

NĀ PUA MAKANI WIND ENERGY PROJECT
Habitat Conservation Plan
FY 2021 Annual Report
(July 1, 2020 – June 30, 2021)



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1.0 Introduction

Nā Pua Makani Power Partners, LLC (NPMPP) developed a Habitat Conservation Plan (HCP; Tetra Tech 2016) for the Nā Pua Makani Wind Energy Project (Project) and received a U.S. Fish and Wildlife Service (USFWS) incidental take permit on September 7, 2018 (ITP; TE63452B-0) and the Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) incidental take license on April 30, 2019 (ITL; ITL-21). Covered Species include:

- Hawaiian hoary bat (*Lasiurus cinereus semotus*) or ‘ōpe‘ape‘a,
- Newell’s shearwater (*Puffinus newelli*) or ‘a’o,
- Hawaiian goose (*Branta sandvicensis*) or nēnē,
- Hawaiian duck (*Anas wyvilliana*) or koloa maoli,
- Hawaiian coot (*Fulica alai*) or ‘alae ke‘oke‘o,
- Hawaiian gallinule (*Gallinula chloropus sandvicensis*) or ‘alae ‘ula,
- Hawaiian stilt (*Himantopus mexicanus knudseni*) or ae‘o, and
- Hawaiian short-eared owl (*Asio flammeus sandwichensis*) or pueo.

Project construction began in FY 2019 and continued into FY 2021. Concrete pouring for the first turbine foundation began on April 30, 2019 and coincides with the effective start date of the ITL. Project commissioning began on August 16, 2020, and commercial operations began on December 11, 2020. During commissioning Project components and the interconnection and transmission capabilities of the system are tested before the initiation of full commercial operation.

On behalf of NPMPP, Tetra Tech, Inc. (Tetra Tech) has prepared this report to describe activities relating to the Project HCP for the State of Hawaii fiscal year (FY) 2021,¹ from July 1, 2020 through June 30, 2021, pursuant to the terms and obligations of the approved HCP, ITL, and ITP. The Project has previously submitted annual HCP progress reports to DOFAW and USFWS for FY 2019 through FY 2020 (Tetra Tech 2019a, Tetra Tech 2020).

2.0 On-Site HCP-Related Management

2.1 Avoidance and Minimization

NPMPP has worked to minimize risk to wildlife through avoidance and minimization measures outlined in the HCP. In addition, NPMPP has implemented monitoring approaches to document potential impacts to wildlife. The measures and approaches have evolved consistent with the terms

¹ Fiscal year references in this report refer to the State of Hawaii fiscal year, which begins every July 1st and ends every June 30th.

of the HCP and in response to the Project's transition from construction, through testing, to commercial operations.

During FY 2021 final construction, with Project turbines not then operational, NPMPP implemented several actions to limit impacts, and identify and respond to downed wildlife:

- NPMPP avoided conducting nighttime construction or transportation work requiring lighting;
- NPMPP had security personnel perform periodic inspections for downed wildlife in the vicinity of Project security lights; and
- NPMPP conducted focused wildlife education trainings for personnel and contractors to increase the probability of incidental detection of downed wildlife and to communicate responsibilities for responding to observations (Section 2.9).

No night work requiring lights that could attract wildlife occurred in FY 2021; however, security lights were operated nightly during construction, between dusk and dawn, near the base of each turbine until a permanent security system could be installed. The temporary installation of these lights was due to vandalism at the Project and the need to address security and safety concerns. The height and position of security lights were checked by site personnel regularly to ensure they were positioned appropriately to minimize potential attraction of wildlife, while meeting project safety and security needs. These lights were maintained at 15 feet tall or less and angled downward to minimize the potential attraction of wildlife (Figure 1).² Security personnel conducted downed wildlife sweeps at sunrise each day in the vicinity of security lights. The results of the downed wildlife monitoring are presented in Section 2.7. New security measures that avoid the use of lights were implemented, and the use of security lights was ended on August 27, 2020.

Following the completion of construction, the Project goes through a commissioning phase during which a series of system performance tests are conducted to ensure that the power production and transmission system meet specified requirements. System performance tests can involve turbine rotor rotation which increases the potential for wildlife collisions. Therefore, upon the initiation of testing, NPMPP implemented additional avoidance and minimization measures including low wind speed curtailment as prescribed in the HCP to reduce the risk of collisions to bats and the voluntary installation of an ultrasonic bat deterrent system on four of the Project's eight turbines.

² Following the discovery of a Hawaiian petrel fatality on July 25, 2020 (see Section 2.7), the maximum mast height was reduced to 10 feet.



Figure 1. Security Light Deployed at Turbine 4

2.2 Downed Wildlife Monitoring

Downed wildlife monitoring at the Project consisted of two approaches during FY 2021: downed wildlife monitoring during construction and systematic fatality monitoring performed upon the initiation of turbine testing and operation. As described in Section 2.1, during construction, Project personnel conducted regular sweeps of turbine areas where wildlife could be downed as a result of collision or attraction to the security lights. Upon the initiation of turbine testing (during commissioning), NPMPP began conducting systematic searches at each of the Project turbines to document fatalities and allow for the development of estimates of potential impacts.

On August 7, 2020, NPMPP provided DOFAW and USFWS the Project's Post-construction Mortality Monitoring (PCMM) Implementation Plan, which described how the Project would implement the theoretical PCMM plan provided in the HCP based on the Project construction footprint, current land use patterns, and topography. The elements of the PCMM monitoring program used to estimate fatality rates of covered species include:

- The specific delineation of systematic search areas,
- Search frequency,
- Bias correction testing protocols (sections 2.3 – 2.4), and
- Methods and results for the calculation of the proportion of the carcass distributions planned for searching.

On August 26, 2020, the Project initiated standardized carcass searches according to the PCMM Implementation Plan, concurrent with the beginning of periodic turbine testing during the Project commissioning phase (August 16, 2020). While input had not yet been received from USFWS or DOFAW on the PCMM Implementation Plan, there was a need to implement a systematic monitoring approach suitable for yielding robust statistical estimates of take. NPMPP and Tetra Tech conducted a site visit with the USFWS and DOFAW on April 16, 2021, and the agencies provided input on the PCMM Implementation Plan in May and June 2021. NPMPP and Tetra Tech are working to incorporate additional information and commitments to address agency questions and concerns. Upon final review and agreement on the PCMM program with USFWS and DOFAW, NPMPP will make any required adjustments to the PCMM Implementation Plan and its future execution.

Under the PCMM Implementation Plan as performed in FY 2021, NPMPP conducted weekly searches with trained canine search teams within systematic search areas (Figure 2). These systematic search areas consist of areas that were cleared and graded during Project construction at each of the Project's eight turbines and can be practicably maintained in low-growing vegetation through mowing. Cleared and maintained areas include roads and pads and additional areas cleared during construction on low or moderate slopes that can be practicably maintained. In addition, as site conditions allow, the canine search team performs supplemental searches within active agricultural areas.



These supplemental areas are not always searchable,³ are highly variable in terms of the vegetative growth, evolve quickly, and are relatively small. These challenges mean that fatalities found within them cannot contribute effectively to fatality estimates. As such, these supplemental searches provide opportunities for an improved understanding of the carcass distribution at the site and the establishment of more robust lower bounds of fatality estimates.

2.3 Carcass Persistence Trials

Four, 28-day carcass persistence trials were conducted in FY 2021 using black rats (*Rattus rattus*) for Hawaiian hoary bat surrogates, and chukars (*Alectoris chukar*) or wedge-tailed shearwater (*Ardenna pacifica*) carcasses collected or procured under the Project's Special Purpose Utility Permit (MB79835D-0) and Hawaii Protected Wildlife Permit (WL20-18) as surrogates for the avian Covered Species. In FY 2021, the probability that a carcass persisted until the next search was 0.77 for bat surrogates and 0.72 for avian Covered Species surrogates (Table 1). The probability of carcass persistence increased once scavenger trapping was implemented in February of 2021 (Section 2.6) from an estimate of 0.71 for bat surrogates and 0.62 avian Covered Species surrogates at the end of December 2020 (FY 2021 Quarter (Q)2).

2.4 Searcher Efficiency Trials

A total of 111 searcher efficiency trials over 12 trial days were administered during FY 2021. Similar to the carcass persistence trials, black rats were used as surrogates for bats, and chukars or wedge-tailed shearwaters as surrogates for avian Covered Species. Searcher efficiency trials occurred approximately monthly throughout the year beginning in Q1 FY 2021. All trials tested canine search teams in FY 2021, as no un-aided human searches occurred in FY 2021. Of the 111 trials placed, 16 bat surrogates and four chukars were not available for detection.⁴ The probability that an available carcass would be detected was 1.00 for avian Covered Species and bat surrogates (Table 1). The proportion of carcasses available for detection increased following the implementation of scavenger trapping from 75.8 percent available prior to the implementation of trapping to 89.8 percent following the implementation of trapping (Section 2.6).

³ Some supplemental search areas regularly or occasionally have loose dogs which threaten the safety of the canine search team. Similarly, other conditions, such as the periodic application of herbicide or other chemicals, may make searching a supplemental search area unsafe or impractical during a particular week.

⁴ Carcasses not available for detection are those that were not detected by the search team, and upon investigation by the testing proctor, could not be found, indicating the carcass had likely been scavenged prior to the search.

Table 1. Cumulative Searcher Efficiency (SEEF) and Carcass Persistence (CARE) Trial Results FY 2021

Size	Total Trials		Mean (95% Confidence Interval)	
	SEEF	CARE	SEEF (Proportion Detected) ¹	Probability of Persistence to the Next Search (<i>r</i>) ²
Bat Surrogate	47	40	1.00 (0.95–1.00)	0.77 (0.62–0.88)
Medium Bird	44	36	1.00 (0.95–1.00)	0.72 (0.60–0.83)
1. Estimates and 95 percent confidence interval calculated using Dalthorp et al. (2017) single year module. 2. The estimate of <i>r</i> is reported in lieu of carcass persistence time, as <i>r</i> provides a more informative portrayal of the effect of carcass persistence on fatality estimates, incorporating information from the carcass persistence distribution and the search interval in a single variable. Estimates and confidence interval for <i>r</i> calculated using Dalthorp et al. (2017) single year module.				

2.5 Vegetation Management

Mowing within each of the eight search plots is currently occurring on an as-needed basis; staff perform vegetation management around turbines weekly following the completion of scheduled fatality monitoring searches. This effort maintains vegetation at heights below approximately 8 inches within the systematic search areas at each turbine.

2.6 Scavenger Trapping

NPMPP has contracted a scavenger control program at the Project to extend carcass persistence times and contribute to a high probability of a carcass persisting until the next search. The program began trapping February 12, 2021.⁵ Traps are checked approximately every two weeks. Active trapping occurred at all eight turbines and throughout the Project area using 90 DOC250 and 10 Steve Allan traps. The scavenger control program documented the removal of 486 mongooses (*Herpestes auropunctatus*), 13 rats (*Rattus* spp.), seven mice (*Mus musculus*), three feral cats (*Felis cattus*), and four non-target species in FY 2021. Under this program, trapping rates have dropped to approximately 25 percent of the initial rate (Table 2). Implementation of the program coincides with increased probability of carcass persistence (Section 2.3) and increased availability of searcher efficiency trial carcasses (Section 2.4).

⁵ The deployment of traps was delayed from Q2 FY 2021 to Q3 as a result of COVID-19-associated shipping delays.

Table 2. Scavenger Trapping Results at the Project in FY 2021

Trap Check Date ¹	Mongoose per Trap	Cats per Trap	Rats per Trap	Non-Target Species per Trap	Active Traps per Check ²
2/19/2021	0.81	0.01	0.00	0.00	106
2/26/2021	0.59	0.00	0.00	0.00	108
3/5/2021	0.47	0.00	0.00	0.00	99
3/19/2021	0.55	0.01	0.00	0.00	97
4/9/2021	0.65	0.00	0.02	0.01	96
4/16/2021	0.41	0.01	0.01	0.02	100
4/30/2021	0.26	0.00	0.01	0.01	100
5/14/2021	0.24	0.00	0.04	0.02	97
5/28/2021	0.36	0.00	0.03	0.04	96
6/18/2021	0.29	0.00	0.00	0.01	96
6/25/2021	0.21	0.00	0.02	0.01	98
1. Traps deployed February 12, 2021 2. Active traps exceed the 100 deployed traps when traps were checked and reset between comprehensive trap checks. Traps were less than 100 when traps were damaged, lost, or malfunctioned.					

2.7 Documented Fatalities and Monitoring Results

No take of HCP Covered Species was documented in FY 2021. All observed downed wildlife were handled and reported in accordance with the USFWS and DOFAW Downed Wildlife Protocol (DOFAW and USFWS 2020). NPMPP documented 26 wildlife incidents in FY 2021 (Table 3). The documented wildlife incidents included one Hawaiian petrel (*Pterodroma sandwichensis*), two wedge-tailed shearwaters, two house finches (*Haemorrhous mexicanus*), two cattle egrets (*Bubulcus ibis*), and one Pacific golden-plover (*Pluvialis fulva*). Each of these species are protected under the Migratory Bird Treaty Act, and the Hawaiian petrel is also listed as endangered under the Endangered Species Act, as amended. Based on the observation of the Hawaiian petrel fatality, NPMPP is working with USFWS and DOFAW to amend its HCP to add the Hawaiian petrel as a Covered Species (Section 5.0).

Table 3. Observed Fatalities, Locations, and Detection Method in FY 2021 at the Project

Species	Date	Turbine Number	Distance to the Turbine (meters)	Detection Method ¹
<i>Pterodroma sandwichensis</i> (Hawaiian petrel)	7/25/2020	9	37	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	8/6/2020	6	0.8	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	8/14/2020	7	0.6	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	8/16/2020	8	1	Incidental
<i>Ardena pacifica</i> (wedge-tailed shearwater)	8/27/2020	7	25	Incidental
<i>Haemorhous mexicanus</i> (house finch)	9/16/2020	4	10	Search
<i>Lonchura punctulata</i> (scaly-breasted munia)	9/28/2020	3	8	Search
<i>Geopelia striata</i> (zebra dove)	11/4/2020	2	2	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	11/12/2020	2	2	Incidental
<i>Ardena pacifica</i> (wedge-tailed shearwater)	11/15/2020	8	13	Incidental
<i>Bubulcus ibis</i> (cattle egret)	12/2/2020	7	27	Search
<i>Lonchura punctulata</i> (scaly-breasted munia)	12/26/2020	7	2	Incidental
<i>Estrilda astrild</i> (common waxbill)	12/27/2020	8	94	Incidental
<i>Pluvialis fulva</i> (Pacific golden-plover)	12/30/2020	6	53	Search
<i>Lonchura punctulata</i> (scaly-breasted munia)	12/31/2020	1	2	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	1/26/2021	2	2	Incidental
<i>Estrilda astrild</i> (common waxbill)	2/10/2021	4	1	Search
<i>Haemorhous mexicanus</i> (house finch)	2/10/2021	2	34	Search
<i>Spilopelia chinensis</i> (spotted dove)	2/23/2021	2	1	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	2/28/2021	9	3	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	3/23/2021	4	1	Incidental
<i>Estrilda astrild</i> (common waxbill)	3/31/2021	3	3	Search
<i>Spilopelia chinensis</i> (spotted dove)	4/21/2021	8	1	Search
<i>Spilopelia chinensis</i> (spotted dove)	4/26/2021	9	2	Incidental
<i>Bubulcus ibis</i> (cattle egret)	6/5/2021	6	32	Incidental
<i>Spilopelia chinensis</i> (spotted dove)	6/15/2021	7	8	Incidental
1. Weekly systematic searches by a trained canine search team were conducted beginning August 26, 2020. Turbine testing in which turbines began operating periodically as part of Project commissioning began on August 16, 2020. Incidental detections are downed wildlife incidents detected outside of the systematic search effort, including detections outside of the defined systematic search areas but found during a search effort.				

2.8 Invasive Species Management Surveys

In FY 2019 NPMPP developed an invasive species management plan to limit the potential impacts of invasive species. Consistent with HCP requirements, NPMPP coordinated with the O'ahu Invasive Species Committee to identify and implement measures to minimize the risk of introducing devil weed (*Chromolaena odorata*) to the Project area. Approaches to minimize risk include periodic site inspections by qualified personnel to search for the presence of plants and cleaning of equipment used in the Project area.

In FY 2021 Tetra Tech performed an invasive species survey at the Project December 17 – 18, 2020. Surveyors found devil weed in multiple areas across the Project Area, including within the systematic search areas at Turbines 3, 6, and 7. The presence of devil weed was particularly large at Turbine 6 with roughly 100 seedlings observed spread across an approximately 6,000-square meter area. At each of these locations, mature flowering plants several feet tall were observed as well as small seedling plants only a few inches in height. In addition to the observations of devil weed within the systematic search areas of the three previously mentioned turbines, it was also observed at several other isolated locations.

Based on input from O'ahu Invasive Species Committee, devil weed is well-established in the area and land managers should work to minimize the risk of spread of the weed through control of known populations and appropriate decontamination measures. NPMPP manages the devil weed within the Project footprint through a combination of hand removal, herbicide, and mowing. Herbicide cannot be used within the systematic search areas to protect the health and safety of the canine search team. Hand pulled specimens are bagged and incinerated. NPMPP continues to monitor and manage known infestations and monitor for the presence of devil weed in new locations. The canine search team and project biologist follow decontamination protocols to clean field gear following potential exposure to devil weed seed sources.

2.9 Wildlife Education and Incidental Reporting System

NPMPP implemented a Wildlife Education and Incidental Reporting Program for contractors and Project staff working at the Project during construction and operation. This training enables contractors and staff to identify the Covered Species that may occur at the Project site by providing staff with printed reference materials that include photographs of each of the Covered Species, information on their biology and habitat requirements, threats to the species onsite, and avoidance and minimization measures of the HCP. Project staff and contractors are responsible for awareness of wildlife activity onsite and responding to and treating wildlife appropriately. Project personnel and contractors are responsible for documenting any Project-related wildlife incidents and reporting any downed wildlife to the on-site manager.

Thirteen Project personnel or subcontractors were trained through this program in FY 2021. Downed wildlife observations found during systematic searches were supplemented by eighteen incidental downed wildlife observations reported in FY 2021 by Project personnel or subcontractors trained through the Wildlife Education and Incidental Reporting Program (Table 3).

3.0 Mitigation and Related Activities

The Project's mitigation requirements are described in Section 6.0 of the HCP (Tetra Tech 2016).

3.1 Hawaiian Hoary Bat

3.1.1 Poamoho Management Area Research and Management Plans

The mitigation plan for the Hawaiian hoary bat in the HCP includes preparation of research and management plans targeting actions that will improve and protect bat habitat in the Poamoho Management Area and study the effectiveness of habitat restoration activities on improving the availability of bat food resources, increasing bat activity, or other appropriate variables. Plans are to be completed within one year of commercial operation (December 2021). NPMPP and Tetra Tech are working with the Ko'olau Mountain Watershed to prepare management and research plans for review and approval by USFWS, DOFAW, and the ESRC.

3.1.2 Bat Deterrent Research Plan

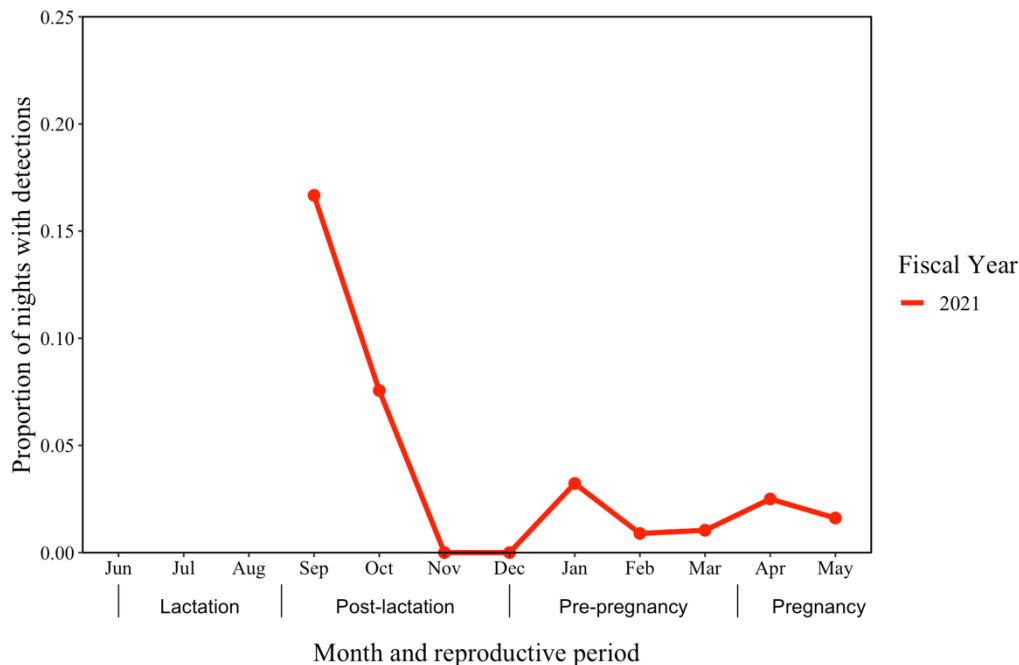
The ITL includes a special condition requiring NPMPP to perform a research focused on bat deterrence measures with the goal of reducing the bat take at wind turbines. NPMPP and Tetra Tech have consulted with DOFAW on their priorities for this research, potential challenges, and possible research approaches. Based on this input, NPMPP and Tetra Tech are preparing a research plan for review and approval by DOFAW. Results of this research will be reported in the HCP annual reports for the duration of the approved research project.

3.1.3 On-Site Acoustic Surveys

The Project commenced commercial operation on December 11, 2020. As part of the HCP the Project commits to performing acoustic monitoring for Hawaiian hoary bat activity for an undefined period during operation (Section 4.2.2 of the HCP, Tetra Tech 2016). Beginning in September 2020 bat activity was monitored at four locations (turbines 1, 4, 6, and 9; Figure 2) using ground-based recording units. Land use within the vicinity (75% MBTH Plot) of sampled turbines include only undeveloped land at turbines 1 and 4, and both agricultural land and undeveloped land at turbines 6 and 9 (Figure 2). Recording units consisted of a Song Meter SM4BAT-FS ultrasonic acoustic recorder equipped with high frequency microphones (SMM-U2; Wildlife Acoustics, Inc., Maynard, Massachusetts), elevated 3 meters above the ground on poles and powered by 12 v/36 amp-h batteries connected to 30 w/12 v Sun Saver Solar Panels (Morningstar Corp, Newton, Pennsylvania). All units were set to record nightly bat activity beginning 1 hour before sunset and end 1 hour after sunrise. Monitoring site locations were selected to provide the best spatial distribution across the Project and representation of the habitats (e.g., mature forest, agriculture, and gulch).

Bat activity at the Project is generally low. Across the four turbines monitored during FY 2021 (June 2020 to May 2021), Hawaiian hoary bats were only detected on 26 nights out of the 969 (2.68 percent) detector-nights sampled.⁶ The highest detection rates occurred at the beginning of the survey period in September (16.67 percent) and October (7.56 percent) of the post-lactation reproductive period,⁷ with the peak activity period occurring in September. Following the peak, bat activity declined in the second half of the post-lactation reproductive period with zero detections occurring in the months of November and December. Bat activity was observed again beginning in January of the pre-pregnancy reproductive period and continued at lower rates (between 0.89 to 3.22 percent) through May of the pregnancy reproductive period (Figure 3).

Detection rates varied among the four sampling locations. During the post-lactation reproductive period detection rates were highest at sites Turbine 6 and Turbine 1 in the month of September. In October detections rates increased at Turbine 4, while decreasing at all of the other sites (Figure 3). Throughout the pre-pregnancy period bat activity primarily occurred at Turbine 1 with low levels of activity at Turbine 4 during the month of January. During the pregnancy reproductive period activity decreased at Turbine 1 and increase at Turbine 6 and Turbine 4. No activity was observed at Turbine 9 after the month of October in the post-lactation reproductive period (Figure 4).



⁶ USFWS and DOWAF approved the reporting of bat acoustic monitoring results on a June 1 – May 31 annual cycle to allow for adequate data review and analysis prior to the annual report submittal deadline of August 1.

⁷ Reproductive periods correspond approximately with reproductive periods as defined by Gorresen et al. (2013).

Figure 3. Monthly Bat Acoustic Activity at Nā Pua Makani for FY 2021 with Corresponding Reproductive Periods

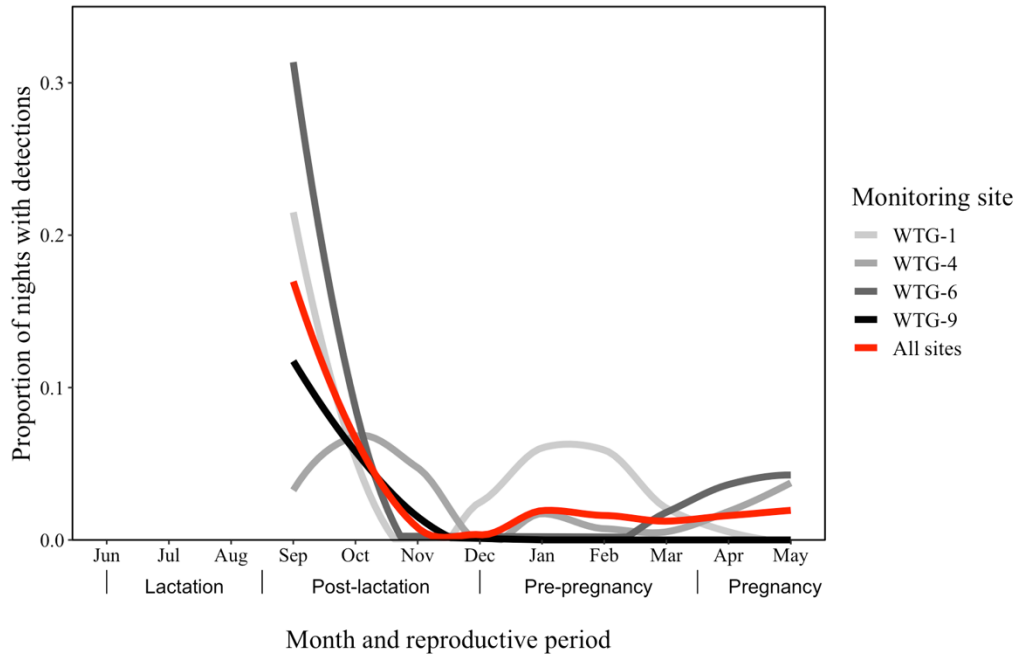


Figure 4. Site-Specific Variation in Detection Rates for Each Month of FY 2021 with Corresponding Reproductive Periods

Note: Trend Lines are fitted with Loess smoothing curve; see Figure 2 for spatial context.

3.2 Newell's Shearwater

NPMPP provided required mitigation funds to the National Fish and Wildlife Foundation (NFWF) on September 22, 2020. NPMPP will report results from the Newell's shearwater mitigation efforts once NFWF identifies and funds an appropriate mitigation project.

3.3 Hawaiian Goose

Some adaptive management of the Hawaiian goose mitigation program is required (Section 4.0). NPMPP is actively working with USFWS, DOFAW, and USFWS Refuges to identify appropriate updates to the mitigation framework for this species.

3.4 Hawaiian Waterbirds

Some adaptive management of the Hawaiian waterbird mitigation program is required (Section 4.0). NPMPP is actively working with USFWS, DOFAW, and DOFAW O'ahu Branch to identify appropriate updates to the mitigation framework for these species.

3.5 Hawaiian Short-eared Owl

NPMPP provided required mitigation funds to the Endangered Species Trust Fund on September 18, 2020, and an MOU for use of the funds and reporting requirements was finalized with DOFAW on February 18, 2021. DOFAW used the funds provided by NPMPP to fund a graduate research project on Hawaiian short-eared owl breeding ecology (pers. comm. Afsheen Siddiqi, October 2021). NPMPP will report updates and results from this effort in future annual reports, as they become available.

4.0 Adaptive Management

NPMPP has identified several adaptive management actions for the Project and has coordinated closely with USFWS and DOFAW to document needs and ensure agency support for the identified actions. Adaptive management actions identified by NPMPP include:

- Limited deployment of ultrasonic acoustic bat deterrents to test their efficacy at the Project;
- Modifications to the waterbird mitigation plan described in the HCP to address changed conditions at Hāmākua Marsh (the proposed mitigation site); and
- Consideration of adjustments to the Hawaiian goose mitigation program to address changed conditions relating to the status of the Hawaiian goose on O’ahu and changed conditions at James Campbell National Wildlife Refuge (the proposed mitigation site).

In consultation with USFWS and DOFAW, NPMPP has voluntarily installed ultrasonic acoustic bat deterrents on four Project turbines based on available scientific research and preliminary results from the Kawailoa Wind Farm on O’ahu (Tetra Tech 2019b, Weaver et al. 2019). Deterrents became operational between September 17 and 28, 2020.

USFWS and DOFAW have agreed that a modified waterbird mitigation program implemented at Hāmākua Marsh that reduces fatalities and/or increases productivity of the resident waterbird species is appropriate, as the fencing, public outreach, and staffing program identified in the HCP is no longer viable due to changed site conditions and development plans. NPMPP and Tetra Tech are working with DOFAW’s O’ahu staff to prepare an adaptive management plan for agency approval.

USFWS and DOFAW have agreed that NPMPP may proceed with a fencing project at James Campbell National Wildlife Refuge for Hawaiian goose mitigation. However, some modifications to the proposed fenced area may be required to account for fencing that has been installed since the approval of the HCP. While the Hawaiian goose, is not currently a resident on O’ahu, it is possible that a Hawaiian goose population will re-establish itself at this site over the Project term. In the meantime, construction of the fence will provide ancillary benefits to wildlife at the refuge. NPMPP and Tetra Tech are working with USFWS Refuges’ and agency HCP staff to identify changes in fencing at James Campbell National Wildlife Refuge since the approval of the HCP to identify appropriate locations for new fence construction that will meet Project requirements.

5.0 Agency Meetings, Consultations, and Site Visits

NPMPP and Tetra Tech communicated actively with USFWS, and DOFAW throughout FY 2021 through in-person meetings, conference calls, and e-mail communications related to the Project's HCP. The purposes of these communications included required semi-annual meetings, and planning associated with avoidance and minimization measures, monitoring, and mitigation. A summary of agency coordination is provided in Table 4.

Table 4. Summary of Key Agency Coordination and Communication in FY 2021

Date	Description	Participants/Recipients
July 3, 2020	Bat acoustic monitoring plan submittal	USFWS, DOFAW
July 31, 2020	HCP annual report submittal	USFWS, DOFAW
August 7, 2020	PCMM implementation plan submittal	USFWS, DOFAW
September 18, 2020	Payment for Hawaiian short-eared owl mitigation submitted to DOFAW	DOFAW
September 22, 2020	Payment for Newell's shearwater mitigation submitted to NFWF	USFWS, NFWF
October 19, 2020	HCP implementation review meeting (in person)	NPMPP, Tetra Tech, USFWS, DOFAW
January 13, 2021	HCP amendment planning discussion	NPMPP, Tetra Tech, USFWS, DOFAW
January 27, 2021	Project HCP annual report submitted to Endangered Species Recovery Committee	Tetra Tech, USFWS, DOFAW
January 28, 2021	Documentation of need for adaptive management of waterbird mitigation program	USFWS, DOFAW
February 18, 2021	MOU for Hawaiian short-eared owl mitigation finalized	NPMPP, DOFAW
April 16, 2021	PCMM site visit	NPMPP, Tetra Tech, USFWS, DOFAW
April 22, 2021	PCMM site visit follow-up	NPMPP, Tetra Tech, USFWS, DOFAW
May 3, 2021	HCP implementation review meeting (conference call)	NPMPP, Tetra Tech, USFWS, DOFAW
May 3, 2021	GIS files of final delineation of PCMM systematic search area submittal	USFWS, DOFAW
May 12, 2021	Comments received from DOFAW on PCMM implementation plan	NPMPP, Tetra Tech
May 18, 2021	GIS files of Project infrastructure and HCP implementation components submittal	USFWS, DOFAW
May 24, 2021	DOFAW O'ahu Branch Hāmākua Marsh adaptive management planning	NPMPP, Tetra Tech, DOFAW O'ahu Branch
June 7, 2021	Hawaiian goose mitigation planning	NPMPP, Tetra Tech, USFWS
June 7, 2021	Hawaiian goose mitigation planning	Tetra Tech, USFWS Refuges
June 15, 2021	Comments received from USFWS on PCMM implementation plan	NPMPP, Tetra Tech, DOFAW

Date	Description	Participants/Recipients
June 23, 2021	Hawaiian goose mitigation planning	NPMPP, Tetra Tech, DOFAW, USFWS, USFWS Refuges

6.0 Expenditures

Total HCP-related expenditures for the Project in FY 2021 were \$430,238. A summary of expenditures by category is provided in Table 5.

Table 5. HCP-related Expenditures at the Project in FY 2021

Category	Amount
Permit Compliance	\$95,507
Fatality Monitoring	\$88,535
Acoustic Monitoring for Bats	\$22,744
Vegetation Management	\$67,500
Scavenger Trapping	\$35,526
Bat Mitigation Planning	\$26,938
Newell's Shearwater Mitigation Funding	\$160,800
Hawaiian Short-eared Owl Mitigation Funding and Coordination	\$27,020
Other Mitigation Planning and Coordination	\$7,950
Total Cost for FY 2021	\$532,521

7.0 FY 2021 HCP Implementation Work Plan

NPMPP's FY 2021 HCP implementation work plan is provided as Table 6.

Table 6. FY 2021 HCP Implementation Work Plan

Program	Component	FY 2022			
		Q1	Q2	Q3	Q4
PCMM	Fatality Searches	Weekly searches throughout FY			
	Bias Correction Trials	Searcher efficiency and carcass persistence trials	Searcher efficiency and carcass persistence trials	Searcher efficiency and carcass persistence trials	Searcher efficiency and carcass persistence trials
	Scavenger Control	Initial trap checks every ~2 weeks, quarterly evaluation to assess changes in schedule			
	Vegetation Management	Occurs shortly after completion of searches, search areas evaluated weekly and managed as needed			
Bat Acoustic Monitoring	Data downloads and Equipment Checks	Download data and equipment check monthly			
Bat Deterrents	Maintenance	Maintain operational deterrents on 4 turbines			
	Research Study	Draft research plan			
		Implement research plan			
Mitigation	Nene	Planning		Implementation	
	Waterbirds	Planning		Implementation	
	Newell’s Shearwater	Coordinate with USFWS regarding mitigation progress and reporting			
	Hawaiian Hoary Bat	Plan preparation	Research plan and management plan approvals	Implementation	
	Hawaiian Short-eared Owl	Coordinate with DOFAW regarding mitigation progress and reporting			
Reporting	Wildlife Incidents	As required per DOFAW and USFWS 2020 protocol			
	Regular Reporting	FY 2020 annual report	Semi-annual agency meeting	ESRC annual review	Semi-annual agency meeting

8.0 References

- DOFAW and USFWS (Hawaii Division of Forestry and Wildlife and U.S. Fish and Wildlife Service). 2020. Standard Protocol for Holders of a State of Hawai'i Incidental Take license and U.S. Fish and Wildlife Service Incidental Take Permit Responding to Dead or Injured Birds and Bats that are Threatened and Endangered Species or MBTA species. Revised August 27, 2020.
- Gorresen, P.M., Bonaccorso, F., Pinzari, C., Todd, C., Montoya-Aiona, K. and Brinck, K. 2013. A Five Year Study of Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) Occupancy on the Island of Hawaii. Hawai'i Cooperative Studies Unit. Technical Report HCSU-041.
- Tetra Tech (Tetra Tech, Inc.). 2016. Nā Pua Makani, Final Habitat Conservation Plan. Document prepared for Nā Pua Makani, LLC.
- Tetra Tech. 2019a. Nā Pua Makani Wind Energy Project Habitat Conservation Plan FY 2019 Annual Report. Prepared for Nā Pua Makani Power Partners, LLC.
- Tetra Tech. 2019b. Kawailoa Wind Habitat Conservation Plan FY 2019 Annual Report. Prepared for Kawailoa Wind, LLC.
- Tetra Tech. 2020. Nā Pua Makani Wind Energy Project Habitat Conservation Plan FY 2019 Annual Report. Prepared for Nā Pua Makani Power Partners, LLC.
- Weaver, S., C. Hein, T. Simpson, and I. Castro-Arellano. 2019. Testing ultrasonic acoustic deterrents for reducing bat fatalities at wind turbines in south Texas. Proceedings of the National Wind Coordinating Collaborative, Wind-Wildlife Research Meeting, XII, 27–30 November 2018, St. Paul, Minnesota, USA. National Wind Coordinating Collaborative, Washington, D.C., USA.