# Kaheawa Pastures Wind Energy Generation Facility

## Habitat Conservation Plan

Draft FY10 Annual Report: Year 4 HCP Implementation


Prepared by

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# KAHEAWA PASTURES WIND ENERGY GENERATION FACILITY HABITAT CONSERVATION PLAN

## YEAR 4 HCP IMPLEMENTATION JULY 2009 – JUNE 2010

## FIGURES AND TABLES



## APPENDICES



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# I. EXECUTIVE SUMMARY

In June 2006 Kaheawa Wind Power, LLC (KWP) began operating the island of Maui's first commercial wind energy generation facility in the Kaheawa Pastures area of West 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 January 2003. 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, KWP developed a project-specific Habitat Conservation Plan (HCP) in cooperation with the USFWS, DLNR and the Hawai`i Endangered Species Recovery Committee (ESRC). Upon final approval of the HCP, the federal ITP (TE-118901-0) and state ITL (ITL-08) were issued in January 2006. Both permits have duration of twenty (20) years. This report summarizes how KWP has implemented the provisions of the HCP during the fourth full year of project operations (July 1, 2009 through June 30, 2010), as specified under the HCP.

The HCP anticipates that the incidental take of four listed species (Hawaiian Petrel, Newell's Shearwater, Nene, and Hawaiian Hoary Bat) may potentially occur as a result of the operation of the wind farm. No other listed, proposed or candidate species are known or believed to be present in the project area.

Remains of one Nene and the carcasses of six introduced game birds, one Spotted Dove, two Hawaiian short-eared owls, and one White-tailed tropicbird – the latter two species are protected under the Migratory Bird Treaty Act – were documented during monitoring in Year 4. Applying the results of monitoring, including Searcher Efficiency (SEEF) and Carcass Removal Trials, we estimated adjusted take for Nene to be 1.21 during Year 4. An accounting of take for each covered species through the end of the fourth year of the project estimates that, on average 0.44 Hawaiian Hoary Bats, 0.60 Hawaiian Petrels, and 1.57 Nene takes may have occurred each year as a result of project operations. No take of Newell's Shearwater have been directly observed or documented. These take levels are well within the expected annual baseline levels for each covered species as described in the HCP.

Regarding mitigation for Nene, KWP has been in regular contact and ongoing discussion with DLNR since summer 2005 regarding construction and operation of a new Nene release facility on Maui. Recent progress on the proposed Safe Harbor Agreement (SHA) and other regulatory requirements is encouraging, suggesting that a new release pen for Nene on Maui could accommodate reintroduction efforts in the near future.

Regarding mitigation for the two seabird species, in Year 4 we placed an increased emphasis on defining baseline metrics and developing a project feasibility assessment to guide future seabird mitigation activities at the suspected Hawaiian Petrel breeding colony at Makamaka'ole.

Mitigation for the baseline level of take for Hawaiian hoary bats was provided in 2006 in the form of funding for research. In addition, since August, 2008 KWP biologists have been conducting acoustic monitoring of bats at Kaheawa using remote acoustic data loggers. Acoustic sensors are moved periodically to survey different portions of the site. Overall, of thirty seven call sequence files documented within the monitoring area from July 1, 2009 through June 30,

2010 thirty were considered bat passes. Bat activity is highest during the months of August through October.

KWP maintains an active and well coordinated wildlife education and outreach program (WEOP) for all personnel on site including numerous staff, contractors, and visitors that regularly perform activities at KWP. In Year 4, 97 individual orientations were delivered.

KWP biologists have been implementing a year-round monitoring program to document downed (i.e., injured or dead) wildlife incidents involving HCP-listed and non-listed species on the project site and its vicinity since operations began in June, 2006. Beginning in Year 5, KWP anticipates adopting a modified downed wildlife monitoring plan that integrates what has been learned during four years of intensive monitoring and review by the DLNR, USFWS, and ESRC and in alignment with the implementation schedule outlined in the HCP.

A wildland fire burned an estimated 6,200 acre region including a portion of the KWP project site in early June, 2010. No other unforeseen circumstances or event cycles, natural or man-made, were documented during Year 4.

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 continues to implement these measures in accordance with the HCP and the recommendations provided by DLNR, USFWS, and the ESRC following the fourth full year of implementation.

*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.*

9/15/2010

David P. Cowan
Vice President, Environmental Affairs
First Wind Energy, LLC as manager for Kaheawa Wind Power, LLC

# II. INTRODUCTION

In June 2006 Kaheawa Wind Power, LLC (KWP) began operating the island of Maui's first commercial wind energy generation facility in the Kaheawa Pastures area of West 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 January 2003. One condition of the CDUA was a requirement to "comply with the Incidental Taking Permit requirements of the U.S. Fish and Wildlife Service, including the preparation of the Habitat Conservation Plan."

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 developed a project-specific HCP in cooperation with the USFWS, DLNR and the Hawai`i Endangered Species Recovery Committee (ESRC). Upon final approval of the HCP, the federal ITP (TE-118901-0) and state ITL (ITL-08) were issued in January 2006. Both permits have a duration of twenty (20) years. Commercial operation of the project commenced in June 2006.

As described in Section VI of the HCP, KWP will provide annual monitoring and reporting on project activities. As specified in the federal permit, reporting will include a summary and discussion of incidental take, including adjusted take calculations pursuant to Section V of the HCP; results of searcher efficiency and carcass removal trials; results and discussion of seabird colony searches and management activities; results of nene nest surveys and protocols; vegetation monitoring of affected plant critical habitat areas; an overall summary of management activities; circumstances that triggered adaptive management and how the adaptive management was implemented; description of all occurrences of changed circumstances and how they were addressed; description of any unforeseen circumstances; progress made in achieving biological goals and objectives; any problems that occurred and how they were handled; description of cost expenditures and other information related to funding assurances; an annual work plan including an implementation schedule and entities responsible for implementation; and any other pertinent information such as actions taken by any State or Federal agencies related to implementation of the HCP.

KWP has submitted four (4) previous reports to the USFWS and DLNR to date: in January 2007, February 2008, October 2008, and November, 2009. Following submittal of the first two reports KWP met formally with representatives from both agencies in April, 2007 and again in February, 2008 to discuss agency comments presented during the annual review process. Meetings with the State of Hawaii Endangered Species Recovery Committee (ESRC) were also held in Honolulu in April, 2007 and 2008 to discuss the reports and specific elements of the monitoring program in greater depth. An amendment to the first report was submitted to the USFWS and DLNR in June, 2007 while responses to address comments provided by USFWS pertaining to the February 2008 report were submitted in early September, 2008. The third report was submitted to the DLNR and USFWS in October, 2008 and was followed by a review meeting with both agencies in Honolulu on December 3, 2008. Several comments and recommendations were provided by the agencies that were discussed with the ESRC in greater depth on January 28, 2009.

Following submittal of the Year 3 Annual Report in November 2009, there was some follow up discussion with both agencies and a final set of comments associated with the Annual Review was expected but never received. KWP has been advised by USFWS and DOFAW on several occasions that further discussions are on hold until completion of the agencies' review. KWP remains very interested especially in the improvements to the fatality monitoring program proposed in the Year 3 report as we strive to increase efficiency in this very labor-intensive effort.

This report summarizes how KWP has implemented the provisions of the HCP during the fourth full year of project operations (July 1, 2009 through June 30, 2010), as specified under the HCP. Year 4 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 potential take to accomplish a net ecological benefit for the species.

KWP has achieved most, if not all of its obligations according to the terms of the HCP, in addition to implementing measures in the interest of good stewardship that go significantly beyond the minimum requirements of the HCP. Table 1 (below) provides a summary of the provisions contained in the HCP that ensure compliance under the terms of the ITL, ITP, and Implementing Agreement (IA), including impact avoidance, minimization, monitoring, mitigation measures, funding assurance, and reporting.

Table 1. Timeline and implementation status of each principle wildlife compliance initiative at the end of Year 4 as outlined in the Kaheawa Wind Power HCP.

| Compliance Measure | Timeline | Status |
|---|---|---|
| WEOP Implementation [1, 2, 3, 4] | Life of Project | Ongoing |
| Downed Wildlife Surveys [3, 4] | Life of Project | Ongoing |
| Searcher Efficiency Studies [3, 4] | Years 1-2 | In-progress |
| Carcass Removal Trials [3, 4] | Years 1-2 | In-progress |
| Nene Interaction Surveys [3, 4] | Year 1 | Completed June, 2007 |
| Funding for Nene Release Pen [5] | Permit Issuance | Completed January, 2008 |
| Annual Funding for Nene Gosling Production or Translocation [5] | Years 1-5 | Completed Years 1-4 |
| Nene Contingency Fund [5] | Permit Issuance | Completed January, 2006 |
| Seabird Colony Searches and Mitigation [5] | Years 1-2 then implement management measures | In-progress |
| On-site Seabird Radar Surveys [3, 4] | Year 1 | Completed in Year 1 |
| Seabird Contingency Fund [5] | Permit Issuance | Completed January, 2006 |
| On-Site Bat Surveys [3, 4] | Year 1 | Completed in Year 1 |
| Hoary Bat Research Fund [5] | Permit Issuance | Completed June, 2006 |
| Hoary Bat Contingency Fund [5] | Permit Issuance | Completed January, 2006 |

1 = impact minimization, 2 = impact avoidance, 3 = monitoring, 4 = documentation and reporting, 5 = mitigation

## Covered Species

The HCP anticipates that the incidental take of four listed species (Hawaiian Petrel, Newell's Shearwater, Nene, and Hawaiian Hoary Bat) may potentially occur as a result of the operation of the wind farm. These species presently are known to, or believed to fly, in the vicinity of the project site and could be injured or killed if they collide with a wind turbine. No other listed, proposed or candidate species are known or believed to be present in the project area.

The Hawaiian Petrel is known to nest primarily on Maui and, to a lesser extent, on Kaua`i, Lana`i, and Hawai`i. On Maui, these petrels are known to nest on Haleakala Crater on East Maui and studies undertaken by KWP biologists and others have ascertained that nesting is likely in the mountains of West Maui. The anticipated direct take of the Hawaiian Petrel in conjunction with the operation of the wind energy generation facility is up to one individual per year. When indirect impacts are taken into consideration, the overall take is not expected to exceed 1.5 birds per year on average.

The Newell's Shearwater breeds on several of the main Hawaiian Islands, with indications that the species may also nest on Maui, although the status of the species on Maui is unclear at this time. Like the Hawaiian Petrel, the anticipated take of the Newell's Shearwater is up to one individual per year. When indirect impacts are taken into consideration, the overall take is not expected to exceed 1.5 birds per year on average.

As part of the State and Federal plans for Nene recovery, Nene have been re-introduced onto the islands of Kaua`i, Maui, Moloka`i and Hawai`i; this recovery program includes a captive-release pen in the Hana`ula area of the West Maui mountains, near the upper end of the project site. As of 2006, 104 Nene had been released from this pen since releases began in 1994 and, although some monitoring is routinely done by DOFAW, their exact distribution, movements, and present population structure are not well known. The anticipated take of the Nene is up to two individuals per year. When indirect impacts are taken into consideration, the overall take is not expected to exceed three birds per year on average.

Little is known about the distribution or habitat use of the Hawaiian Hoary Bat. While it has been recorded on several islands, it is believed to be most abundant on Hawai`i and present in low numbers on Maui. The species has been detected in the project area, although these limited observations have been seasonal and few, despite ongoing efforts to detect and monitor their presence at the site. The anticipated take of the Hawaiian Hoary Bat in conjunction with the operation of the wind energy generation facility is up to one per year.

## III. AVIAN AND BAT FATALITY MONITORING

### Monitoring Surveys for Downed Wildlife

KWP biologists have been implementing a year-round monitoring program to document downed (i.e., injured or dead) wildlife incidents involving HCP-listed and non-listed species on the project site and its vicinity since operations began in June, 2006. Protocols outlined in the HCP ensure that KWP monitoring staff follow a clear set of reporting and response guidelines that help facilitate specimen recovery and/or rehabilitation and documentation.

Since systematic intensive surveys began in June, 2006, foot searches by trained monitoring technicians have been the standard method used to conduct daily surveys for downed wildlife at KWP. Each of the 20 rectangular wind turbine (WTG) search plots centered on each turbine base measure 180x200 meters with the longest dimension oriented NE-SW in alignment with the prevailing wind direction. In addition, we surveyed three meteorological (met) towers at KWP, and four temporary met towers (but see below) in an adjacent project area that were being used to assess wind conditions for a proposed KWP II facility. In the four plus years since operation began there has been no observed take documented at any of the met towers.

We established all search plot boundaries using a Trimble GPS Pathfinder Geo-XT handheld receiver, a rangefinder and a compass. The corners of plot boundaries are marked using heavy gauge steel fence posts and labeled for reference. Because they are significantly larger than met tower plots, we maintain WTG search transects parallel to each other using medium gauge 5-ft steel fence posts as transect markers and replace these as necessary, which enables the searchers to maintain their position visually without relying heavily on the GPS.

As in past years, the majority of the WTG 1-3 overlap portions are not searchable on foot due to steep terrain and sensitive vegetation (Fig. 1). To account for these areas we visually scanned the portions of search plots that overlap the adjacent upper Papalaua and Manawainui Gulches (WTG 1-3) using a spotting scope, binoculars and un-aided visual surveillance. To perform these overlap searches we selected several observation points along the edges of both gulches that we believe, dependant on variations in weather conditions among surveys, afford good visual coverage of the overlap areas.

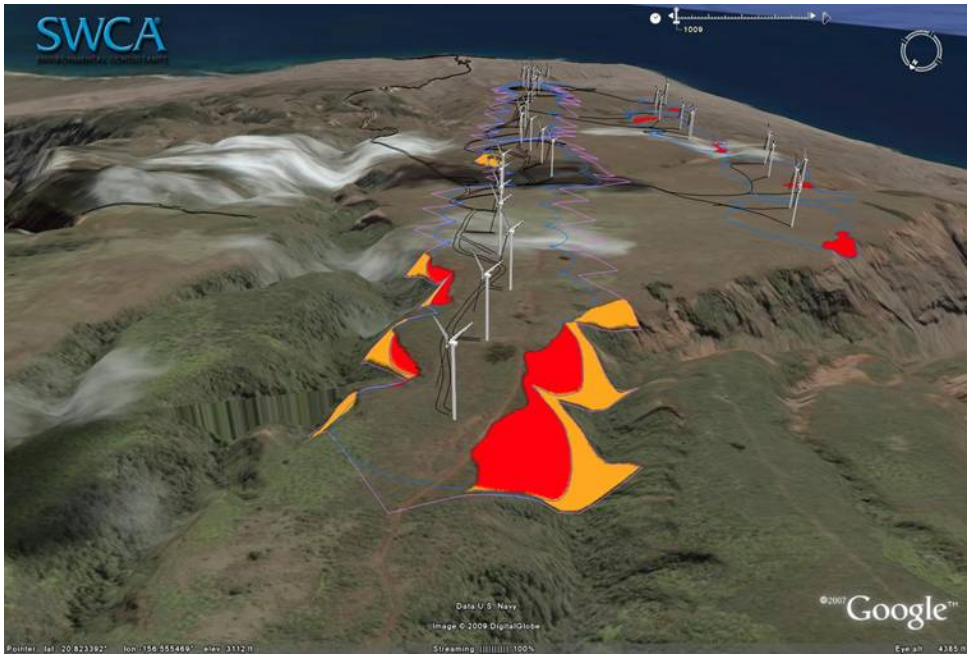


Figure 1. Shaded portions of search plots at WTG 1-3 representing ≥ 50% slope require visual surveillance from the edges of Papalaua and Manawainui Gulches as an alternative monitoring measure.

The downed wildlife monitoring program includes two types of monitoring periods. The year-round intensive monitoring regime consists of full coverage of all plots by trained searchers (wildlife monitors/technicians) once per week. During the Nene and seabird fledging seasons, May-June and October-November, respectively, search effort increases to two searches of the site each week in order to provide more coverage during these presumably higher risk periods. KWP wildlife monitoring staff performed systematic searches of the twenty WTG search plots

and seven met tower search plots according to this monitoring regime during the Year 4 reporting period, despite efforts to implement proposed adjustments in monitoring effort and survey design outlined in the Year 3 Annual Report, submitted in November, 2009. Each of the three met tower search plots (KWP-MET 1-3), located immediately adjacent to the WTG 1, 7, and 14 plot boundaries are searched in conjunction with the turbine search plots. Four separate met towers (KWP II-MET 1, 2, 5, and 6) installed by Kaheawa Wind Power II (KWP II) in October, 2007 were also searched, although two of these were decommissioned in November, 2009 followed by the remaining two in early June, 2010. While installed they were searched separately but at the same frequency as described for the KWP site (Appendix 1).

Because vegetation and ground cover can influence the detection of fatalities and behavior of scavengers, at the recommendation of USFWS and DOFAW, KWP developed a ground cover classification strategy based on the distribution and abundance of different vegetation and cover types (bare, grass, shrub) to account for the effects of ground cover variability on carcass detection and scavenging (Appendix 10). While not specifically prescribed in the HCP, it was agreed as an adaptive measure that should improve the accuracy of our take estimates.

In 2007 we obtained permission from the DLNR and USFWS to use Wedge-tailed Shearwater (*Puffinus pacificus*) carcasses as surrogates to assess searcher efficiency and carcass removal rates for the two listed seabirds at KWP. We used shearwater carcasses almost exclusively for trials conducted in 2007 and 2008, while assessing the best way to procure larger carcasses as surrogates for Nene. In 2009 we began exploring sources of larger birds locally, with an emphasis on any specimens (vagrants or introduced waterfowl species) we could obtain from state and federal wetland preserves and/or refuges. The USFWS Regional Office in Portland, Oregon were consulted on the process for adding Nene to our existing permits, but this proved to be challenging given the few carcasses available. In 2009 we also contacted the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (Wildlife Services) in Alaska to inquire on the availability of goose carcasses, knowing the agency performs population control seasonally in the vicinity of airports in the south-central Alaska region. Information that was gathered on baseline population health and disease screening were shared with the USGS National Wildlife Health Center (Honolulu Field Station), State of Hawaii Department of Agriculture (Quarantine Branch), and USFWS Enforcement Division to inform these agencies of our intentions to import carcasses of Lesser Canada Goose (*Branta canadensis parvipes*) and to address feedback and any concerns. Dr. Thierry Work was particularly willing to review the information on health screening results (100% negative test results for avian influenza) for this population. Our MBTA permit was amended in July, 2009 adding provisions for several larger bird species (Barn owls, Black-crowned night herons, Cattle egret) including waterfowl (non-ESA listed), such as ducks and/or geese, to serve as surrogates for Nene. In 2010, we coordinated with the USDA on the procurement of 30 Lesser Canada Goose carcasses for

delivery in the early summer of 2010 for use in Searcher Efficiency Studies and Carcass Removal Trials at KWP.

Owing to the challenges of procuring larger bird carcasses locally, the seasonal availability of species such as geese from outside Hawaii, and permitting and quarantine requirements, we were not able to obtain a suitable number of specimens until 2010. Our permit request from DOFAW was delayed in 2009 due to agency review of our requested amendments and technical issues affecting the re-issuance. Our requests for assistance from state and federal biologists and refuge staff in an effort to procure carcasses of larger species found in local wetlands and refuges did not result in the procurement of any specimens. Carcasses that were recovered by DOFAW staff following wildlife incidents at KWP were not made available for subsequent use in trials. The few introduced game species that were discovered during or incidental to monitoring at KWP were incorporated into the trials as available. No small mammals (rats) were used for trials in Year 4 but are being introduced as trial surrogates for bats in Year 5. We believe the Lesser Canada Goose carcasses will function well as surrogates for Nene in Year 5.

**Searcher Efficiency Studies**

Searcher efficiency studies (SEEF) provide estimates of carcass detection probability and are an important component of downed wildlife monitoring at KWP. Each SEEF is controlled by a proctor and performed in conjunction with a daily search plan. Searchers are not informed in advance that a trial is being initiated. Before initiating a SEEF exercise, specimens are removed from cold storage and thawed (usually overnight). Prior to the arrival of searchers to the site, carcasses are placed inside previously selected search plots according to ground cover type in a random manner by tossing the carcass to a resting position. The proctor records location, weather, GPS position, ground cover type and surrounding habitat features, and obtains photos. Searchers later the same day perform their surveys as normal and report observations and findings. Carcasses that go un-detected are collected and, if in reasonable condition at the conclusion of the trial, are refrozen for subsequent use in Carcass Removal Trials. Each SEEF exercise is discussed afterward between the proctor and searchers to assess factors that may have affected detection. We separated the trials into periods of summer/fall (May-October) and winter/spring to evaluate whether seasonal differences in detection were evident (Table 2).

At the request of DOFAW and USFWS during the Year 2 Annual Review in December, 2008 KWP agreed to increase the numbers and frequency of SEEF trials in Year 3. Greater sampling effort in Year 3 and 4 also enabled more emphasis to be placed on detecting variability in searcher efficiency among ground cover types. Small and medium-sized bird carcasses far outnumbered large-bodied carcasses in SEEF trials conducted during Years 3-4, mostly due to the greater availability of shearwaters and doves. In Year 3 there were 46 SEEF trials performed at KWP using mostly medium-sized seabird carcasses, representing by far the largest sample size

among years. Results suggest that detection rates vary depending on ground cover types at KWP (Table 2), with a steady decline in detection rates going from bare ground to shrub (Fig. 2).

Table 2. Wedge-tailed shearwater carcass detection rates in three ground cover types across all seasons during Year 3 at Kaheawa Wind Power.

| Season | Ground Cover | | | ± SD (n=271) | | |
|---|---|---|---|---|---|---|
| | Bare | Grass | Shrub | SD Bare | SD Grass | SD Shrub |
| Entire year | 1 | 0.813008 | 0.676923 | 0 | 0.147417 | 0.119588 |
| winter/spring | 1 | 0.8 | 0.692308 | 0 | 0.141844 | 0.067624 |
| summer/fall | 1 | 0.830189 | 0.653846 | 0 | 0.164465 | 0.163865 |

Nene are probably more detectable than petrels and shearwaters in most types of ground cover due to their larger size. Trials planned in Year 5 using carcasses of Lesser Canada Goose are likely to result in higher detection efficiencies overall than what we observe for medium-sized seabird carcasses. Early in Year 4 we used a Ring-necked pheasant in a trial but this specimen was later set aside for use in CARE. We used Zebra Doves, a Eurasian Skylark, and House Sparrow as surrogate species in SEEFs because they approach the size of Hawaiian Hoary Bats.

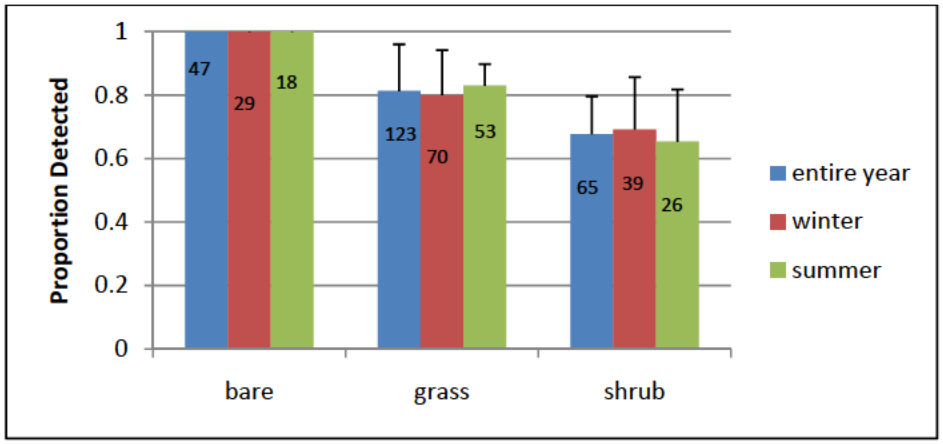


Figure 2. Proportion of shearwater carcasses detected by searchers in three different ground cover types at Kaheawa Wind Power during Year 3 (n=235).

## Carcass Removal Trials

The objective of performing carcass removal studies at KWP is to determine the average amount of time an avian or bat carcass is expected to remain visible to searchers before being removed by scavengers or otherwise rendered undetectable. Consistent with Appendix 9 of the HCP and incorporating feedback from DLNR and USFWS during previous annual reviews, areas selected to perform trials were chosen to be representative of different ground cover characteristics and geographic portions of the search plots across seasons. The length of time (expressed in days) that a carcass remained visible to observers in the trial area using the normal search technique

was determined for each experimental carcass used in the trial. Mean carcass removal time was calculated for each carcass size class and vegetation type by summing the retention time for each carcass and dividing by the total number of carcasses used in the trial.

In past years, Day 1 represented the day a trial was initiated but this was changed to Day 0 in Year 4. This allows the day subsequent to trial initiation to be identified as Day 1 and eliminates the possibility that a trial might be terminated at 13 rather than 14 full days. CARE data were re-calculated for past years to standardize and account for this bias. The HCP recommends that specimens shall be observed daily for the first 7 days of the trial, then again on Days 10 and 14. On each day the status and condition of specimens are assessed concerning presence/absence, evidence of scavenging and/or decomposition, change in position/location, visibility, and overall condition of the carcass. Appendix 3 provides a summary of each trial conducted in Year 4.

Although numerous trials have been conducted with Wedge-tailed shearwaters at KWP, only four large bird specimens were available in Year 4. As described, we are expecting to obtain large bird carcasses in the early summer of 2010 and in Year 5, along with small birds, we began using small mammals (rats) collected in the area for CARE and SEEF exercises.

**Direct Observations of Incidental Take**

There was one (1) downed wildlife incident that involved an HCP-covered species at KWP during the Year 4 reporting period. On May 14, 2010 KWP biologists discovered feathers and bone fragments of a Nene near WTG 20. This incident was treated as an authorized take under the Incidental Take Permit (ITP) and Incidental Take License (ITL) issued to KWP by the USFWS and DLNR, respectively. The initial discovery was well documented and reported according to established protocols and terms outlined in the HCP and by agreement with DOFAW and USFWS. DLNR/DOFAW staff on Maui responded within 48 hours to the location and recovered the feathers and bone fragments that were discovered on the ground beneath the low native shrubbery. Though cause of death is uncertain, and difficult to ascertain due to the weathered and aged-appearance of the materials, a veterinary examination may provide further information. A report documenting and describing the circumstances and of this incident was submitted to USFWS and DLNR in Honolulu and is included in Appendix 13 of this report.

The condition of the Nene remains suggest they may have been present at the location for several months prior to discovery. However, this seems unlikely considering the large size of a fresh Nene carcass, the fact that this area was well within a plot that is regularly searched and easily accessed, and the sparse vegetation and ground cover where the remains were found. KWP is therefore reviewing the history of monitoring and environmental conditions at the site, to determine whether there may have been extenuating conditions that caused the carcass to remain undetected by searchers. Examination of high-resolution aerial photos taken after the 2006

wildfire suggest the area where the remains were discovered may not have been burned. Subsequent to their discovery, a wildfire in June, 2010 raced through the region and burned most of the area where the remains had been discovered.

## Estimating the Adjusted Take

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 total direct take, as described in Section V of the HCP. In Year 4, there was one (1) occurrence of Observed Direct Take (ODT) of a Covered Species documented on May 14, 2010. Although there were no eye-witness accounts and the remains were in an advanced stage of decomposition when discovered, the cause of death is (for the time being) assumed to be project-related based on the proximity of the remains to project structures.

Ongoing SEEF and Carcass Removal Trials using Wedge-tailed Shearwaters and other medium-sized birds (mostly introduced game birds) provide a sound basis for estimating Adjusted Take for both Hawaiian Petrels and Newell's Shearwaters. However, because these species are smaller and dissimilar in many respects to the larger-bodied Nene, using the results of SEEF and CARE for these smaller species would probably inflate the adjusted estimates of take for Nene. To address this problem we looked to the results of numerous mainland projects that have involved larger-bodied birds for reference. Published SEEF results for larger-bodied birds such as geese, waterfowl, pheasants, and raptors often approach and sometimes exceed 0.90 (Strickland et. al. 2000, Strickland, Johnson, and Erickson unpublished data). In comparison, our results using shearwaters and medium-sized game birds in Year 4 yielded searcher efficiencies of 0.81 on average (range 0.67–1.00, n=23). Osborne et al. (2000) found a steady increase in observer detection efficiency as a function of increasing bird size class by comparing Brown-headed Cowbirds, Rock Doves, and Snow Geese during a 2-year study conducted at the Buffalo Ridge Wind Resource Area in Minnesota. In this study, searcher detection efficiency ranged between 0.83 and 1.00 for Snow Geese and averaged 0.92 for this species across all ground cover types. To be conservative we chose the lower end of this detection probability range (0.83) for use in estimating adjusted take for Nene, because these values were derived empirically and they approach the values we report for medium-sized taxa.

Many studies report a range of scavenger removal rates depending on the size of birds, vegetation and ground cover characteristics, and season. Many studies also pool results for all species and size classes, making size-specific scavenging rate comparisons, and estimates of detection probability difficult. We hypothesize that removal rates for large birds at KWP would be less than rates observed for large birds at mainland sites because of the reduced capacity of local scavenger species to completely remove carcasses from the monitoring site. In a comprehensive review of numerous avian mortality studies conducted at wind facilities,

Smallwood (2007) reports 73% retention of large non-raptors and up to 99% for large raptors by day seven. Though conservative for Nene, the results of trials using Wedge-tailed Shearwaters and other medium-sized avian species do provide empirically derived values based on adequate sample sizes that are useful as a floor for purposes of estimating SEEF and carcass retention of medium-sized seabirds at KWP. We use the results of SEEF trials using Wedge-tailed Shearwaters, Short-eared Owl, and Black Francolin, to represent medium-sized avian species, while Zebra doves, House Sparrow, and Eurasian Skylark were used as surrogates in the estimation of detection probability and retention time for the Hawaiian Hoary Bat. One Ring-necked pheasant was used in SEEF for large-bodied birds. CARE trials for medium-sized birds were performed with Gray francolin, Black francolin, and Wedge-tailed shearwaters. Smaller birds, such as Zebra dove and Eurasian skylark were used to evaluate scavenger removal for small bodied animals the size of bats. Four Ring-necked pheasants were used in CARE trials as surrogates for Nene.

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 fatalities that may have occurred at KWP, based on one (1) ODT of this covered species during the Year 4 reporting period, we used an estimator, *m*, as proposed by Shoefeld (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, *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) during downed wildlife monitoring.

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 reports enable cause of death and condition of the specimen to be determined. Results of the veterinary examination of the Nene materials discovered during Year 4 are not presently available to inform the timing and cause of death. Because this incident was identified outside the known breeding season for Nene on Maui, no indirect take is assessed for purposes of estimating the adjusted take.

Because they are resident at Kaheawa on a year-round basis, Nene may be taken at any time during the year at KWP. We considered values for search interval (I) and carcass retention time

(t) that represent annual averages because it remains unclear when the fatality occurred. We also used the lower end of the detection probability (p) range reported by Smallwood (2007) for large birds in the adjusted take calculation for Nene. Table 3 (below) provides a summary of how these variables are applied to the Shoefeld (2004) formula to estimate total direct take for Nene in Year 4.

Table 3. Estimation of the Total Direct Take of Nene at the Kaheawa Wind Power facility during Year 4 (FY10).

| Parameter | Value | |
|---|---|---|
| Observed Direct Take (C) | 1 | |
| Total Search Plots (N) | 20 | |
| Number of Plots Searched (k) | 20 | |
| Search Interval (I) | 6.99 | 3.72 |
| Carcass Retention Time (t) | 13.0 | |
| Carcass Detection Probability (p) | 0.83 | |
| Natural Log ($e^{t/I}$) | 1.712051 | 1.331297 |
| m = | 1.41 | 1.21 |

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

The Year 4 running average suggests that the annual take levels for each covered species are very low, remaining at or below baseline levels (Table 4). Two observed direct takes of Nene were documented during the Year 2 breeding season (FY08), resulting in an estimated adjusted take of about 3 birds. Indirect take was included in the take estimates for Nene in Year 2 because it is possible that both of these birds could have been reproductively active at the time each take was documented. At the conclusion of FY10, on average, less than two Nene per year are estimated to have been killed during the 4.5 year period that has elapsed since the ITL and ITP were issued to KWP in 2006. When annual take levels are assessed for Hawaiian Petrel, average take remains less than one individual per year at the end of FY10, including indirect take incurred in 2007. One Hawaiian Hoary Bat fatality was observed in September, 2008, outside the known breeding season for this covered species, therefore no indirect take adjustment was applied. Thus Hawaiian Hoary Bats are estimated to have been taken at an annual rate of 0.44 individuals per year at KWP through Year 4. No Newell's Shearwater fatalities have been documented at the site to date, and the adjusted take estimate for this species remains at zero.

Table 4. Summary of Adjusted Take through Year 4 of the Kaheawa Wind Power HCP.

| Species | Observed Take | Total Indirect Take[1] | FY10 Total Adjusted Take | FY09 Total Adjusted Take | FY08 Total Adjusted Take | FY10 Running Average[2] | Annual Take Limit |
|---|---|---|---|---|---|---|---|
| Nene | 4 | 1.51 | 1.21 | 1.21 | 4.62 | 1.57 | 3 |
| Hawaiian Petrel | 1 | 0.87 | | | 2.61 | 0.60 | 2 |
| Newell's Shearwater | 0 | | | | | | 2 |
| Hawaiian Hoary Bat | 1 | | | 1.98 | | 0.44 | 1 |

[1] Indirect take was assessed for 2 Nene and 1 Hawaiian Petrel in FY08.

[2] These estimates of the average annual take are based on 4.5 years since permit issuance.

At the end of Year 4, take levels appear to be at or below those expected for the project, and in each case are below Baseline levels as described in the HCP. Indirect take was not assessed for the remains of the Nene discovered in Year 4 because it remains unclear when the take occurred; although it is assumed to be project related for take assessment purposes.

## IV. MITIGATION INITIATIVES

### NENE

**Funding for Construction and Operation of a New Nene Release Facility**

KWP has been in regular discussion with DLNR since summer 2005 regarding the requirement for construction and operation of a new Nene release facility on Maui. Upon permit issuance, KWP set aside funds internally to contribute to a Nene propagation and release or translocation program, as prescribed in the HCP. At the request of the USFWS in December, 2007 KWP disbursed $100,000 to the DLNR to support the first year of this project. A second payment of $41,000 was made in February 2009 while a double-annual payment was disbursed in February, 2010. DOFAW has now selected a desirable site, secured agreements with the land owner, and have reportedly made significant progress on construction (J. Medeiros, pers. comm.).

**Funding for Nene Captive Propagation and Reintroduction**

As presented in the HCP, captive propagation of Nene goslings to compensate for take is closely tied to the construction of the new release pen. In December, 2007, 2009, and 2010 KWP disbursed funds to the DLNR to support this project. KWP will continue to provide funding to support this work on an annual basis or as otherwise prescribed by the terms of the HCP.

DOFAW officials on Maui have indicated that the new release pen is nearing completion, suggesting that the site may be suitable for captive releases in 2011. KWP continues to express support and interest in seeing releases at the new site proceed, and has communicated openly with the Maui Bird Conservation Center (MBCC) to learn the specific requirements necessary to maintain the captive flock, perform incubation and gosling care, establish timelines, and address considerations associated with the release process.

**Other Mitigation Opportunities**

KWP is committed to supporting reasonable and scientifically sound measures for meeting the goals set forth in the HCP for Nene mitigation on Maui. Gosling production appears to be

something we can anticipate in the future, the capacity for maintaining a healthy, productive flock at the MBCC sounds feasible, and the regulatory and management steps necessary for completing the new release pen and initiating releases on Maui are progressing. However, because of the unexpected time lag that has occurred to date, KWP encourages consideration of all available alternative options, especially if they may allow at least some mitigation to be accomplished sooner.

One such measure may be translocation/relocation of Nene from situations where they are being exposed to threats elsewhere, perhaps on other islands, to a release site on Maui. Nene relocation, translocation, and reintroduction all have been successfully performed to assist management and as species recovery measures. In parallel with ongoing efforts prescribed in the HCP, KWP will continue exploring the potential for Nene relocation and/or translocation strategies, in consultation with DLNR, USFWS, the Nene Recovery Action Group (NRAG), MBCC, ESRC, and other qualified experts, as a means to fulfill mitigation objectives on Maui.

Another option to consider is predator control. The Hana`ula Nene population which has become partially established in the Kaheawa region probably experiences significant mortality from predation by feral cats and Indian mongoose (*Herpestes javanicus*), particularly during the nesting and gosling dependency periods. By implementing a predator removal effort in selected portions of the Kaheawa region, in coordination with ongoing efforts by DLNR adjacent to the release site, egg hatching success, gosling survival, and annual recruitment might be expected to improve. Furthermore, carefully selecting areas in the region removed from the KWP site that possess desirable foraging resources could be managed to promote quality browsing habitat. These types of measures could provide a net benefit and improve annual productivity of Nene, and may offer alternative strategies for achieving mitigation requirements under the HCP.

## HAWAIIAN PETREL AND NEWELL'S SHEARWATER

### Colony Searches to Identify Management Options in West Maui

According to the HCP, the first priority for seabird mitigation for KWP is to locate as-yet unknown or unconfirmed nesting colonies of Hawaiian Petrels and Newell's Shearwaters in West Maui, identify management needs, and where possible, implement management measures. During surveys and investigations in 2007 and 2008, detections of both Hawaiian Petrels and Newell's Shearwaters were documented at several West Maui sites. In 2007, numerous Newell's Shearwaters were heard calling from a remote portion of Kahakuloa NAR adjacent to Pu`u Kukui Watershed Preserve. Hawaiian Petrels were also heard in upper Honokahau and Kahakuloa Valleys. In spring of 2007, KWP biologists located the first documented site where activity levels of Hawaiian Petrels suggested the presence of a nesting colony in the Makamaka`ole Stream portion of West Maui (Fig. 3).

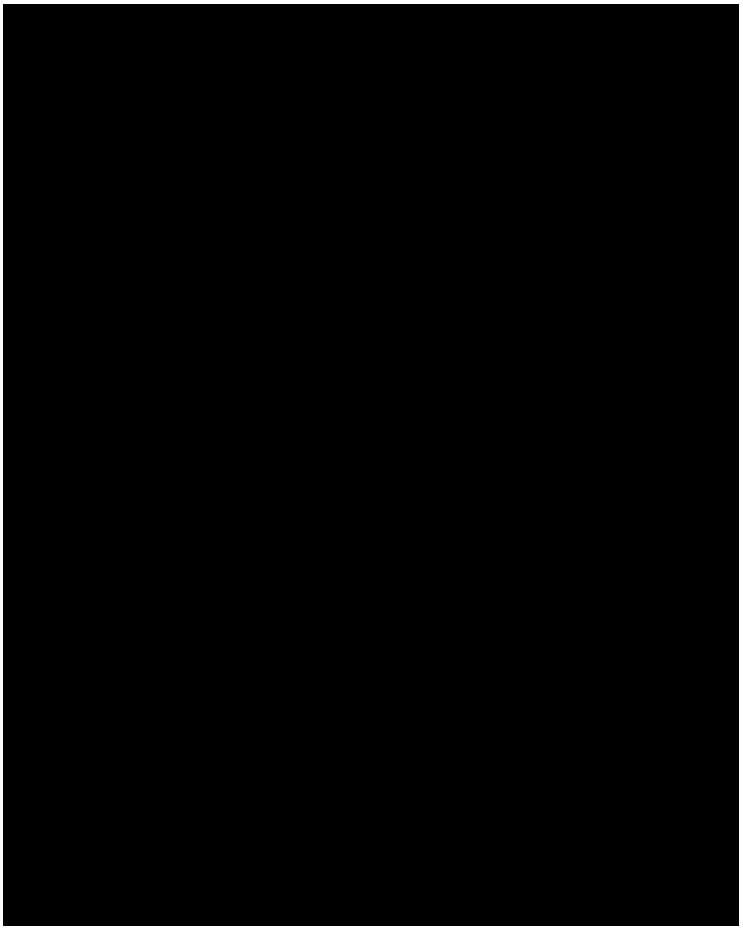

Figure 3. Areas where audio and visual detections of Hawaiian petrels and Newell's shearwaters made by KWP biologists in 2007-2010 suggest nearby breeding colonies of these species in the West Maui Mountains.

Numerous visits and subsequent observations at the site in 2008, 2009, and 2010 have provided evidence of consistent use patterns, including courtship-like paired flight displays and high rates of call detection, based on rigorous audio and visual observations, continuing to suggest Makamaka`ole may contain a dispersed breeding colony of Hawaiian Petrels.

DOFAW wildlife biologists from Maui and seabird researchers from the USGS and H.T. Harvey and Associates accompanied us to the colony during the night time activity period in early July, 2007 to help corroborate our findings. Initial results and findings were quickly shared with members of the Hawaii Seabird Recovery Action Group and a brief presentation was given at the group's summer meeting in 2007. Radar and visual surveys conducted at Makamaka`ole in June, 2009 and May and July, 2010 combined with audio verifications suggest both Hawaiian Petrels and Newell's Shearwaters are actively using portions of Kahakuloa and Makamaka‘ole to access colonies nearby and presumably further interior.

## West Maui Seabird Mitigation Initiatives

The 2009 Action Plan previously introduced in the Year 3 Annual Report was developed to guide mitigation measures in Year 4, and permits were secured in June to conduct the work outlined in the plan. Although progress was made, many of the tasks were not able to be completed within the plan year primarily due to staffing challenges including turnover, as well as the remoteness of the site and underestimating the time required to gain access and transport field materials.

Trapping and removing predators was identified as a primary task in the 2009 Action Plan, although no clear agreement had been established that would yield mitigation credit for successfully removing predators. Beginning in October 2009, during the seabird fledging season, KWP wildlife technicians deployed live traps set to capture cats and mongoose along the fenceline trail and the northern section of Makamaka`ole Stream. These areas were selected for trapping because they were believed to represent intercept points for animals using trails or paths created by our activities. Though no cats were captured, sixteen (16) Indian mongoose were removed, seven (7) of which were retained and later necropsied (Appendix 5).

Because of the unknown number and distribution of burrows at the site, the 2010 Action Plan submitted to DOFAW and USFWS in May, 2010 outlined goals and objectives for the 2010 breeding season that included greater emphasis on searching for naturally-occurring burrows and included social attraction and installation of artificial nesting burrows (Table 5).

Table 5. Proposed conservation measures contained in the 2010 Action Plan for seabirds at Makamaka`ole, West Maui.

| Task | Requirements | Dates | Goals |
|---|---|---|---|
| Social attraction | Install playback system and conduct playbacks | May-August, 2010 | Attract first-time breeding and non-breeding prospectors to investigate the source of the vocalization playbacks. |
| Artificial burrows | Install 30 artificial burrows at adequate densities[1] | May, 2010 | Provide burrow features that will be discovered and favorably occupied by prospecting and/or breeding birds. |
| Search for naturally occurring burrows | Search for nesting sites on foot where access is possible, mostly during daylight hours | May- September, 2010 | Identify natural burrows to better estimate colony boundaries, nesting densities, and proximity to the experimental area. |
| Use radar to evaluate seabird movements | Conduct radar surveys to assess movement rates and localized flight behavior | 3-4 days per month or greater in May, June, July, and August, 2010 | Measure movement rates at sequential periods during the breeding season to better characterize net flux at the site and assess the usefulness of radar as a tool to measure flight activity in the vicinity of the colony. |
| Botanical and | Commission botanical | Prior to | Characterize the plant community and identify |

| | | | |
|---|---|---|---|
| cultural investigations | and cultural assessments of the mitigation site | September, 2010 | invasive species threats and habitat-limiting conditions should they exist; specific features or areas that constitute cultural and historic importance. |
| Fencing feasibility | Visit the site with fence design and construction specialists to identify options and limiting factors | June-July, 2010 | Develop a fencing design and routing plan that, if feasible would enable a substantial number of artificially installed and natural burrows to be protected, with construction to begin after the 2011 breeding season. |

[1] Densities to be determined based on available information from Haleakala Crater, Lana'ihale, and installation configurations used at other sites for closely related species.

In May, 2010 after reviewing the 2009 results and the preliminary plan for 2010, the ESRC, DOFAW, and USFWS recommended that KWP redirect efforts in 2010 and develop a formal project feasibility assessment for Makamaka`ole using clearly defined metrics to determine the mitigation capacity and suitability of the site. The ESRC, along with DOFAW and USFWS, also recommended that KWP refrain from installation of social attraction and artificial burrow systems until this measure receives further review and the feasibility assessment is complete.

## Activities Implemented in Year 4

Burrow searches were performed in several new areas during the 2010 breeding season while areas previously surveyed in 2008 and 2009 to the NW of the fence were partially searched again in 2010 to help define the edges of habitats and confirm terrain boundaries. No burrows were located during searches at Makamaka`ole during Year 4, despite new sites being incorporated into the search effort. The figure shown below (Fig. 3) is taken from the 2010 project feasibility assessment and represents searched areas delineated using GPS for the area through July, 2010 (see Appendix 7).

Figure 4. Areas that were searched for nesting burrows during 2008-2010 with 2010 audio point count stations shown for reference.

In Year 4 KWP biologists continued monitoring the section of fence running along the Kahakuloa NAR boundary adjacent to the proposed seabird mitigation area where, in 2008 and 2009 strands of reinforced white poly-vinyl marking tape were installed to increase visibility to flying birds – a technique which has shown success in reducing petrel collision fatalities elsewhere in the Hawaiian Islands. For example, marking ungulate fences to enhance visibility near breeding seabird colonies has been shown to reduce collision mortality at the Hawaiian Petrel breeding colony on the island of Lana`i and adjacent to breeding petrels at Mauna Loa on the island of Hawai`i. KWP biologists have not observed any petrel carcasses at this fence section prior to or after marking the fence, although petrels have been observed flying within a few meters of the fence, which prompted concerns about collision risk. A Barn owl carcass was observed on a nearby segment of this fence in December, 2008 which confirmed the fence does pose a collision risk to birds.

We conducted one short radar survey in June, 2009 at Makamaka`ole to evaluate whether the site was suitable for using radar to measure seabird movement given the unique geography of the area and our proximity to the suspected colony. The 2009 survey went well, and so at the onset of the 2010 breeding season, we conducted a radar survey and began performing audio-visual point counts in late May, 2010. By late June, 2010 we were surveying from 5 distinct point count stations with a minimum distance of 130 meters between points. The radar site enabled us to survey much of the study area in a 0.75 km radius. During the early July survey we began

using an Epiphan VGA2USB video capture device that enables the movements of seabird targets observed on radar to be recorded, archived, and used in post-processing for presenting movement patterns visually (Fig. 4).

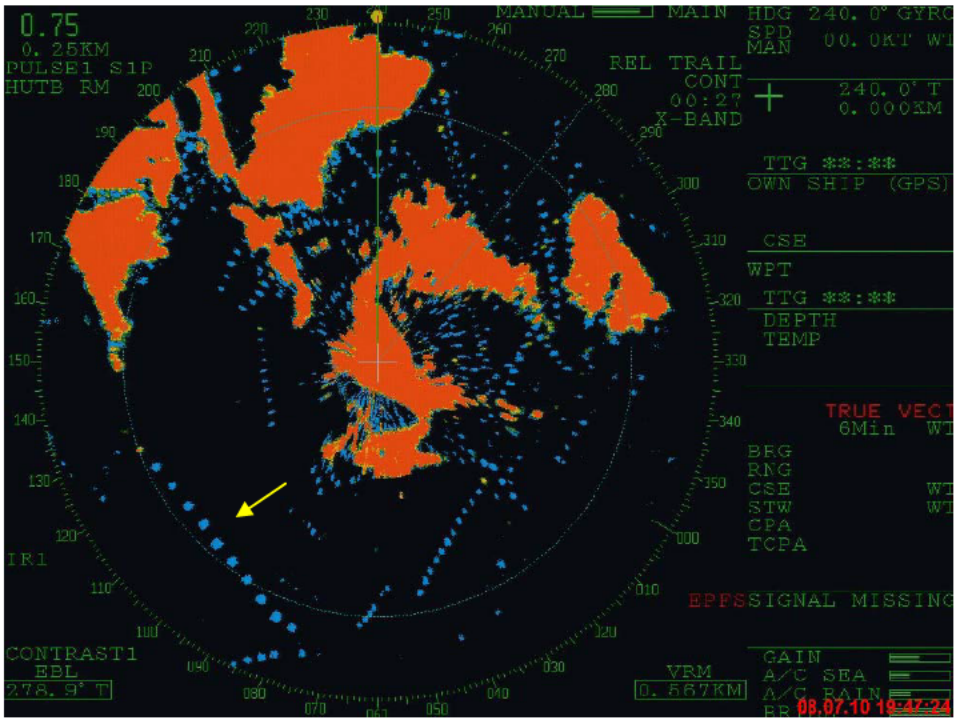


Figure 5. Radar screen capture using the Epiphan VGA2USB software showing an inland-bound target exhibiting behavior resembling petrels and shearwaters at Makamaka`ole on July 8, 2010.

We are continuing to explore radar as a potential monitoring tool for documenting and estimating net movement rates through Makamaka`ole Valley relative to attendance patterns and activity levels measured during audio-visual point count sessions near the suspected colony. If determined practical, radar might become an important tool for detecting changes (i.e., increases) in activity levels over time and informing project success.

Despite efforts to develop and implement meaningful conservation measures that would be expected to result in improved survivorship and productivity of birds believed to be using the Makamaka`ole site for breeding, many uncertainties persisted following the 2009 breeding season. Most notable of these was the lack of information on the numbers and distribution of nesting burrows at the site.

## 2010 Project Feasibility

Because First Wind is preparing separate HCPs for projects on Maui and Oahu (KWP II and Kahuku Wind Power, respectively) that contain mitigation provisions for Hawaiian petrels and Newell's shearwaters, First Wind, the agencies and ESRC agreed these projects should combine seabird mitigation resources with KWP at Makamaka`ole or another suitable site in order to achieve the maximum conservation value for these species. The result has been a more structured approach to data collection, survey effort, project design and implementation at Makamaka`ole during the 2010 breeding season in order to determine whether the site has the potential to meet the mitigation needs of multiple projects.

The methods being used at Makamakaole during the 2010 breeding season and which are described at greater length in the feasibility assessment (see Appendix 7) include:

- Audio-visual point count surveys
- Radar surveys
- Searches for nesting burrows
- Fence construction feasibility
- Botanical and cultural assessment
- Predator removal and management
- Summary of Findings

Table 6 (below) provides a summary of conservation measures that have been implemented successfully at Makamaka`ole along with an assessment of their mitigation value. Measures assigned a "net conservation benefit" value have not (as yet) been given direct credit, but may satisfy the net conservation benefit requirement when direct credit is at or near 1:1.

Table 6. Summary of the conservation measures being implemented at the Makamaka`ole seabird mitigation site and proposed mitigation value for each.

| Conservation Measure | Mitigation Value |
|---|---|
| Research and field surveys from 2006-2009 resulting in the discovery of a previously undocumented seabird breeding colony in West Maui | Net conservation benefit |
| Voluntary installation of flagging along DLNR's ungulate fence | Net conservation benefit |
| Trapping of predators from vicinity of colony | Potential direct compensation for take (compensation ratio to be determined) |
| Radar surveys to document movement rates and activity levels | Net conservation benefit |
| Audio-visual point surveys to document activity rates and distribution at the suspected colony | Net conservation benefit |
| Searches for naturally-occurring burrows | Net conservation benefit |
| Installation of artificial burrows and social attraction (proposed) | Net conservation benefit |

## HAWAIIAN HOARY BAT

### Monitoring to Assess Presence and Activity Levels

Visual detections of Hawaiian Hoary Bats at KWP are very infrequent. In fact, no confirmed sightings of bats occurred during the entire first year of project operations while systematic visual observations were performed by KWP biologists as prescribed in the HCP. Two separate bat sightings were reported by contractors in Year 2, but subsequent interviews did not provide enough information to confirm the reports. In August, 2008 KWP biologists began conducting acoustic monitoring of bats at Kaheawa using Anabat (Titley Electronics, New South Wales, Australia) remote acoustic data loggers deployed at various locations on the KWP site in an effort to document the presence of bats remotely.

Each Anabat station consists of a detector attached to a double T-post platform and programmed to record on a 12-hour duty cycle (1800-0600) at a height of about five feet above ground level along an elevation gradient between 1900-3200 ft (asl). Detectors are visited every 7 to 12 days to check the overall status of the systems and download data from on-board CF storage cards. Recorded call files are sorted by night and visually inspected on a computer screen using Analook® software and filtering tools to determine whether recorded sound files are recognizable as qualifying Hoary Bat calls based on the known shape and frequency profile displayed by this species.

Summary data provided in Table 7 (below) include the total recorded bat call files and qualifying bat passes for all detectors combined as well as for each individual detector through Year 4. Passes are call sequences with three or more calls. 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). Bat activity was also assessed relative to the hour of the night that call files and bat passes were recorded.

Overall 38 call sequence files were documented within the monitoring area from July 1, 2009 through June 30, 2010. Thirty-one sequence files were considered bat passes. No bat fatalities were observed or documented during Year 4. Seventy-nine per cent of the 39 bat passes detected since August, 2008 occurred during FY10. Ninety-seven per cent of all documented passes occurred between May and November while 74 % occurred between August and October with a peak of 41 % occurring in September. Ninety-two per cent of all passes occurred between 20:00 and 01:00 hours while 54 % occurred between 20:00 and 21:00 hours. Sixty-two per cent of all passes were represented by the highest and lowermost detectors located near the top of KWP and the bottom of the proposed KWP II project area, respectively. The peak bat activity detected at

Kaheawa coincides with the post-lactation period for Hawaiian Hoary Bats and may be related to an overwinter upslope migration (Menard 2001).

Table 7. Frequency of Hawaiian hoary bat passes recorded by Anabat acoustic detectors recorders at the Kaheawa Wind Power facility on Maui, August 2008 – June 2010.

| Detector ID # | Location | Survey dates | Operation Days | Total Passes | FY 2010 Passes | Total Detection Rate |
|---|---|---|---|---|---|---|
| **1** | KWP I | 08/08/08- 11/11/08 | 86 | 2 | | ***0.02*** |
| **2** | KWP I | 08/08/08- 11/05/08 | 86 | 3 | | ***0.03*** |
| **3** | KWP I | 08/07/08- 11/05/08 | 82 | 2 | | ***0.02*** |
| **4** | KWP I | 08/07/08- 11/12/08 | 89 | 0 | | 0.00 |
| **5** | KWP I | 11/12/08- 04/07/09 | 138 | 0 | | 0.00 |
| **6** | KWP I | 11/12/08- 04/15/09 | 138 | 0 | | 0.00 |
| **7** | KWP I | 11/14/08- 04/16/09 | 159 | 0 | | 0.00 |
| **8** | KWP I | 11/14/08- 04/04/09 | 72 | 0 | | 0.00 |
| **9** | KWP I | 04/28/09- 05/27/10 | 343 | 1 | **1** | 0.00 |
| **10** | KWP I | 05/17/09- 06/30/10 | 394 | 12 | **11** | ***0.03*** |
| **11** | KWP I | 05/07/09- 05/27/10 | 307 | 0 | **0** | 0.00 |
| **12** | KWP I | 04/28/09- 05/27/10 | 366 | 4 | **4** | ***0.01*** |
| **13** | KWP I | 06/02/09- 05/27/10 | 324 | 1 | **1** | 0.00 |
| **14** | KWP II | 06/03/09- 06/30/10 | 375 | 12 | **12** | ***0.03*** |
| 15 | KWP II | 06/03/09- 05/27/10 | 314 | 2 | **2** | ***0.01*** |
| **16** | KWP I | 06/03/09- 10/23/09 | 66 | 0 | **0** | 0.00 |
| **17** | KWP I | 06/24/10- 06/30/10 | 7 | 0 | **0** | 0.00 |
| **18** | KWP II | 05/27/10- 06/30/10 | 35 | 0 | **0** | 0.00 |
| **19** | KWP I | 06/27/10- 06/30/10 | 5 | 0 | **0** | 0.00 |
| **20** | KWP II | 05/27/10- 06/30/10 | 16 | 0 | **0** | 0.00 |
| **21** | KWP II | 05/28/10- 06/30/10 | 34 | 0 | **0** | 0.00 |
| | | **Total detector nights** | **3436** | | | |
| | | **Total passes** | **39** | | | |
| | | **Overall detection rate** | **0.011** | | | |

The concentration of acoustic activity measured in the fall suggests seasonal use patterns that may correspond with key life history requirements (Fig. 4). The ongoing monitoring efforts planned in FY11 are expected to provide information necessary to guide risk analyses and management considerations to minimize project-related impacts to bats at KWP and the proposed KWP II project areas .We have kept the 2 most productive detectors at the uppermost locations at KWP (ID #'s 10 and 14) and have relocated the remaining 5 (ID #'s 17, 19, 21, 18 and 20) in Year 5.

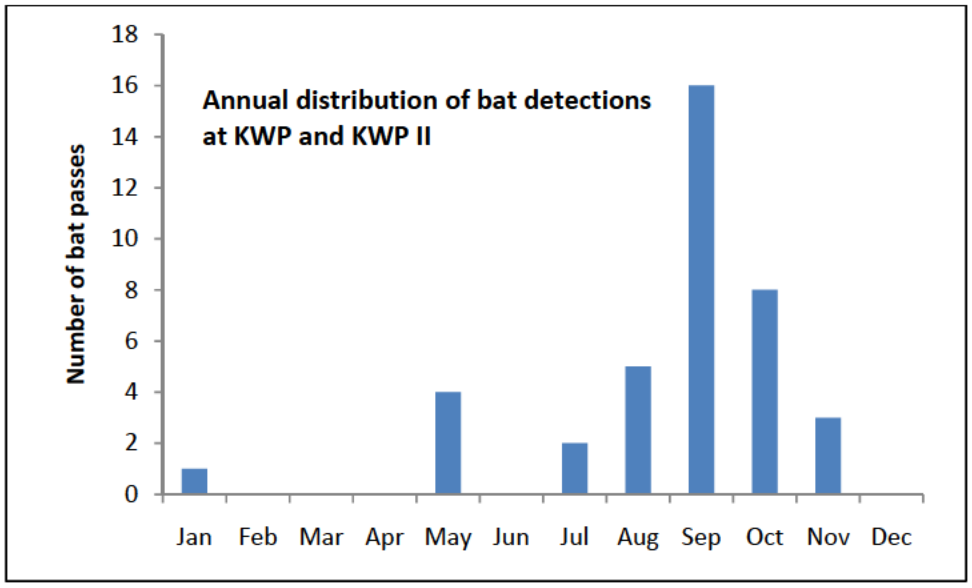


Figure 6. Cumulative bat passes across all months documented at Kaheawa Pastures using Anabat acoustic monitoring sensors during August 2008 – June 2010.

## V. WILDLIFE EDUCATION AND OBSERVATION PROGRAM

### Personnel Orientations, Information Exchange, and Reporting

The Wildlife Education and Observation Program (WEOP) continues to be an important impact avoidance and minimization measure that has proven to be a valuable component of the HCP. KWP maintains an active and well coordinated wildlife orientation and outreach process for all personnel on site. Numerous staff, contractors, and visitors regularly perform activities at KWP which necessitate timely orientations with personnel as they arrive at the work site. These frequently include refresher sessions for those present on a longer-term basis and as circumstances warrant. Regular staff and visitor updates include announcements concerning recent wildlife observations, such as adult Nene pairs browsing in the vicinity of work zones or travel corridors, current levels of Nene activity being observed on site such as the presence of family groups and goslings, and recommendations for safely performing activities in the vicinity of covered wildlife. The 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, and especially during the Nene breeding season, regular staff updates by KWP biologists, sometimes in coordination with DLNR/DOFAW, enable 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.

KWP Operations staff are required to inform the Senior Wildlife Biologist in advance of new personnel arriving to ensure that adequate wildlife orientations can be provided. 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
- if in flight, Estimated Height Above Ground in meters
- 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. Observations recorded in the WEOP logbook during Year 4 are summarized in Appendix 6. During Year 4 we obtained 240 records of wildlife observations, mostly comprised of Nene (n = 203). A total of 512 individual Nene observations were reported on and around the KWP site (many of these were the same individuals on repeated occasions), including a number of observations of Nene flight interaction and turbine avoidance behavior. 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. Prior to their participation at KWP, many of the operations and maintenance personnel and contractors have had few opportunities to view species like Nene in the wild. Thus, this program serves to promote a sense of responsibility for the resources, and has been an important part of our efforts to care for the well-being of HCP covered species. Furthermore, WEOP provides the training capacity necessary to facilitate the documentation of downed wildlife incidents, evidenced during the reporting and subsequent documentation of two separate fatality incidents which occurred in December, 2007 (Nene) and September, 2008 (Hawaiian Hoary Bat), clearly demonstrating the success of this program.

# VI. BOTANICAL RESOURCES

Several botanical resource assessments have been performed at KWP in the past. Those conducted since formal operations began in June, 2006 are summarized in the Year 3 Annual Report (Kaheawa Wind Power 2009). Those surveys focused primarily on describing the plant community on the KWP site and along the access road prior to construction of the facility and road network, in addition to identifying sensitive native plant communities and ESA-listed plant species that occur in the search plot overlap portions of WTG 1-3. In January, 2009 a survey was performed on and adjacent to the KWP site to document any changes in the plant community following the 2006 wildfire (Hobdy 2009). None of the species identified in this survey are classified as Threatened, Endangered, or candidates for listing under the provisions of the federal ESA. No conditions warranted nor resulted in the commissioning of botanical assessments in Year 4.

No significant or apparent impacts are known to have occurred in the search plot overlap portions of Papalaua and Manawainui Gulches and WTG 1-3 in Year 4. Because all of the downed wildlife monitoring in this area is performed from outside the sensitive overlap portions of these plots, the fenceline installed by DLNR and its partners appears intact and free of breaches, and no feral animals have been observed near these areas, there is no reason to believe that any increased or cumulative impacts to the sensitive botanical resources in these areas are occurring.

## Native Plant Establishment

Once the KWP facility entered into the operational phase of the project in late 2006, KWP began implementing a native plant reestablishment program intended to restore important native plants common in the region and in the foot-print of the project area. The results have been encouraging and have involved considerable coordination with other conservation partners, volunteers, and the community. Even with the challenges of a harsh, often dry climate, survival has been high, on the order of 80-90 % overall for established transplants and seedlings. During the Year 3 reporting period, KWP succeeded in planting nearly 25,000 native plants comprising six species (*Metrosideros*, *Dodonaea*, *Bidens, Heteropogon, Wikstromia*, and *Scaveola*) which were, with the exception of *Heteropogon*, grown solely from seeds collected at Kaheawa. In part, through successful long-term working relationships with Maui Cultural Lands, Inc. and other conservation groups, including local native plant growers and restoration enthusiasts, significant portions of the site are becoming re-established with native species common in the area. By Year 4 it has become evident that most of the planted areas are maturing and increased substantially in overall ground cover, canopy area and stature, and diversity – resulting in enhanced retention of propagules, natural recruitment and soil stabilization (Fig. 7).

Figure 7. Two year old ‘a’ali’i grown from seed and out-planted on a previously bare fill slope adjacent to a WTG at the Kaheawa Wind Power facility in 2010.

In Year 3 the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) provided KWP with additional Pili Grass (*Heteropogon contortus*) seed for use in promoting native ground cover and facilitating soil and land conservation at the wind facility. Results of previous collaboration with the NRCS enabled KWP to conduct field trials with Pili to determine efficient treatment methods. The seed was dispersed sparingly to supplement ground cover establishment throughout the site and has shown a great deal of success as application techniques have improved. In addition, about 6,000 individual Pili Grass plants grown from seed were included in last year’s planting efforts. We have found that Pili grass seedlings establish themselves well during outplanting, enabling the plants to become quickly established, grow to a mature stature and begin early seed production, and enhance seed retention in substrates, promoting germination and growth (Fig. 8). In Year 4, KWP received 120 additional bales of Pili Grass from the Kahoolawe Island Reserve Commission as part of a continuing partnership to promote the usefulness of this resource as a tool for improving soil and land conservation. These bales were either staked in place against partially bare fill slopes or broken up and spread across otherwise bare areas to encourage natural germination of seeds.

Figure 8. Mature Pili Grass planted as seedlings at the Kaheawa Wind Power facility on Maui.

## Minimizing and Managing Invasive Species

KWP continues to work actively with stakeholders, agency staff, 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, KWP, and other concerned parties. This species has been a considerable concern for rangeland managers throughout Hawaii for many years because of its toxicity to livestock. KWP continues to welcome the support and collaboration we share with the DLNR, USDA Rangeland Extension Office, and the State Plant

Quarantine Division to evaluate constructive management options to control this invasive species.

The presence of Fireweed continues to be a concern at KWP. There were no significant management or control measures implemented in Year 4, although management is planned in Year 5. Because this species has become partially established on several gravel turbine pads and access roadways, a combination of manual removal and chemical treatments will be necessary to adequately control and, if possible eliminate fireweed in these areas.

# VII. ADAPTIVE MANAGEMENT CONSIDERATIONS

## Comments and Recommendations: Year 2 and Year 3 Annual Review

The Year 2 Annual Review resulted in several recommendations by DOFAW and USFWS. These recommendations and the actions taken by KWP to address them were presented in the Year 3 Annual Report. This report was submitted to DLNR and USFWS in November, 2009 and at the time received preliminary review by the Conservation Initiatives Coordinator at DLNR. However as of this writing no formal comments have been provided to KWP regarding the changes made from Year 2 to Year 3, or on the Year 3 annual report.

## Proposed Changes to Downed Wildlife Monitoring

Implementation of the KWP HCP is entering its fifth consecutive year, and a strong record of fatality monitoring has been established. With regard to fatality monitoring, the HCP states that,

> "…intensive searches will be conducted for the first two years, after which the approach may be modified based on the results obtained up to that point… In subsequent years, if less intensive monitoring measures are agreed to by USFWS and DLNR, monitoring will consist of a reduced level of effort, consisting of smaller search plots at a subset of turbines, with plots and turbines being relocated periodically to sample a variety of locations. The ongoing effort will be supplemented by the WEOP Program, as implemented by on-site staff. Depending upon the findings, the location and focus of the ongoing effort can be modified, with the concurrence of the USFWS and DLNR, to target areas or times of particular interest".

KWP has fulfilled this requirement and provided adequate information on which to develop an adaptive management approach to wildlife fatality monitoring. A proposal was submitted with the Year 3 Annual Report detailing the basis for the proposed changes and their overall effects on monitoring effectiveness and search effort. This report also concluded that after more than

three years of systematic and intensive search effort, including ongoing Carcass Removal Trials and SEEF exercises, KWP clearly established the basis for introducing an adaptation to the intensive monitoring design, as prescribed in the HCP. The results contained in the Year 4 report are expected to provide even greater confidence in the results obtained at KWP during four full consecutive years of monitoring.

The present configurations of the search plots at KWP (180 x 200 m) represent 100% of the maximum height of the turbines plus 10 m up- and down-wind to compensate for possible wind drift. However, none of the downed wildlife carcasses observed at KWP during 4 years of steady monitoring have been documented at distances beyond 75% of maximum turbine height (range 1-61 m, n = 21). Although a Hawaiian short-eared owl carcass was discovered at a distance of 98 meters from the nearest turbine December, 2009 the evidence suggests it most likely collided with an overhead transmission array not associated directly with project facilities or WTGs.

Several studies that have examined the distribution of avian and bat carcasses at wind facilities indicate that most carcasses are found within 50% of maximum turbine height (Arnett 2005, Jain et al. 2007, Fiedler et al. 2007). Most of these studies documented fatalities of small songbirds and bats. However, these fatality distributions are also expected to apply to larger bodied birds which, due to their higher body mass would be expected to fall closer to the base of turbines than animals of lesser body mass. Given the range of distance most carcasses are expected to fall after having collided with WTG structures, KWP proposes to establish two concentric survey areas (50% and 75% maximum turbine height) that will be searched weekly. Since variability in ground cover and terrain inside search areas and its affect on carcass detection should be considered, the revised monitoring plan also includes provisions for maintaining vegetation in the new circular plots (see Appendix 10).

Given these considerations, KWP again proposes that turbine search plots should be modified from their present rectangular shape and monitored under a new search schedule and plot ground cover management regime. A full description of the proposed plan is provided in Appendix 9 and 10.

Under the proposed modifications, each search area would contain 2 concentric plots centered on each turbine base representing the 50% and 75% maximum turbine height radii. Monitoring will entail searching each plot within the 50% radius each week over the entire monitoring year. Thus, each week all search areas are monitored within the 50% maximum turbine height, which is expected to provide the coverage necessary to account for most, if not all downed wildlife that might result from collisions with wind turbines at KWP. Each week half (10) of the twenty WTG search plots will be searched to 75% maximum turbine height while each subsequent week an alternate subset of 75% maximum turbine height areas will be searched.

This type of monitoring effort along with continued trials is expected to account for most, if not all HCP-covered wildlife fatalities that may occur at KWP in Year 5 and beyond. Carcass removal trials and SEEF exercises will continue in order to provide adjustment parameters for take estimations and to detect changes in carcass retention time and carcass detection efficiency of searchers for each carcass size class.

## VIII. CHANGED OR UNFORESEEN CIRCUMSTANCES

There were no changed circumstances during the Year 4 reporting period at KWP. A wildfire consumed an estimated 6,400 acres of grasslands and mostly invasive stands of forest in West Maui and also burned substantial portions of the search plot areas between WTG 12-20 at KWP. At the time of this writing, most burned portions of KWP are showing signs of rapid regeneration, in a succession that suggests most undesirable "pasture weeds" and fire-resistant invasive species will continue to prevail over native plant species while the risk of fire continues.

Results of annual monitoring by the DLNR and KWP of the Hana`ula-Kaheawa Nene population do not suggest that this West Maui population is experiencing any ill effects or changes in population status owing to natural or project-related impacts. Although data are limited at this time, observations by KWP and DLNR/DOFAW suggest the West Maui population is stable and may be increasing. Little is known about the current status of Hawaiian Petrels and Newell's Shearwaters on Maui, though no unexpected impacts or significant changes in the status of these species have emerged that might prompt elevated concerns for their survival. Hawaiian Hoary Bats do not appear common in the KWP area. Their presence in the project vicinity appears seasonal, and the results of continued monitoring suggest no changes or unforeseen circumstances appear to have affected this covered species or its habitat. The wildfire in early June, 2010 was by far the most significant overall natural event that directly impacted portions of the landscape adjacent to KWP and the surrounding region. No other changes in the landscape or habitat associated with the KWP project are known to have occurred during Year 4.

## IX. FUNDING

A summary of HCP-related expenditures for Years 1-4 is attached (Appendix 12). This summary lists all costs (including staff labor) that KWP has expended toward fulfilling the terms of the HCP, and compares them against the budgeted amounts specified in Appendix 11 of the HCP. In general the total expenditures are running fairly close to the total budgeted amount for the four-year period. Expenditures within categories do vary, however. For example, Nene expenditures initially lagged due to the one-plus-year delay that occurred before commencing

payment of the Nene propagation funds to DOFAW. A double payment was disbursed in 2010, which should bring this into line. Spending on seabird mitigation also was initially lagging slightly, but has since been brought into alignment with current management initiatives and studies at the Makamaka`ole site. Spending has exceeded budgeted amounts for fatality monitoring efforts. The rate of spending on monitoring should decrease markedly as proposed monitoring plans are adopted in Year 5, however will likely continue to exceed budgeted amounts for the foreseeable future. Also included in Appendix 12 is a summary of the three Contingency Funds and related interest accrual at 2.5% annually per the HCP and Implementing Agreement. On January 13, 2010 the Letters of Credit (LOC Number SB000020 and SB000021), each of which name the State of Hawaii Department of Land and Natural Resources as the beneficiary were officially amended and include an increase in the value of LOC SB000021 from $414,000 by $66,000 to a total value of $480,000 and an expiration date of February 7, 2016.

Finally, a listing of additional conservation measures being implemented by KWP and their approximate costs is provided. These are either related to CDUP compliance, or voluntary on the part of KWP. They are not included in the HCP budget.

## X. LOOKING AHEAD

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 has continued to implement these measures in accordance with the HCP and the recommendations provided by DLNR, USFWS, and the ESRC through the fourth full year of implementation. Several specific items have been presented that point to accomplishments and challenges encountered during Year 4. Finding innovative solutions and building on what has been learned during four years of successful monitoring are expected to result in continued fine-tuning and improvement.

Progress on Nene mitigation, in close collaboration with DLNR and USFWS, appears very encouraging. KWP looks forward to exploring ways to facilitate Nene captive propagation and reintroduction, translocation, and relocation in more depth. The timeliness of progress on the proposed SHA is also encouraging, suggesting that a new release pen for Nene reintroduction on Maui could accommodate captive releases in the near future.

KWP has continued making advancements in mitigation for seabirds according to the goals of the 2010 project feasibility assessment. As the assessment continues, new insights are expected to emerge that are likely to inform long-term mitigation strategies and provide a basis for subsequent adaptive management as necessary.

Searcher Efficiency and Carcass Removal trials using avian carcasses that are more representative of Nene (e.g., Canada Goose) along with fresh carcasses of small mammals (rats)

as trial surrogates for Hawaiian hoary bats should improve confidence in the take adjustments for these Covered Species in Year 5.

Finally, KWP wishes to adopt a modified downed wildlife monitoring protocol that integrates what has been learned during four years of intensive monitoring according to the implementation schedule outlined in the HCP. KWP has developed a revised proposal that it hopes will be considered, in consultation with DLNR, USFWS, and the ESRC, appropriate for implementation in Year 5.

## XI. LITERATURE CITED

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| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1-Jul-09 | WTG 06-10 | 1 | 1 | 9:00 | 13:00 | DM | 4.00 | 5 | | |
| 2-Jul-09 | WTG 11-15 | 3 | 2 | 7:45 | 12:00 | IB, DM | 8.50 | 5 | | |
| 3-Jul-09 | HOLIDAY: 4th of July | | | | | | | | | |
| | | | | | | **Weekly Totals:** | **12.50** | **10** | **0.50** | |
| 6-Jul-09 | WTG 16-20 | | 5, 6 | 9:45 | 13:00 | IB, DM | 6.50 | 5 | | |
| 7-Jul-09 | WTG 01-05 | 1 | | 9:45 | 13:30 | DM | 3.75 | 5 | | |
| 8-Jul-09 | WTG 06-09 | 2 | 1 | 10:00 | 13:00 | DM | 3.00 | 4 | | |
| 9-Jul-09 | WTG 10-13 | 3 | | 10:30 | 13:00 | IB, DM | 5.00 | 4 | | |
| 10-Jul-09 | WTG 14-16 | | 2 | 10:15 | 11:45 | DM | 1.50 | 3 | | |
| | | | | | | **Weekly Totals:** | **19.75** | **21** | **1.05** | |
| 13-Jul-09 | WTG 17-20 | | 5, 6 | 10:45 | 13:45 | DM | 3.00 | 4 | | |
| 14-Jul-09 | WTG 01-04 | 1 | | 9:15 | 12:30 | DM | 3.25 | 4 | | |
| 15-Jul-09 | WTG 05-08 | 2 | | 10:45 | 12:45 | DM | 2.00 | 4 | | |
| 16-Jul-09 | ---- | | | | | | | | | |
| 17-Jul-09 | WTG 09-17 | 3 | 1, 2 | 10:15 | 13:30 | IB, DM | 6.50 | 9 | | |
| | | | | | | **Weekly Totals:** | **14.75** | **21** | **1.05** | |
| 20-Jul-09 | ---- | | 5, 6 | 10:30 | 11:15 | IB | 0.75 | 0 | | |
| 21-Jul-09 | WTG 18-02 | 1 | | 10:15 | 14:00 | DM | 3.75 | 5 | | |
| 22-Jul-09 | WTG 03-07 | 2 | | 9:30 | 13:30 | DM | 4.00 | 5 | | |
| 23-Jul-09 | WTG 08-11 | | 1 | 10:15 | 13:15 | DM | 3.00 | 4 | | |
| 24-Jul-09 | WTG 12-18 | 3 | 2 | 10:00 | 14:30 | DM | 4.50 | 7 | | |
| | | | | | | **Weekly Totals:** | **16.00** | **21** | **1.05** | |
| 27-Jul-09 | WTG 19-03 | 1 | 5, 6 | 8:30 | 13:00 | DM | 4.50 | 5 | | |
| 28-Jul-09 | WTG 04-07 | 2 | | 11:00 | 14:00 | DM | 3.00 | 4 | | |
| 29-Jul-09 | WTG 08-11 | | 1 | 8:30 | 12:00 | DM | 3.50 | 4 | | |
| 30-Jul-09 | WTG 12-15 | | 2 | 9:30 | 12:30 | DM | 3.00 | 4 | | |
| 31-Jul-09 | WTG 16-19 | 3 | | 11:00 | 14:30 | IB | 3.50 | 4 | | |
| | | | | | | **Weekly Totals:** | **17.50** | **21** | **1.05** | |
| | | **KWP** | **KWP - II** | **Start** | **End** | | **Searcher** | **# of Plots** | **Sweeps** | **Downed Wildlife** |

| Date | Search Plot ID | MET Towers | MET Towers | Time | Time | Observers | Hours Searched | Per Week | Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|
| 3-Aug-09 | ---- | | | | | | | | |
| 4-Aug-09 | WTG 20-04 | 1 | 5, 6 | 9:30 | 13:45 | IB, DM | 8.50 | 5 | |
| 5-Aug-09 | WTG 05-09 | 2 | 1 | 9:30 | 13:15 | DM | 3.75 | 5 | |
| 6-Aug-09 | WTG 10-14 | 3 | 2 | 10:30 | 13:30 | IB, DM | 6.00 | 5 | |
| 7-Aug-09 | WTG 15-19 | | | 9:30 | 12:30 | IB, DM | 6.00 | 5 | |
| | | | | | | **Weekly Totals:** | **24.25** | **20** | **1.00** |
| 10-Aug-09 | Zero Visibility / Heavy Rains | | | | | | | | |
| 11-Aug-09 | Zero Visibility / Heavy Rains | | | | | | | | |
| 12-Aug-09 | Zero Visibility / Heavy Rains | | | | | | | | |
| 13-Aug-09 | WTG 20-05 | 1 | 1, 5, 6 | 11:00 | 16:00 | DM | 5.00 | 6 | |
| 14-Aug-09 | WTG 06-11 | 2, 3 | 2 | 8:00 | 12:30 | DM | 4.50 | 6 | |
| | | | | | | **Weekly Totals:** | **9.50** | **12** | **0.60** |
| 17-Aug-09 | WTG 12-15 | 3 | 2 | 10:15 | 13:15 | DM | 3.00 | 4 | |
| 18-Aug-09 | WTG 16-20 | | | 8:30 | 12:30 | DM | 4.00 | 5 | |
| 19-Aug-09 | WTG 01-05 | 1 | | 8:00 | 12:00 | DM | 4.00 | 5 | |
| 20-Aug-09 | WTG 06-11 | 2 | 1, 5, 6 | 8:00 | 13:45 | DM | 5.75 | 6 | |
| 21-Aug-09 | ---- | | | | | | | | |
| | | | | | | **Weekly Totals:** | **16.75** | **20** | **1.00** |
| 24-Aug-09 | WTG 12-15 | 3 | 5, 6 | 8:00 | 11:30 | DM | 3.50 | 4 | |
| 25-Aug-09 | WTG 16-20 | | 2 | 8:00 | 12:30 | DM | 4.50 | 5 | |
| 26-Aug-09 | WTG 01-04 | 1 | | 9:00 | 12:00 | DM | 3.00 | 4 | |
| 27-Aug-09 | WTG 05-08 | 2 | | 8:00 | 12:00 | DM | 4.00 | 4 | |
| 28-Aug-09 | WTG 09-11 | | 1 | 9:30 | 12:00 | DM | 2.50 | 3 | |
| | | | | | | **Weekly Totals:** | **17.50** | **20** | **1.00** |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 31-Aug-09 | WTG 12-15 | 3 | 2 | 9:00 | 12:00 | DM | 3.00 | 4 | | |
| 1-Sep-09 | WTG 16-20 | | 5, 6 | 8:00 | 12:00 | DM | 4.00 | 5 | | |
| 2-Sep-09 | WTG 01-05 | 1 | | 9:00 | 12:45 | IB, DM | 7.50 | 5 | | |
| 3-Sep-09 | WTG 06-11 | 2 | 1 | 9:30 | 13:00 | IB, DM | 7.00 | 6 | | |
| 4-Sep-09 | Overlap | | | 13:00 | 14:00 | IB, DM | 2.00 | 0 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | **Weekly Totals:** | **23.50** | **20** | **1.00** | |
| 7-Sep-09 | HOLIDAY: Labor Day | | | | | | | | | |
| 8-Sep-09 | WTG 13-17 | 3 | 2, 5, 6 | 7:45 | 11:30 | DM | 3.75 | 5 | | |
| 9-Sep-09 | WTG 18-02 | 1 | | 6:30 | 10:30 | DM | 4.00 | 5 | | |
| 10-Sep-09 | WTG 03-07 | 2 | | 8:30 | 12:15 | DM | 3.75 | 5 | | |
| 11-Sep-09 | WTG 08-13 | | 1 | 11:00 | 15:00 | IB | 4.00 | 6 | | |
| | | | | | | **Weekly Totals:** | **15.50** | **21** | **1.05** | |
| 14-Sep-09 | WTG 14-17 | 3 | 5, 6 | 9:00 | 12:30 | IB | 3.50 | 4 | | |
| 15-Sep-09 | WTG 18-20 | | | 10:30 | 13:00 | IB | 2.50 | 3 | | |
| 16-Sep-09 | WTG 01-05 | 1 | | 11:30 | 15:30 | IB | 4.00 | 5 | | |
| 17-Sep-09 | WTG 06-10 | 2 | 1 | 12:00 | 16:00 | IB | 4.00 | 5 | | |
| 18-Sep-09 | WTG 11-13 | | 2 | 12:00 | 15:00 | IB | 3.00 | 3 | | |
| | | | | | | **Weekly Totals:** | **17.00** | **20** | **1.00** | |
| 21-Sep-09 | WTG 12-15 | 3 | 2, 5, 6 | 11:30 | 15:00 | IB, DM | 7.00 | 4 | | |
| 22-Sep-09 | WTG 16-20 | | | 11:00 | 15:00 | DM | 4.00 | 5 | | |
| 23-Sep-09 | WTG 01-05 | 1 | | 8:30 | 12:30 | DM | 4.00 | 5 | | |
| 24-Sep-09 | ---- | | | | | | | | | |
| 25-Sep-09 | Overlap | | | 13:00 | 14:00 | IB, DM | 2.00 | 0 | | |
| | | | | | | **Weekly Totals:** | **17.00** | **14** | **0.70** | |

| **Date** | **Search Plot ID** | **KWP MET Towers** | **KWP - II MET Towers** | **Start Time** | **End Time** | **Observers** | **Searcher Hours** | **# of Plots Searched** | **Sweeps Per Week** | **Downed Wildlife Observed (Species)** |
|---|---|---|---|---|---|---|---|---|---|---|
| 28-Sep-09 | WTG 06-11 | 2 | 1 | 8:00 | 13:00 | DM | 5.00 | 6 | | |
| 29-Sep-09 | WTG 12-16 | 3 | 2 | 8:00 | 12:00 | DM | 4.00 | 5 | | |
| 30-Sep-09 | WTG 17-01 | 1 | | 9:00 | 13:00 | DM | 4.00 | 5 | | |
| 1-Oct-09 | WTG 02-06 | | 5, 6 | 9:00 | 13:00 | DM | 4.00 | 5 | | |
| 2-Oct-09 | WTG 07-11 | 2 | 1 | 9:00 | 13:30 | DM | 4.50 | 5 | | |
| | | | | | | **Weekly Totals:** | **21.50** | **26** | **1.30** | |

| 1st Qtr. WTG search interval | 7.5 |
|---|---|
| 1st Qtr. MET search interval | 7.3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5-Oct-09 | WTG 12-01 | 1, 3 | 2, 5, 6 | 8:00 | 14:00 | IB, DM | 12.00 | 10 | | |
| 6-Oct-09 | WTG 02-11 | 2 | 1 | 8:00 | 13:00 | IB, DM | 10.00 | 10 | | |
| 7-Oct-09 | WTG 12-01 | 1, 3 | 2, 5, 6 | 9:00 | 14:00 | IB, DM | 10.00 | 10 | | |
| 8-Oct-09 | ---- | | | | | | | | | |
| 9-Oct-09 | WTG 02-11 | 2 | 1 | 9:30 | 14:30 | IB, DM | 10.00 | 10 | | |
| | | | | | | **Weekly Totals:** | **42.00** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12-Oct-09 | ---- | | | | | | | | | |
| 13-Oct-09 | WTG 13-02 | 1, 3 | 2, 5, 6 | 10:00 | 15:00 | IB, DM | 10.00 | 10 | | |
| 14-Oct-09 | WTG 03-12 | 2 | 1 | 9:30 | 14:30 | IB, DM | 10.00 | 10 | | |
| 15-Oct-09 | WTG 13-02 | 1, 3 | 2 | 7:30 | 12:30 | IB, DM | 10.00 | 10 | | |
| 16-Oct-09 | WTG 03-12 / Overlap | 2 | 1, 5, 6 | 10:00 | 16:00 | IB, DM | 12.00 | 10 | | |
| | | | | | | **Weekly Totals:** | **42.00** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19-Oct-09 | WTG 14-03 | 1, 3 | 2, 5, 6 | 10:00 | 16:00 | IB, DM | 12.00 | 10 | | |
| 20-Oct-09 | WTG 04-13 | 2 | 1 | 9:00 | 14:30 | IB, DM | 11.00 | 10 | | |
| 21-Oct-09 | WTG 14-01 | 1, 3 | 2 | 8:30 | 12:30 | IB, DM | 8.00 | 8 | | |
| 22-Oct-09 | WTG 02-11 | 2 | 1 | 9:15 | 14:30 | IB, DM | 10.50 | 10 | | |
| 23-Oct-09 | WTG 12-13 | | 5, 6 | 10:30 | 11:30 | IB, DM | 2.00 | 2 | | |
| | | | | | | **Weekly Totals:** | **43.50** | **40** | **2.00** | |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 26-Oct-09 | WTG 15-04 | 1 | 5, 6 | 9:45 | 15:00 | IB, DM | 10.50 | 10 | | **RNPH** |
| | | | | | | | | | | Time: **11:04** |
| | | | | | | | | | | Nearest WTG: **7** |
| | | | | | | | | | | Dist to WTG (m): **0.60** |
| | | | | | | | | | | Dir from WTG: **W** |
| | | | | | | | | | | Gr Cov: **Bare** |
| 27-Oct-09 | WTG 05-07 | 2 | | 10:00 | 11:30 | IB, DM | 3.00 | 3 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 28-Oct-09 | WTG 08-17 | 3 | 1, 2 | 10:00 | 15:30 | IB, DM | 11.00 | 10 | |
| 29-Oct-09 | WTG 18-07 | 1, 2 | 5, 6 | 10:00 | 15:30 | IB, DM | 11.00 | 10 | |
| 30-Oct-09 | WTG 08-14 | 3 | 1, 2 | 9:00 | 13:00 | IB, DM | 8.00 | 7 | |
| | | | | | | **Weekly Totals:** | **43.50** | **40** | **2.00** |
| 2-Nov-09 | WTG 16-05 | 1 | 5, 6 | 11:00 | 15:00 | IB, DM | 8.00 | 10 | |
| 3-Nov-09 | WTG 06-15 | 2, 3 | 1, 2 | 10:00 | 14:30 | IB, DM | 9.00 | 10 | |
| 4-Nov-09 | WTG 16-20 | | 5, 6 | 7:00 | 11:00 | DM | 4.00 | 5 | |
| 5-Nov-09 | WTG 01-05 | 1 | | 10:00 | 14:00 | DM | 4.00 | 5 | |
| 6-Nov-09 | WTG 06-15 | 2, 3 | 1, 2 | 10:00 | 14:00 | IB, DM | 8.00 | 10 | |
| | | | | | | **Weekly Totals:** | **33.00** | **40** | **2.00** |
| 9-Nov-09 | WTG 16-20 | | 5, 6 | 9:30 | 13:30 | IB | 4.00 | 5 | |
| 10-Nov-09 | WTG 01-05 | 1 | | 12:30 | 16:00 | IB | 3.50 | 5 | |
| 11-Nov-09 | WTG 06-10 | 2 | 1 | 10:00 | 14:30 | IB | 4.50 | 5 | |
| 12-Nov-09 | WTG 11-19 | 3 | 2 | 9:30 | 14:00 | IB, DM | 9.00 | 9 | |
| 13-Nov-09 | WTG 20-11 | 1, 2 | 1, 2, 5, 6 | 10:00 | 15:00 | IB, DM | 10.00 | 12 | |
| | | | | | | **Weekly Totals:** | **31.00** | **36** | **1.80** |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 16-Nov-09 | WTG 12-01 | 1, 3 | 2, 5, 6 | 8:00 | 13:00 | IB, DM | 10.00 | 10 | | |
| 17-Nov-09 | WTG 02-11 | 2 | 1 | 8:00 | 13:00 | IB, DM | 10.00 | 10 | | |
| 18-Nov-09 | WTG 12-20 | 3 | 2, 5, 6 | 9:30 | 14:30 | IB, DM | 10.00 | 9 | | **BLFR** |
| | | | | | | | | | | Time: **11:04** |
| | | | | | | | | | | Nearest WTG: **7** |
| | | | | | | | | | | Dist to WTG (m): **1.5** |
| | | | | | | | | | | Dir from WTG: **N** |
| | | | | | | | | | | Gr Cov: **Bare** |
| 19-Nov-09 | WTG 01-05 | 1 | | 8:30 | 12:00 | DM | 3.50 | 5 | | |
| 20-Nov-09 | WTG 06-11 | 2 | 1 | 10:00 | 14:45 | DM | 4.75 | 6 | | |
| | | | | | | **Weekly Totals:** | **38.25** | **40** | **2.00** | |
| 22-Nov-09 | WTG 12-15 | 3 | 2 | 11:00 | 14:00 | DM | 3.00 | 4 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 23-Nov-09 | WTG 16-20 | | 5, 6 | 10:00 | 13:45 | DM | 3.75 | 5 | |
| 24-Nov-09 | WTG 01-05 | 1 | | 10:15 | 14:00 | DM | 3.75 | 5 | |
| 25-Nov-09 | WTG 06-11 | 2 | 1 | 9:30 | 13:00 | IB, DM | 7.00 | 6 | |
| 26-Nov-09 | HOLIDAY: Thanksgiving | | | | | | | | |
| 27-Nov-09 | HOLIDAY: Day After | | | | | | | | |
| | | | | | | **Weekly Totals:** | **17.50** | **20** | **1.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 30-Nov-09 | WTG 12-15 | 3 | 2, 5 | 10:00 | 13:00 | DM | 3.00 | 4 | |
| 1-Dec-09 | WTG 16-19 | | | 11:00 | 14:00 | IB, DM, MC | 9.00 | 4 | |
| 2-Dec-09 | WTG 20-03 | 1 | 5 | 11:30 | 14:30 | DM, IB | 6.00 | 4 | |
| 3-Dec-09 | WTG 04-08 | 2 | | 12:00 | 15:00 | DM, MC | 6.00 | 5 | |
| 4-Dec-09 | WTG 09-11 | | | 9:30 | 12:00 | DM, MC | 5.00 | 3 | |
| | | | | | | **Weekly Totals:** | **29.00** | **20** | **1.00** |

| **Date** | **Search Plot ID** | **KWP MET Towers** | **KWP - II MET Towers** | **Start Time** | **End Time** | **Observers** | **Searcher Hours** | **# of Plots Searched** | **Sweeps Per Week** | **Downed Wildlife Observed (Species)** |
|---|---|---|---|---|---|---|---|---|---|---|
| 7-Dec-09 | WTG 13-20 | 3 | 2, 5 | 10:30 | 14:30 | IB, DM, MC | 12.00 | 8 | | **SPDO** |
| | | | | | | | | | | Time: **11:15** |
| | | | | | | | | | | Nearest WTG: **5** |
| | | | | | | | | | | Dist to WTG (m): **1.2** |
| | | | | | | | | | | Dir from WTG: **E** |
| | | | | | | | | | | Gr Cov: **Bare** |
| 8-Dec-09 | WTG 01-07 | 1, 2 | | 10:30 | 14:30 | DM, MC | 8.00 | 7 | | |
| 9-Dec-09 | WTG 08-12 | | | 9:00 | 11:30 | DM, MC | 5.00 | 5 | | |
| 10-Dec-09 | ---- | | | | | | | | | |
| 11-Dec-09 | Overlap | | | 9:45 | 12:45 | IB, DM, MC | 9.00 | 0 | | |
| | | | | | | **Weekly Totals:** | **34.00** | **20** | **1.00** | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 14-Dec-09 | WTG 14-17 | 3 | 2 | 9:00 | 13:00 | DM, MC | 8.00 | 4 | |
| 15-Dec-09 | WTG 18-02 | 1 | | 8:30 | 13:30 | DM, MC | 10.00 | 5 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16-Dec-09 | WTG 03-06 | | | 9:15 | 13:15 | DM, MC | 8.00 | 4 | | |
| 17-Dec-09 | WTG 07-10 | 2 | | 12:30 | 14:30 | MC, IB | 4.00 | 4 | | |
| 18-Dec-09 | WTG 11-13 / Overlap | | 5 | 8:30 | 10:30 | MC, IB | 4.00 | 3 | | |
| | | | | | | **Weekly Totals:** | **34.00** | **20** | **1.00** | |
| 21-Dec-09 | WTG 15-19 | | 2 | 9:00 | 13:00 | DM | 4.00 | 5 | | |
| 22-Dec-09 | WTG 20-04 | 1 | | 10:00 | 13:30 | DM, MC | 7.00 | 5 | | **RNPH** |
| | | | | | | | | | | Time: **09:10** |
| | | | | | | | | | | Nearest WTG: **7** |
| | | | | | | | | | | Dist to WTG (m): **1.8** |
| | | | | | | | | | | Dir from WTG: **NE** |
| | | | | | | | | | | Gr Cov: **Bare** |
| 23-Dec-09 | WTG 05-09 | 2 | | 9:00 | 13:00 | DM, MC | 8.00 | 5 | | |
| 24-Dec-09 | WTG 10-14 / Overlap | 3 | 5 | 9:00 | 13:00 | DM, IB | 8.00 | 5 | | |
| 25-Dec-09 | HOLIDAY: Christmas | | | | | | | | | |
| | | | | | | **Weekly Totals:** | **27.00** | **20** | **1.00** | |
| | | | | **2nd Qtr. WTG search interval** | | | **4.4** | | | |
| | | | | **2nd Qtr. MET search interval** | | | **4.2** | | | |

| **Date** | **Search Plot ID** | **KWP MET Towers** | **KWP - II MET Towers** | **Start Time** | **End Time** | **Observers** | **Searcher Hours** | **# of Plots Searched** | **Sweeps Per Week** | **Downed Wildlife Observed (Species)** |
|---|---|---|---|---|---|---|---|---|---|---|
| 28-Dec-09 | WTG 16-20 | | 2, 5 | 12:00 | 14:00 | DM, MC | 4.00 | 5 | | |
| 29-Dec-09 | WTG 01-05 | 1 | | 12:00 | 14:30 | DM, MC | 5.00 | 5 | | |
| 30-Dec-09 | WTG 06-10 | 2 | | 9:00 | 12:00 | DM, MC, IB | 9.00 | 5 | | **SEOW** |
| | | | | | | | | | | Time: **09:33** |
| | | | | | | | | | | Nearest WTG: **12** |
| | | | | | | | | | | Dist. To WTG (m): **98** |
| | | | | | | | | | | Dir. fr WTG: **NW** |
| | | | | | | | | | | Gr Cov: **Grass** |
| 31-Dec-09 | WTG 11-15 / Overlap | 3 | | 8:45 | 11:45 | DM, MC | 6.00 | 5 | | |
| 1-Jan-10 | HOLIDAY: New Year | | | | | | | | | |
| | | | | | | **Weekly Totals:** | **24.00** | **20** | **1.00** | |
| 4-Jan-10 | WTG 17-20 | | 2, 5 | 9:30 | 11:00 | DM, MC | 3.00 | 4 | | |
| 5-Jan-10 | WTG 1-4 | 1 | | 9:00 | 11:45 | MC | 2.75 | 4 | | |
| 6-Jan-10 | WTG 5-8 | 2 | | 9:00 | 13:15 | MC, IB, GS | 12.75 | 4 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7-Jan-10 | WTG 9-12 | | | 9:00 | 12:00 | MC, DM | 6.00 | 4 | |
| 8-Jan-10 | WTG 13-16 / Overlap | 3 | | 9:00 | 13:00 | MC, DM | 8.00 | 4 | |
| | | | | | | **Weekly Totals:** | **32.50** | **20** | **1.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11-Jan-10 | WTG 18-02 | 1 | 5 | 10:00 | 15:00 | DM, MC | 10.00 | 5 | |
| 12-Jan-10 | WTG 03-07 | 2 | | 10:00 | 14:00 | DM, MC | 8.00 | 5 | |
| 13-Jan-10 | WTG 08-12 | | | 9:30 | 12:45 | DM, MC | 6.50 | 5 | |
| 14-Jan-10 | WTG 13-15 | | | 9:00 | 13:00 | DM, MC | 8.00 | 3 | |
| 15-Jan-10 | WTG 16-17 | 3 | 2 | 9:00 | 12:00 | DM, MC | 6.00 | 2 | |
| | | | | | | **Weekly Totals:** | **38.50** | **20** | **1.00** |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 18-Jan-10 | HOLIDAY: Martin L. King | | | | | | | | | |
| 19-Jan-10 | WTG 19-03 | 1 | | 11:00 | 15:30 | DM, MC | 9.00 | 5 | | |
| | | | | | | | | | | |
| 20-Jan-10 | WTG 04-08 | 2 | | 11:00 | 14:00 | IB, DM, MC | 9.00 | 5 | | |
| 21-Jan-10 | WTG 09-13 | 3 | 5 | 10:00 | 13:00 | DM, IB | 6.00 | 5 | | **WTTR** |
| | | | | | | | | | | Time: **10:28** |
| | | | | | | | | | | Nearest WTG: **9** |
| | | | | | | | | | | Dist to WTG (m): **73** |
| | | | | | | | | | | Dir from WTG: **E** |
| | | | | | | | | | | Gr Cov: **Grass/Shrub** |
| 22-Jan-10 | WTG 14-18 | | 2 | 10:00 | 13:00 | DM, IB | 6.00 | 5 | | |
| | | | | | | **Weekly Totals:** | **30.00** | **20** | **1.00** | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 25-Jan-10 | WTG 20-04 | 1 | | 9:30 | 13:30 | DM, MC, IB | 12.00 | 5 | |
| 26-Jan-10 | Zero Visibility / Heavy Rains | | | | | | | | |
| 27-Jan-10 | WTG 05-09 | 2 | | 9:00 | 13:00 | DM, MC, IB | 12.00 | 5 | |
| 28-Jan-10 | WTG 10-11 | | | 13:00 | 14:30 | DM, MC | 3.00 | 2 | |
| 29-Jan-10 | WTG 12-19 / Overlap | 3 | 2, 5 | 7:00 | 13:00 | DM, MC, IB | 18.00 | 8 | |
| | | | | | | **Weekly Totals:** | **45.00** | **20** | **1.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1-Feb-10 | WTG 01-05 | 1 | | 11:30 | 14:30 | DM, MC, IB | 9.00 | 5 | |
| 2-Feb-10 | WTG 06-10 | 2 | | 9:00 | 12:00 | DM | 3.00 | 5 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3-Feb-10 | WTG 11-15 | 3 | | 9:00 | 11:00 | DM, MC | 4.00 | 5 | | |
| 4-Feb-10 | WTG 16-20 | | 2, 5 | 10:00 | 13:15 | MC, IB | 6.50 | 5 | | |
| 5-Feb-10 | Overlap | | | 10:00 | 12:00 | IB, MC | 4.00 | 0 | | |
| | | | | | | **Weekly Totals:** | **26.50** | **20** | **1.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 8-Feb-10 | ---- | | | | | | | | | |
| 9-Feb-10 | WTG 02-06 | | | 10:00 | 16:00 | IB, MC | 12.00 | 5 | | |
| 10-Feb-10 | WTG 07-09 | 2 | | 10:00 | 15:00 | IB, MC | 10.00 | 3 | | |
| 11-Feb-10 | WTG 12-14 | 3 | | 13:00 | 15:00 | IB, MC | 4.00 | 3 | | |
| 12-Feb-10 | WTG 15-17 | 1 | 2, 5 | 12:30 | 15:00 | IB | 2.50 | 3 | | |
| | | | | | | **Weekly Totals:** | **28.50** | **14** | **0.70** | |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 15-Feb-10 | Holiday: President's Day | | | | | | | | | |
| 16-Feb-10 | WTG 18-02 | 1 | 5 | 10:00 | 15:00 | IB, MC | 10.00 | 5 | | |
| 17-Feb-10 | WTG 03-07 | 2 | | 9:45 | 15:00 | IB, MC | 10.50 | 5 | | |
| 18-Feb-10 | WTG 08-12 | | | 10:00 | 13:00 | IB, MC | 6.00 | 5 | | |
| 19-Feb-10 | WTG 13-17 | 3 | 2 | 10:00 | 15:30 | IB, MC | 11.00 | 5 | | |
| | | | | | | **Weekly Totals:** | **37.50** | **20** | **1.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22-Feb-10 | WTG 19-02 / Overlap | 1 | | 9:30 | 13:30 | DM, MC | 8.00 | 4 | | |
| 23-Feb-10 | WTG 03-05 | | | 8:30 | 12:30 | DM, MC | 8.00 | 3 | | |
| 24-Feb-10 | WTG 06-10 | 2 | | 8:00 | 13:00 | DM, MC | 10.00 | 5 | | |
| 25-Feb-10 | WTG 11-14 | 3 | | 8:30 | 12:30 | DM, MC | 8.00 | 4 | | |
| 26 Feb 10 | WTG 15 18 | | 2, 5 | 8:00 | 12:00 | DM, MC | 8.00 | 4 | | |
| | | | | | | **Weekly Totals:** | **42.00** | **20** | **1.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1-Mar-10 | WTG 01-05 | 1 | | 9:00 | 13:00 | DM, MC | 8.00 | 5 | | |
| 2-Mar-10 | WTG 06-10 | 2 | | 9:00 | 13:00 | DM, MC | 8.00 | 5 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3-Mar-10 | WTG 11-15 | 3 | 2 | 11:00 | 14:00 | DM, MC | 6.00 | 5 | | |
| 4-Mar-10 | WTG 16-20 | | 5 | 10:30 | 13:30 | DM, MC | 6.00 | 5 | | |
| 5-Mar-10 | ---- | | | | | | | | | |
| | | | | | | **Weekly Totals:** | **28.00** | **20** | **1.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 8-Mar-10 | WTG 02-11 | | | 10:30 | 13:30 | DM, MC, IB | 9.00 | 10 | | |
| 9-Mar-10 | WTG 12-20 | | | 9:30 | 13:00 | DM, MC, IB | 10.50 | 9 | | |
| 10-Mar-10 | Zero Visibility | | | | | | | | | |
| 11-Mar-10 | WTG 01-11 | 1, 2 | | 7:30 | 9:45 | DM, MC, IB | 6.75 | 11 | | |
| 12-Mar-10 | WTG 12-18, 20-01 | 3 | 2, 5 | 8:45 | 12:00 | DM, MC, IB | 9.75 | 9 | | |
| | | | | | | **Weekly Totals:** | **36.00** | **39** | **1.95** | |

| **Date** | **Search Plot ID** | **KWP MET Towers** | **KWP - II MET Towers** | **Start Time** | **End Time** | **Observers** | **Searcher Hours** | **# of Plots Searched** | **Sweeps Per Week** | **Downed Wildlife Observed (Species)** |
|---|---|---|---|---|---|---|---|---|---|---|
| 15-Mar-10 | WTG 03-07, 09-13 / Overlap | 2 | | 11:30 | 14:00 | MC, IB | 5.00 | 10 | | **BLFR** |
| | | | | | | | | | | Time: **13:30** |
| | | | | | | | | | | Nearest WTG: **17** |
| | | | | | | | | | | Dist to WTG (m): **2.7** |
| | | | | | | | | | | Dir from WTG: **NW** |
| | | | | | | | | | | Gr Cov: **Bare** |
| 16-Mar-10 | WTG 14-19, 01-02, 08 | | | 11:00 | 13:00 | MC, DM | 4.00 | 9 | | |
| 17-Mar-10 | WTG 03-10, 12, 15 | | | 10:00 | 13:00 | IB, MC, DM | 9.00 | 10 | | |
| 18-Mar-10 | ---- | | | | | | | | | |
| 19-Mar-10 | WTG 11, 13-02 | 1, 3 | 2, 5 | 11:15 | 13:45 | GS, IB, DM, MC | 10.00 | 11 | | |
| | | | | | | **Weekly Totals:** | **28.00** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22-Mar-10 | WTG 04-08 | 2 | | 11:00 | 13:15 | DM, IB | 4.50 | 5 | | |
| 23-Feb-10 | WTG 09-13 | | | 10:00 | 12:00 | MC, DM, IB | 6.00 | 5 | | |
| 24-Mar-10 | WTG 14-18 | | | 10:00 | 15:00 | MC, DM, IB | 15.00 | 5 | | **SEOW** |
| | | | | | | | | | | Time: **10:15** |

| Nearest WTG: **14** |
|---|
| Dist to WTG (m): **60.35** |
| Dir from WTG: **SSW** |
| Gr Cov: **Grass** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 25-Mar-10 | WTG 19-20 | | | 13:00 | 14:00 | MC, DM, IB | 3.00 | 2 | |
| 26-Mar-10 | WTG 01-03 | 1, 3 | 2, 5 | 11:00 | 13:00 | MC, DM | 4.00 | 3 | |
| | | | | | | **Weekly Totals:** | **32.50** | **20** | **1.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 29-Mar-10 | ---- | | | | | | | | |
| 30-Mar-10 | WTG 05-10 | | | 10:45 | 12:30 | DM, MC, KM | 5.25 | 6 | |
| 31-Mar-10 | ---- | | | | | | | | |
| 1-Apr-10 | WTG 11-18 | | | 10:30 | 14:30 | MC, IB | 8.00 | 8 | |
| 2-Apr-10 | WTG 19-04 | 1, 2, 3 | 2, 5 | 11:00 | 14:45 | MC | 3.75 | 6 | |
| | | | | | | **Weekly Totals:** | **17.00** | **20** | **1.00** |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|---|
| 5-Apr-10 | WTG 06-09 | | | 10:00 | 13:00 | MC, IB | 6.00 | 4 | | |
| 6-Apr-10 | WTG 11-13 | 3 | | 8:30 | 11:30 | MC, IB | 6.00 | 3 | | |
| 7-Apr-10 | WTG 14-17 | | 2 | 9:30 | 12:00 | MC, IB | 5.00 | 4 | | |
| 8-Apr-10 | WTG 18-01 | 1, 2 | | 10:30 | 15:00 | MC, IB | 9.00 | 4 | | |
| 9-Apr-10 | WTG 02-05 | | 5 | 10:00 | 13:30 | IB, GS | 7.00 | 4 | | |
| | | | | | | **Weekly Totals:** | **33.00** | **19** | **0.95** | |
| | | | | **3rd Qtr. WTG search interval** | | | **6.6** | | | |
| | | | | **3rd Qtr. MET search interval** | | | **5.2** | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 12-Apr-10 | Zero Visibility / Rain | | | | | | | | |
| 13-Apr-10 | Zero Visibility / Rain | | | | | | | | |
| 14-Apr-10 | WTG 07-10 | 2 | | 13:00 | 15:30 | MC, IB | 5.00 | 4 | |
| 15-Apr-10 | WTG 11-14 | | | 10:30 | 13:00 | MC, IB | 5.00 | 4 | |
| 16-Apr-10 | WTG 15-18 | 1, 3 | 2, 5 | 10:45 | 13:15 | MC, IB | 5.00 | 4 | |
| | | | | | | **Weekly Totals:** | **15.00** | **12** | **0.60** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 19-Apr-10 | Zero Visibility / Rain | | | | | | | | |
| 20-Apr-10 | WTG 19-03 | 1 | | 10:00 | 15:30 | MC, IB | 11.00 | 5 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 21-Apr-10 | WTG 04-08 | 2 | | 10:30 | 15:30 | MC, IB | 10.00 | 5 | | |
| 22-Apr-10 | WTG 09-13 | 3 | | 10:00 | 13:00 | MC, IB | 6.00 | 5 | | |
| 23-Apr-10 | WTG 14-18 / Overlap | | 2, 5 | 9:00 | 14:00 | MC, IB | 10.00 | 5 | | |
| | | | | | | **Weekly Totals:** | **37.00** | **20** | **1.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 26-Apr-10 | WTG 20-03 | 1 | | 9:30 | 12:00 | MC, IB | 5.00 | 4 | | |
| 27-Apr-10 | WTG 04-07 | 2 | | 10:00 | 12:45 | MC, IB | 5.50 | 4 | | |
| 28-Apr-10 | WTG 08-11 | | | 9:30 | 11:30 | MC, IB | 4.00 | 4 | | |
| 29-Apr-10 | WTG 12-13 | | 5 | 10:30 | 11:30 | MC, IB | 2.00 | 2 | | |
| 30-Apr-10 | WTG 14-19 | 3 | 2 | 10:15 | 15:00 | MC, IB | 9.50 | 6 | | |
| | | | | | | **Weekly Totals:** | **26.00** | **20** | **1.00** | |

| **Date** | **Search Plot ID** | **KWP MET Towers** | **KWP - II MET Towers** | **Start Time** | **End Time** | **Observers** | **Searcher Hours** | **# of Plots Searched** | **Sweeps Per Week** | **Downed Wildlife Observed (Species)** |
|---|---|---|---|---|---|---|---|---|---|---|
| 3-May-10 | WTG 01-04 | 1 | | 9:45 | 12:15 | MC, IB | 5.00 | 4 | | |
| 4-May-10 | ---- | | | | | | | | | |
| 5-May-10 | WTG 05-09, 01-04 | 2 | 5 | 9:00 | 12:45 | DM, MC, IB | 11.25 | 9 | | |
| 6-May-10 | WTG 10-14, 05-09 | 3 | | 10:00 | 13:30 | GS, DM, MC, IB | 14.00 | 10 | | |
| 7-May-10 | WTG 15-20, 10-14 | | 2 | 9:00 | 15:00 | GS, DM, MC, IB | 24.00 | 11 | | |
| | | | | | | **Weekly Totals:** | **54.25** | **34** | **1.70** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 10-May-10 | WTG 02-05, 15-20 | | | 9:00 | 12:00 | DM, MC, IB | 9.00 | 10 | | |
| 11-May-10 | WTG 06-09, 01-04 | 1 | | 10:00 | 14:00 | GS, DM, MC, IB | 16.00 | 8 | | |
| 12-May-10 | WTG 10-15, 05-09 | 2, 3 | 2 | 8:15 | 13:15 | DM, MC, IB | 15.00 | 11 | | |
| 13-May-10 | WTG 16-19, 10-14 | | 5 | 10:45 | 13:45 | DM, MC, IB | 9.00 | 9 | | |
| 14-May-10 | WTG 20-01 | | | 12:45 | 14:00 | DM, MC, IB | 3.75 | 2 | | **HAGO** |
| | | | | | | | | | | Time: **13:43** |
| | | | | | | | | | | Nearest WTG: **20** |
| | | | | | | | | | | Dist to WTG (m): **43** |
| | | | | | | | | | | Dir from WTG: **E** |
| | | | | | | | | | | Gr Cov: **Shrub** |
| | | | | | | **Weekly Totals:** | **52.75** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 17-May-10 | WTG 03-07, 16-19 | | | 9:30 | 12:30 | DM, MC, IB | 9.00 | 9 | | |
| 18-May-10 | WTG 08-11, 20-03 | 1,2,3 | | 10:30 | 13:30 | DM, MC, IB | 9.00 | 8 | | |
| 19-May-10 | WTG 12-15, 04-07 | | 5 | 9:45 | 12:15 | DM, MC, IB | 7.50 | 8 | | |
| 20-May-10 | WTG 16-19, 08-11 | | | 10:00 | 13:00 | DM, MC, IB | 9.00 | 8 | | |
| 21-May-10 | WTG 20-02, 12-15 | | 2 | 10:00 | 12:15 | IB, MC | 4.50 | 7 | | |
| | | | | | | **Weekly Totals:** | **39.00** | **40** | **2.00** | |

| Date | Search Plot ID | KWP MET Towers | KWP - II MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed _S_ ecies_ |
|---|---|---|---|---|---|---|---|---|---|---|
| 24-May-10 | WTG 04-07, 16-19 | | | 14:00 | 16:00 | IB, MC | 4.0 | 8 | | |
| 25-May-10 | WTG 08-11, 20-03 | 2 | | 9:00 | 11:30 | IB, MC | 5.0 | 8 | | |
| 26-May-10 | WTG 12-15, 04-07 | 1 | | 9:00 | 13:00 | IB, MC | 8.0 | 8 | | |
| 27-May-10 | WTG 16-19, 08-11 | | 5 | 9:00 | 11:00 | IB, MC | 4.0 | 8 | | |
| 28-May-10 | WTG 20-03, 12-15 / Overlap | 3 | 2 | 9:00 | 11:30 | IB, MC | 5.0 | 8 | | |
| | | | | | | **Weekly Totals:** | **26.00** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 31-May-10 | Holiday: Memorial Day | | | | | | | | | |
| 1-Jun-10 | WTG 05-11, 17-03 | 1 | | 11:00 | 15:00 | IB, MC | 8.0 | 14 | | |
| 2-Jun-10 | WTG 12-18, 04-10 | 2, 3 | | 12:30 | 15:30 | IB, MC | 6.0 | 14 | | |
| 3-Jun-10 | Annual Nene Survey | | | | | | | | | |
| 4-Jun-10 | WTG 19-04, 11-16 | | 2, 5 | 9:00 | 12:00 | IB, MC | 6.0 | 12 | | |
| | | | | | | **Weekly Totals:** | **20.00** | **40** | **2.00** | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7-Jun-10 | WTG 06-09, 18-01 | 1, 2 | No METs | 9:00 | 13:00 | DM, MC, IB | 12.0 | 8 | | |
| 8-Jun-10 | FIRE EVACUATION | | | | | | | | | |
| 9-Jun-10 | FIRE ASSESSMENT | | | | | | | | | |
| 10-Jun-10 | WTG 10-13, 02-05 | 3 | No METs | 11:00 | 14:00 | DM, IB | 6.0 | 8 | | |
| 11-Jun-10 | WTG 14-17, 06-09 | | No METs | 9:00 | 12:00 | MC, IB | 6.0 | 8 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Weekly Totals:** | **24.00** | **24** | **1.20** | |
| 14-Jun-10 | WTG 10-13, 18-20 / Overlap | 3 | 11:00 | 15:00 | DM, MC, IB | 12.0 | 7 | | |
| 15-Jun-10 | WTG 14-17, 01-05 | 1 | 8:00 | 14:00 | DM, MC, IB | 18.0 | 9 | | |
| 16-Jun-10 | WTG 18-01, 06-09 | | 9:00 | 13:00 | DM, MC, IB | 12.0 | 8 | | |
| 17-Jun-10 | WTG 02-05, 10-13 | | 12:00 | 15:00 | DM, MC, IB | 9.0 | 8 | | |
| 18-Jun-10 | WTG 06-09, 14-17 / Overlap | 2 | 9:30 | 14:00 | DM, MC, IB | 13.5 | 8 | | |
| | | | | | **Weekly Totals:** | **64.50** | **40** | **2.00** | |

| Date | Search Plot ID | KWP MET Towers | Start Time | End Time | Observers | Searcher Hours | # of Plots Searched | Sweeps Per Week | Downed Wildlife Observed (Species) |
|---|---|---|---|---|---|---|---|---|---|
| 21-Jun-10 | WTG 11-14, 19-02 | 1, 3 | 9:30 | 12:30 | DM, MC, IB | 9.0 | 8 | | **BLFR** |
| | | | | | | | | | Time: **10:28** |
| | | | | | | | | | Nearest WTG: **12** |
| | | | | | | | | | Dist to WTG (m): **0.60** |
| | | | | | | | | | Dir from WTG: **West** |
| | | | | | | | | | Gr Cov: **Bare** |
| 22-Jun-10 | WTG 15-18, 03-06 | 2 | 9:00 | 12:00 | DM, MC, IB | 9.0 | 8 | | |
| 23-Jun-10 | WTG 19-02, 07-10 | | 9:30 | 12:30 | DM, MC, IB | 9.0 | 8 | | |
| 24-Jun-10 | WTG 03-06, 11-14 | | 10:00 | 13:00 | DM, MC, IB | 9.0 | 8 | | |
| 25-Jun-10 | WTG 07-10, 15-18 / Overlap | | 10:00 | 13:00 | DM, MC | 6.0 | 8 | | |
| | | | | | **Weekly Totals:** | **42.00** | **40** | **2.00** | |
| 28-Jun-10 | WTG 12-15 | 3 | 11:00 | 13:00 | IB, MC | 4.0 | 4 | | **BLFR** |
| | | | | | | | | | Time: **12:00** |
| | | | | | | | | | Nearest WTG: **14** |
| | | | | | | | | | Dist to WTG (m): **0.60** |
| | | | | | | | | | Dir from WTG: **North** |
| | | | | | | | | | Gr Cov: **Bare** |
| 29-Jun-10 | WTG 16-19 | | 10:00 | 12:00 | IB, MC | 4.0 | 4 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 30-Jun-10 | WTG 20-03 | | 10:00 | 12:00 | IB, MC | 4.0 | 4 | |
| | | | | | **Weekly Totals:** | **12.00** | **12** | **0.60** |

| | |
|---|---|
| **4th Qtr. WTG search interval** | **5.1** |
| **4th Qtr. MET search interval** | **4.9** |

Species Abbreviations (AOU):

BLFR = Black Francolin
GRPA = Gray Francolin (Gray Partridge)
HAGO = Hawaiian Goose (Nene)
RNPH = (Common) Ring-necked Pheasant
SEOW = Short-eared Owl (Pueo)
SPDO = Spotted Dove
WTTR = White-tailed Tropicbird

| Observers | Date | Proctor | Search Plots | Number of Carcasses | Trial Species | Number Detected | Detection Efficiency | Ground Cover Class |
|---|---|---|---|---|---|---|---|---|
| D. Medrano | 14-Jan-2010 | G. Spencer | WTG 14 | 1 | RNPH | 1 | 1.00 | Shrub/Bare |
| M. Craig | | | WTG 15 | 1 | BLFR | 1 | 1.00 | Bare |
| | | | | | | **January Average** | **1.00** | |

| Observers | Date | Proctor | Search Plots | Number of Carcasses | Trial Species | Number Detected | Detection Efficiency | Ground Cover Class |
|---|---|---|---|---|---|---|---|---|
| D. Medrano | 17-Mar-2010 | I. Bordenave | WTG 05 | 1 | ZEDO | 1 | 1.00 | Bare |
| M. Craig | | | WTG 05 | 1 | SEOW | 1 | 1.00 | Grass |
| | | | WTG 06 | 1 | WTSH | 1 | 1.00 | Grass |
| | | | WTG 06 | 1 | ZEDO | 1 | 1.00 | Grass |
| | | | WTG 06 | 1 | BLFR | 1 | 1.00 | Bare: bottom of the cistern |
| D. Medrano | 19-Mar-2010 | I. Bordenave | WTG 16 | 2 | ZEDO | 1 | 0.50 | Replanted Shrub |
| M. Craig | | | WTG 16 | 1 | ZEDO | 1 | 1.00 | Grass |
| G. Spencer | | | WTG 16 | 1 | WTSH | 1 | 1.00 | Grass |
| D. Medrano | 24-Mar-2010 | I. Bordenave | WTG 14 | 1 | WTSH | 0 | 0.00 | Grass |
| M. Craig | | | WTG 14 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | WTG 15 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | WTG 15 | 1 | ZEDO | 0 | 0.00 | Shrub |
| | | | WTG 15 | 1 | WTSH | 1 | 1.00 | Shrub |
| D. Medrano | 25-Mar-2010 | I. Bordenave | WTG 19 | 1 | ZEDO | 1 | 1.00 | Bare |
| M. Craig | | | WTG 19 | 1 | ZEDO | 1 | 1.00 | Shrub |
| | | | WTG 19 | 1 | WTSH | 1 | 1.00 | Shrub |
| D. Medrano | 30-Mar-2010 | M. Craig | WTG 05 | 1 | ZEDO | 0 | 0.00 | Grass |
| I. Bordenave | | | WTG 05 | 1 | WTSH | 0 | 0.00 | Shrub |
| | | | WTG 07 | 1 | ZEDO | 0 | 0.00 | Grass |
| | | | WTG 07 | 1 | WTSH | 0 | 0.00 | Shrub |
| | | | WTG 07 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | | | | **March Average** | **0.68** | |

| Observers | Date | Proctor | Search Plots | Number of Carcasses | Trial Species | Number Detected | Detection Efficiency | Ground Cover Class |
|---|---|---|---|---|---|---|---|---|
| I. Bordenave | 1-Apr-2010 | M. Craig | WTG 16 | 1 | WTSH | 1 | 1.00 | Shrub |
| | | | WTG 16 | 1 | ZEDO | 0 | 0.00 | Bare |
| | | | WTG 16 | 1 | ZEDO | 1 | 1.00 | Grass |
| I. Bordenave | 5-Apr-2010 | M. Craig | WTG 06 | 1 | WTSH | 1 | 1.00 | Grass |
| | | | WTG 07 | 1 | ZEDO | 0 | 0.00 | Shrub |
| | | | WTG 07 | 1 | HOSP | 0 | 0.00 | Bare |
| | | | WTG 08 | 1 | ZEDO | 0 | 0.00 | Shrub |
| I. Bordenave | 7-Apr-2010 | M. Craig | WTG 15 | 1 | WTSH | 1 | 1.00 | Shrub |
| | | | WTG 15 | 1 | ZEDO | 0 | 0.00 | Grass |
| | | | WTG 16 | 1 | SKLA | 0 | 0.00 | Bare |
| | | | WTG 16 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | WTG 16 | 1 | WTSH | 1 | 1.00 | Shrub |
| | | | WTG 17 | 1 | ZEDO | 0 | 0.00 | Grass |
| | | | | | | **April Average** | **0.46** | |

| Observers | Date | Proctor | Search Plots | Number of Carcasses | Trial Species | Number Detected | Detection Efficiency | Ground Cover Class |
|---|---|---|---|---|---|---|---|---|
| D. Medrano<br>I. Bordenave | 15-Jun-2010 | M. Craig | WTG 15 | 1 | ZEDO | 0 | 0.00 | Bare |
| | | | WTG 15 | 1 | WTSH | 0 | 0.00 | Shrub |
| | | | WTG 16 | 1 | WTSH | 1 | 1.00 | Grass |
| | | | WTG 16 | 1 | ZEDO | 1 | 1.00 | Grass |
| | | | WTG 17 | 2 | ZEDO | 1 | 0.50 | Bare |
| | | | WTG 17 | 1 | ZEDO | 0 | 0.00 | Shrub |
| | | | WTG 17 | 1 | WTSH | 1 | 1.00 | Shrub |
| D. Medrano<br>I. Bordenave | 17-Jun-2010 | M. Craig | WTG 03 | 1 | ZEDO | 0 | 0.00 | Grass |
| | | | WTG 04 | 1 | WTSH | 0 | 0.00 | Grass |
| | | | WTG 04 | 2 | ZEDO | 0 | 0.00 | Shrub |
| | | | WTG 05 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | WTG 05 | 1 | ZEDO | 0 | 0.00 | Grass |
| D. Medrano<br>M. Craig | 24-Jun-2010 | I. Bordenave | WTG 3 | 2 | ZEDO | 2 | 1.00 | Bare |
| | | | WTG 3 | 1 | WTSH | 1 | 1.00 | Grass |
| | | | WTG 4 | 1 | SEOW | 1 | 1.00 | Shrub |
| | | | WTG 4 | 1 | ZEDO | 1 | 1.00 | Shrub |
| I. Bordenave<br>M.Craig | 28-Jun-2010 | D. Medrano | WTG 12 | 2 | ZEDO | 1 | 0.50 | Bare |
| | | | WTG 12 | 1 | WTSH | 1 | 1.00 | Bare/Burn |
| | | | WTG 14 | 1 | WTSH | 1 | 1.00 | Bare/Burn |
| | | | WTG 15 | 1 | ZEDO | 1 | 1.00 | Bare/Burn |
| I. Bordenave<br>M.Craig | 29-Jun-2010 | D. Medrano | WTG 16 | 1 | SEOW | 1 | 1.00 | Grass |
| | | | WTG 17 | 1 | WTSH | 1 | 1.00 | Bare |
| | | | WTG 17 | 1 | ZEDO | 0 | 0.00 | Grass |
| | | | WTG 17 | 1 | ZEDO | 1 | 1.00 | Bare/Burn |
| | | | WTG 18 | 1 | ZEDO | 1 | 1.00 | Bare |
| | | | WTG 18 | 1 | WTSH | 1 | 1.00 | Bare/Burn |
| | | | | | | **June Average** | **0.63** | |

**Overall Average: 0.64**

**Winter/Spring Averages (December - May)**

| | | |
|---|---|---|
| Small Size: | Bare/Burn | **0.67** |
| HOSP = House Sparrow | Grass | **0.43** |
| SKLA = Eurasian Skylark | Shrub | **0.33** |
| ZEDO = Zebra Dove | Overall | **0.48** |

| | | |
|---|---|---|
| Medium Size: | Bare/Burn | **1.00** |
| BLFR = Black Francolin | Grass | **0.80** |
| SEOW = Short-eared Owl | Shrub | **0.71** |
| WTSH = Wedge-tailed Shearwater | Overall | **0.84** |

| | | |
|---|---|---|
| Large Size: (RNPH) | Shrub | **1.00** |
| RNPH = Ring-necked Pheasant | Overall | **1.00** |

**Summer/Fall Averages (June - Nov)**

| | | |
|---|---|---|
| Small Size: | Bare/Burn | **0.73** |
| HOSP = House Sparrow | Grass | **0.25** |
| SKLA = Eurasian Skylark | Shrub | **0.25** |
| ZEDO = Zebra Dove | Overall | **0.41** |

| | | |
|---|---|---|
| Medium Size: | Bare/Burn | **1.00** |
| BLFR = Black Francolin | Grass | **0.75** |
| SEOW = Short-eared Owl | Shrub | **0.67** |
| WTSH = Wedge-tailed Shearwater | Overall | **0.81** |

| Carcass Removal Trial #1: Summer/Fall 2009 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Carcass ID** | **Trial Species** | **Location** | **Trial Day** | **Date** | **Status** | **Condition** | **Comments** |
| A | Wedge-tailed Shearwater | 50m N of WTG 04 | 0 | 23-Jul-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 24-Jul-09 | P | I,U | Insects present (flies). |
| | | | 2 | 25-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 3 | 26-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 4 | 27-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 5 | 28-Jul-09 | P | I,U,D,Des | |
| | | | 6 | 29-Jul-09 | P | I,U,D,Des | |
| | | | 9 | 1-Aug-09 | P | I,U,D,Des | |
| | | | 13 | 5-Aug-09 | P | I,U,D,Des | |
| B | Wedge-tailed Shearwater | 45m NW of WTG 08 | 0 | 23-Jul-09 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 24-Jul-09 | P | I,U | |
| | | | 2 | 25-Jul-09 | P | I,U | |
| | | | 3 | 26-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 4 | 27-Jul-09 | A | ---- | Could not find. |
| | | | 5 | 28-Jul-09 | A | ---- | |
| | | | 6 | 29-Jul-09 | A | ---- | |
| | | | 9 | 1-Aug-09 | A | ---- | |
| | | | 13 | 5-Aug-09 | A | ---- | |
| C | Wedge-tailed Shearwater | 45m NW of WTG 09 | 0 | 23-Jul-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 24-Jul-09 | P | I,U | |
| | | | 2 | 25-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 3 | 26-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 4 | 27-Jul-09 | P | I,U,D | Insects present (ants). |
| | | | 5 | 28-Jul-09 | P | I,U,D,Des | |
| | | | 6 | 29-Jul-09 | P | I,U,D,Des | |
| | | | 9 | 1-Aug-09 | P | I,U,D,Des | |
| | | | 13 | 5-Aug-09 | P | I,U,D,Des | |

| Carcass Removal Trial #1: Summer/Fall 2009 (Cont.) | | | | | | | |
|---|---|---|---|---|---|---|---|
| D | Wedge-tailed Shearwater | 35m SW of WTG 13 | 0 | 23-Jul-09 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 24-Jul-09 | P | I,U | |
| | | | 2 | 25-Jul-09 | A | ---- | Could not find. |
| | | | 3 | 26-Jul-09 | A | ---- | |
| | | | 4 | 27-Jul-09 | A | ---- | |
| | | | 5 | 28-Jul-09 | A | ---- | |
| | | | 6 | 29-Jul-09 | A | ---- | |
| | | | 9 | 1-Aug-09 | A | ---- | |
| | | | 13 | 5-Aug-09 | A | ---- | |

**Status Codes**
A = Absent, P = Present

**Condition Codes**
D = Natural decomposition (insects usually visible);
Des = Dessication evident;
F = Feathers and Bone fragments; Fr = Fresh; I = Intact;
R = Remains discovered; U = Undisturbed
Sp = Partially Scavenged; Sc = Completely Scavenged

**Results**

| Carcass | Retention Time (days) |
|---|---|
| A | 13 |
| B | 3 |
| C | 13 |
| D | 1 |

Average Retention Time
**7.50**

| Carcass Removal Trial #2: Summer/Fall 2009 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Carcass ID** | **Trial Species** | **Location** | **Trial Day** | **Date** | **Status** | **Condition** | **Comments** |
| A | Wedge-tailed Shearwater | 45m NW of WTG 02 | 0 | 23-Sep-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 24-Sep-09 | ---- | ---- | Unchecked. |
| | | | 2 | 25-Sep-09 | ---- | ---- | Unchecked. |
| | | | 3 | 26-Sep-09 | ---- | ---- | Unchecked. |
| | | | 4 | 27-Sep-09 | ---- | ---- | Unchecked. |
| | | | 5 | 28-Sep-09 | P | Des,I,U | |
| | | | 6 | 29-Sep-09 | P | Des,I,U,D | Insects present (flies). |
| | | | 9 | 2-Oct-09 | P | Des,I,U,D | Insects present (flies). |
| | | | 13 | 6-Oct-09 | P | Des,I,U,D | Insects present (flies). |

| Carcass Removal Trial #2: Summer/Fall 2009 (Cont.) | | | | | | | |
|---|---|---|---|---|---|---|---|
| B | Wedge-tailed Shearwater | 60m SE of WTG 02 | 0 | 23-Sep-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 24-Sep-09 | ---- | ---- | Unchecked. |
| | | | 2 | 25-Sep-09 | ---- | ---- | Unchecked. |
| | | | 3 | 26-Sep-09 | ---- | ---- | Unchecked. |
| | | | 4 | 27-Sep-09 | ---- | ---- | Unchecked. |
| | | | 5 | 28-Sep-09 | P | Des,I,U | |
| | | | 6 | 29-Sep-09 | P | Des,I,U,D | Insects present (flies). |
| | | | 9 | 2-Oct-09 | P | Des,I,U,D | Insects present (flies). |
| | | | 13 | 6-Oct-09 | P | D,Sp | Carcass found 2ft SE from its original placement; found under heavy shrub. |
| C | Wedge-tailed Shearwater | 25m N of WTG 06 | 0 | 23-Sep-09 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 24-Sep-09 | ---- | ---- | Unchecked. |
| | | | 2 | 25-Sep-09 | ---- | ---- | Unchecked. |
| | | | 3 | 26-Sep-09 | ---- | ---- | Unchecked. |
| | | | 4 | 27-Sep-09 | ---- | ---- | Unchecked. |
| | | | 5 | 28-Sep-09 | P | Des,I,U | |
| | | | 6 | 29-Sep-09 | P | Des,I,U,D | Insects present (flies). |
| | | | 9 | 2-Oct-09 | P | Des,I,U,D | Insects present (flies/ants). |
| | | | 13 | 6-Oct-09 | P | Des,I,U,D | Insects present (flies/ants). |
| D | Ring-necked Pheasant (♂) | 35m SW of WTG 07 | 0 | 23-Sep-09 | P | Fr | Vegetation Class: BARE/GRASS. |
| | | | 1 | 24-Sep-09 | ---- | ---- | Unchecked. |
| | | | 2 | 25-Sep-09 | ---- | ---- | Unchecked. |
| | | | 3 | 26-Sep-09 | ---- | ---- | Unchecked. |
| | | | 4 | 27-Sep-09 | ---- | ---- | Unchecked. |
| | | | 5 | 28-Sep-09 | P | D,Sp | Moved 6ft SW under grass. Lower torso innards were partially eaten, insects present (flies/ants). |
| | | | 6 | 29-Sep-09 | P | D,Sp | Moved an additional 2ft SW. Scavenging continues. Insects present (ants). |
| | | | 9 | 2-Oct-09 | P | D,Sc,F | |
| | | | 13 | 6-Oct-09 | P | D,Sc,F | |

| Carcass Removal Trial #2: Summer/Fall 2009 (Cont.) | | | | | | | |
|---|---|---|---|---|---|---|---|
| E | Wedge-tailed Shearwater | 60m SE of WTG 02 | 0 | 23-Sep-09 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 24-Sep-09 | ---- | ---- | Unchecked. |
| | | | 2 | 25-Sep-09 | ---- | ---- | Unchecked. |
| | | | 3 | 26-Sep-09 | ---- | ---- | Unchecked. |
| | | | 4 | 27-Sep-09 | ---- | ---- | Unchecked. |
| | | | 5 | 28-Sep-09 | P | D,Des,I | Moved ½ft West. Strong winds may have moved it. |
| | | | 6 | 29-Sep-09 | P | D,Des,I | Moved 1ft South. Insects present (ants). |
| | | | 9 | 2-Oct-09 | P | D,Des,I | Insects present (flies/ants). |
| | | | 13 | 6-Oct-09 | P | D,Des,I | |

**Status Codes**
A = Absent, P = Present

**Condition Codes**
D = Natural decomposition (insects usually visible);
Des = Dessication evident;
F = Feathers and Bone fragments; Fr = Fresh; I = Intact;
R = Remains discovered; U = Undisturbed
Sp = Partially Scavenged; Sc = Completely Scavenged

**Results**

| Carcass | Retention Time (days) |
|---|---|
| A | 13 |
| B | 13 |
| C | 13 |
| D | 13 |
| E | 13 |

Average Retention Time
**13.00**

| Carcass Removal Trial #3: Summer/Fall 2009 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Carcass ID** | **Trial Species** | **Location** | **Trial Day** | **Date** | **Status** | **Condition** | **Comments** |
| A | Wedge-tailed Shearwater | 40m NW of WTG 01 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 11-Nov-09 | P | I,U | |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | I,U | |
| | | | 4 | 14-Nov-09 | P | I,U | |
| | | | 5 | 15-Nov-09 | P | I,U,Des | |
| | | | 6 | 16-Nov-09 | P | I,U,Des | |
| | | | 9 | 19-Nov-09 | P | I,U,Des | |
| | | | 13 | 23-Nov-09 | P | I,U,Des | |

| Carcass Removal Trial #3: Summer/Fall 2009 (Cont.) | | | | | | | |
|---|---|---|---|---|---|---|---|
| B | Wedge-tailed Shearwater | 30m E of WTG 03 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 11-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 4 | 14-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 5 | 15-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 6 | 16-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 9 | 19-Nov-09 | P | D,I,U | Insects present (ants). |
| | | | 13 | 23-Nov-09 | P | D,I,U | Insects present (ants). |
| C | Gray Francolin | 25m SE of WTG 06 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 11-Nov-09 | P | I,U | |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | I,U,D | Insects present (ants). |
| | | | 4 | 14-Nov-09 | A | I,D | Undetectable under normal searching condition. Found through deep searching and manipulation of molasses grass. |
| | | | 5 | 15-Nov-09 | A | ---- | |
| | | | 6 | 16-Nov-09 | A | ---- | |
| | | | 9 | 19-Nov-09 | A | ---- | |
| | | | 13 | 23-Nov-09 | A | ---- | |
| D | Ring-necked Pheasant (♂) | 20m W of WTG 11 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 11-Nov-09 | P | I,U | |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | I,U | |
| | | | 4 | 14-Nov-09 | P | I,U,Des | |
| | | | 5 | 15-Nov-09 | P | I,U,Des | |
| | | | 6 | 16-Nov-09 | P | I,U,Des | |
| | | | 9 | 19-Nov-09 | P | I,U,Des | |
| | | | 13 | 23-Nov-09 | P | F,Sp | Moved 12 ft NNE. |

Carcass Removal Trial #3: Summer/Fall 2009 (Cont.)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E | Wedge-tailed Shearwater | 80m E of WTG 14 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: GRASS/SHRUB. |
| | | | 1 | 11-Nov-09 | P | I,U | |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | I,U,D | Insects present (ants). |
| | | | 4 | 14-Nov-09 | P | I,U,D | Insects present (ants). |
| | | | 5 | 15-Nov-09 | P | I,U,D | Insects present (ants). |
| | | | 6 | 16-Nov-09 | P | I,U,D | |
| | | | 9 | 19-Nov-09 | P | I,U,D | |
| | | | 13 | 23-Nov-09 | P | I,U,D | |
| F | Wedge-tailed Shearwater | 100m W of WTG 17 | 0 | 10-Nov-09 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 11-Nov-09 | P | I,U | |
| | | | 2 | 12-Nov-09 | ---- | ---- | Unchecked. |
| | | | 3 | 13-Nov-09 | P | I,U,Des | |
| | | | 4 | 14-Nov-09 | P | I,U,Des | |
| | | | 5 | 15-Nov-09 | P | I,U,Des | |
| | | | 6 | 16-Nov-09 | P | I,U,Des | |
| | | | 9 | 19-Nov-09 | P | I,U,Des | |
| | | | 13 | 23-Nov-09 | A | ---- | Could not find. No signs. |

**Status Codes**
A = Absent, P = Present

**Condition Codes**
D = Natural decomposition (insects usually visible);
Des = Dessication evident;
F = Feathers and Bone fragments; Fr = Fresh; I = Intact;
R = Remains discovered; U = Undisturbed
Sp = Partially Scavenged; Sc = Completely Scavenged

**Results**

| Carcass | Retention Time (days) |
|---|---|
| A | 13 |
| B | 13 |
| C | 3 |
| D | 13 |
| E | 13 |
| F | 9 |
| | Average Retention Time |
| | **10.67** |

**Carcass Removal Trial #4: Winter/Spring 2010**

| Carcass ID | Trial Species | Location | Trial Day | Date | Status | Condition | Comments |
|---|---|---|---|---|---|---|---|
| A | Ring-necked Pheasant (♀) | 40m W of WTG 02 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 3-Feb-10 | P | I,U | |
| | | | 2 | 4-Feb-10 | P | Sp | Neck has been defeathered, feathers around head, belly feathers removed. |
| | | | 3 | 5-Feb-10 | P | Sp,F | Scavenging continues. More plundering, looking more like a feather pile. |
| | | | 4 | 6-Feb-10 | P | F, Sc | |
| | | | 5 | 7-Feb-10 | P | F | |
| | | | 6 | 8-Feb-10 | P | F | |
| | | | 9 | 11-Feb-10 | P | F | |
| | | | 13 | 15-Feb-10 | P | F | |
| B | Eurasian Skylark | 15m S of WTG 06 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 3-Feb-10 | A | ---- | Could not find carcass. |
| | | | 2 | 4-Feb-10 | A | ---- | |
| | | | 3 | 5-Feb-10 | A | ---- | |
| | | | 4 | 6-Feb-10 | A | ---- | |
| | | | 5 | 7-Feb-10 | A | ---- | |
| | | | 6 | 8-Feb-10 | A | ---- | |
| | | | 9 | 11-Feb-10 | A | ---- | |
| | | | 13 | 15-Feb-10 | A | ---- | |
| C | Wedge-tailed Shearwater | 25 E of WTG 08 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 3-Feb-10 | P | I | Moved ½ft West of its original position. |
| | | | 2 | 4-Feb-10 | P | I | |
| | | | 3 | 5-Feb-10 | P | I,U | |
| | | | 4 | 6-Feb-10 | P | I,U | |
| | | | 5 | 7-Feb-10 | P | I,U | |
| | | | 6 | 8-Feb-10 | P | I,U | |
| | | | 9 | 11-Feb-10 | P | F,Sp | |
| | | | 13 | 15-Feb-10 | P | F,Sc | |

**Carcass Removal Trial #4: Winter/Spring 2010 (Cont.)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D | Zebra Dove | 15m E of WTG 14 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 3-Feb-10 | A | ---- | Could not find carcass. |
| | | | 2 | 4-Feb-10 | A | ---- | |
| | | | 3 | 5-Feb-10 | A | ---- | |
| | | | 4 | 6-Feb-10 | A | ---- | |
| | | | 5 | 7-Feb-10 | A | ---- | |
| | | | 6 | 8-Feb-10 | A | ---- | |
| | | | 9 | 11-Feb-10 | A | ---- | |
| | | | 13 | 15-Feb-10 | A | ---- | |
| E | Wedge-tailed Shearwater | 25m NE of WTG 17 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 3-Feb-10 | P | I,U | |
| | | | 2 | 4-Feb-10 | P | F,R,Sp | Feathers and wings are visible. |
| | | | 3 | 5-Feb-10 | P | F,Sp | Remnants of back/wing; begin to plunder/torn. |
| | | | 4 | 6-Feb-10 | P | F,Sc | Back/wing appears completely plundered/torn. |
| | | | 5 | 7-Feb-10 | P | F | |
| | | | 6 | 8-Feb-10 | P | F | |
| | | | 9 | 11-Feb-10 | P | F | |
| | | | 13 | 15-Feb-10 | P | F | |
| F | Ring-necked Pheasant (♂) | 90m NW of WTG 19 | 0 | 2-Feb-10 | P | Fr | Vegetation Class: GRASS/SHRUB. |
| | | | 1 | 3-Feb-10 | P | I,U | |
| | | | 2 | 4-Feb-10 | P | I,U | |
| | | | 3 | 5-Feb-10 | P | I,U,Des | |
| | | | 4 | 6-Feb-10 | P | I,U,Des | |
| | | | 5 | 7-Feb-10 | P | Sp | First sign of scavenging (head area); beginning to be plundered. |
| | | | 6 | 8-Feb-10 | P | F,Sc | |
| | | | 9 | 11-Feb-10 | P | F | |
| | | | 13 | 15-Feb-10 | P | F | |

**Carcass Removal Trial #4: Winter/Spring 2010 (Cont.)**

**Results**

| **Status Codes** | **Carcass** | **Retention Time (days)** |
|---|---|---|
| A = Absent, P = Present | A | 13 |
| | B | 0 |
| **Condition Codes** | C | 13 |
| D = Natural decomposition (insects usually visible); | D | 0 |
| Des = Dessication evident; | E | 13 |
| F = Feathers and Bone fragments; Fr = Fresh; I = Intact; | F | 13 |
| R = Remains discovered; U = Undisturbed | | Average Retention Time |
| Sp = Partially Scavenged; Sc = Completely Scavenged | | **8.67** |

**Carcass Removal Trial #5: Winter/Spring 2010**

| Carcass ID | Trial Species | Location | Trial Day | Date | Status | Condition | Comments |
|---|---|---|---|---|---|---|---|
| A | Black Francolin | 25m S of WTG 02 | 0 | 16-Mar-10 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 17-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 2 | 18-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 3 | 19-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 4 | 20-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 5 | 21-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 6 | 22-Mar-10 | P | D,I,U | Insects present (ants). |
| | | | 9 | 25-Mar-10 | P | D,I,U | |
| | | | 13 | 29-Mar-10 | P | D,I,U | |
| B | Zebra Dove | 50m NE of WTG 04 | 0 | 16-Mar-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 17-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 2 | 18-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 3 | 19-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 4 | 20-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 5 | 21-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 6 | 22-Mar-10 | P | D,I,U | Insects present (flies). |
| | | | 9 | 25-Mar-10 | P | D,I,U | |
| | | | 13 | 29-Mar-10 | P | D,I,U | |

**Carcass Removal Trial #5: Winter/Spring 2010 (Cont.)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | Wedge-tailed | 40m SE of WTG 05 | 0 | 16-Mar-10 | P | Fr | Vegetation Class: SHRUB. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Shearwater | | 1 | 17-Mar-10 | P | I,U | |
| | | | 2 | 18-Mar-10 | P | I,U | |
| | | | 3 | 19-Mar-10 | P | I,U | |
| | | | 4 | 20-Mar-10 | P | I,U | |
| | | | 5 | 21-Mar-10 | P | I,U,D | |
| | | | 6 | 22-Mar-10 | P | I,U,D | |
| | | | 9 | 25-Mar-10 | P | I,U,D | |
| | | | 13 | 29-Mar-10 | P | I,U,D | |
| D | Zebra Dove | 55m NE of WTG 07 | 0 | 16-Mar-10 | P | Fr | Vegetation Class: GRASS/SHRUB. |
| | | | 1 | 17-Mar-10 | P | I,U | |
| | | | 2 | 18-Mar-10 | P | I,U | |
| | | | 3 | 19-Mar-10 | P | I,U | |
| | | | 4 | 20-Mar-10 | P | I,U,D | Insects present (ants). |
| | | | 5 | 21-Mar-10 | P | I,U,D | Insects present (ants). |
| | | | 6 | 22-Mar-10 | P | I,U,D | Insects present (ants). |
| | | | 9 | 25-Mar-10 | P | I,U,D | Insects present (ants). |
| | | | 13 | 29-Mar-10 | P | I,U,D | Insects present (ants). |
| E | Wedge-tailed Shearwater | 45m W of Substation | 0 | 16-Mar-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 17-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 2 | 18-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 3 | 19-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 4 | 20-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 5 | 21-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 6 | 22-Mar-10 | P | D,I,U | Insects present (flies/ants). |
| | | | 9 | 25-Mar-10 | P | F,Sc | Insects present (flies/ants). |
| | | | 13 | 29-Mar-10 | P | F | |

| **Carcass Removal Trial #5: Winter/Spring 2010 (Cont.)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| F | Black Francolin | 100m E of WTG 12 | 0 | 16-Mar-10 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 17-Mar-10 | P | I,U | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 18-Mar-10 | P | I,U | |
| | | | 3 | 19-Mar-10 | P | I,U | |
| | | | 4 | 20-Mar-10 | P | I,U,Des | |
| | | | 5 | 21-Mar-10 | P | I,U,Des | |
| | | | 6 | 22-Mar-10 | P | I,U,Des | |
| | | | 9 | 25-Mar-10 | A | ---- | Could not find. |
| | | | 13 | 29-Mar-10 | A | ---- | |

**Status Codes**
A = Absent, P = Present

**Condition Codes**
D = Natural decomposition (insects usually visible);
Des = Dessication evident;
F = Feathers and Bone fragments; Fr = Fresh; I = Intact;
R = Remains discovered; U = Undisturbed
Sp = Partially Scavenged; Sc = Completely Scavenged

**Results**

| **Carcass** | **Retention Time (days)** |
|---|---|
| A | 13 |
| B | 13 |
| C | 13 |
| D | 13 |
| E | 13 |
| F | 6 |
| | Average Retention Time |
| | **11.83** |

**Carcass Removal Trial #6: Winter/Spring 2010**

| Carcass ID | Trial Species | Location | Trial Day | Date | Status | Condition | Comments |
|---|---|---|---|---|---|---|---|
| A | Zebra Dove | 22m SW of WTG 07 | 0 | 17-May-10 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 18-May-10 | P | I,U | |
| | | | 2 | 19-May-10 | P | I,U | |
| | | | 3 | 20-May-10 | P | I,U | |
| | | | 4 | 21-May-10 | P | I,U | |
| | | | 5 | 22-May-10 | P | I,U,D | Insects visible (ants). |
| | | | 6 | 23-May-10 | P | I,U,D | Insects visible (ants). |
| | | | 9 | 26-May-10 | A | ---- | Could not find. |
| | | | 13 | 30-May-10 | A | ---- | |

**Carcass Removal Trial #6: Winter/Spring 2010 (Cont.)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B | Wedge-tailed Shearwater | 35m S of WTG 07 | 0 | 17-May-10 | P | Fr | Vegetation Class: GRASS. |
| | | | 1 | 18-May-10 | P | D,I,U | Insects visible (ants). |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 19-May-10 | P | D,I,U | Insects visible (flies/ants). |
| | | | 3 | 20-May-10 | P | D,I,U | Insects visible (ants). |
| | | | 4 | 21-May-10 | P | D,I,U | Insects visible (ants). |
| | | | 5 | 22-May-10 | P | D,I,U | Insects visible (ants). |
| | | | 6 | 23-May-10 | P | F,R,Sc | One wing, clean breast bone, and feather pile found 25m west of original position. |
| | | | 9 | 26-May-10 | P | F,R | |
| | | | 13 | 30-May-10 | P | F,R | |
| C | Zebra Dove | 63m NE of WTG 10 | 0 | 17-May-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 18-May-10 | P | I,U | |
| | | | 2 | 19-May-10 | A | ---- | Could not find. |
| | | | 3 | 20-May-10 | A | ---- | |
| | | | 4 | 21-May-10 | A | ---- | |
| | | | 5 | 22-May-10 | A | ---- | |
| | | | 6 | 23-May-10 | A | ---- | |
| | | | 9 | 26-May-10 | A | ---- | |
| | | | 13 | 30-May-10 | A | ---- | |
| D | Wedge-tailed Shearwater | 58m NE of WTG 10 | 0 | 17-May-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 18-May-10 | P | I,U | |
| | | | 2 | 19-May-10 | P | I,U | |
| | | | 3 | 20-May-10 | P | I,U | |
| | | | 4 | 21-May-10 | P | I,U | |
| | | | 5 | 22-May-10 | P | I,U | |
| | | | 6 | 23-May-10 | P | I,U,D | Insects present (flies/maggots). |
| | | | 9 | 26-May-10 | P | F,R,Sc | Remains found 1.5m from original area. |
| | | | 13 | 30-May-10 | P | F | |

**Carcass Removal Trial #6: Winter/Spring 2010 (Cont.)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E | Wedge-tailed Shearwater | 83m E of WTG 12 | 0 | 17-May-10 | P | Fr | Vegetation Class: BARE. |
| | | | 1 | 18-May-10 | P | I,U | |
| | | | 2 | 19-May-10 | P | I,U | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 3 | 20-May-10 | P | I,U | |
| | | | 4 | 21-May-10 | P | I,U | |
| | | | 5 | 22-May-10 | P | I,U,D | Insects present (flies/maggots). |
| | | | 6 | 23-May-10 | P | I,U,D | Insects present (ants). |
| | | | 9 | 26-May-10 | P | I,D | Moved 6m South of original area, possibly moved by wind. Deterioration caused by insects (ants/maggots). |
| | | | 13 | 30-May-10 | P | I,D | Insects present (ants/maggots). |
| F | Zebra Dove | 81m E of WTG 12 | 0 | 17-May-10 | P | Fr | Vegetation Class: SHRUB. |
| | | | 1 | 18-May-10 | P | D,I,U | Insects present (ants). Skull begins to be exposed. |
| | | | 2 | 19-May-10 | P | D,I,U | Insects present (ants). Skull completely exposed. |
| | | | 3 | 20-May-10 | P | D,I,U | Insects present (ants). |
| | | | 4 | 21-May-10 | P | D,I,U | Insects present (ants). |
| | | | 5 | 22-May-10 | P | D,I,U | Insects present (ants). |
| | | | 6 | 23-May-10 | P | D,I,U | Insects present (ants). |
| | | | 9 | 26-May-10 | P | D,I,U | |
| | | | 13 | 30-May-10 | P | D,I,U | |

**Status Codes**
A = Absent, P = Present

**Condition Codes**
D = Natural decomposition (insects usually visible);
Des = Dessication evident;
F = Feathers and Bone fragments; Fr = Fresh; I = Intact;
R = Remains discovered; U = Undisturbed
Sp = Partially Scavenged; Sc = Completely Scavenged

**Results**

| **Carcass** | **Retention Time (ti)** |
|---|---|
| A | 6 |
| B | 13 |
| C | 1 |
| D | 13 |
| E | 13 |
| F | 13 |

Average Retention Time
**9.83**

Annual Average Retention Time
**10.33**

1 Nene observed June 2010 (**1x search interval**)
Search Interval, I = 6.99; Carcass retention time, t = 13;, p = 0.83

| ODT | N | C | I | k | t | p | $e^{I/t}$ | $e^{I/t} - 1$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 20 | 1 | 6.99 | 20 | 13 | 0.83 | 1.7120514 | 0.712051 |

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

| | | | | | |
|---|---|---|---|---|---|
| 139.8 | 1.542051 | m = | 0.647822057460612 | * | 2.16564684271211 |
| 215.8 | 0.712051 | | | | |

**m = 1.41** **Indirect Take** (m*0.5) = **0.00** **Adjusted Take = 1.41**

---

1 Nene observed June 2010 (**2x search interval**)
Search Interval, I = 6.99; Carcass retention time, t = 13;, p = 0.83

| ODT | N | C | I | k | t | p | $e^{I/t}$ | $e^{I/t} - 1$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 20 | 1 | 3.72 | 20 | 13 | 0.83 | 1.3312973 | 0.331297 |

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

| | | | | | |
|---|---|---|---|---|---|
| 74.4 | 1.161297 | m = | 0.344763670064875 | * | 3.50530490768102 |
| 215.8 | 0.331297 | | | | |

**m = 1.21** **Indirect Take** (m*0.5) = **0.00** **Adjusted Take = 1.21**

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## Proposed Vegetation Management Plan

This vegetation management protocol was developed to outline methods to manage vegetation in the circular search plots being proposed for implementation in Year 5 of the Kaheawa Wind Power HCP. Several botanical surveys have been done in the past at KWP and in the areas proposed for management. No state or federally listed plant species or critical habitats have been identified or are known to occur in the project area. The procedures and techniques that are proposed take into consideration three main factors and objectives:

1. Manage ground cover at a stature that will improve monitoring efficiency without compromising soil stability;
2. Minimize impacts to native plant species;
3. Evaluate effects, if any, on Nene attraction.

### *Assessing Baseline Vegetation Cover*

Vegetation cover types within the current 180x200 meter search plots were mapped in the field using hand-held GPS (Trimble Geo-XT hand-held receiver, sub-meter accuracy) and interpretation of color aerial photography prior to and just after the 2006 wildfire (September 14, 2006; scale 1"=800 ft ±). Ground cover proportions within the proposed 70-meter radius management areas are centered on the base of each WTG tower section and were derived from these maps and ground surveys (Table 1). Ground cover types used in this assessment include:

- Bare/Burned Ground
- Native vegetation
    - Low ground cover (grasses, ʻūlei , 'ilima, ferns)
    - Medium shrubs (ʻaʼaliʼi , Pukiawe, koʼokoʼolau, ʻōhiʼa)
    - Tall Shrubs and trees (Pukiawe, ʻōhiʼa)
- Non-native vegetation
    - Low statured grasses (Kikuyu grass)
    - Tall grasses (Molasses grass, Natal red-top)
    - Mixed Tall grasses and shrubs (Molasses grass, Lantana, Christmasberry)
    - Large shrubs and trees (Christmasberry, Lantana, Ironwood)

Table 1. Percent cover, as of late summer 2010, represented by native and non-native plant species and bare areas in each of the proposed 70 meter WTG management plots at KWP.

| ***70m*** | **Percent Cover** | | | **Area** (sq.m.) | | | |
|---|---|---|---|---|---|---|---|
| | Bare | Native | Non-Native | Bare | Native | Non-Native | Total |
| 1 | 22 | 0.78 | 0.00 | 3384.92 | 12001.08 | 0 | 15386 |
| 2 | 25 | 0.55 | 0.20 | 3846.5 | 8462.3 | 3077.2 | 15386 |
| 3 | 28 | 0.22 | 0.50 | 4308.08 | 3384.92 | 7693 | 15386 |
| 4 | 40 | 0.25 | 0.35 | 6154.4 | 3846.5 | 5385.1 | 15386 |
| 5 | 27 | 0.12 | 0.61 | 4154.22 | 1846.32 | 9385.46 | 15386 |
| 6 | 26 | 0.01 | 0.73 | 4000.36 | 153.86 | 11231.78 | 15386 |
| 7 | 23 | 0.07 | 0.70 | 3538.78 | 1077.02 | 10770.2 | 15386 |
| 8 | 59 | 0.04 | 0.37 | 9077.74 | 615.44 | 5692.82 | 15386 |
| 9 | 63 | 0.06 | 0.31 | 9693.18 | 923.16 | 4769.66 | 15386 |
| 10 | 78 | 0.01 | 0.21 | 12001.08 | 153.86 | 3231.06 | 15386 |
| 11 | 76 | 0.05 | 0.19 | 11693.36 | 769.3 | 2923.34 | 15386 |
| 12 | 69 | 0.01 | 0.30 | 10616.34 | 153.86 | 4615.8 | 15386 |
| 13 | 80 | 0.01 | 0.19 | 12308.8 | 153.86 | 2923.34 | 15386 |
| 14 | 94 | 0.05 | 0.01 | 14462.84 | 769.3 | 153.86 | 15386 |
| 15 | 70 | 0.28 | 0.02 | 10770.2 | 4308.08 | 307.72 | 15386 |
| 16 | 66 | 0.32 | 0.02 | 10154.76 | 4923.52 | 307.72 | 15386 |
| 17 | 95 | 0.04 | 0.01 | 14616.7 | 615.44 | 153.86 | 15386 |
| 18 | 95 | 0.04 | 0.01 | 14616.7 | 615.44 | 153.86 | 15386 |
| 19 | 81 | 0.16 | 0.03 | 12462.66 | 2461.76 | 461.58 | 15386 |
| 20 | 96 | 0.02 | 0.02 | 14770.56 | 307.72 | 307.72 | 15386 |
| | | | | 186632.2 | 47542.74 | 73545.08 | **sq.m.** |
| | | | | 4047 | 4047 | 4047 | sq m/acre |
| | | | | **46.12** | **11.75** | **18.17** | **acres** |

*Vegetation management considerations*

Mechanical measures, such as mowing, will be used to treat substantial portions of the proposed plots while some areas will be limited to weed-whacking. Oversight and implementation by environmental staff will also ensure that secondary or unintentional impacts are minimized. The operators of any mechanized mowing equipment will be trained to recognize and avoid wildlife and native vegetation in specific areas where this method is appropriate. The KWP Operations and Maintenance team have agreed to help facilitate the vegetation management by providing equipment and logistical support as needed.

Many of the areas being considered for management contain irregular slopes and terrain, large rocks, heavy non-native ground cover, and have not been previously cut back for management purposes. The June 2010 wildfire burned a substantial portion of the plots mostly between WTG 12-20, rendering them temporarily bare ground. Areas previously bare, combined with the areas

that were recently burned presently represent about 40% of the proposed 70 meter management areas. Figure 1 shows the non-native composition and relative cover at each proposed WTG management plot.

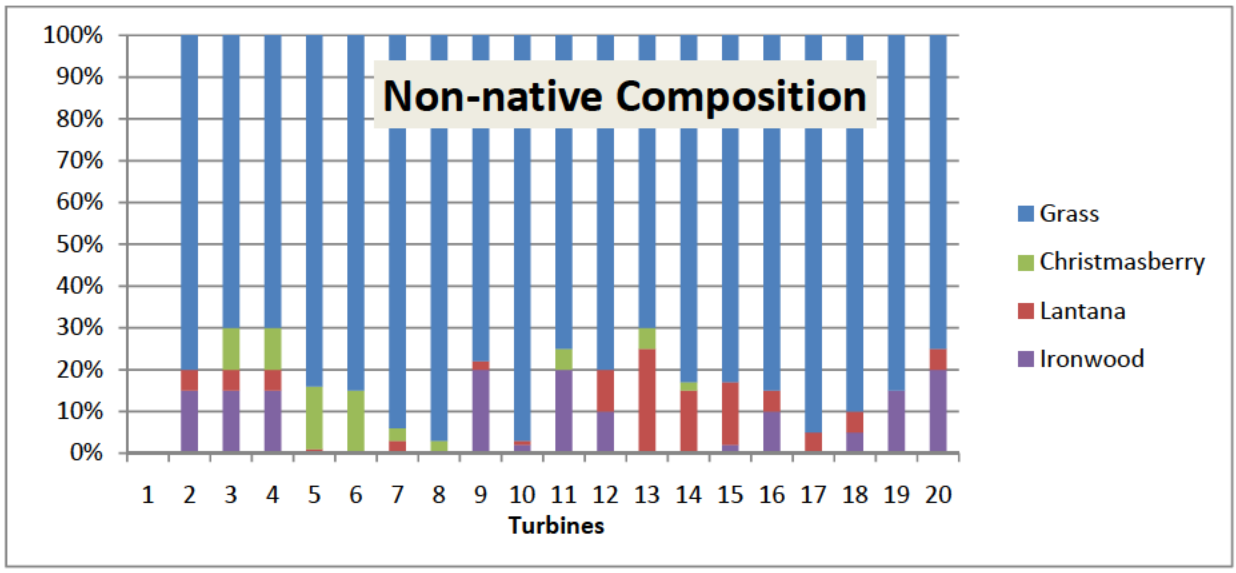


Figure 1. Relative composition of non-native plant groups present in each of the twenty proposed 70-meter WTG management plots at Kaheawa Wind Power.

Vegetation Management has been a subject of ongoing discussion concerning how it might improve the monitoring efficiency of searchers and whether it could pose an increased attraction risk for the local Nene population. Most of the non-native cover that is proposed for managing is composed of plant species rarely preferred by Nene as food items due to their limited nutritional quality. Combined with several years of data that indicate Nene are widespread and common in the area and the availability of higher quality habitat elsewhere, it does not appear likely that the proposed management will promote an increased risk for Nene at KWP. However, given some uncertainty, KWP will closely monitor Nene activity throughout the vegetation management process to determine if birds begin exhibiting clear indications of attraction to the managed areas, and if so, whether this constitutes an increased risk of take.

*Methods*

Prior to the onset of the 2010-2011 breeding season for Nene (October-May), we propose to begin implementing site-specific measures to reduce the stature and canopy cover of dominant non-native plant species inside the 70 meter managed areas at each WTG. Proposed methods include:

- Weed-whacker
- Commercial mower attachment for tractor (John Deere 329-D)
- Round-up treatments (bare turbine pads, sub-station, and OM buffer only; see Fire Contingency Plan for CDUA MA-3103)

Prior to initiating any of these methods, each 70 meter management area will be thoroughly surveyed to determine whether Nene or other wildlife are, or appear to be, occupying the area, delineate the treatment areas, and identify the appropriate methods for use. In some plots for example, too many large, scattered rocks and irregular terrain will make mechanized mowing attachments impractical. In these areas it may be necessary to rely solely on weed-whacker technology. Some plots may contain few rocks and be situated on relatively uniform terrain, enabling a tractor and mower attachment to cut substantial portions of the cover quickly. Thus, each site will require careful assessment to determine the most appropriate procedures prior to and during treatment.

*Ongoing Maintenance and Monitoring*

Initially, this management plan is designed to avoid and minimize any substantive impacts to native plant species inside the 70 meter managed areas. However, some level of native plant impact or reduction in canopy cover may be appropriate given the improvements in carcass detection probability that are expected. Ideally, each plot would be composed of ≥ 90% bare ground/low grass, but this may not be possible given variability in native cover among sites.

Monitoring will entail photo-documentation and development of a GIS database that tracks the progress of vegetation management so that new maps can accompany reports and summaries. These summaries will include:

- Plot Number;
- Dates of treatment;
- Treatment area (sq. meters);
- Dominant plant species in treatment areas;
- Methods used (weed-whacker, mower attachment);
- Area use patterns of Nene supplemental to WEOP.

Follow up monitoring will entail regular inspections of the managed areas to document a) rates of re-growth and species composition, b) qualitative observations of Nene use patterns in the vicinity of the treated areas, c) changes in the relative cover of native plants in treated areas, and d) whether these native assemblages create reduced carcass detection probability, should therefore be considered for subsequent management, or left intact.

KAHEAWA WIND POWER, LLC

August 8, 2009

To: James Kwon
U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii

Paula Hartzell
State of Hawaii, Department of Land and Natural Resources
Division of Forestry and Wildlife, Honolulu, Hawaii

Ref: **Downed Wildlife Incident**: Hawaiian short-eared owl (*Pueo*), Kaheawa access road

At 14:42 on Monday, July 20th, 2009 a Pueo (Hawaiian short-eared owl, *Asio flammeus sandwichensis*) carcass was discovered on the access road leading to the Kaheawa Pastures Wind Energy Generation Facility (KWP) in West Maui. Though not an HCP-covered species, Pueo are covered under the separate provisions of the Migratory Bird Treaty Act and are protected state-wide. Ian Bordenave, the biologist who first observed the bird reported the incident promptly to the Senior Wildlife Biologist in charge of the HCP (Greg Spencer). Mr. Spencer followed by verbally informing the DLNR and USFWS in Honolulu to coordinate carcass salvage and report preliminary details of the incident.

**Condition of specimen and description of circumstances**: The owl was located on the ground near the edge of the roadway, about 5 ft W of the intersecting Jeep road and approximately 150m SW of the KWP II MET 5 meteorological tower (Figure 1). Dominant ground cover in the immediate area is composed mostly of mixed grasses and bare ground. The carcass appeared completely intact, with no apparent external signs of trauma (Figures 2 and 3). However, when handled it appeared the bones supporting the body structure may have been damaged, as they were palpable to the touch. The entire area was searched intensively in an effort to locate any other biological material. No additional materials, feathers, or evidence of scavenging or predation were observed. The specimen appeared relatively fresh (1 day post-mortem) based on the condition of the carcass and the minimal degree of rigor observed. Fresh to strong trade winds had been affecting weather state-wide for about a week. A summary containing relevant information gathered at the incident site is provided in Table 1 (below).

**Table 1. Information gathered during the documentation of a downed wildlife incident on the access road leading to the Kaheawa Wind Power facility on July 20th, 2009.**

| **Species (common name):** | **Hawaiian Short-eared Owl** |
|---|---|
| **Date:** | Monday, July 20, 2009 |
| **Time Initially Reported (HST):** | 14:45 |
| **Time Responders Arrive (HST):** | Same as initial reporting |
| **Time DLNR Arrives (HST)** | n/a |
| **Location:** | KWP access road, below Lahaina-Pali Trail |
| **Date last surveyed:** | n/a |
| **Distance to Lahaina-Pali Trail (m):** | 120 |
| **Ground cover profile:** | Bare/Gravel road bed, pasture grasses in vicinity |
| **Wind direction (cardinal) and speed (mph):** | ENE 25-30 |
| **Cloud Cover (%):** | 30 |
| **Cloud Deck (magl):** | >500 |
| **Precipitation (%):** | 0 |
| **Temperature (F°):** | 75° |

**Probable cause of injuries and supportive evidence**: Vehicle collision appears one of the most likely causes of death based on the condition and location of the specimen. During mid to late summer each year, increased levels of Pueo activity are observed in this area, evidenced by higher encounter rates, especially during crepuscular and evening hours. During these periods birds are commonly observed roosting alongside the access road corridor. Recognizing their vulnerability to vehicle interaction, each summer KWP wildlife staff implement measures to minimize potential impact to this species as part of the WEOP program.

**Action taken**: Response by project wildlife staff followed procedures outlined in the Wildlife Casualty Monitoring Protocol contained in the HCP. Discussion with USFWS and DLNR resulted in a decision to allow KWP biologists to remove the carcass from the field and place it in the KWP specimen freezer for interim storage.

Documentation and response actions included a direct line measurement from the leading edge of the MET tower base to the specimen, GPS coordinates, photographs of various aspects of the specimen and surrounding conditions, and observations of prevailing weather and environmental circumstances. Follow up briefings and interviews were performed with KWP operations staff and contractors on site to gather any subsequent information or insights that might shed light on the timing of the incident or potential cause of death. A WEOP refresher was performed that reiterated the need for all personnel to exercise the minimization measures that are required on behalf of covered and non-covered species on site and along all access roads. The specimen was carefully collected and placed in well-labeled double-plastic bags and frozen at the KWP facility until coordination with DLNR on subsequent disposition.


Figure 1. Hawaiian short-eared owl (Pueo) carcass discovered along the access road leading to the KWP facility on July 20, 2009.

Figure 2. Hawaiian short-eared owl carcass discovered on the afternoon of July 20, 2009 along the edge of the access road leading to the KWP facility on Maui.

Figure 3. Ventral view of the Hawaiian short-eared owl discovered by KWP biologists along the access road leading to the KWP facility on July 20, 2009.

For additional information or clarification on this incident, please contact:
**Gregory Spencer**, *Senior Wildlife Biologist* – Kaheawa Wind Power, LLC, Maui, Hawaii
[redacted] [redacted]

**Kaheawa Wind Power, LLC**

**Habitat Conservation Plan**
**Downed Wildlife Incident Documentation and Reporting Form**

| | |
|---|---|
| Observer Name | Ian Bordenave |
| Date | 12/30/2009 |
| Species (common name) | Hawaiian Short-eared Owl (Pueo) |
| Time Observed (HST) | 09:33 |
| Time Initially Reported (HST) | same |
| Time Responders Arrive (HST) | same |
| Location | Below utility lines near WTG 11-12 |
| GPS Coordinates (lat/long) | $20^{o}$ 48.46N $156^{o}$ 32. 59W |
| Date Last Surveyed | 12/24/2009 |
| Distance to Base of nearest WTG (m) | 98 to WTG 12 |
| Bearing from Base of nearest WTG | NW |
| Ground Cover Type | Mixed grass/Shrub |
| Wind Direction and Speed (mph) | Variable, 7 |
| Cloud Cover (%) | 20 |
| Cloud Deck (magl) | >500 |
| Precipitation | none |
| Temperature ($^{o}$F) | 84 |

| |
|---|
| **Condition of Specimen**: Advanced state of decomposition/desiccation. No clear evidence of scavenging. Remains indicate carcass remained undisturbed for an extended duration of exposure to the elements prior to being discovered (outside the standard search area). |
| **Probable Cause of Injuries and Supportive Evidence**: Based on the location only, possible strike with overhead utility lines (approx. 15 m horizontal distance from carcass). However, this is difficult to ascertain conclusively given the advanced level of decomposition evident. |
| **Action Taken**: Carcass location was marked and the Senior Wildlife Biologist was notified. Photos and documentation were recorded and monitoring activities resumed. No other carcasses or specimen materials were found during a search of the surrounding area. Carcass was left in place undisturbed with the exception of some light grass displacement during field examination. |

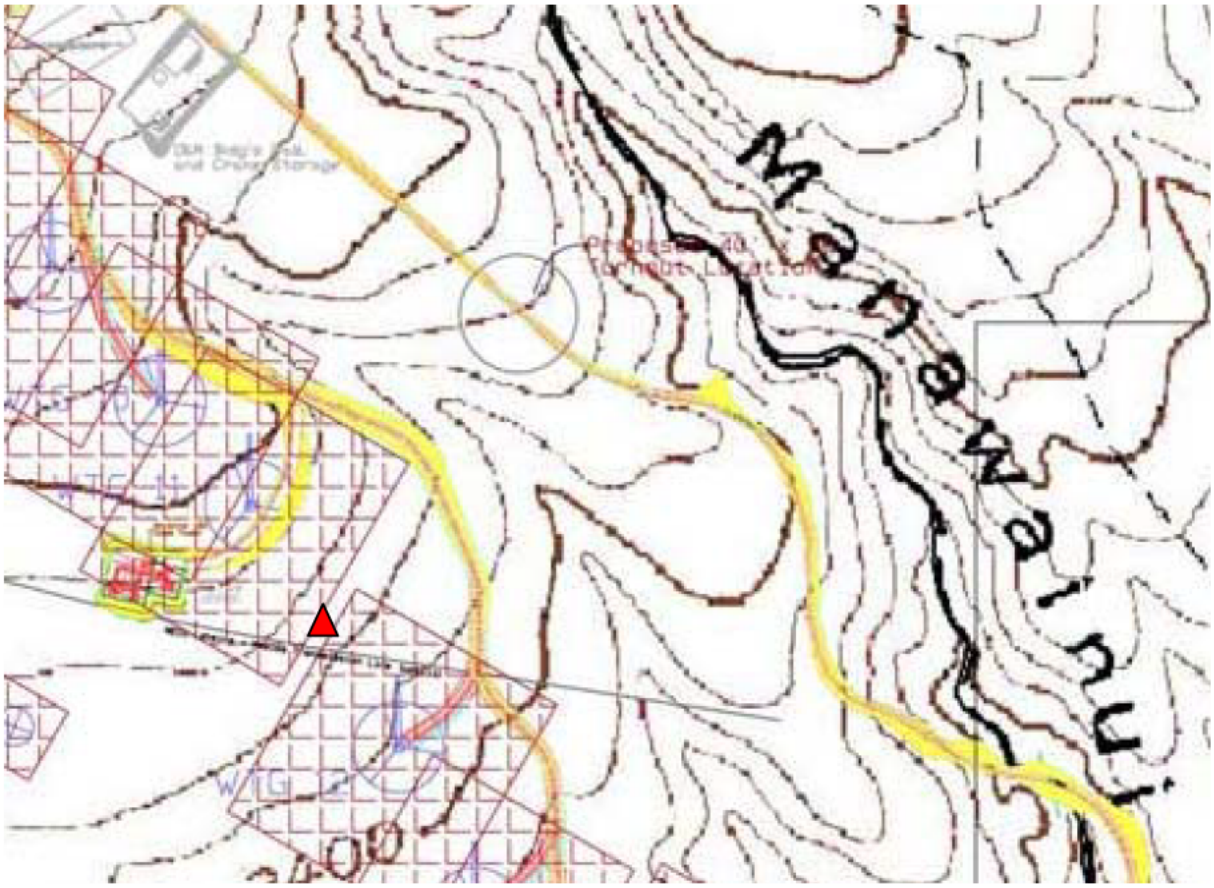


Figure 1. The red triangle in the figure above indicates the location where the Pueo carcass was discovered at the Kaheawa Pastures Wind Energy facility on December 30, 2009.


Figure 2. The dried and weathered carcass of a Hawaiian Short-eared owl discovered beneath dense molasses grass cover at the Kaheawa Wind Power facility, Maui, December 30, 2009.

## Summary

The Hawaiian Short-eared Owl documented in this report was discovered in a moderately dense area of Molasses Grass in a dried and desiccated condition that suggests it had remained undisturbed for many months. The exact location of the discovery is at the very edge of the WTG-12 search plot in a portion of pasture that does not necessarily receive the same diligent search effort as surrounding areas, owing to the fact that is lies between plot boundaries. Collision with the nearby utility lines is possible.

James Kwon (Pacific Islands Fish and Wildlife Office) and Lauren Goodmiller (DLNR/DOFAW) were notified of the incident on January 26, 2010 by telephone.

Maui District Wildlife Biologist, Dr. Fern Duvall, visited the site with the Senior Wildlife Biologist on the morning of Wednesday, January 27, 2010 and collected the remains of the owl.

Figure 3. Maui District Wildlife Biologist obtaining photos of the incident site on January 27, 2010.

For additional information or clarification on this incident, please contact:

Gregory Spencer, Senior Wildlife Biologist
Kaheawa Wind Power, Environmental Affairs
[redacted] [redacted]

# Kaheawa Wind Power, LLC

## Habitat Conservation Plan – Downed Wildlife Incident Reporting Form

| | |
|---|---|
| Observer Names | David Medrano and Mitch Craig |
| Date | 1/21/2010 |
| Species (common name) | White-tailed Tropicbird |
| Time Observed (HST) | 10:10 |
| Time Initially Reported (HST) | Same |
| Time Responders Arrive (HST) | Same |
| Location | WTG 9 |
| GPS Coordinates (Lat/Long) | 20˚ 48' 57.38" N<br>156˚ 38' 05.15" W |
| Date Last Surveyed | 1/14/2010 |
| Distance to Base of nearest WTG (m) | Dorsal/anterior/wings: 50 to WTG 9 |
| Distance to Base of nearest WTG (m) | Legs and lower flank/breast: 73 to WTG 9 |
| Bearing from Base of nearest WTG | East |
| Ground Cover Type | Mixed grass/Shrub |
| Wind Direction and Speed (mph) | Variable, 6 |
| Cloud Cover (%) | 0 |
| Cloud Deck (magl) | >500 |
| Precipitation | None |
| Temperature ($^{o}$F) | 78 |

| |
|---|
| **Condition of Specimen**: Downed wildlife monitors observed the partially scavenged, mostly intact remains of a White-tailed tropicbird during routine monitoring near WTG-9. They searched the area and located the severed leg and lower abdominal portion 14 m away to the east of the first section. It appeared both legs were fully separated from the body and this section did not appear to have been scavenged. |
| **Probable Cause of Injuries and Supportive Evidence**: Based on the appearance of the carcass, turbine collision seems probable. Moderate to strong *kona* winds and reduced visibility due to volcanic emissions and cloud cover over the course of the previous week may have contributed to an increased risk of avian collisions at the time the incident occurred. |
| **Action Taken**: Observers in the field immediately informed the Senior Wildlife Biologist. USFWS and DLNR were contacted by telephone on January 26, 2010. Documentation and photos, including notes on the condition of the carcass were gathered at the time the incident was initially reported. The carcass was inadvertently discarded, which did not provide substantive opportunity for agency inspection and review. The incident site was visited on January 27, 2010 by Maui District Wildlife Biologist, Fern Duvall, and the Senior Wildlife Biologist at KWP, Gregory Spencer, in order to make observations, gather some additional documentation, and discuss the incident. An easily discernable feather pile remains evident at the site. |

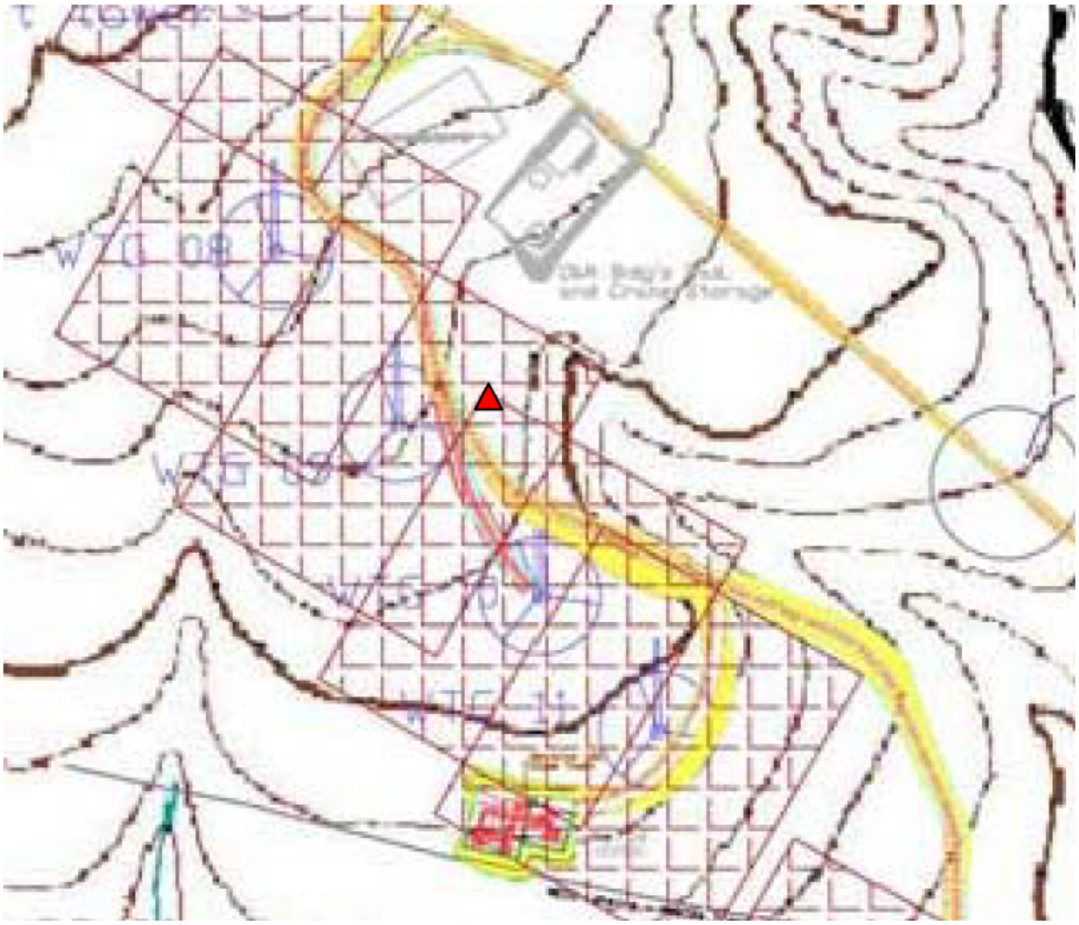

Figure 1. Location of a White-tailed tropic bird carcass discovered east of WTG-9 during routine downed wildlife monitoring at the Kaheawa Wind Power facility on Maui, January 21, 2010.

Figure 2. The partially scavenged remains of a White-tailed Tropicbird discovered by downed wildlife monitors near WTG-9 at the Kaheawa Wind Power facility on the island of Maui, January 21, 2010.

Figure 3. Legs and lower abdominal section of a White-tailed tropicbird located 14 m east of the partially scavenged remains shown in Figure 2 (above) at the Kaheawa Wind Power facility on the island of Maui, January 21, 2010.

White-tailed tropicbirds (*Phaethon lepturis*), considered a protected species by the State of Hawaii and protected by federal law under the provisions of the Migratory Bird Treaty Act, are common but somewhat intermittently observed near Kaheawa Pastures, spending most of their time associated with the deeper gulches adjacent to the area. Weather at the time of the incident was dominated by south and southwesterly winds, gusty at times with volcanic haze and dense cloud cover, including periods of rain.

James Kwon (Pacific Islands Fish and Wildlife Office) and Lauren Goodmiller (DLNR/DOFAW) were notified of the incident on January 26, 2010 by telephone, and Maui District Wildlife Biologist, Dr. Fern Duvall, agreed to visit the site with the Senior Wildlife Biologist on the morning of Wednesday, January 27, 2010. Disposal of carcass materials involved in a downed wildlife incident are contrary to the protocols followed for documenting and adequately reporting such events according to the terms of the HCP. Going forward, each carcass regardless of condition, unless directed otherwise by the DLNR or USFWS, will be either retained in frozen storage on site, or recovered directly by agency response staff.

<u>For additional information or clarification on this incident, please contact</u>:

Gregory Spencer, Senior Wildlife Biologist
Kaheawa Wind Power, Environmental Affairs
[redacted] [redacted]

## Kaheawa Wind Power, LLC

## Habitat Conservation Plan – Downed Wildlife Incident Documentation Form

| | |
|---|---|
| Observer Names | D. Medrano, I. Bordenave, M. Craig |
| Date | March 24, 2010 |
| Date Last Surveyed | March 16, 2010 |
| Species (common name) | Hawaiian short-eared owl (*Pueo*) |
| Time Observed (HST) | 10:15 |
| Time Initially Reported (HST) | same |
| Time Responders Arrive (HST) | 13:30 |
| Location | WTG-14 |
| GPS Coordinates (Lat/Long) | Carcass: 20˚ 48' 34" N, -156˚ 32' 54" W<br>Wing: 20˚ 48' 33" N, -156˚ 32' 55" W |
| Distance to Base of nearest WTG (m) | Carcass : 60.5 to WTG-14<br>Wing: 87 to WTG-14 |
| Distance to nearest Met Tower (m) | Approx. 170 |
| Distance to nearest overhead lines (m) | >250 |
| Bearing from Base of nearest WTG | 220˚ (SSW) |
| Ground Cover Type | mixed grasses |
| Wind Direction and Speed (mph) | NNE, 20 |
| Cloud Cover (%) | 50 |
| Cloud Deck (magl) | 250 |
| Precipitation | None |
| Temperature ($^{O}$F) | 68˚ |

| |
|---|
| **Condition of Specimen**: The Pueo appeared to be un-scavenged and exhibited signs of initial decomposition. Most of the flesh around the facial disk was absent and some desiccation was evident. The left wing was separated from the body and during the subsequent search for additional material a wing was discovered about 27 m downwind. Cranium shows some signs of blunt force trauma. |
| **Probable Cause of Injuries and Supportive Evidence**: Based on field examination, the separation of the left wing and trauma to the skull, collision with a turbine rotor is possible. |
| **Action Taken**: Observers immediately contacted the Senior Wildlife Biologist (Greg Spencer) and began subsequent documentation of the incident that included several photos of the incident scene and carcass. Mr. Spencer immediately left voice messages with James Kwon (USFWS) and Lauren Goodmiller (DLNR/DOFAW) and was able to coordinate carcass recovery with Maui DOFAW wildlife biologist, Fern Duvall. The carcass materials were left in place and collected by Fern Duvall at about 13:30 the same day of the incident. |

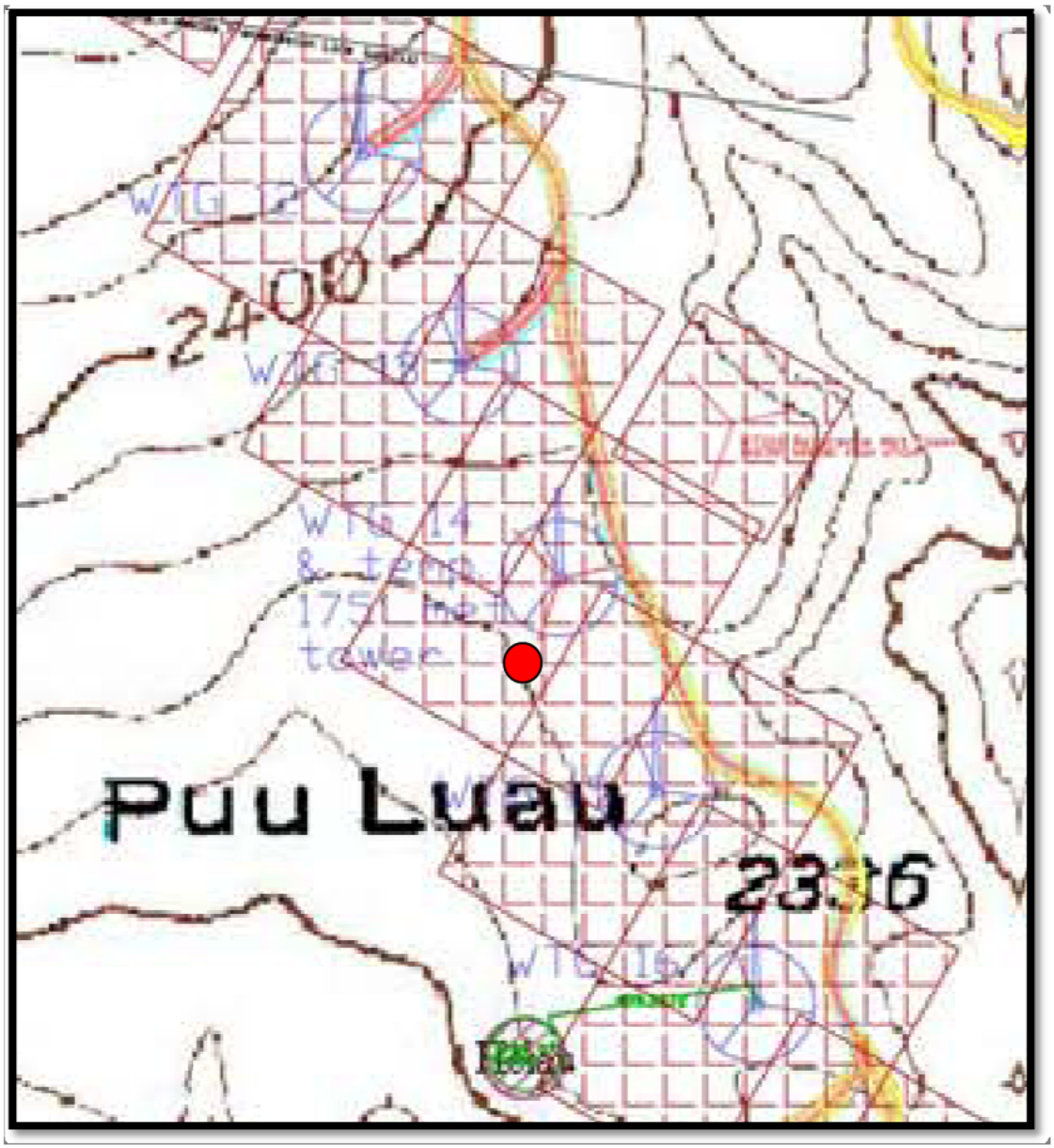


Figure 1. The red dot indicates the location SW of WTG-14 where the remains of a Hawaiian short-eared owl (*Asio flammeus*) carcass was discovered by downed wildlife monitors on March 24, 2010 at Kaheawa Wind Power.


Figure 2. Carcass of a Pueo discovered by downed wildlife monitors at Kaheawa Wind Power on March 24, 2010.


Figure 3. Anterior view showing detail of the cranial section of a Pueo carcass discovered at Kaheawa Wind Power, March 24, 2010.

Figure 4. The arrow denotes the position of the wing segment discovered about 27 meters SSW (down-wind) from the carcass.

Figure 5. Wing segment detail, Kaheawa Wind Power, March 24, 2010.

**Summary**

Routine searches were being performed by KWP wildlife monitors when the owl carcass was discovered. All standard protocols for documenting and reporting downed wildlife incidents, as outlined in the HCP and as agreed to between KWP, DLNR and USFWS were followed. Lauren Goodmiller responded in writing to Mr. Spencer's telephone notification of the incident and was able to confirm agency response. Maui DLNR/DOFAW wildlife biologist Fern Duvall arrived at the site within 2 hours of being notified and proceeded to collect the specimen then left the site.

Although it may be impossible to determine exactly when time of death occurred, it does appear based on the condition of the carcass that it had been dead for several days. Wind speeds across the state and especially at Kaheawa Pastures have been strong and persistent for most of the month of March, with peak periods of sustained winds in excess of 30 mph with steady and regular gusts to near 50 mph measured at KWP during March 8-13, 2010. Although Pueo are commonly seen in flight under a wide range of wind speeds, few bird species, including Pueo are seen at KWP during winds of this strength and persistence, probably because it makes maneuvering in flight difficult. Thus, in this case abnormally strong and persistent trade winds probably associated with periods of dense cloud cover may have contributed an increased risk factor for birds transiting or foraging in the vicinity of site facilities at this time.

<u>For additional information or clarification, please contact</u>:

Gregory Spencer, Senior Wildlife Biologist
Kaheawa Wind Power, Environmental Affairs
[redacted]

## Kaheawa Wind Power, LLC

## Habitat Conservation Plan
## Downed Wildlife Incident Documentation and Reporting Form

| | |
|---|---|
| Observer Names | Ian Bordenave |
| Date | May 14, 2010 |
| Species (common name) | Nene (presumed) |
| Time Observed (HST) | 13:43 |
| Time Initially Reported (HST) | 13:45 |
| Time Responders Arrive (HST) | 08:30 May 17, 2010 |
| Location | WTG-20 |
| GPS Coordinates (specify units) | $20^{o}$ 48'12.76" N $156^{o}$ 32' 38.96" W |
| Date Last Surveyed | May 10, 2010 |
| Distance to Base of nearest WTG (m) | 42.6 |
| Bearing from Base of nearest WTG | East |
| Distance to nearest Met Tower (m) | >500 |
| Distance to nearest overhead lines (m) | 90 |
| Ground Cover Type | Shrub/mixed grasses |
| Wind Direction and Speed (mph) | NNE 10-15 |
| Cloud Cover (%) | 25 |
| Cloud Deck (magl) | >1,000 |
| Precipitation | None |
| Temperature ($^{o}$F) | 72.5 |

| |
|---|
| **Condition of Specimen**: The remains consisted of mostly a feather pile and some scattered bone fragments, including a partially intact wing section. The material all appeared fairly desiccated and weathered, making it difficult to ascertain the degree of scavenging. |
| **Probable Cause of Injuries and Supportive Evidence**: Very difficult to ascertain the probable cause of death, although proximity to turbines suggests collision is a possibility. The evidence suggests the carcass has been present in this location for a lengthy period, perhaps in excess of the time KWP has been in operation. |
| **Action Taken**: Ian Bordenave immediately notified Greg Spencer by phone. Greg responded by convening with field monitors at the incident site, inspected the remains, and then proceeded to immediately notify DLNR/DOFAW (Scott Fretz, John Medeiros, and Lauren Goodmiller) and USFWS (James Kwon) by telephone. John returned Greg's call by 15:40 on May 14, 2010 and confirmed staff would collect the remains on Monday, May 17, 2010, while James Kwon and Scott Fretz confirmed receipt of notification later the same day. |

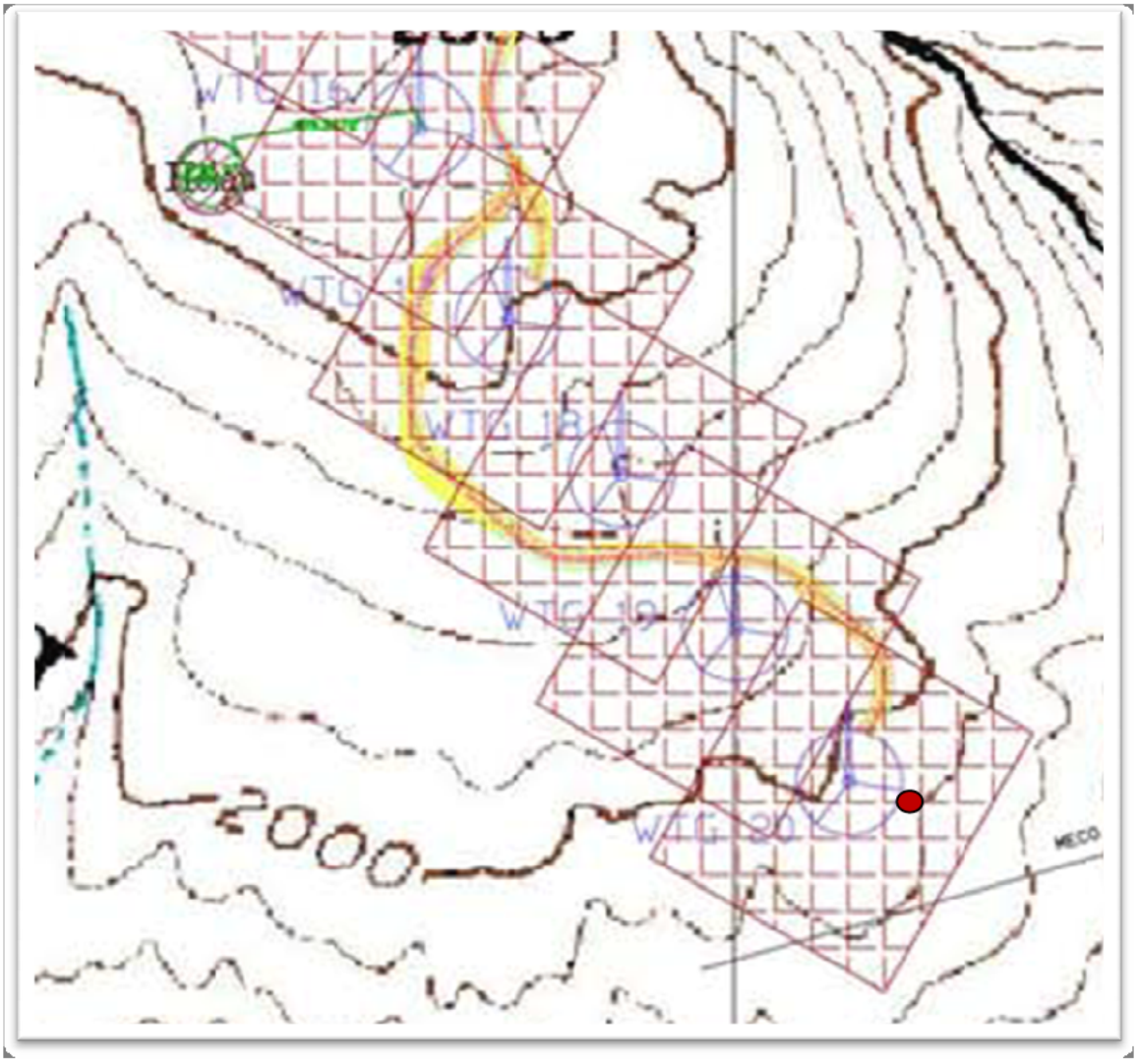


Figure 1. The small red oval to the East of WTG-20 indicates the location where the remains of a Nene were discovered by searchers conducting routine downed wildlife monitoring at the Kaheawa Wind Power facility on May 14, 2010.


Figure 2. Broad-scale view of the incident scene showing the location of the carcass remains in the lower foreground looking toward the lower tower section of WTG-20 at the Kaheawa Wind Power facility.


Figure 3. Small feather pile and desiccated bone fragments visible beneath ground cover canopy 42 meters east of WTG-20 at the Kaheawa Wind Power facility on May 14, 2010.


Figure 4. Small portion of wing and feathers discovered by downed wildlife monitors near WTG-20 at the Kaheawa Wind Power facility on May 14, 2010.

**Summary**

Routine searches to document downed wildlife were being performed at the time the remains were discovered. Standard protocols for documenting and reporting downed wildlife incidents were followed, which included initial notification of the Senior Wildlife Biologist and subsequent agency notifications. John Medeiros (Wildlife Biologist, DLNR/DOFAW) coordinated with his staff on Maui and the materials were collected by Sasha Smith in the early morning hours of Monday, May 17, 2010. The area was thoroughly searched for evidence of bands prior to and following collection of the remains but none were found.

Because the remains appeared very old and weathered, making any substantive field determinations concerning cause of death would be pre-mature. Since the materials were discovered inside a search plot that receives consistent year-round monitoring and may belong to a very large HCP-covered avian species (Nene), it raises some question about the age of the carcass and whether the bird may have died prior to commissioning of the Kaheawa Wind Power facility in June, 2006. Given its size and body dimensions, it seems highly unlikely that a mature Nene carcass in this location would be consistently overlooked by field monitors while it slowly decomposed. Further insights are expected following veterinary examination of the remains.

For additional information or clarification, please contact:

Gregory Spencer, Senior Wildlife Biologist
Kaheawa Wind Power, Environmental Affairs
[redacted]

## Kaheawa Wind Power, LLC

## Habitat Conservation Plan
## Downed Wildlife Incident Documentation and Reporting Form

| | |
|---|---|
| Observer Name | Mitchell Craig |
| Date | June 21, 2010 |
| Species (common name) | Black francolin |
| Time Observed (HST) | 10:28 |
| Time Initially Reported (HST) | 08:00 (June 22, 2010) |
| Time Responders Arrive (HST) | N/A |
| Location | KWP WTG-12 |
| GPS Coordinates (specify units and datum) | $20^{o}$ 48'44" N $156^{o}$ 32' 57" W |
| Date Last Surveyed | June 17, 2010 |
| Distance to base of nearest WTG (m) | 0.76 |
| Bearing from base of nearest WTG | $270^{o}$ |
| Distance to base of nearest Met (m) | >300 |
| Distance to nearest overhead lines (m) | 100 |
| Ground Cover Type | Bare Ground |
| Wind Direction and Speed (mph) | North 10-15 |
| Cloud Cover (%) | 80 |
| Cloud Deck (magl) | >500 |
| Precipitation | 0 |
| Temperature ($^{o}$F) | 75 |

| |
|---|
| **Condition of Specimen**: Completely intact, freshly dead, resting in place at the base of turbine. No scavenging evident. |
| **Probable Cause of Injuries and Supportive Evidence**: In-flight collision with the base of the turbine tower. This kind of collision mortality has been observed in past with introduced game birds. Evidence is consistent with this type of incident. |
| **Action Taken**: Greg Spencer was informed by email on June 22, 2010. Greg followed up immediately to confirm report and gather additional facts. Greg notified Lauren Goodmiller (DLNR/DOFAW) and James Kwon (USFWS) by phone the morning of June 22, 2010 and received call-back concurrence shortly after from Lauren Goodmiller. Documentation (above) and photos (see following pages) were obtained and the specimen was labeled and placed in frozen storage at the KWP site. |


The orange dot indicates the location of a Black francolin discovered 0.76 meters west of WTG-12 on June 21, 2010 by wildlife monitors at the Kaheawa Wind Power facility, Maui, Hawaii.


A Black francolin discovered at the base of WTG-12 at the Kaheawa Wind Power facility on June 21, 2010. This introduced game species is believed to have collided with the base section of the bright white turbine base.


Close up image of the Black francolin discovered at the base of WTG-12 on June 21, 2010.

For additional information or clarification, please contact:
Gregory Spencer, Senior Wildlife Biologist
Kaheawa Wind Power, Environmental Affairs
[redacted]

| **Baseline Scenario** assumes actual take is as expected | Year 1 | | | Year 2 | | Year 3 | | Year 4 | | Years 1-4 Totals | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| **General Measures** | | | | | | | | | | | | |
| **Annual vegetation management, mowing around turbines to facilitate searches** | $ 500.00 | | | $ 500.00 | | $ 500.00 | | $ 500.00 | | $ 2,000.00 | $ - | |
| **Wildlife Education and Observation Program (WEOP) and Downed Wildlife Protocol** | $ 3,000.00 | | | $ 500.00 | | $ 500.00 | | $ 500.00 | | $ 4,500.00 | $ - | |
| KWP Biologist (Greg Spencer) | | $ 5,000.00 | $ 1,000.00 | | $ 2,000.00 | | $ 1,000.00 | | $ 1,000.00 | $ - | $ 10,000.00 | Developing and conducting on-site outreach programs and wildlife orientations. |
| Consultant (Eric Nishibayashi) | | $ 1,000.00 | | | | | | | | $ - | $ 1,000.00 | Pre-construction outreach. |
| KWP Staff (Ian Bordenave, David Medrano, Mitch Craig) | | | $ 800.00 | | $ 1,000.00 | | $ 500.00 | | $ 1,000.00 | $ - | $ 3,300.00 | Assisting in the presentation of orientation materials. |
| Wildlife Conservation signage | | $ 300.00 | $ 300.00 | | $ 300.00 | | | | | $ - | $ 900.00 | Posted cautionary and wildlife conservation awareness signage as necessary throughout site. |
| **General Subtotal** | **$ 3,500.00** | **$ 6,300.00** | **$ 2,100.00** | **$ 1,000.00** | **$ 3,300.00** | **$ 1,000.00** | **$ 1,500.00** | **$ 1,000.00** | **$ 2,000.00** | **$ 6,500.00** | **$ 15,200.00** | |
| Nene: Potential take of 3 per year | | | | | | | | | | | | |
| Pre-construction surveys | $ 8,000.00 | | | | | | | | | $ 8,000.00 | $ - | Combined with next item. |
| On-site full-time/on-call environmental inspector during construction | $ 25,000.00 | | | | | | | | | $ 25,000.00 | $ - | |
| KWP Biologist(s) | | $ 15,000.00 | | | | | | | | $ - | $ 15,000.00 | |
| Consultant (Eric Nishibayashi) | | $ 24,000.00 | | | | | | | | $ - | $ 24,000.00 | Construction-phase consultation. |
| Spotting Scope and Accessories | | $ 200.00 | | | | | | | | $ - | $ 200.00 | |

| **Baseline Scenario** assumes actual take is as expected | Year 1 | | | Year 2 | | Year 3 | | Year 4 | | Years 1-4 Totals | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| Regular on-site observations of nene response to turbines - staff biologist/intern | $ 10,000.00 | | | | | | | | | $ 10,000.00 | $ - | |
| KWP Staff (Greg Spencer) | | $ 3,500.00 | $ 4,000.00 | | | | | | | $ - | $ 7,500.00 | |
| KWP Staff (Ian Bordenave) | | $ 1,500.00 | $ 3,000.00 | | | | | | | $ - | $ 4,500.00 | |
| Construction of new release pen (DOFAW) | $ 50,000.00 | | | | $ 50,000.00 | | | | | $ 50,000.00 | $ 50,000.00 | |
| New DOFAW truck | $ 9,000.00 | | | | $ 9,000.00 | | | | | $ 9,000.00 | $ 9,000.00 | |
| Labor for maintenance and predator control plus $1000 for helicopter logistics | $ 16,000.00 | | | 16,000.00 | $ 16,000.00 | 16,000.00 | $ 16,000.00 | 16,000.00 | $ 32,000.00 | $ 64,000.00 | $ 64,000.00 | Double payment made in February, 2010. |
| Cost of propagating 10 chicks/yr yrs 1-5, 4 chicks every 2 years thereafter | $ 25,000.00 | | | $ 25,000.00 | $ 25,000.00 | $ 25,000.00 | $ 25,000.00 | $ 25,000.00 | $ 50,000.00 | $ 100,000.00 | $ 100,000.00 | Double payment made in February, 2010. |
| Contingency Fund | $264,000.00 | $264,000.00 | | $ 6,600.00 | $ 6,600.00 | $ 6,765.00 | $ 6,765.00 | $ 6,934.00 | $ 6,934.00 | $ 284,299.00 | $ 284,299.00 | Included in Contingency Letter of Credit. |
| **Nene Subtotal** | **$407,000.00** | **$308,200.00** | **$ 7,000.00** | **$ 47,600.00** | **$ 106,600.00** | **$ 47,765.00** | **$ 47,765.00** | **$ 47,934.00** | **$ 88,934.00** | **$ 550,299.00** | **$ 558,499.00** | |
| Seabirds: Potential take of 1.5 per year of each species | | | | | | | | | | | | |
| Vehicle, radar, night-vision and related survey equipment, including training | $ 50,000.00 | | | | | | | | | $ 50,000.00 | $ - | |
| 2001 Ford F-150 incl. licensing, taxes, maint., and fees | | $ 23,530.00 | | | $ 10,000.00 | | $ 5,000.00 | | $ 5,000.00 | $ - | $ 43,530.00 | |
| Furuno Radar (cost-share 50%) | | $ 8,100.00 | | | | | | | | $ - | $ 8,100.00 | |
| IR Night-vision goggles | | $ 3,500.00 | | | | | | | | $ - | $ 3,500.00 | Additional night vision equipment. |
| Miscellaneous support equip + supplies | | $ 500.00 | | | | | | | | $ - | $ 500.00 | Additional IR and thermal equipment in FY10. |

| **Baseline Scenario** assumes actual take is as expected | **Year 1** | | | **Year 2** | | **Year 3** | | **Year 4** | | **Years 1-4 Totals** | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| **Conduct on-site radar and night-vision/thermal surveys to document sea bird interaction and response to turbines; 2 surveys in June and October using staff biologist and assistant** | $ 16,000.00 | | | | | | | | | $ 16,000.00 | $ - | |
| KWP Biologist (Greg Spencer) | | $ 8,000.00 | | | | | | | | $ - | $ 8,000.00 | Expenditures reflect personnel time on surveys, set-up, and logistics (2 surveys). |
| KWP Staff (Ian Bordenave) | | $ 4,000.00 | | | | | | | | $ - | $ 4,000.00 | Expenditures reflect personnel time on surveys, set-up, and logistics (2 surveys). |
| **Conduct searches to identify West Maui colonies in need of protection and implement protection measures - assume colonies found in first two years by staff biologist and intern** | $ 60,000.00 | | | $ 60,000.00 | | $ 15,000.00 | | $ 15,000.00 | | $ 150,000.00 | $ - | Some expenditures in this task are directed at project feasibility assessment in 2010 and were shared with Kahuku Wind Power and Kaheawa Wind Power II. |
| KWP Biologist (Greg Spencer) | | $ 10,000.00 | $ 10,000.00 | | $ 20,000.00 | | $ 10,000.00 | | $ 10,000.00 | $ - | $ 60,000.00 | Includes coordination, logistics, and field studies, reporting. |
| KWP Staff (Ian Bordenave) | | $ 4,000.00 | $ 4,000.00 | | $ 15,000.00 | | $ 5,000.00 | | $ 7,000.00 | $ - | $ 35,000.00 | Includes coordination, logistics, and field studies. |
| KWP Staff (David Medrano) | | | | | | | | | $ 5,000.00 | $ - | $ 5,000.00 | |
| KWP Staff (Mitch Craig) | | | | | | | | | $ 3,000.00 | $ - | $ 3,000.00 | |
| KWP Staff (H. Oppenheimer) | | $ 4,500.00 | | | | | | | | $ - | $ 4,500.00 | Preliminary field studies and historical reference material assemblage. |
| Radar surveys in West Maui | | | | | | | $ 1,500.00 | | $ 1,500.00 | $ - | $ 3,000.00 | Includes costs for radar lab (SUV rental) and digital data acquisition software. |

| **Baseline Scenario** assumes actual take is as expected | Year 1 | | | Year 2 | | Year 3 | | Year 4 | | Years 1-4 Totals | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| Camping and Field Equipment | | $ 4,000.00 | $ 1,000.00 | | $ 200.00 | | | | $ 500.00 | $ - | $ 5,700.00 | Includes costs for equipment, supplies, and food. |
| Flight Equipment | | $ 400.00 | $ 500.00 | | $ 500.00 | | | | | $ - | $ 1,400.00 | Flight suits, gloves, boots, Personal Protective/Safety Equipment. |
| Helicopter flights | | $ 4,000.00 | $ 6,000.00 | | $ 2,000.00 | | | | | $ - | $ 12,000.00 | This cost does not include cooperating agencies' cost-share. |
| Outreach and Cooperative Conservation Exchange | | $ 3,000.00 | $ 1,500.00 | | | | $ 3,000.00 | | $ 3,000.00 | $ - | $ 10,500.00 | This expense applies to Senior Wildlife Biologist's time developing collaborations, land access agreements, mitigation plan. |
| Predator traps, fence marking supplies | | | | | | | $ 1,500.00 | | | $ - | $ 1,500.00 | Live traps for predator removal, fence visibility enhancement. |
| **Contingency Fund** | $100,000.00 | $100,000.00 | | $ 2,500.00 | $ 2,500.00 | $ 2,562.50 | $ 2,562.50 | $ 2,626.00 | $ 2,626.00 | $ 107,688.50 | $ 107,688.50 | Included in Contingency Letter of Credit. |
| **Seabird Subtotal** | **$226,000.00** | **$177,530.00** | **$ 23,000.00** | **$ 62,500.00** | **$ 50,200.00** | **$ 17,562.50** | **$ 28,562.50** | **$ 17,626.00** | **$ 37,626.00** | **$ 323,688.50** | **$ 316,918.50** | |
| Hawaiian Hoary Bats: Potential take of 1 per year | | | | | | | | | | | | |
| **Conduct monthly 2-night surveys - staff biologists** | $ 10,000.00 | | | | | | | | | $ 10,000.00 | $ - | |
| KWP Biologist (Greg Spencer) | | $ 4,000.00 | $ 3,000.00 | | | | | | | $ - | $ 7,000.00 | Actual cost of survey effort, logistics, etc. |
| KWP Staff (Ian Bordenave) | | $ 2,000.00 | $ 3,000.00 | | | | | | | $ - | $ 5,000.00 | Actual cost of survey effort, logistics, etc. |
| **Up-front contribution to bat research cooperative** | $ 20,000.00 | $ 20,000.00 | | | | | | | | $ 20,000.00 | $ 20,000.00 | |
| **Contingency Fund** | $ 20,000.00 | $ 20,000.00 | | $ 500.00 | $ 500.00 | $ 512.50 | $ 512.50 | $ 525.31 | $ 525.31 | $ 21,537.81 | $ 21,537.81 | Included in Contingency Letter of Credit. |
| **Bat Subtotal** | **$ 50,000.00** | **$ 46,000.00** | **$ 6,000.00** | **$ 500.00** | **$ 500.00** | **$ 512.50** | **$ 512.50** | **$ 525.31** | **$ 525.31** | **$ 51,537.81** | **$ 53,537.81** | |

| **Baseline Scenario** assumes actual take is as expected | **Year 1** | | | **Year 2** | | **Year 3** | | **Year 4** | | **Years 1-4 Totals** | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| **Fatality Monitoring** | | | | | | | | | | | | |
| **Systematic Downed Wildlife Searches, Searcher Efficiency and Carcass Removal Studies** | $ 65,000.00 | | | $ 60,000.00 | | $ 15,000.00 | | $ 15,000.00 | | $ 155,000.00 | $ - | |
| KWP Biologist (Greg Spencer) | | $ 20,000.00 | $ 14,000.00 | | $ 18,000.00 | | $ 5,000.00 | | $ 5,000.00 | $ - | $ 62,000.00 | Actual cost of personnel performing searches, coordinating trials, and reporting. |
| KWP Staff (Ian Bordenave) | | $ 12,000.00 | $ 8,000.00 | | $ 20,000.00 | | $ 15,000.00 | | $ 10,000.00 | $ - | $ 65,000.00 | Actual cost of personnel performing routine searches and coordinating trials. |
| KWP Staff (David Medrano) | | | | | $ 15,500.00 | | $ 20,000.00 | | $ 20,000.00 | $ - | $ 55,500.00 | Wildlife monitoring Technician. |
| KWP Staff (Karl Mokross) | | | | | $ 15,500.00 | | $ 10,000.00 | | | $ - | $ 25,500.00 | Wildlife monitoring Technician. |
| KWP Staff (Mitch Craig) | | | | | | | | | $ 10,000.00 | | $ 10,000.00 | |
| Support equipment and supplies | | $ 2,000.00 | $ 3,000.00 | | $ 1,000.00 | | $ 300.00 | | $ 500.00 | $ - | $ 6,800.00 | Transect markers, Personal Protective Equipment, etc. |
| Northwest Wildlife Consultants (Training) | | $ 3,200.00 | | | | | | | | $ - | $ 3,200.00 | Initial training and orientation to standard protocols and techniques. |
| **Fatality Monitoring Subtotal** | $ 65,000.00 | $ 37,200.00 | $ 25,000.00 | $ 60,000.00 | $ 70,000.00 | $ 15,000.00 | $ 50,300.00 | $ 15,000.00 | $ 45,500.00 | $ 155,000.00 | $ 228,000.00 | |
| **Annual Subtotals** | $751,500.00 | $575,230.00 | $ 63,100.00 | $ 171,600.00 | $ 230,600.00 | $ 81,840.00 | $ 128,640.00 | $ 82,085.31 | $ 174,585.31 | $ 1,087,025.31 | $ 1,172,155.31 | |
| | | | | | | | | | | | | |
| | | | | | | | | Cumulative Budgeted **$1,087,025.31** | | | | |
| | | | | | | | | Cumulative Expended **$1,172,155.31** | | | | |

| **Additional Conservation Measures (Non-HCP Budgeted)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Baseline Scenario** assumes actual take is as expected | **Year 1** | | | **Year 2** | | **Year 3** | | **Year 4** | | **Years 1-4 Totals** | | Notes |
| | HCP Budget | Expenditures Aug, 2005 – Dec, 2006 (Previously Reported) | Expenditures January – June, 2007 (Previously Reported) | HCP Budget | Expenditures July 2007 – June 2008 (Previously Reported) | HCP Budget | Expenditures July 2008 - June 2009 (Previously Reported) | HCP Budget | Expenditures | HCP Budgeted Amounts | Actual Expenditures | |
| **Native vegetation reestablishment efforts** | | | | | | | | | | | | |
| Nursery propagation | | | | | $ 20,000.00 | | $ 45,000.00 | | | | $ 65,000.00 | |
| Contract outplanting | | | | | $ 15,000.00 | | $ 35,000.00 | | | | $ 50,000.00 | |
| Project Management (KWP Staff) | | | | | $ 10,000.00 | | $ 20,000.00 | | | | $ 30,000.00 | |
| **Subtotal** | | | | | $ 45,000.00 | | $ 100,000.00 | | | | $ 145,000.00 | |
| **On-site acoustic bat detection surveys** | | | | | | | | | | | | |
| Anabat acoustic data loggers | | | | | | | $ 15,000.00 | | | | $ 15,000.00 | |
| System monitoring and data analysis (KWP Staff) | | | | | | | $ 8,000.00 | | $ 4,000.00 | | $ 12,000.00 | |
| Summarizing results (KWP Staff) | | | | | | | $ 2,000.00 | | $ 1,000.00 | | $ 3,000.00 | |
| **Subtotal** | | | | | | | $ 25,000.00 | | $ 5,000.00 | | $ 30,000.00 | |
| **Annual Subtotals** | | | | | $ 45,000.00 | | $ 125,000.00 | | $ 5,000.00 | | $ 175,000.00 | |