

Table 3. All Carcass Retention Trial Means and Standard Deviations (in days) at KAH.

Searcher Efficiency Trials

SWCA environmental consultants has been contracted to independently conduct SEEF trials at Kahuku. SWCA generated random locations within all WTG and MET tower search plots for carcass placement in two vegetation classes, On-pad and Off-pad (Figure 1). On-pads are the flat, graded areas immediately around the WTG's that are consistently mowed every 2-3 weeks to maintain grass as short as 2.25 inches. Off-pads are all other areas outside the pads including graded slopes leading away from the pads and all other ungraded but managed areas also outside the pads. The vegetation in the Off-pad areas ranges from 3 inches to 4 feet tall.

SWCA personnel place carcasses in the pre-selected random locations on-site in the morning before First Wind biologists arrive. First Wind operations personnel verify that carcasses are still in place after fatality searches are complete and provide SWCA with this information. First Wind operations personnel in addition to SWCA are also sometimes directed to place carcasses according to the GPS locations provided by SWCA.

In June 2011 through June 30, 2012, 122 small and medium carcasses were placed in the two vegetation types. Searchers found 31 of 42 small carcasses On-pad (73.8 %), 9 of 27 small carcasses Off-pad (33.3 %), 23 of 23 medium carcasses On-pad (100%) and 24 of 30 medium carcass Off-pad (80%) (Appendices 13 and 14).

Vegetation Type	**On-pad**			**Off-pad**		
Size Class	Placed	Found	Per Cent	Placed	Found	Per Cent
Small (rats)	42	31	73.8	27	9	33.3
Medium (birds)	23	23	100	30	24	80

Table 4. Searcher Efficiency Trials at KAH.

Hawaiian Hoary Bat Monitoring

KAH biologists have deployed 12 Titley Scientific Anabat™ ultrasonic bat detectors (models SD1 and SD2) on site since January 2011 (locations shown in Figure 1). Each detector is approximately 55 meters from each WTG either north (facing southwest) or south (facing northwest) attached on wood or metal poles and positioned 3 meters from the ground. Thirteen passes were detected at 9 of these 14 locations (Figure 4, Appendix 15). All detections occurred in the period June-October.

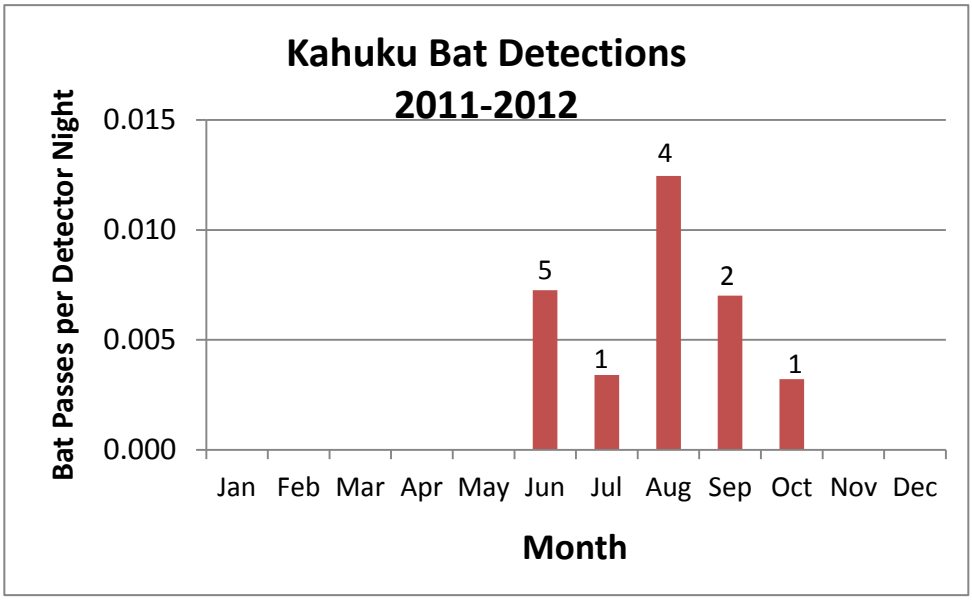


Figure 4. Hawaiian Hoary Bat pass detection rates at KAH in 2011 and 2012 (pass numbers above bars).

Wildlife Education and Observation Program

First Wind biologists began implementing WEOP trainings on February 15, 2011 for all permanent or transient personnel on site. Twenty-eight WEOP training orientations have been administered in FY2012.

First Wind HCP, operations and contract staff all observed 2 ducks that were Mallard or Mallard hybrids on March 19 (1 duck) and March 29 (1 duck) along the road between WTG 11 and 12.

Mitigation

Newell's Shearwater

According to the HCP, mitigation options for Newell's shearwaters include participation in the colony-based protection and/or social attraction project at Makamaka'ole on West Maui, or colony-based protection and management measures on Kauai, possibly in conjunction with the island-wide HCP. KAH has initiated discussions with The Nature Conservancy (TNC) and a private landowner on Kauai regarding cooperative management to benefit a known Newell's shearwater colony located within an area currently being managed by TNC for watershed and native plant community protection. A preliminary proposal for research (Appendix 20) to be conducted at Wainiha Valley was accepted and an initial exploratory visit made on June 5, 2012 (Figure 5).

Figure 5. Slope in Wainiha Valley, Kauai where Newell's Shearwaters have historically been heard.

Hawaiian Petrel

The first option for Hawaiian petrel mitigation according to the HCP is likewise closely tied to the mitigation program being developed at Makamaka'ole on the island of Maui. Depending on the capacity of the site this may still be an option. In the event it is not, KAH has confirmed with the National Park Service that there is still a need for predator control in petrel nesting areas that are currently beyond the Park's capacity to manage.

Waterbirds

In December 2010 and February 2012, KAH made the first 2 of 3 total annual payments of $92,500 each to DOFAW to provide support for the first 2 of 3 years of waterbird mitigation funding as outlined in the HCP. DOFAW began to use these funds in July, 2011 to hire 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 (Appendices 16-19). The USFWS determined that rat baiting stipulated in the HCP is actually not appropriate at Hamakua Marsh. Consequentially First Wind has agreed to pay an additional $26,500 per year to fund live rat trapping with trapping activity beginning in March 2012.

Pueo

In December, 2010 KAH provided $25,000 in funding to DOFAW to initiate Pueo research, as outlined in the HCP. DOFAW indicates that Pueo research has not yet been conducted (Scott Fretz, pers.com. ESRC Mtg.).

Hawaiian Hoary Bat

First Wind and DOFAW have agreed to an MOU and First Wind has paid DOFAW the full obligation of $150,000 for bat mitigation to be conducted by DOFAW at Kahikinui.

Vegetation Management

The HCP for KAH stipulates that the fatality monitoring plots around the WTG's and MET tower be mowed every month. Areas around the WTG's that are well-graded and flat (On-pad) are mowed every 2-3 weeks to 2.25 inches (Figure 6). Graded slopes that cannot be mowed are weed trimmed to 2-3 inches. Other areas outside the pads and graded slopes (Off-pad) are mowed with the turf-mower at 2.25 to 4 inches and /or brush cut-mowed with the Compact Track Loader to 2 to 5 inches every 3 to 6 weeks. Herbicides have also been used to retard growth.

Figure 6. WTG 9- 75% fatality monitoring plot (On-pad=brown, Off-pad=green).

The Kalaheokahipu Gulch that passes through the WTG 10 and 11 fatality monitoring plots is considered unmanageable and adjustments to take of covered species will be made to account for fatalities that may occur but are not recovered from this unsearchable area (Figure 7).

Figure 7. Kalaheokahipu Gulch near WTG 11 at KAH.

Adaptive Management

Considering the low CARE trial results for small carcasses (3.44 days for On-pad vegetation in FY 2011 Q4 and FY 2012 Q1) and the inter-search interval of 3.51 days for the 50 % perimeter fatality monitoring plots from January to October, we increased the search frequency in the 50 % plots from 2 to 3 times a week beginning October 1, 2011. We began predator control efforts in October 2011 at all plots to reduce the numbers of scavengers. After 6 months of searching the 50 % plots 3 times per week (inter-search interval equaled 2.52 days) and intensive scavenger trapping the mean CARE trial results for small carcasses On-pad was 5.94 days overall through March 31, 2012. The search interval returned to 2 times per week in FY 2012 Q4.

The third Hawaiian Hoary bat fatality in FY 2012 occurred April 23, 2012. According to fatality estimate calculations the adult bat baseline of 4 was exceeded (Appendix 16). Curtailment of all turbines up to a wind speed of 5 m/s began April 27, 2012 and is implemented between sunset and sunrise from April through October (Appendix 21).

Agency Site Visits and Reporting

Representatives from the USFWS and DOFAW visited Kahuku on September 21, 2011, January 15 and March 6, 2012. Sandee Hufana and Kathryn Stanaway (DOFAW) and Aaron Nadig (USFWS) visited September 21. Patrice Ashfield , Aaron Nadig, Dawn Greenlee, and Rachel Rounds, Afsheen Siddiqi, Tim Langer, Michelle Bogardus, Jodi Charrier, and Ken Foote (USFWS) and Kathryn Stanaway (DOFAW) visited January 15. Patrice Ashfield , Stefanie Starvakis, Kristi Young, Aaron Nadig, and Michael Frey (USFWS) visited March 6.

The Endangered Species Recovery Committee met June 28, 2012 and successfully reviewed the Kahuku Wind Power FY 2011 HCP report.

In addition to the FY 2011 and FY 2012 annual reports, we also provided quarterly reports for FY 2011 Q2 and Q3 and FY 2012 Q1, Q2, and Q3.

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 were renewed for 1 year in 2011 and 2012.

First Wind fulfilled part of its mitigation obligation under the HCP with a Memorandum of Agreement and payments made on December 9, 2010 to DOFAW of $92,500 and on January 19, 2012 to DOFAW for $92,500 for waterbird mitigation. A Memorandum of Agreement and the required payment of $150,000 were made to DOFAW in April 19, 2012 to support Hawaiian Hoary Bat habitat enhancement at Kahikinui, Maui. Details for all other HCP expenditures are in Appendix 22.

Looking Ahead

We recently began to train dogs to takeover fatality searching, reducing human effort and increasing our ability to find carcasses (Figure 8). We also began experimenting with new self-resetting scavenger traps for rats and Mongoose. We intend to experiment with grazing animals to reduce mowing time and costs and herbicide use.

Figure 8. Matt Wickey training Honey to search for downed wildlife.

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Appendix 1.

Fatality Monitoring Plot Search Dates at KAH in FY 2012 Q1, Q2, Q3, and Q4 (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			
6/30	D	6/30	d	6/30	d	7/1	d	7/1	d	6/30	d	7/1	d	6/30	d	6/30	d	7/1	d	7/1	d	7/1	d	7/1	d
7/5	5	7/5	5	7/5	5	7/5	4	7/5	4	7/5	5	7/6	5	7/6	6	7/6	6	7/6	5	7/6	5	7/6	5	7/6	5
7/7	2	7/7	2	7/7	2	7/8	3	7/8	3	7/7	2	7/8	2	7/7	1	7/7	1	7/8	2	7/8	2	7/8	2	7/8	2
7/11	4	7/11	4	7/11	4	7/11	3	7/11	3	7/11	4	7/12	4	7/12	5	7/12	5	7/12	4	7/12	4	7/12	4	7/12	4
7/14	3	7/14	3	7/14	3	7/15	4	7/15	4	7/14	3	7/15	3	7/14	2	7/14	2	7/15	3	7/15	3	7/15	3	7/15	3
7/18	4	7/18	4	7/18	4	7/18	3	7/18	3	7/18	4	7/19	4	7/19	5	7/19	5	7/19	4	7/19	4	7/19	4	7/19	4
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WTG																									MET	
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WTG																																			
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WTG																								MET	
1		2		3		4		5		6		7		8		9		10		11		12			
4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d	4/2	d
4/5	3	4/6	4	4/5	3	4/6	4	4/5	3	4/6	4	4/5	3	4/6	4	4/5	3	4/6	4	4/5	3	4/6	4	4/6	4
4/9	4	4/9	3	4/9	4	4/9	3	4/9	4	4/9	3	4/9	4	4/9	3	4/9	4	4/9	3	4/9	4	4/9	3	4/9	3
4/12	3	4/13	4	4/12	3	4/13	4	4/12	3	4/13	4	4/12	3	4/13	4	4/12	3	4/13	4	4/12	3	4/13	4	4/13	4
4/16	4	4/16	3	4/16	4	4/16	3	4/16	4	4/16	3	4/16	4	4/16	3	4/16	4	4/16	3	4/16	4	4/16	3	4/16	3
4/19	3	4/20	4	4/19	3	4/20	4	4/19	3	4/20	4	4/19	3	4/20	4	4/19	3	4/20	4	4/19	3	4/20	4	4/20	4
4/23	4	4/23	3	4/23	4	4/23	3	4/23	4	4/23	3	4/23	4	4/23	3	4/23	4	4/23	3	4/23	4	4/23	3	4/23	3
4/26	3	4/27	4	4/26	3	4/27	4	4/26	3	4/27	4	4/26	3	4/27	4	4/26	3	4/27	4	4/26	3	4/27	4	4/27	4
4/30	4	4/30	3	4/30	4	4/30	3	4/30	4	4/30	3	4/30	4	4/30	3	4/30	4	4/30	3	4/30	4	4/30	3	4/30	3
5/3	3	5/4	4	5/3	3	5/4	4	5/3	3	5/4	4	5/3	3	5/4	4	5/3	3	5/4	4	5/3	3	5/4	4	5/4	4
5/7	4	5/8	4	5/7	4	5/8	4	5/7	4	5/8	4	5/7	4	5/8	4	5/7	4	5/8	4	5/7	4	5/8	4	5/8	4
5/10	3	5/11	3	5/10	3	5/11	3	5/10	3	5/11	3	5/10	3	5/11	3	5/10	3	5/11	3	5/10	3	5/11	3	5/11	3
5/14	4	5/14	3	5/14	4	5/14	3	5/14	4	5/14	3	5/14	4	5/14	3	5/14	4	5/14	3	5/14	4	5/14	3	5/14	3
5/17	3	5/18	4	5/17	3	5/18	4	5/17	3	5/18	4	5/17	3	5/18	4	5/17	3	5/18	4	5/17	3	5/18	4	5/18	4
5/21	4	5/21	3	5/21	4	5/21	3	5/21	4	5/21	3	5/21	4	5/21	3	5/21	4	5/21	3	5/21	4	5/21	3	5/21	3
5/24	3	5/25	4	5/24	3	5/25	4	5/24	3	5/25	4	5/24	3	5/25	4	5/24	3	5/25	4	5/24	3	5/25	4	5/25	4
5/29	5	5/29	4	5/29	5	5/29	4	5/29	5	5/29	4	5/29	5	5/29	4	5/29	5	5/29	4	5/29	5	5/29	4	5/29	4
5/31	2	6/1	3	5/31	2	6/1	3	5/31	2	6/1	3	5/31	2	6/1	3	5/31	2	6/1	3	5/31	2	6/1	3	6/1	3
6/4	4	6/4	3	6/4	4	6/4	3	6/4	4	6/4	3	6/4	4	6/4	3	6/4	4	6/4	3	6/4	4	6/4	3	6/4	3
6/7	3	6/8	4	6/7	3	6/8	4	6/7	3	6/8	4	6/7	3	6/8	4	6/7	3	6/8	4	6/7	3	6/8	4	6/8	4
6/11	4	6/11	3	6/11	4	6/11	3	6/11	4	6/11	3	6/11	4	6/11	3	6/11	4	6/11	3	6/11	4	6/11	3	6/11	3
6/14	3	6/15	4	6/14	3	6/15	4	6/14	3	6/15	4	6/14	3	6/15	4	6/14	3	6/15	4	6/14	3	6/15	4	6/15	4
6/18	4	6/18	3	6/18	4	6/18	3	6/18	4	6/18	3	6/18	4	6/18	3	6/18	4	6/18	3	6/18	4	6/18	3	6/18	3
6/21	3	6/22	4	6/21	3	6/22	4	6/21	3	6/22	4	6/21	3	6/22	4	6/21	3	6/22	4	6/21	3	6/22	4	6/21	3
6/25	4	6/25	3	6/25	4	6/25	3	6/25	4	6/25	3	6/25	4	6/25	3	6/25	4	6/25	3	6/25	4	6/25	3	6/25	4
6/28	3	6/29	4	6/28	3	6/29	4	6/28	3	6/29	4	6/28	3	6/29	4	6/28	3	6/29	4	6/28	3	6/29	4	6/29	4
7/2	4	7/2	3	7/2	4	7/2	3	7/2	4	7/2	3	7/2	4	7/2	3	7/2	4	7/2	3	7/2	4	7/2	3	7/2	3

Appendix 2. Hawaiian Hoary Bat Fatality Estimation at KAH in FY 2012.

Bat Take Calculation	**Period 1** (Jan. 31, 2011 to Oct. 1, 2011)	**Period 2** (Oct. 1, 2011 to Apr. 1, 2012)	**Period 3** (Apr. 1, 2012 to July 1, 2012)
Search Area Vegetation Type	**On-pad**		
Proportion	1.00		
Bat (SEEF) likelihood of detection (p_{ij})	***0.74***		
Mean Carcass removal time (t) (days)	***6.49***		
No of carcasses (c_{ij}) (Observed Take)	***3***		
Eq3			
λ	0.15		
d_{99}	29.89		
I = search interval	***3.51***	***2.49***	***3.50***
d_{99} (Eq 2 applied)	4	2	4
e_{ij}	1	1	1
Eq4			
λd_{99}	0.54	0.38	0.54
r_{ij}	0.77	0.83	0.77
m_{ij}	***5.26***	***4.89***	***5.26***
total + unsearchable	5.26	4.89	5.26
proportion of sampled turbines	1	1	1
total + unsearchable + unsampled turbines	5.26	4.89	5.26
Unobserved take	**2.26**	**1.89**	**2.26**
Unobserved indirect take	***0.68***	***0.57***	***0.68***
Total adjusted take	***5.94***	***5.46***	***5.94***
Days in Period	242	183	91
Period Ration (of 516 total days)	0.469	0.355	0.176
Weighted Period Take	2.78	1.94	1.05
Overall Adjusted Take	***5.77***		
Adult Weighted Period Take	2.47	1.73	0.93
Adult Overall Adjusted Take	***5.13***		
Juvenile Weighted Period Take	0.32	0.20	0.12
Juvenile Overall Adjusted Take	***0.64***		

Appendix 3. R-Estimator Results for Hawaiian Hoary Bat Fatalities.

Turbine search areas were not provided.

This study included all 12 turbines located at the study site.

User-defined alpha level of 0.05; all reported confidence intervals are 95% confidence intervals.

The number of observed casualties for some requested groups is less than 5, use caution when interpreting estimates.

Requested Summaries

Factor	Level	Number. Found	SiteTotal. Estimate	SiteTotal. Lower	SiteTotal. Upper	PerTurbine. Estimate	PerTurbine. Lower	PerTurbine. Upper
Overall		3	5	5	6	0.4	0.34	0.49
Species	LACI	3	5	5	6	0.4	0.34	0.49

User-defined alpha level of 0.05; all reported confidence intervals are 95% confidence intervals.

Searcher Efficiency Estimates; AIC for mean-only model:54.8

SE.Cov.Ind	Found	Placed	Estimate	Lower	Upper
mean	34	46	0.74	0.61	0.87

Carcass Persistence Estimates; AIC for mean-only model and distribution = lognormal:168.13

Estimates and Confidence Intervals for r based on an interval of 4 days.

CP.Cov.Ind	Placed	CP	Lower	Upper	r	r.Lower	r.Upper
mean	35	5.94	4.33	8.59	0.87	0.79	0.93

Appendix 4. CARE C

CARE C		**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**	
Carcass Type		RAT		SCAUP		RAT		WTSH		RAT		SCAUP		RAT		WTSH	
WTG		1		2		4		5		7		8		10		11	
Vegetation, Distance from WTG	On-Pad, 20 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																
day 0	7/26		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	7/27	P	Scav,A	P		P		P		P	A	P		P		P	
day 2	7/28	P		P		P	A	P		P		P		P		P	
day 3	7/29	***Present***	A	P		P		P		P		P		P	L,A	P	M
day 4	7/30	***Absent***	C	P		P		P		P		P		***Present***	S	P	
day 5	7/31			P		P		P		P		P	Scav	***Absent***		P	
day 6	8/1			P		P		P		***Present***	A	P	L			P	
day 7	8/2			P	L	***Present***	A,S	P	Scav,W,B	***Absent***		P				P	A,L
day 8	8/3			P		***Absent***		P				P				P	
day 9	8/4			P	Scav,W,B			P				P				P	
day 10	8/5			P				P				P				P	
day 11	8/6			P				P				P				P	
day 12	8/7			P				P				P				P	M
day 13	8/8			P				P				P				P	
day 14	8/9			***Present***	>2W,>10B			***Present***	>2W,>10B			***Present***				***Present***	
Retention (days)		***3***		***14***		***7***		***14***		***6***		***14***		***4***		***14***	

Appendix 5. CARE E.

CARE E		**1**		**2**		**3**		**4**		**5**	**6**		**7**	**8**		**MET**
Carcass Type		RAT		SCAUP		RAT		WTSH		RAT	SCAUP		RAT	WTSH		RAT
WTG		2		3		5		6		8	9		11	12		
Veg-type, Distance from WTG	Off-Pad, 80 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	Present /Absent		Present /Absent	Present /Absent		Present /Absent
Day	Date															
day 0	9/14		Notes		Notes		Notes		Notes			Notes	***Present***		Notes	
day 1	9/15	P		P	Scav,M	P		P		***Present***	***Present***		Absent	P		P
day 2	9/16	P		P	F	P		P	Scav,M	Absent	Absent	No F		P		P
day 3	9/17	P		P	F	P		P	F					P		***Present***
day 4	9/18	***Present***	M	P	F	P		P	F					P		Absent
day 5	9/19	Absent		P	F	***Present***	D	P	F					P	A,D	
day 6	9/20			P	F	Absent		P	F					P		
day 7	9/21			P	F			P	F					P		
day 8	9/22			P	F			P	F					P		
day 9	9/23			P	F			P	F					P		
day 10	9/24			P	F			P	F					P		
day 11	9/25			P	F			P	F					P		
day 12	9/26			P	F			P	F					P		
day 13	9/27			P	F			P	F					P		
day 14	9/28			***Present***	>2W,>10B			***Present***	<2W,>10B					***Present***		
Retention (days)		***4***		***14***		***5***		***14***		***1***	***1***		***0***	***14***		***3***

Appendix 6. CARE F.

CARE F		1		2		3		4		5		6		7		8		9	
Carcass Type		Rat		Rat		Duck		Rat		WTSH		Rat		Duck		Rat		WTSH	
WTG		1		2		3		5		6		8		9		11		12	
Vegetation, Distance from WTG	On-Pad,41 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																		
day 0	11/11	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes	P	Notes
day 1	11/12	P	A	P		P		P		P		***Present***	A	P		P		P	
day 2	11/13	P		P		P		***Present***	L	P		Absent		P		P	M	P	M
day 3	11/14	P		P	A	P		Absent		P				P		***Present***		P	
day 4	11/15	P		P		P	L			P	L			P		Absent		P	Scav, F
day 5	11/16	P	S,D	P		P				P				P				***Present***	>10B
day 6	11/17	P		P		P				P	D			P	Scav, L			Absent	<10B
day 7	11/18	P		P		P				P				P					
day 8	11/19	P		P		P				P				P					
day 9	11/20	P		P		P				P				P					
day 10	11/21	P		P		P				P				P					
day 11	11/22	***Present***		P		P				P				P					
day 12	11/23	Absent		P		P				P				P					
day 13	11/24			P		P	Scav			P				P					
day 14	11/25			***Present***		***Present***				***Present***				***Present***	>10B				
Retention (days)		***11***		***14***		***14***		***2***		***14***		***1***		***14***		***3***		*5*	

Appendix 7. CARE G.

CARE G		**1**		**2**		**3**	
Carcass Type		Rat		Rat		Rat	
WTG		1		2		3	
Vegetation, Distance from WTG	On-Pad, 41 m	Present /Absent		Present /Absent		Present /Absent	
Day	Date						
day 0	12/6		Notes		Notes		Notes
day 1	12/7	P		P		P	
day 2	12/8	P		P		P	A
day 3	12/9	P	A	P		P	H
day 4	12/10	P		P		P	
day 5	12/11	P		P		P	
day 6	12/12	P		P		P	
day 7	12/13	P		P		***Present***	
day 8	12/14	P	D	P		Absent	
day 9	12/15	P		***Present***	D		
day 10	12/16	P		Absent			
day 11	12/17	P					
day 12	12/18	P					
day 13	12/19	***Present***					
day 14	12/20	Absent					
Retention (days)		***13***		***9***		***7***	

Appendix 8. CARE H.

CARE H		1		2		3		4		5		6		7		8		9		10	
Carcass Type		Rat		WTSH		Rat		Duck		Rat		WTSH		Rat		Rat		Duck		Rat	
WTG		2		2		5		5		8		8		10		11		11		12	
Vegetation, Distance from WTG	On-Pad, 41 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																				
day 0	1/18		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	1/19	***Present***		P	Scav	***Present***		P		P	M	P		P	A	P	Scav,M	P		P	A, M
day 2	1/20	Absent	Scav	P		Absent	Scav	P		P	A	P		P		***Present***	Scav	P		P	
day 3	1/21			P				P		P		P	Scav	***Present***	C	Absent		P		P	
day 4	1/22			P				P	L	***Present***	A	P		Absent				P		***Present***	C
day 5	1/23			P				P		Absent		P						P		Absent	
day 6	1/24			P				P				P						P			
day 7	1/25			P				P				P						P			
day 8	1/26			P				P				P						P			
day 9	1/27			P				P	D			P						P	D		
day 10	1/28			P				P				P						P			
day 11	1/29			P				P				P						P			
day 12	1/30			P				P				P						P			
day 13	1/31			P				P				P						P			
day 14	2/1			***Present***				***Present***				***Present***						***Present***			
Retention (days)		***2***		***14***		***2***		***14***		***4***		***14***		***2***		***2***		14		***4***	

Appendix 9. CARE I.

CARE I		1		2		3		4		5		6		7		8	
Carcass Type		Rat		Rat		Rat		Rat		Rat		Rat		Rat		Rat	
WTG		2		3		5		6		8		9		11		12	
Vegetation, Distance from WTG	On-Pad, 41 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																
day 0	2/15		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	2/16	P	A, H	P		P		P	A, H	P	A, H	P	A, H	P	A, M	P	M
day 2	2/17	P		P	H	P		P		P		P	C	P		P	A
day 3	2/18	P		P	H	P	A	P	M, S, D	P		P		P	A	P	H
day 4	2/19	P		P		P		P		P	C	P	C	P	M	P	C
day 5	2/20	P		P		P	L	P		***Present***	C, M, S	***Present***	S	P	H	***Present***	Scav, M
day 6	2/21	P		P		P		P		Absent		Absent		***Present***	S	Absent	
day 7	2/22	P		P		P	H	P						Absent			
day 8	2/23	P		P	H	P		P									
day 9	2/24	P	D	P		P	D	P									
day 10	2/25	P		P		P		P									
day 11	2/26	P		P		P		P									
day 12	2/27	P		P		P	H	P									
day 13	2/28	P		P		P		P									
day 14	2/29	***Present***	S	***Present***		***Present***		***Present***									
Retention (days)		***14***		***14***		***14***		***14***		***5***		***5***		***6***		***5***	

Appendix 10. CARE J.

CARE J		1		2		3		4		5		6		7		8	
Carcass Type		Rat		Duck		Rat		WTSH		Rat		Duck		Rat		WTSH	
WTG		2		3		5		6		8		9		11		12	
Vegetation, Distance from WTG	Off-pad, 55 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																
day 0	3/20		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	3/21	P	A, H	P		P	A	P	Scav, F, M	P	A, H	P		P	A, H, S	P	
day 2	3/22	P	C	P		P	M	P		P		P		P	C	P	M
day 3	3/23	P	C	P	L	P		P		P	D, S	P	A	***Present***	S	P	Scav
day 4	3/24	P		P	A	P		P		P		P	C	Absent	C	P	
day 5	3/25	P		P		P		P		P		P				P	
day 6	3/26	P		P		P		P		P		P				P	D
day 7	3/27	P		P		P		P		P		P	C			P	
day 8	3/28	P		P		P		P		P		P				P	
day 9	3/29	P		P		P		P		P		P				P	
day 10	3/30	P		P		P	S	P		P		P				P	
day 11	3/31	P		P		P		P		P		P				P	
day 12	4/1	P		P		P		P		P		P				P	
day 13	4/2	P	M	P		P	D	P		P		P				P	
day 14	4/3	***Present***		***Present***		***Present***		***Present***		***Present***		***Present***				***Present***	
Retention (days)		***14***		***14***		***14***		***14***		***14***		***14***		***3***		***14***	

Appendix 11. CARE K.

CARE K		1		2		3		4		5		6		7		8	
Carcass Type		Rat		WTSH		Rat		Duck		Rat		WTSH		Rat		Duck	
WTG		1		2		4		5		7		8		10		11	
Vegetation, Distance from WTG	Off-pad, 75 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																
day 0	5/8		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	5/9	P		P		P	A,M	P		P	A	P		P	A	P	
day 2	5/10	P	A	P		P	L,M	P		P		P	SCAV,A,M	P		P	
day 3	5/11	P	SCAV, M	P		P	D,M	P		***Present***		P		P	C	P	L
day 4	5/12	P		P		P		P		Absent		P		P	S	P	
day 5	5/13	P	M	P		***Present***	S	P				P		P	M	***Present***	
day 6	5/14	P	S	P	M	Absent		P				P		P		Absent	SCAV,F
day 7	5/15	P		P				P	L			P		P	S,M		
day 8	5/16	P	S	P	D			P				P		P			
day 9	5/17	P		P	SCAV			P				P		P			
day 10	5/18	***Present***	S	P				P				P		***Present***	S		
day 11	5/19	Absent		P				P				P		Absent			
day 12	5/20			P				P				P					
day 13	5/21			P				P				P					
day 14	5/22			***Present***				***Present***				***Present***	>2W,>10B				
Retention (days)		***10***		***14***		***5***		***14***		***3***		***14***		***10***		***5***	

Appendix 12. CARE L.

CARE L		1		2		3		4		5		6		7		8	
Carcass Type		Duck		Rat		WTSH		Rat		WTSH		Rat		Duck		Rat	
WTG		1		3		4		6		7		9		10		12	
Vegetation, Distance from WTG	On-pad, 25 m	Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent		Present /Absent	
Day	Date																
day 0	6/15		Notes		Notes		Notes		Notes		Notes		Notes		Notes		Notes
day 1	6/16	P	M, L	P	A	P		P	M	P	SCAV,M,F	***Present***	L, H	P		P	L
day 2	6/17	P	A	P	M, H	P	A	P	A, H	P		Absent	SCAV, H	P	L	P	A, H
day 3	6/18	P		P	M	P	M	P	L	P				P	A	P	C
day 4	6/19	P		P	S	P	D	P	S, D	P				P		P	C, S
day 5	6/20	P		P	D	P		P		P				P		P	H
day 6	6/21	P	D	P		P		P		P				P		P	
day 7	6/22	P		P		P		P		P				P		P	
day 8	6/23	P		P		P		P		P				P		P	
day 9	6/24	P		P		P		P		P				P		P	S
day 10	6/25	P		P	M	P		P		P				P		P	
day 11	6/26	P		P		P	SCAV,M,S	P		P				P	D	P	
day 12	6/27	P		P		P		P		P				P		P	
day 13	6/28	P		P		P		P		P				P		P	S
day 14	6/29	***Present***		***Present***		***Present***		***Present***		***Present***	>10B,>2W			***Present***		***Present***	
Retention (days)		***14***		***14***		***14***		***14***		***14***		***1***		***14***		***14***	