Kaheawa Wind Power
Habitat Conservation Plan
FY 2025 Annual Report

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Incidental Take License ITL-08/ Incidental Take Permit TE118901-1

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Executive Summary

This report summarizes work performed by Kaheawa Wind Power, LLC (KWP I), owner of the Kaheawa Wind Power I Project (Project), during the State of Hawai‘i fiscal year (FY) 2025 (July 1, 2024 – June 30, 2025) under the terms of the approved Habitat Conservation Plan (HCP). The HCP was approved in January 2006 and describes KWP I’s compliance obligations under Project’s state Incidental Take License (ITL-08) and federal Incidental Take Permit (TE118901-1). Species covered under the HCP include four federally and state-listed threatened and endangered species (Covered Species). The 20-turbine Project was constructed in 2005 and 2006 and has been operating since June 22, 2006.

Wildlife fatality monitoring in FY 2025 continued within search plots limited to cleared areas within 70 meters of each Wind Turbine Generator (WTG). Canine-handler teams searched each of the fatality monitoring search plots once per week year-round. Bias correction trials were conducted quarterly at the Project to measure the probability that a carcass would persist until the next search (carcass persistence) and the probability that an available carcass would be found (searcher efficiency) by a canine search team. In FY 2025, mean probabilities of a carcass persisting until the next search were 0.87 (bat surrogates), 1.00 (nēnē surrogates), and 0.98 (seabird surrogates). Searcher efficiency was 1.00 for nēnē and seabird surrogates and 0.98 for bat surrogates.

No fatalities of Covered Species were detected in FY 2025. Since the commencement of operations, the Project’s total observed direct take of Covered Species has been 13 ‘ōpe‘ape‘a, 35 nēnē, and 8 ‘ua‘u. The fatality estimates using the Evidence of Absence estimator at the upper 80 percent credibility level are estimated at less than or equal to 28 ‘ōpe‘ape‘a, 54 nēnē, and 19 ‘ua‘u. Rounded up indirect take estimates for the Covered Species are four ‘ōpe‘ape‘a, two nēnē, and five ‘ua‘u. Combining these values, there is an approximately 80 percent chance that cumulative take of Covered Species at the Project since the beginning of operations through FY 2025 was less than or equal to 32 ‘ōpe‘ape‘a, 56 nēnē, and 24 ‘ua‘u.

The bat acoustic monitoring program captured bat activity across the Project at five detector locations throughout FY 2025. Between July 2024 and June 2025, ‘ōpe‘ape‘a were detected on 111 out of 1,350 detector-nights sampled (8.2 percent). Detection rates increased during the months of August and September, during the lactation and post-lactation reproductive periods. The seasonal pattern of detection rates was similar to previous years, and similar to the detection rate observed at the adjacent Kaheawa II Wind Project (KWP II) in FY 2025.

Mitigation obligations have been met for three of the four Covered Species. The ‘ōpe‘ape‘a baseline (Tier 1) and Higher level of take (Tier 2) mitigation funding obligations were met prior to this fiscal year; current estimated take remains within Higher level of take (Tier 2). KWP I’s nēnē current estimate of take remains within Tier 1. Tier 1 mitigation is ongoing as propagation efforts at the Haleakalā Ranch nēnē release pen, with additional mitigation planning for release pen management at the Pu‘u O Hōkū Ranch release pen occurring throughout FY 2025 in conjunction with the USFWS

and DOFAW. USFWS and DOFAW have provided concurrence that the Tier 2 mitigation obligation had been met for the ʻuaʻu based on outcomes of the 2022 breeding season on Lānaʻi. The Tier 1 mitigation obligation for the ʻaʻo was met prior to FY 2025 based on outcomes of the 2022 breeding season at Makamakaʻole. To date, no observed take of the ʻaʻo has occurred at KWP I.

KWP I continues to communicate actively with USFWS and DOFAW. Biweekly check in calls with both agencies occurred throughout FY 2025 in addition to the submittal of quarterly reports, in-person meetings, and email communications related to the Project's HCP. The purpose of these communications included required semi-annual and annual HCP implementation meetings, new HCP development as the end of the permit term approaches, and discussions of all components of mitigation.

Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

The Hawaii Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW) and U.S. Fish and Wildlife Service (USFWS) approved the Kaheawa Wind Project I (Project) Habitat Conservation Plan (HCP) in 2006. Kaheawa Wind Power, LLC (KWP I) was issued a federal Incidental Take Permit (ITP; TE72434A-1) from the USFWS and a state Incidental Take License (ITL; ITL-08, Amendment 2) from the DLNR in January of 2006. The ITP and ITL cover the incidental take of four federally and state-listed threatened and endangered species (referred to as the Covered Species) over a 20-year permit term.

The Covered Species[1] include the:

- ʻŌpeʻapeʻa (Hawaiian hoary bat; *Lasiurus cinereus semotus*);
- Nēnē (Hawaiian goose; *Branta sandvicensis*);
- ʻUaʻu (Hawaiian petrel, *Pterodroma sandwichensis*); and
- ʻAʻo (Newell's shearwater, *Puffinus newelli*).

The HCP frames take levels and mitigation as "Baseline Take" and "Higher Take." Hereafter, this document refers to Baseline Take as Tier 1 and Higher Take as Tier 2. The ITP and ITL were amended in 2012 to reduce the permitted take of seabirds, and then again in 2015/2016 to increase the permitted take of ʻōpeʻapeʻa.

The Project was constructed in 2005 and 2006 and was commissioned to begin operating on June 22, 2006. The Project continues to be operated by KWP I. KWP I and Tetra Tech, Inc. (Tetra Tech) have collaborated to prepare this progress report to describe the work performed for the Project during the State of Hawaiʻi 2025 fiscal year (FY 2025; July 1, 2024– June 30, 2025) pursuant to the terms and obligations of the approved HCP, ITL, and ITP. KWP I has previously submitted annual HCP progress reports for FY 2007 through FY 2024 to the USFWS and DOFAW (KWP I 2007, KWP I 2008, KWP I 2009, KWP I 2010, KWP I 2011, KWP I 2012, KWP I 2013, KWP I 2014, KWP I 2015, KWP I 2016, KWP I 2017, KWP I 2018, Tetra Tech 2019, Tetra Tech 2020, Tetra Tech 2022a, Tetra Tech 2022b, Tetra Tech 2023, KWP I 2024).

2.0 Fatality Monitoring

The Project has implemented a year-round intensive fatality monitoring program to document downed (i.e., injured or dead) wildlife incidents involving Covered Species and other species at the Project since operations began in June 2006. In consultation with USFWS, DOFAW, and the

[1] A fifth listed species, the assimulans yellow-faced bee (*Hylaeus assimulans*), has been documented at the site and KWP I was informed of this discovery by DOFAW entomologists in April 2025. This species will be covered in the next HCP upon expiration of the existing ITP and ITL in January 2026, along with the ʻakēʻakē (band-rumped storm petrel; *Oceanodroma castro*).

Endangered Species Recovery Committee (ESRC), fatality search areas have evolved over time from the start of operations through the initiation of the current approach, established in April 2015. The last modifications were in response to the March 31, 2015, ESRC meeting, wherein members agreed to "encourage the applicant to work with the statistical experts and researchers to develop an alternative more efficient and focused monitoring strategy which still meets the committee's expressed preference for continuation of annual monitoring." The evolution of the searched areas in which fatality monitoring occurred (search plots) included:

- In June 2006, search plots were 180-meter by 200-meter rectangles centered on each of the Project's 20 wind turbine generators (WTG).
- On October 1, 2010, search plots were reduced to 73-meter radius circular plots centered on each WTG, except where steep slopes prohibited visual searching.
- Since April 2015, search plots were reduced to the graded WTG pads and access roads that fall within a 70-meter radius circle centered on each of the Project's 20 WTGs (Search Area; Figure 1). This search area continues to be used for monitoring in FY 2025; density weighted proportions (DWP) of the carcass distribution searched are presented in Appendix 1 (analysis and development presented in the FY 2018 annual report).

In FY 2025, all 20 WTGs were searched for fatalities once per week. The FY 2025 mean search interval for all WTGs was 7.0 days (*SD* = 0.0). The search plots were searched by a canine search team which included a trained detector dog accompanied by a handler. Should search conditions prevent the use of dogs (e.g., weather, injury, availability of canine search team, etc.), search plots would be visually surveyed by Project staff. In FY 2025, all searches were conducted by canine teams and no visual searches occurred.

No Covered Species were found in FY 2025, and fatalities of other species including those protected under the Migratory Bird Treaty Act (MBTA) are reported in Section 7.4.

Additionally, KWP I tracks observations of live nēnē on site when they overlap with the timing of fatality searches. Because individual nēnē are not banded, KWP I provides a count of individuals observed, however, individuals are likely counted mulitple times throughout the year. In FY 2025, a total of 45 observations were made of 97 (non-distinct) individual adult nēnē and 44 (non-distinct) fledglings over 28 days between September 2024 and June 2025, with observations made in every month of this timeframe. Additionally, five active nēnē nests were directly observed in January and February.

Precautions have been taken to prevent potential canine interactions with wildlife, particularly with nēnē. If nēnē were present in the search area, the canine handler immediately retrieved and restrained the dog, avoided disturbing the birds, postponed searching in the vicinity of the birds, worked on leash away from wildlife and/or temporarily skipped canine searches in the proximity of the nēnē. No canine searcher-wildlife interactions occurred in FY 2025. Additionally, predator control efforts were targeted to protect detected nēnē nests in support of successful fledging.

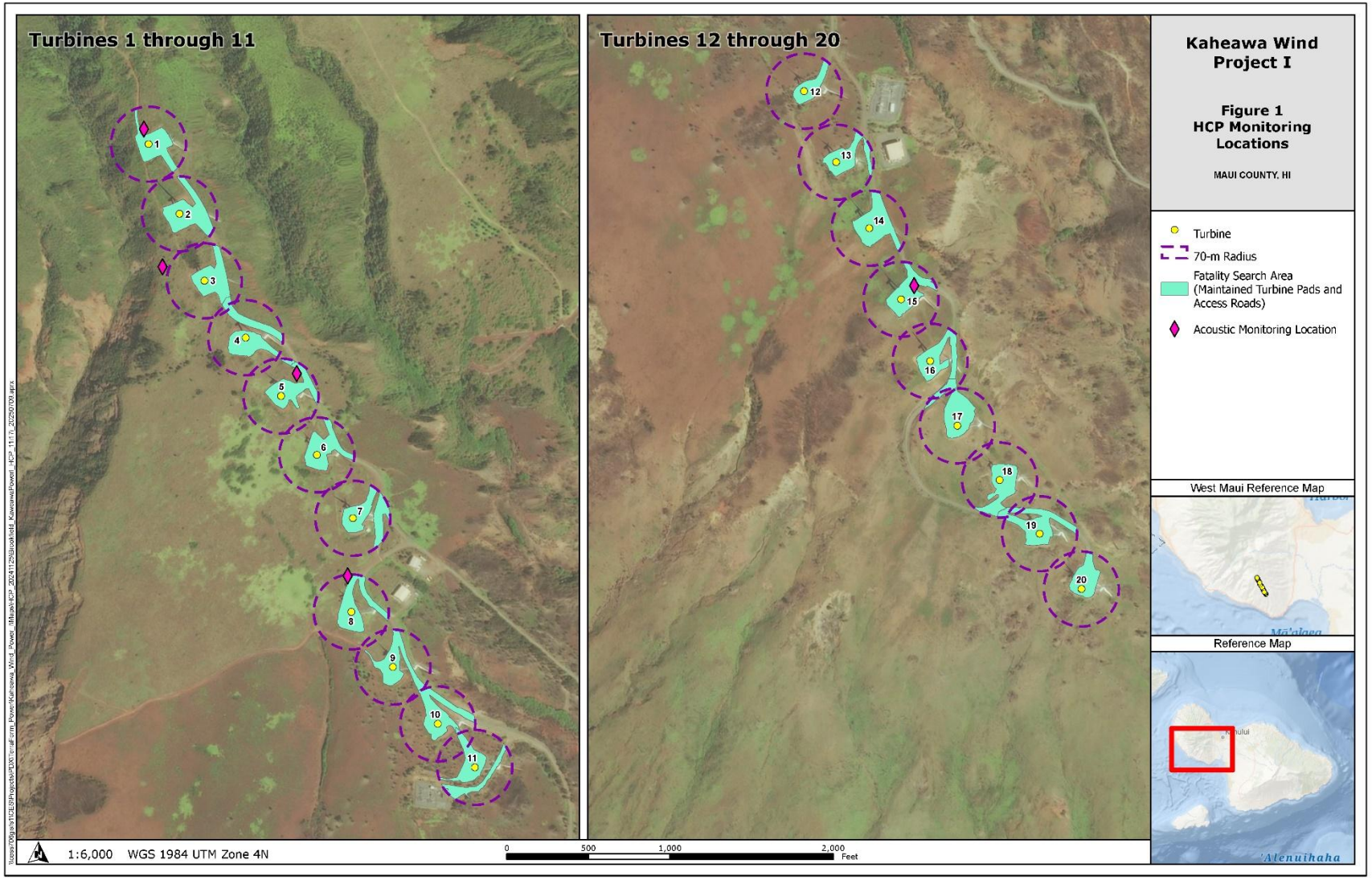

Figure 1. HCP Monitoring Locations

3.0 Carcass Persistence Trials

One 28-day carcass persistence trial was conducted in each quarter of FY 2025, for a total of four trials in FY 2025. Trials used black rats (*Rattus rattus*) for ʻōpeʻapeʻa surrogates (i.e., small carcass), large chickens (*Gallus gallus*) for nēnē surrogates (i.e., large birds), and wedge-tailed shearwater (*Ardenna pacifica*) carcasses as surrogates for the ʻuaʻu and the ʻaʻo (i.e., medium birds; Covered Seabird Species) and included a total of 40 carcasses (20 small, 11 medium, and nine large).

For FY 2025, the probability that a carcass persisted until the next search was 0.87 for all bat surrogate carcasses (95 percent Confidence Interval [CI] = 0.76, 0.94; N=20), 1.00 for nēnē surrogates (95 percent CI = 0.97, 1.00; N=9), and 0.98 for seabird surrogates (95 percent CI = 0.89, 1.00; N=11).

4.0 Searcher Efficiency Trials

Searcher efficiency trials occurred throughout the year with a total of 79 searcher efficiency trial carcasses were placed over 21 trial days during FY 2025. Similar to the carcass persistence trials, black rats were used as surrogates for ʻōpeʻapeʻa and chickens were used as surrogates for the nēnē. Trial proctors used wedge-tailed shearwaters and other medium-sized birds collected under the Project's Special Purpose Utility Permit (PER0055564[2]) and Protected Wildlife Permits (231228115819-WILD and 250122122859-WILD) as surrogates for Covered Seabird Species. All trials were conducted on canine search teams in FY 2025, as no visual searches occurred. Of the 79 trial carcasses placed, four bat surrogates were lost to scavenging prior to the search; all other carcasses were available for detection. For FY 2025, the probability that a canine search team would find a carcass was 0.94 for bat surrogates (95 percent CI = 0.84, 0.98; N=46), 1.00 for nēnē surrogates (95 percent CI = 0.84, 1.00; N=14) and 1.00 for ʻuaʻu surrogates (95 percent CI = 0.85, 1.00; N=15).

5.0 Vegetation Management

In order to maximize fatality monitoring efficiency and minimize impacts to native plants, KWP I performs vegetation management at the Project. Vegetation management activities have evolved over time, and account for management activity restrictions during the nēnē nesting season. The evolution of activity includes:

- Initial vegetation management activities within the search plots were limited to between April 1 and October 31 to minimize risk during the nēnē nesting season.

[2] This permit expired March 31, 2025. However, a permit renewal application was submitted on February 25, 2025, more than 30 days prior to expiration, and therefore the activities authorized by the permit are allowed to continue per 50 CFR 13.22 until the USFWS acts on the renewal application. As of August 12, 2025, the renewal status remains "Application in Review".

- In November 2016, Stephanie Franklin of DOFAW-Maui verbally approved using hand management tools (spray packs and weed whackers) during the nēnē nesting season if the activity was within the current search area and did not disturb wildlife.
- In March 2017, Stephanie Franklin of DOFAW-Maui verbally approved the removal of Christmas berry (*Schinus terebinthifolius*) within 70 meters of the WTGs to reduce potential nēnē nesting habitat in the vicinity.
- In September 2021, Stephanie Franklin of DOFAW-Maui verbally approved the continuation of the quarterly management program and woody vegetation removal using hand and power tools, and manual application of herbicide on cut stumps as necessary, in proximity to select turbines. Additional woody vegetation removal was approved to occur within a one-meter buffer of select turbine access roads with all work completed between April 1 and October 31 and in conjunction with a biological monitor.

The vegetation management program implemented at the Project in FY 2025 consisted of one herbicide application in October 2024, and an as-needed weed-whacking program. Herbicide was applied to the cleared areas within each search plot outside of the nēnē breeding season, as wind and weather conditions allowed. Remaining vegetation was trimmed by weed whacking to maintain annual consistency of the graded roads and pads (cleared area) within 70 meters of each turbine. Additionally, in May 2025, ironwoods encroaching on turbine pads were removed to further limit nēnē nesting opportunity and ensure the full extent of the cleared area could be successfully searched.

6.0 Scavenger Trapping

KWP I implements regular scavenger trapping at the Project to contribute to a high probability of a carcass persisting between fatality searches and to reduce the depredation risk to nēnē. The program includes a quarterly intensive trapping effort followed by ongoing biweekly (every other week) trapping effort. In FY 2025, trapping included the use of 23 DOC250 body grip traps and 18 live traps placed throughout the Project. Trap distribution has remained consistent through the implementation of the program, with an increased level of effort initiated in FY 2022. As previously mentioned, in January and February, some traps were redistributed to offer protections in the vicinity of nesting nēnē. All traps utilized an additional protective entry guard which excluded nēnē ("gosling gaurd"). In FY 2025, there were an average of 30.5 trap nights per quarter for cage traps, and 91 trap nights per quarter for the DOC250s. With this effort, the scavenger trapping program removed a total of 35 mongooses (*Herpestes auropunctatus*), and two feral cats (*Felis cattus*) in FY 2025. No non-target animals were trapped.

7.0 Documented Fatalities and Take Estimates

No fatalities of Covered Species were detected in FY 2025. Any observed downed wildlife would be handled and reported in accordance with the Downed Wildlife Protocol provided by USFWS and DOFAW (USFWS and DOFAW 2020). No injured (live) downed wildlife was observed at the Project in FY 2025.

To calculate take estimates, the number of observed fatalities is scaled to account for fatalities that are not detected (unobserved). Unobserved fatalities are the result of three primary factors:

- Carcasses may be scavenged before searchers can find them;
- Carcasses may be present, but not detected by searchers; and
- Carcasses may fall outside of the search area.

Carcass persistence and searcher efficiency (bias correction; see Sections 3.0 and 4.0) measure the effect of the first two factors. The third factor, the number of carcasses that fall outside of the search plot area, is dependent upon the proportion of the carcass distribution that is searched. The search area for fatalities at the Project has evolved over time (Section 2.0); therefore, the proportion of the carcass distribution searched has varied historically. As no changes to search plot dimensions have been made since FY 2016, the estimate of the DWP of the carcass distribution searched (Appendix 1) has remained the same as described in the FY 2017 annual report (KWP I 2017).

Cumulative take at an upper credible limit (UCL) of 80 percent was calculated for each Covered Species for which documented fatalities have occurred, per request of USFWS and DOFAW. The UCL is estimated from three components:

1. Observed direct take (ODT) during protocol (standardized) fatality monitoring;
2. Estimated Unobserved direct take (UDT); and
3. Estimated Indirect take.

The Evidence of Absence software program (EoA; Dalthorp et al. 2017), the agency-approved analysis tool for estimating direct take, uses results from bias correction trials and ODT to generate a UCL of direct take (i.e., ODT + UDT). Direct take values from this analysis can be interpreted as: there is an 80 percent probability that actual direct take at the Project over the analysis period was less than or equal to the 80 percent UCL. Indirect take calculations are based on the HCP (KWP I 2006) and agency guidance. Indirect take is estimated based on factors such as the breeding season in which fatalities are observed, sex and age characteristics of Covered Species fatalities found at the Project, their associated life history characteristics as described in the Project's approved HCP, and current agency guidance for the ʻōpeʻapeʻa (e.g., USFWS 2016).

Additionally, EoA includes a module that allows users to project future estimates of mortality based on results of past fatality monitoring. Due to the inherent uncertainty of these projections (including the potential future contribution of indirect take) and the amplification of this uncertainty resulting from the use of the 80 percent UCL as the estimate of take for regulatory

compliance, long term projections may have limited utility. Nevertheless, they do help gauge the likelihood of permit take exceedance, and may help operators in their mitigation planning, assuming future management and monitoring conditions can be reasonably estimated.

7.1 ʻŌpeʻapeʻa

7.1.1 Estimated Take

No take of ʻōpeʻapeʻa was observed in FY 2025. A total of 13 ʻōpeʻapeʻa fatalities have been observed at the Project since monitoring began in June 2006. Of the 13 observed, 10 were found inside of fatality search plots and are used to estimate direct take. Three bat fatalities were classified as incidental observations. All bat carcasses have previously been transferred to the U.S. Geological Survey or the Bishop Museum for genetic sexing. Genetic sexing is used to refine estimates of indirect take. The observed ʻōpeʻapeʻa fatalities by fiscal year are listed in Table 1.

Table 1. Observed ʻŌpeʻapeʻa Fatalities at KWP I Through FY 2025

Fiscal Year	ʻŌpeʻapeʻa Observed Direct Take	ʻŌpeʻapeʻa Incidental Fatality Observations	Total
2007	0	0	0
2008	0	0	0
2009	0	1	1
2010	0	0	0
2011	0	1	1
2012	0	0	0
2013	2	0	2
2014	4	0	4
2015	0	0	0
2016	0	0	0
2017	1	1	2
2018	1	0	1
2019	1	0	1
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	1	0	1
2024	0	0	0
2025	0	0	0
Total	**10**	**3**	**13**

The estimated direct take (ODT + UDT) for the 13 ʻōpeʻapeʻa fatalities found between the start of fatality monitoring in June 2006 and end of FY 2025 (June 30, 2025) is less than or equal to 28 ʻōpeʻapeʻa (80 percent UCL; Appendix 1a).

Indirect take is estimated to account for the potential loss of individuals (offspring) that may occur indirectly as the result of the loss of an adult (breeding) female through direct take during the period that females may be pregnant or supporting dependent young. The seasonal timing and sex of all observed fatalities (those observed in fatality monitoring as well as incidental to fatality monitoring) is used in the estimate of indirect take. Cumulative indirect take is calculated as 3.18 adults (Appendix 2a).

The UCL for cumulative Project take of the ʻōpeʻapeʻa at the 80 percent credibility level is 32 adult ʻōpeʻapeʻa (28 [estimated direct take] + 4 [estimated indirect take, rounded up from 3.17]). That is, there is an approximately 80 percent probability that cumulative take at the Project at the end of FY 2025 is less than or equal to 32 ʻōpeʻapeʻa (Appendix 1a).

7.1.2 Projected Take

KWP I projected ʻōpeʻapeʻa take through the end of the permit term using the fatality monitoring data collected through FY 2025. The objective of this analysis was to evaluate the potential for the Project to exceed the permitted take limit at the 80 percent UCL prior to the end of the permit term (Appendix 3a). For this analysis, the detection probability for future years is assumed to be unchanged from the FY 2025 detection probability (0.479; 95 percent CI 0.413, 0.545), and the fatality rate is unaltered for all future years (rho=1). Future indirect take is unknown and will potentially vary based on the timing of ODT. Based on historical Project data, KWP I assumed total indirect take for the Project over the permit term would be a maximum of six adult equivalents (approximately 20 juveniles based on assumed ʻōpeʻapeʻa survival rates; USFWS 2016), or 12 percent of the permitted take. Currently, the proportion of total take that is attributable to indirect take is roughly 10.2 percent (3.17 [adult bat equivalents estimated from indirect take] / 31.17 [ʻōpeʻapeʻa estimated combining the direct and indirect take]), making the assumption of indirect take of six adult ʻōpeʻapeʻa conservative. Assuming six adult bat equivalents are attributed to the Project as indirect take, the permitted direct take under the Project's ITP and ITL would be 44 ʻōpeʻapeʻa (50 ʻōpeʻapeʻa [permitted by ITL and ITP] minus 6 ʻōpeʻapeʻa [estimated as attributed to indirect take] = 44 ʻōpeʻapeʻa estimated direct take maximum).

Based on the analysis, there is over a 99.9 percent probability that the 80 percent UCL of cumulative take at the Project *will not* exceed permitted Tier 2 take during the permit term (Appendix 3b). EoA projected a median estimate of 20 years of Project operation without a direct take estimate exceeding 44 ʻōpeʻapeʻa. Therefore, based on these projections the Project is likely to remain below the permitted take limit of 50 ʻōpeʻapeʻa for the permit term.

7.2 Nēnē

7.2.1 Estimated Take

No observed take of nēnē occurred in FY 2025. A total of 35 nēnē fatalities attributable to the Project have been observed at the Project since monitoring began in June 2006. Twenty-seven of the 35 nēnē were found during standardized searches inside of fatality search plots and are used to estimate direct take, while nine were detected outside of the standardized search parameters and thus considered incidental detections. The observed nēnē fatalities by fiscal year are listed in Table 2.

Table 2. Observed Nēnē Fatalities at KWP I Through FY 2025

Fiscal Year	Nēnē Observed Direct Take	Nēnē Incidental Fatality Observations	Total
2007	0	0	0
2008	2	0[1]	2
2009	1	0	1
2010	1	0	1
2011	5	0	5
2012	1	0	1
2013	4	0	4
2014	3	0	3
2015	4	0	4
2016	1	0	1
2017	0	1	1
2018	1	0[2]	1
2019	2	0	2
2020	0	0	0
2021	0	2[3]	2
2022	1	0	1
2023	1	2	3
2024	0	3	3
2025	0	0	0
Total	**27**	**8**	**35**

1. Two nēnē fatalities were detected in 2007, one detected incidentally but both were treated as Observed direct take. This has been corrected from past years with incorrectly reported 3 nēnē fatatlities, with one counted as an incidental.
2. This has been mistakenly reported as 1 in past annual reports. FY 2018 annual reports states that "One adult bat and one adult nēnē fatality attributed to WTG collision were observed within the search area on formal searches during FY 2018. No other adults of covered species were found outside of the search area or incidental to formal searches."
3. Includes one juvenile fatality found outside of search area. Based on estimated age and carcass condition at discovery, it is unknown if carcass was attributed to Project operations or other circumstances.

The estimated direct take (ODT + UDT) for the 27 nēnē fatalities (within the search area) found between the start of operation (June 5, 2006) and end of FY 2025 (June 30, 2025) is less than or equal to 54 nēnē (80 percent UCL; Appendix 1b).

Indirect take is estimated to account for the potential loss of individuals that may occur as the result of the loss of their parents. Both parents care for young post-fledging (Banko et al. 2020). The point during the breeding season when an adult is taken determines to what extent offspring may be affected. Cumulative indirect take was 3.53 juveniles (1.81 adults, assuming a 0.8 annual survival rate and 3 years from fledging to adult; Appendix 2b).[3]

The UCL for cumulative Project take of the nēnē at the 80 percent credibility level is 56 nēnē (54 [estimated direct take] + 2 [estimated indirect take, rounded up from 1.81]). That is, there is an approximately 80 percent probability that cumulative take at the Project at the end of FY 2025 is less than or equal to 56 adult nēnē.

Mitigation credits for KWP I are lagging behind the Project's take, given a (previously reported) challenging mitigation environment. In FY 2025, KWP received a letters from DOFAW and email from USFWS recognizing mitigation offsets achieved through FY 2024. Total mitigation achieved through FY 2025 (including preliminary results from the FY 2025 breeding season) are presented in Appendix 2b and distributed annually as indicated in rows K and L of Appendix 2b.

Per the HCP, the Project may cause a net loss in productivity in the event that take outpaces the number of individuals produced from mitigation efforts. The lag between production of nēnē through mitigation efforts and the take of nēnē at the Project drive the estimates of lost productivity. Accrued lost productivity at a given point in time is calculated as the cumulative take less the number of individuals generated from mitigation efforts to date, and then adjusted by a factor of 0.1 to account for the probability that those unmitigated birds would have produced young (KWP 2006). USFWS and DOFAW have agreed that the Project will not accrue lost productivity for nēnē take that occurred prior to calendar year 2011, the year the release pen was constructed. Six nēnē fatalities were documented at the Project prior to January 1, 2011. Accrued lost productivity is currently estimated at 12.15 juveniles, or 6.22 adult equivalents (Appendix 2b).

KWP I had consulted with agencies throughout FY 2025 regarding adjustments to the mitigation program needed to meet the obligation given the lag in mitigation to offset take. In FY 2025 KWP I developed an MOU with DOFAW and the Puʻu O Hōkū Ranch to assume management of the updated nēnē release pen after the translocation of four family groups from the island of Kauaʻi. Management will commence in FY 2026 (See Section 9.2).

[3] No indirect take was attributed to the observed juvenile fatality observed in FY 2021, as a juvenile could not have dependent young.

7.2.2 Projected Take

KWP I projected nēnē take through the end of the permit term using the fatality monitoring data collected through FY 2025. The objective of this analysis was to evaluate the potential for the Project to exceed the Tier 1 take limit (described as Baseline Take in the Project's HCP) at the 80 percent UCL prior to the end of the permit term (Appendix 3). For this analysis, the detection probability for future years is assumed to match the estimated overall detection probability of FY 2025 (0.346; 95 percent CI 0.329, 0.363), and the fatality rate is unaltered for all future years (rho=1). Future indirect take is unknown and will potentially vary based on the timing of ODT. Based on historical Project data, KWP I assumed total indirect take for the Project over the permit term would be a maximum of two adult equivalents (approximately four juveniles based on an assumed nēnē survival rate from juvenile to adult of 0.512; SWCA 2011), or 3.3 percent of the Tier 1 take. Currently, the proportion of total take that is attributable to indirect take is 3.2 percent (1.81 [adult goose equivalents estimated from indirect take]/ 55.84 [adult nēnē estimated, combining the direct and indirect take]), making the assumption of two indirect take on par with the 19 year dataset. Assuming two adult nēnē are attributed to the Project as indirect take, the permitted direct take under Tier 1 of the Project's ITP and ITL would be 58 nēnē (60 nēnē [permitted by ITL and ITP for Tier 1] minus 2 nēnē [estimated attributed to indirect take] = 58 nēnē estimated direct take maximum).

Based on the analysis described above, there is a 77.3 percent chance that the 80 percent UCL of cumulative take *will not* exceed the Tier 1 take limit during the permit term (Appendix 3). EoA projected a median estimate of 20 years of Project operation without a direct take estimate exceeding 58 nēnē. KWP I has taken actions to minimize the threats to the nēnē at the Project and anticipates continuing to work with USFWS, DOFAW, and technical experts to further reduce risks of take (Sections 5.0 and 10.0).

7.3 ʻUaʻu

7.3.1 Estimated Take

No observed take of ʻuaʻu in FY 2025. A total of eight ʻuaʻu fatalities have been observed at the Project since monitoring began in June 2006. Seven of the eight ʻuaʻu were found inside of fatality search plots and were used to estimate direct take. The FY 2013 fatality was found outside of the designated search areas and is treated as an incidental observation. The observed ʻuaʻu fatalities by fiscal year are listed in Table 3.

Table 3. Observed ʻUaʻu Fatalities at KWP I Through FY 2025

Fiscal Year	ʻUaʻu Observed Direct Take	ʻUaʻu Incidental Fatality Observations	Total
2007	0	0	0
2008	1	0	1
2009	0	0	0

Fiscal Year	ʻUaʻu Observed Direct Take	ʻUaʻu Incidental Fatality Observations	Total
2010	0	0	0
2011	0	0	0
2012	2	0	2
2013	0	1	1
2014	1	0	1
2015	2	0	2
2016	0	0	0
2017	0	0	0
2018	0	0	0
2019	1	0	1
2020	0	0	0
2021	0	0	0
2022	0	0	0
2023	0	0	0
2024	0	0	0
2025	0	0	0
Total	**7**	**1**	**8**

The estimated direct take (ODT + UDT) for the seven ʻuaʻu fatalities found between the start of operation (June 5, 2006) and end of FY 2025 (June 30, 2025) is less than or equal to 19 ʻuaʻu (80 percent UCL; Appendix 1c).

Indirect take is estimated to account for the potential loss of individuals that may occur as the result of the loss their parents. Both parents for the ʻuaʻu care for their young until fledging. The point during the breeding season when an adult is taken determines to what extent offspring may be affected. Cumulative indirect take was calculated at 14.35 juveniles (4.30 adults assuming a 0.3 survival rate from fledging to adult; Appendix 2c).

The Project may cause a net loss in productivity if take outpaces the number of individuals produced from mitigation efforts. The life history lag between production of the ʻuaʻu through mitigation efforts and the take of ʻuaʻu at the Project drives the estimates of lost productivity. Accrued lost productivity at a given point in time is calculated as the cumulative take less the number of individuals generated from mitigation efforts to date, and then adjusted by a factor of 0.15 to account for the probability that those unmitigated ʻuaʻu would have produced young (KWP I 2006). Each year's lost productivity is accumulated until mitigation occurs for the estimated adult take. Lost productivity information is provided in Appendix 2c.

The UCL for cumulative Project take of the ʻuaʻu at the 80 percent credibility level is 24 ʻuaʻu (19 [estimated direct take] + 5 [estimated indirect take, rounded up from 4.31]). That is, there is an

approximately 80 percent probability that cumulative take at the Project at the end of FY 2025 is less than or equal to 24 ʻuaʻu.

7.3.2 Projected Take

KWP I projected ʻuaʻu take through the end of the permit term using the fatality monitoring data collected through FY 2025. The objective of this analysis was to evaluate the potential for the Project to exceed the permitted take limit at the 80 percent UCL prior to the end of the permit term (Appendix 3). For this analysis, the detection probability for future years is assumed to match the estimated overall detection probability of FY 2025, and the fatality rate is unaltered for all future years (rho=1). Future indirect take is unknown and will potentially vary based on the timing of ODT. Based on historical Project data, KWP I assumed total indirect take for the Project over the permit term would be a maximum of eight adult equivalents (approximately 27 juveniles based on an assumed ʻuaʻu survival rate of 0.3 from fledging to adult; KWP I 2006), or 21.1 percent of the permitted take. Currently, the proportion of total take that is attributable to indirect take is 18.5 percent (4.31 [adult petrel equivalents estimated from indirect take]/ 23.31 [adult petrel estimated combining the direct and indirect take]), making the assumption of eight indirect take upwardly conservative.

Assuming eight adult ʻuaʻu equivalents are attributed to the Project as indirect take, the permitted direct take under the Project's ITP and ITL would be 30 ʻuaʻu (38 ʻuaʻu [permitted by ITL and ITP] minus 8 ʻuaʻu [estimated to be attributed to indirect take] = 30 ʻuaʻu estimated direct take maximum).

Based on the analysis described above and presented in Appendix 3, there is a 100 percent chance that the 80 percent UCL of cumulative take *will not* be exceeded during the permit term. Specifically, the estimated direct take threshold of 30 exceeds more than 100percent of the projected mortality estimates (Appendix 3). EoA projected a median estimate of 20 years of Project operation without a direct take estimate exceeding 30 ʻuaʻu. Therefore, the Project anticipates remaining below the permitted take limit of 38 ʻuaʻu for the permit term.

7.4 Non-listed Species

Twelve fatalities representing six non-listed species were documented at WTGs at the Project in FY 2025. One of the six species observed in FY 2025 is protected by the Migratory Bird Treaty Act (MBTA): the koa'e kea (white-tailed tropicbird; *Phaethon lepturus*; two individuals). The other ten fatalities were of five non-native (introduced) species without MBTA protection: the black francolin (*Francolinus francolinus*; one individual), gray francolin (*Francolinus pondicerianus;* three individuals), ring-necked pheasant (*Phasianus colchicus*; two individuals), African silverbill (*Euodice cantans*; two individuals), and zebra dove (*Geopelia striata*; one individual). One unknown gamebird fatality was also observed. A list of fatalities for FY 2025 is provided in Appendix 4.

8.0 Wildlife Education and Observation Program

The wildlife education and observation program (WEOP) helps to ensure the safety and well-being of native wildlife in work areas and along site access roadways. The training provides useful information to assist staff, contractors, and visitors to be able to conduct their business in a manner consistent with the requirements of the HCP, the Conditional Use Permit, land use agreements and applicable laws. Personnel are trained to identify Covered Species and other species of wildlife that may be found on-site and what protocol to follow, as determined in the HCP and through relevant agency guidance (e.g., USFWS and DOFAW 2020), when downed wildlife is found. The trainees are also made aware of driving conditions and receive instruction on how to drive and act around wildlife. Records of wildlife observations by WEOP-trained staff are also used by the HCP program to identify the patterns of wildlife use of the site. In FY 2025, nēnē gosling observations made during standardized searches were supplemented by observations reported by Project personnel trained by the WEOPs program.

During FY 2025, 32 people received WEOP training. WEOP trainings will continue to be conducted on an as-needed basis to provide on-site personnel with the information to respond appropriately in the event they observe a Covered Species or encounter downed wildlife while on-site.

9.0 Mitigation

The Project's mitigation requirements are described in Section 5.0 of the approved HCP (KWP I 2006).

9.1 ʻŌpeʻapeʻa

9.1.1 Mitigation

Mitigation for Tier 1 take of 20 ʻōpeʻapeʻa was funded in 2006 and completed. An HCP minor amendment approved by USFWS in October 2015 and DOFAW in January 2016 authorized take of up to an additional 30 ʻōpeʻapeʻa under Tier 2 which had been identified in the HCP but not included on the ITP and ITL.

A mitigation project that mitigates for 15 of the additional 30 ʻōpeʻapeʻa began May 2017 and was completed in FY 2020 (KWP I 2017, Tetra Tech 2020). This mitigation project consisted of ʻōpeʻapeʻa ecological research in East Maui, contracted to H.T. Harvey Ecological Consultants. The contract total cost was $750,000.

Mitigation funding for the remaining 15 ʻōpeʻapeʻa in Tier 2 was provided to the U.S. Geological Survey Hawaiian Hoary Bat Research Group starting in FY 2018 to conduct bat ecological research on Hawaiʻi Island to better inform future bat conservation. The funding obligation was completed in FY 2022. Publications and manuscripts in process include:

- Montoya-Aiona, K., P. M. Gorresen, K. N. Courtot, A. Aguirre, F. Calderon, S. Casler, S. Ciarrachi, J. Hoeh, J. L. Tupu, and T. Zinn. 2023. Multi-scale assessment of roost selection by ʻōpeʻapeʻa, the Hawaiian hoary bat (Lasiurus semotus). PLoS ONE 18:e0288280. Available: https://doi.org/10.1371/journal.pone.0288280
- Hoeh, J.P., Aguirre, A.A., Calderon, F.A., Casler, S.P., Ciarrachi, S.G., Courtot, K.N., Montoya-Aiona, K.M., Pinzari, C.A. and Gorresen, P.M., 2023. Seasonal and Elevational Differences by Sex in Capture Rate of ʻŌpe ʻape ʻa (Lasiurus semotus) on Hawai ʻi Island. *Pacific Science*, *77*(1), pp.1-26.
- Pinzari, C.A., P. M. Gorresen, R.W. Peck, and K.N. Courtot. in review. Mixed plate: Dietary composition and diversity in an endemic island bat, the Hawaiian ʻōpeʻapeʻa. [includes analyses of barcoding of 141 fecal samples, modeling of bat diet in relation to sex, season, and habitat].
- Gorresen, P. M., K.M. Montoya-Aiona, and K.N. Courtot. *in prep*. Roost ecology of the ʻōpeʻapeʻa, the Hawaiian hoary bat (*Lasiurus semotus*). [includes analyses of roost fidelity and activity from radio-telemetry, visual checks, and thermal video].
- Gorresen, P. M., R.W. Peck, C. A. Pinzari, and K.N. Courtot. *in prep*. Prey availability and diet of the ʻōpeʻapeʻa, the Hawaiian hoary bat (*Lasiurus semotus*). [includes analyses of 2 years prey availability data].

The Project, in combination with Kaheawa Wind Power II (KWP II), had a total funding obligation of $1.7M to allocate to portions of each Project's mitigation requirement. KWP I, in combination with KWP II exceeded this funding obligation by $131,500 over the original cost, for a total combined expenditure of $1,831,500.

9.1.2 Acoustic Monitoring at the Project

As a voluntary measure (not required in the HCP), acoustic monitoring for bat activity at the Project has been conducted continuously since August 2008. In October 2013 (FY 2014) nine Song Meter SM2BAT+ ultrasonic recorders (SM2) were deployed, replacing the previously used Anabat SD2 bat detectors (Titley Electronics, Brendale, QLD, Australia). Each SM2 was equipped with one SMX-U1 ultrasonic microphone (Wildlife Acoustics, Maynard, MA, USA) positioned horizontally, facing southwest (away from the prevailing northeast trade winds), 6.5 meters above ground level. In October 2019 (FY 2020), the Pali brush fires burned across most of the Project destroying four SM2 units. In order to continue with the objectives of the monitoring program and address gaps in the spatial coverage of SM2's introduced by the brush fire; the monitoring regime was redesigned in July 2020 with the deployment of five SM2 units (WTGs 1, 5, 13, 15, and 20; Figure 1). This type of unit has been continuously used since October 2013. Additionally, because of differences in the equipment used prior to FY 2014, data collected in FY 2025 is only comparable to data collected between FY 2014 and FY 2024.

The objective of bat acoustic monitoring is to better understand the annual and seasonal variation in bat activity at the Project. Analysis of variance (ANOVA) and a Tukey's Honest Significant Difference (HSD) were used to test for interannual differences in detection rates between sampling years. A linear model (LM) was constructed to test for a change in detection rates across all sampling years. FY 2014 was removed from the analysis because it did not represent a full sampling year and excluded months known to have high detection rates (July, August, and September). All data were normalized with an Ordered Quantile Normalization transformation using the 'bestNormalize' package in R (Peterson 2021). The distribution of residuals from the LM were examined to check for violations of model assumptions. All tests were two-tailed, employed an alpha value of 0.05, and were conducted in R version 4.4.2 (R Core Team 2024). The characterization of Hawaiian hoary bat seasons corresponds approximately to Gorresen et al. (2013).

In FY 2025, detection rates exhibited seasonal variation, consistent with trends documented in previous years. During the FY 2025 monitoring period (July 2024 to June 2025), 'ōpe'ape'a were detected on 111 out of 1,350 detector-nights sampled (8.2 percent). Detection rates increased during the months of August and September, during the lactation and post-lactation reproductive periods, with the largest peak (0.26) in detection rates occurring during the month of October (Figure 2). After the initial peak in October, detection rates sharply declined in November followed by fluctuations throughout the end of the post-lactation and pre-pregnancy reproductive periods (December to March). The second largest peak in detection rates (0.13) occurred in April of the pregnancy reproductive period, followed by a decline in May and June. Period (Figure 2). These seasonal fluctuations mirror patterns observed throughout the Project's long-term monitoring and remain consistent with established bat reproductive periods (Figure 3).

Across the duration of the Project's monitoring program (FY 2015 – FY 2025), there were only marginal fluctuations in interannual detection rates (Table 4). While detection rates in FY 2025 were higher than FY 2024 by 2.8 percent, the difference was not statistically significant (ANOVA: $F_{10,121} = 1.96$, $P = 0.043$; Tukey's HSD: $P > 0.992$). Additionally, the HSD post-hoc analysis, which controls for Type I error accumulation in multiple comparisons (Tian et al. 2018), found no significant differences in annual detection rates among any years between FY 2015 and FY 2025 ($P > 0.166$ for all pairwise comparisons). Overall, across all analyzed monitoring years (FY2015 – FY2025) there is still an increasing trend in the annual detection rates, however following two years with lower annual detection rates the trend is no longer significant at an alpha value of 0.05 (LM: $R^2 = 2.65$ percent; $F_{1,130} = 3.54$, $P > 0.062$; Figure 4).

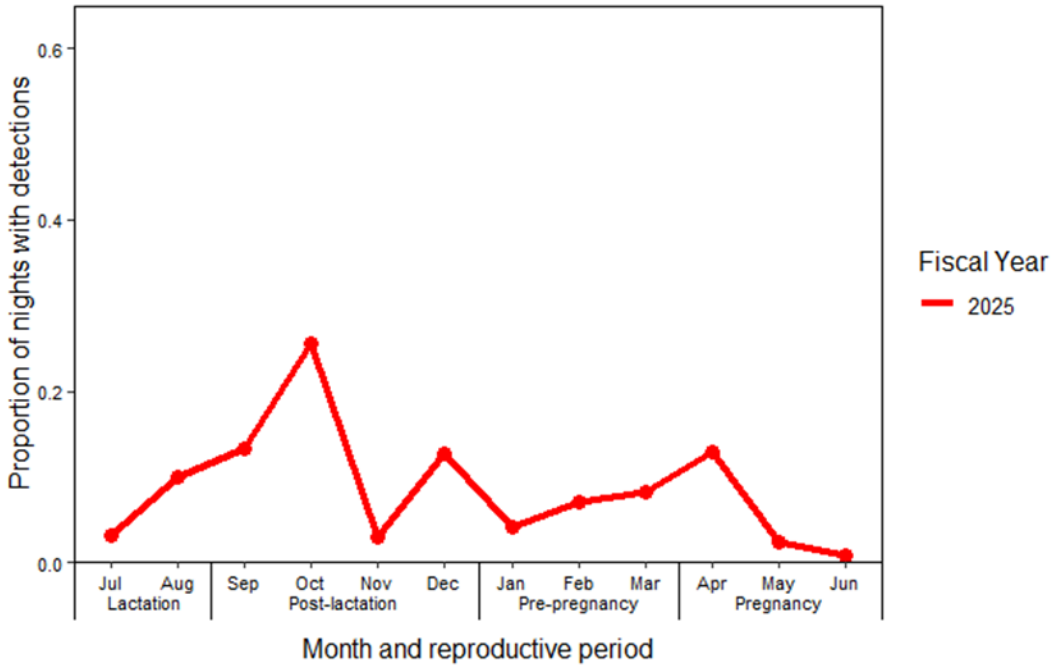

Figure 2. Monthly Detection Rates at the Project in FY 2025 with Corresponding Reproductive Periods

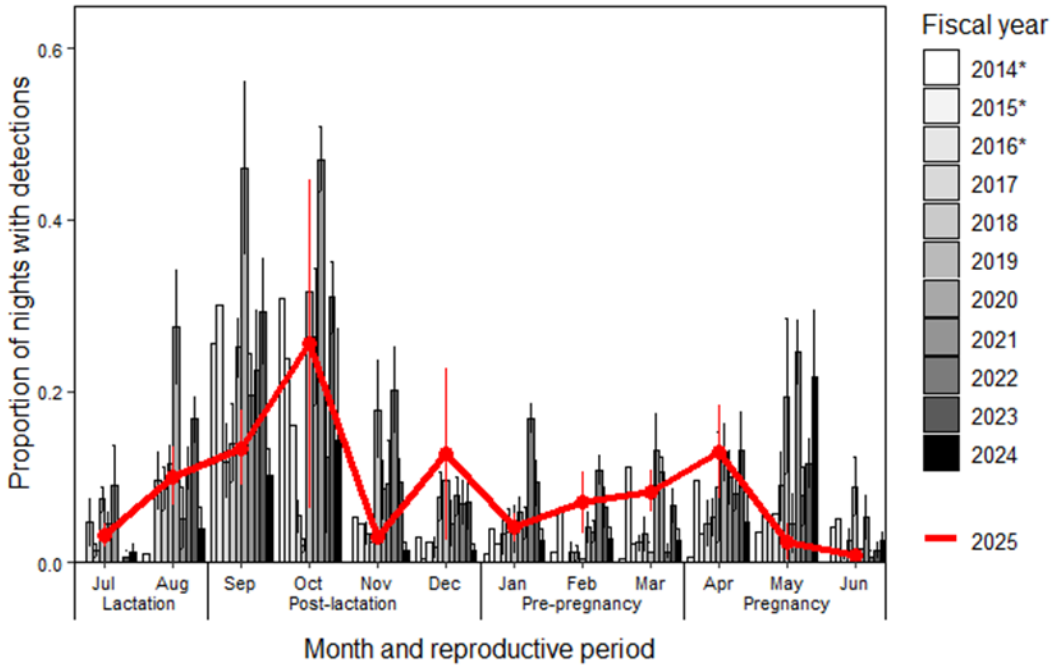

Figure 3. Monthly Bat Detection Rates at the Project for FY 2014 to FY 2025 with Corresponding Reproductive Periods

*Note: Error bars (SE) not available for fiscal years 2014, 2015, and 2016.

Table 4. Number of Nights Sampled, Number of Nights with Detections and Proportion of Nights with Bat Detections Between FY 2014 and FY 2025

Dates[1]	No. of Nights Sampled	No. of Nights with Detections	Proportion of Nights with Detections
FY 2014 (October 2013 - June 2014)	2,700	101	0.037
FY 2015 (July 2014 - June 2015)	3,203	249	0.078
FY 2016 (July 2015 - June 2016)	2,426	175	0.072
FY 2017 (July 2016 - June 2017)	2,827	131	0.046
FY 2018 (July 2017 - June 2018)	2,989	162	0.054
FY 2019 (July 2018 - June 2019)	2,906	372	0.128
FY 2020 (July 2019 - June 2020)	1,853	280	0.151
FY 2021 (July 2020 - June 2021)	1,680	225	0.134
FY 2022 (July 2021 - June 2022)	1,756	167	0.095
FY 2023 (July 2022 - June 2023)	1,778	214	0.120
FY 2024 (July 2023 - June 2024)	1,715	92	0.054
FY 2025 (July 2024 - June 2025)	1,350	111	0.082
1. Number of monitoring sites: FY 2014 - 2019 (n = 9), FY 2020 - 2025 (n = 5).			

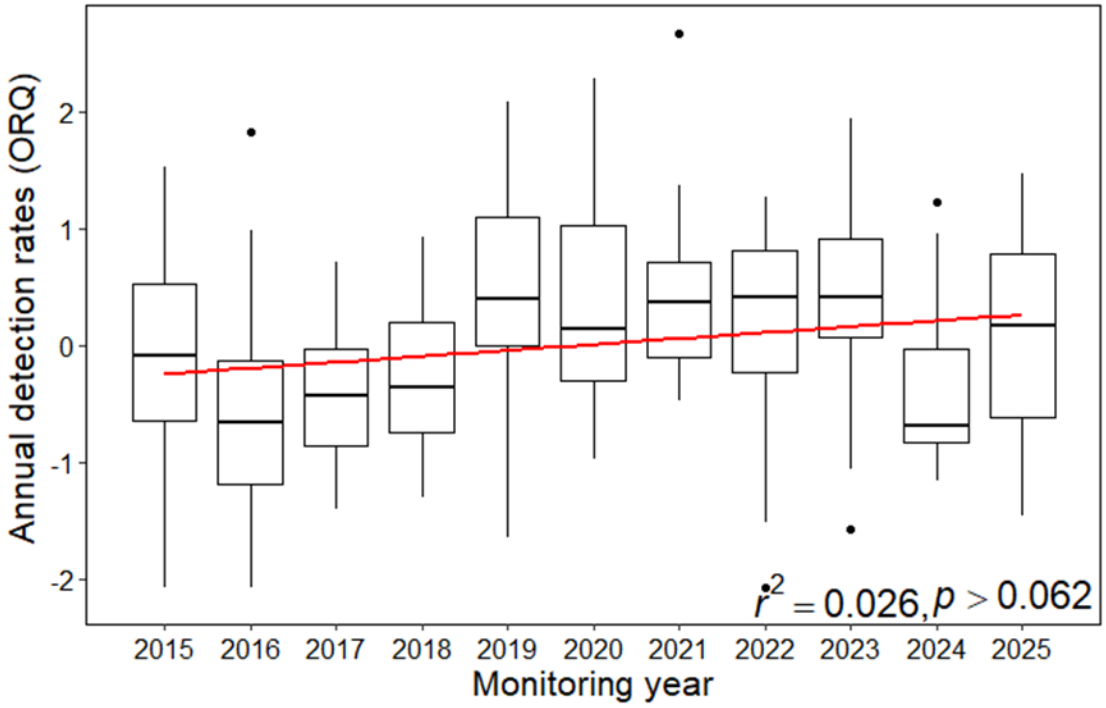

Figure 4. Box-plot with Linear Regression Showing the Increasing Trend in the Annual Detection Rate at the Project Between FY 2015 and FY 2025

*Note: Ordered Quantile normalization transformation (ORQ). All data were normalized using this transformation.

In FY 2025, KWP I collected data at the five Song Meter SM2BAT+ acoustics recorders SMX-U1 microphones and at a second set of five detectors: the newest models available, the Song Meter SM4BAT-FS and SMM-U2 microphone. KWP I monitored at side by side detectors at each sampling location in order to understand how the more sensitive SMM-U2 microphones affected the detection of bat activity at the Project. This is analysis is ongoing and will be presented in the final report.

9.2 Nēnē

In 2009, the Project provided $264,000 to DOFAW to fund construction and management of the Haleakalā Ranch nēnē release pen as part of Project nēnē mitigation. DOFAW constructed the release pen three years later. Funding was used by DOFAW to perform fence maintenance, predator control, vegetation management, and monitoring at the Haleakalā Ranch pen. A total of 30 nēnē were translocated from Kauaʻi to the Haleakalā Ranch pen from 2011 to 2012 with accrued benefits based on the effects of these actions including production of fledglings and increases adult survival rates.

In FY 2025 KWP I continued to work closely with DOFAW and USFWS to address lagging mitigation credits based on challenges with successful propagation. In a letter dated July 12, 2024, DOFAW provided concurrence on allocation of previously unspent funds for management at the Haleakalā Ranch nēnē release pen for FY 2021 through FY 2023. On September 26, 2024, KWP I provided an additional payment of $228,585 to fund historic shortages from 2012 through 2018 at the Haleakalā Ranch nēnē release pen. On October 30, 2024, DOFAW emailed agency concurrence that KWP I had achieved 45.68 mitigation credits through FY 2024; on December 12, 2024, DOFAW provided a letter of Mitigation Credit Quantification. In an email provided on December 10, 2024, USFWS acknowledged that “to date KWP I has met 45.65 nēnē of their required mitigation.”

Credit allocation from FY 2012 through FY 2025 (still preliminary and awaiting agency concurrence) for the fledglings and increased adult survival at the Haleakalā Ranch release pen are summarized in Appendix 2b. An MOU for continued management of the release pen was fully executed by KWP I, DOFAW and Haleakalā Ranch on March 4,2025.

KWP I continues to adaptively manage the nēnē mitigation program to address lagging mitigation through release pen management at the Puʻu O Hōkū Ranch on the island of Molokaʻi. KWP I, DOFAW and the Puʻu O Hōkū Ranch signed an MOU in early FY 2026 and will begin implementing the Scope of Work (SOW) to manage the release pen supporting nēnē translocated to the island (as well as the existing population on the island) to further offset the take accrued from KWP I. On April 4, 2025 DOFAW translocated 24 nēnē to the pen, with a translocation plan outlining the continued release of approximately 25 breeding nēnē pairs and their young over a five-year timeframe (DOFAW 2025).

KWP I will continue to work with both agencies to explore additional mitigation opportunities to address lagging mitigation prior to the end of the permit term.

9.3 Seabirds

KWP I is committed to seabird protection and recovery on Maui and Maui Nui. KWP I completed its mitigation obligation for both ʻaʻo and the ʻuaʻu prior to FY 2025.

9.3.1 ʻAʻo Survey - East Maui

KWP II funded surveys for potential mitigation sites on east Maui, which were completed in September 2015 (KWP I 2016). These surveys identified potential colony locations, estimated the numbers of birds present, assessed predator activity, and evaluated management feasibility at the colony locations.

9.3.2 ʻUaʻu and ʻAʻo – Makamakaʻole

Mitigation efforts at Makamaka'ole began with the construction of the two predator exclosures completed in September 2013. Mitigation efforts at Makamaka'ole involved predator monitoring and trapping, artificial burrow checks and monitoring using game cameras, seabird social attraction using decoys and sound systems, and ongoing maintenance, including vegetation management, of both enclosures through January 2023.

On December 5, 2022, DOFAW provided a letter assessing that after the 2022 breeding season at Makamakaʻole, credit for 148 adults and 2 fledglings translated into 8.53 ʻaʻo mitigation credits for KWP I (in conjunction with KWP II), and that KWP I had completed its mitigation obligation for the ʻaʻo. On December 8, 2022, USFWS provided a letter assessing credit for 149 adults and 2 fledglings, translating to a ʻaʻo mitigation credit of 8.54 adult equivalents, and that the mitigation obligation for KWP I (in conjunction with KWP II) had been met. Although Makamakaʼole had been managed to benefit the ʻuaʻu, as well as the ʻaʻo, no ʻuaʻu activity has been detected at burrows within the enclosures since 2017, and mitigation for the ʻuaʻu was adaptively managed to Lānaʻi (Section 9.3.3).

In September 2024, KWP I signed a Memorandum of Agreement (MOA) with DOFAW (in conjunction with KWP II) to provide $750,000 in funding for a fence replacement at Makamaka'ole and to resume specified management and monitoring activities at the site. Funding was provided to Maui Nui Seabird Recovery Project in February 2025 for management actions to be provided throughout the term of the current ITL.

9.3.3 Lānaʻi ʻUaʻu Protection Project

The ʻuaʻu have not been observed occupying the Makamakaʼole mitigation site since 2017. Therefore, both KWP projects worked together with USFWS an DOFAW to adaptively manage mitigation efforts for this species to ensure that its mitigation obligations are met.

Beginning in the 2018 ʻuaʻu breeding season, both KWP projects worked with USFWS and DOFAW to adaptively manage ʻuaʻu mitigation efforts in an interim fashion. As a result of this adaptive management, KWP I provided funding to Pūlama Lānaʻi to supplement ʻuaʻu breeding colony

protection efforts on Lānaʻi in 2018. The success of this program and difficulties in attracting ʻuaʻu to Makamaka'ole suggested that both KWP projects could benefit the ʻuaʻu and make progress on mitigation obligations by continuing support for the Lānaʻi petrel breeding program. From FY 2021 to FY 2023 (two breeding seasons), the two KWP projects adaptively managed their seabird mitigation programs by providing funding to Pūlama Lānaʻi.

On March 27, 2023, USFWS provided a letter assessing that after the 2022 breeding season, the total estimated benefit provided for the ʻuaʻu from breeding colony protection efforts on Lānaʻi was 89.20 credits based on a previously agreed upon assessment framework (pers. comm. E. Gosliner, USFWS, October 31, 2022 and P. Radley, DOFAW, November 16, 2022). Additionally, based on ʻuaʻu activity at Makamakaʻole in 2016 and 2017, in their March 27th letter, USFWS approved an estimated benefit for the ʻuaʻu of 0.56. Thus, the total mitigation benefit achieved across mitigation projects is 89.72 adult ʻuaʻu for both KWPs. KWP I's Tier 2 ʻuaʻu mitigation obligation per the ITP is 38 ʻuaʻu (including adults, subadults, fledglings, nestlings, and eggs). In the March 27 letter, USFWS acknowledges that KWP I has meet its ʻuaʻu mitigation obligation. In a letter dated February 27, 2025, DOFAW provided concurrence that KWP I earned an estimated benefit 89.72 adult ʻuaʻu for Makamakaʻole and Lānaʻihale from 2015 to 2022 in conjunction with KWP II, fulfilling the mitigation requirement for both projects.

10.0 Adaptive Management

In accordance with the HCP, the Project began implementing Low Wind Speed Curtailment (LWSC) at all WTGs up to wind speeds of 5 meters per second (m/s) on July 29, 2014. LWSC is expected to reduce risk of bat take (Section 7.12). LWSC was increased to 5.5 m/s on August 4, 2014 in response to bat take occurring at the Project and at KWP II on March 13, 2013 and February 26, 2014. Curtailment at 5.5 m/s is in effect from sunset to sunrise, annually, from February 15 through December 15. The Project continues site-wide bat activity assessment via acoustic monitoring after the initial HCP-required 12-month monitoring period (Section 9.1.2).

The Project has previously implemented a variety of actions to minimize risk to the nēnē, which continued in FY 2025. Scavenger trapping efforts implemented at the Project to improve persistence of carcasses during fatality monitoring have contributed to reducing the risk of predation of the nēnē, while targeted predator control around discovered nesting sites improves the opportunity for successful fledging. Safety measures to avoid interactions between nēnē and canine search teams also have been identified and are implemented as needed. KWP I has taken practicable actions to minimize the threats to the nēnē. In FY 2023, KWP I implemented a vegetation management plan developed with concurrence from the agencies reducing the amount of woody vegetation on site to minimize the attractiveness of onsite habitat to the nēnē (Section 5.0). Because nēnē have a continued breeding presence at the site, KWP I continued to work with agencies in FY 2025 for targeted vegetation reduction.

KWP I will continue to monitor nēnē activity on site to inform vegetation management success, and continue to work with USFWS, DOFAW, and technical experts to further reduce risk to the species.

11.0 Agency Meetings, Consultations, and Visits

KWP I communicated actively with USFWS and DOFAW throughout FY 2025 with the implementation of biweekly check in conference calls, along with an in-person meeting, submittal of quarterly reports, and email communications related to both the Project's current HCP Implementation and the development of a new HCP. These communications were developed to provide frequent and close communication regarding HCP implementation and new HCP development, along with ESRC review of the annual report, focused discussions regarding mitigation projects, mitigation credits for the nēnē, and mitigation opportunities under the developing HCP. A summary of agency coordination is presented in Table 5.

Table 5. Summary of Agency Coordination and Communication in FY 2025 or related to FY 2025 Reporting

Date	Communication	Participants
July 1 – June 30 (biweekly)	Recurring check-in calls	KWP I, Tetra Tech, USFWS, DOFAW
July 1, 2024	Call to discuss potential expansion of Haleakala nēnē pen	DOFAW Maui, KWP I, KWP II
July 12, 2024	USFWS edits/comments on Haleakala MOU	To: KWP I and KWP II From: USFWS
July 16, 2024	DOFAW edits/comments on Haleakalā MOU and SOW	To: KWP I and KWP II From: DOFAW
July 17, 2024	Letter accepting nēnē mitigation proposal for allocation of leftover funds	To: KWP I and KWP II From: DOFAW
July 18, 2024	DOFAW email accepting nēnē mitigation proposal for providing past funding shortages, and instructions for providing payment	To: KWP I and KWP II From: DOFAW
July 23, 2024	Haleakala Annual Report	To: DOFAW Maui From: KWP I and KWP II
July 31, 2024	Annual report submission	Submitted by Terraform to DOFAW, USFWS
August 12, 2024	Edits and comments on Makamaka'ole MOA	To: KWP I and KWP II From: DOFAW
August 23, 2024	Met with DOFAW Maui on site to discuss banding of nēnē and satellite tagging	DOFAW Maui, KWP I, Aloha Environmental Services
August 30, 2024	USFWS comments on annual reports	T: KWP I From: USFWS

Date	Communication	Participants
September 5, 2024	DOFAW comments on annual reports	To: KWP I From: DOFAW
September 13, 2024	Call to discuss Molokai nēnē translocation	DOFAW Maui, KWP I
September 19, 2024	Haleakla SOW and MOU	To: KWP I and KWP II From: DOFAW
September 24, 2024	Call about the nene translocation to Molokai	DOFAW, DOFAW Maui, USFWS, KWP, POH Ranch
September 25, 2024	DOFAW-Maui Haleakala Nene Report	To: KWP I and KWP II From: DOFAW Maui
October 11, 2024	Final Annual Report submitted	To: DOFAW and USFWS From: KWP I
October 18, 2024	Request for nēnē banding opportunity at the Project (email)	To: DOFAW Maui From: KWP I
November 1, 2024	Submission of Q1 report	To: USFWS and DOFAW From; KWP I
December 9, 2024	Draft MOU for management of Makamaka'ole submitted	To: DOFAW From: KWP I and KWP II
January 30, 2025	Comments on MOU for makamaka'ole received	To: KWP I and KWP II From: DOFAW
January 31, 2025	Revised Haleakala MOU	To: KWP I and KWP II From:DOFAW
January 31, 2025	Submission of Q2 report	To USFWS and DOFAW From: KWP I
January 31, 2025	Draft MOU for Haleakalā Ranch Nēnē Pen, changes to incorporate request from Ranch	To KWP I From DOFAW
February 11, 2025	Sent revised makamaka'ole supplemental agreement	To: DOFAW From: KWP I and KWP II
February 12, 2025	Supplemental agreement for Makamaka'ole – final version with request for funding	To: KWP I and KWP II From: DOFAW
February 13, 2025	Draft SOW for Pu'u O Hoku Ranch	To: DOFAW and USFWS From: KWP I and KWP II
February 26, 2025	Request for a call to discuss nēnē banding opportunities at the Project	To: DOFAW Maui From: KWP I
February 27, 2025	Final signed Haleakalā Ranch MOU	To: DOFAW From: KWP I and KWP II

Date	Communication	Participants
February 27, 2025	Signed supplemental agreement for makamaka'ole	To: DOFAW From: KWP I and KWP II
March 4, 2025	Fully executed Haleakalā Ranch MOU	To; KWP I and KWP II From: DOFAW
March 17, 2025	KWP I and II Hawaiian Petrel Credit letter from DOFAW	To: KWP I and KWP II From: DOFAW
March 26, 2025	Draft Pu'u O Hoku MOU and Scope of Work with DOFAW edits	To: KWP I and KWP II From DOFAW
April 2, 2025	POH nēnē translocation information	To: KWP I and KWP II From; DOFAW
April 3, 2025	Final Molokai Supplemental Nēnē Translocation Plan_2025	To: KWP I and KWP II From USFWS
April 9, 2025	POH nēnē release pen draft SOW comments	To: KWP I and KWP II From: USFWS
April 30, 2025	Q3 report	To USFWS and DOFAW From: Tetra Tech on behalf of KWP I
August 15, 2025	Draft annual report submitted	To: DOFAW and USFWS From: KWP I
September 26, 2025	Comments on draft annual report	To: KWP I From: USFWS
January 29, 2026	Comments on draft annual report	To: KWP I From: DOFAW
February 12, 2026	FY 2025 annual review meeting	DOFAW, KWP I, Tetra Tech

12.0 Expenditures

Total HCP-related expenditures for the Project in FY 2025 were $474,900 (Table 6).

Table 6. HCP-related Expenditures at the Project in FY 2025

Category[1]	Amount
Permit Compliance[2]	$98,000
Fatality Monitoring	$115,200
Acoustic Monitoring for Bats	$23,000
Vegetation Management and Scavenger Trapping	$72,000

Category[1]	Amount
Nēnē Mitigation: Haleakalā Ranch and Pu'u O Hōkū Ranch Release Pens [3]	$78,500
Makamaka'ole	$88,200
Total Cost for FY 2025	**$474,900**

1. Staff labor and equipment costs are included in the overall costs for each category.
2. Includes areas of overlap between new HCP development and current HCP compliance.
3. Mitigation project are co-funded by KWP I and KWP II, this number represents KWP I's portion of the funding.

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Appendix 1. Dalthorp et al. (2017) Fatality Estimation for the Ōpeʻapeʻa, Nēnē, and ʻUaʻu at the Project through FY 2025

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Appendix 1a. Dalthorp et al. (2017) Fatality Estimation for the ʻŌpeʻapeʻa at Project Through FY 2025

Modeling Period	FY	Dates		Period Length (days)	% Year	LWSC	Search Interval (days)	Number of Searches in Modeling Period	Observed Fatalities (X)	K[1]	Canine Searches	DWP[2]	ĝ			B		M*[3]
		Begin	Ending										ĝ	95% LCI	95% UCI	Ba	Bb	
1	2007	6/22/2006	6/30/2007	373	1.02	no	9	41	0	0.7	No	1	0.445	0.261	0.638	11.21	13.96	1
2	2008	7/1/2007	6/30/2008	365	1	no	9	41	0	0.7	No	1	0.442	0.258	0.636	11.06	13.94	1
3	2009	7/1/2008	6/30/2009	364	1	no	7	52	0	0.7	No	1	0.501	0.312	0.69	12.70	12.64	1
4	2010	7/1/2009	6/30/2010	364	1	no	7	52	0	0.7	No	1	0.45	0.272	0.634	12.37	15.14	1
5	2011	7/1/2010	6/30/2011	364	1	no	7	52	0	0.7	No	1	0.505	0.257	0.752	7.145	7.007	1
6	2012	7/1/2011	6/30/2012	365	1	no	7	52	0	0.7	No	1	0.345	0.149	0.574	6.089	11.56	1
7	2013	7/1/2012	6/30/2013	364	1	no	7	52	2	0.7	No	1	0.414	0.183	0.669	5.894	8.335	7
8	2014	7/1/2013	6/30/2014	364	1	no	7	52	4	0.7	No	1	0.484	0.332	0.638	19.23	20.47	18
9	2015	7/1/2014	6/30/2015	364	1	5.5 m/s	7	52	0	0.7	No	1	0.217	0.128	0.321	14.76	53.30	19
10	2016	7/1/2015	6/30/2016	365	1	5.5 m/s	7	52	0	1	Yes	0.4922	0.44	0.408	0.472	407.9	520.1	19
11	2017	7/1/2016	6/30/2017	364	1	5.5 m/s	7	52	1	1	Yes	0.4922 or 0.573	0.524	0.499	0.549	816.1	741.0	21
12	2018	7/1/2017	6/30/2018	364	1	5.5 m/s	7	52	1	1	Yes	0.573	0.459	0.386	0.533	80.67	95.13	23
13	2019	7/1/2018	6/30/2019	364	1	5.5 m/s	7	52	1	1	Yes	0.573	0.368	0.289	0.45	50.35	86.64	26
14	2020	7/1/2019	6/30/2020	365	1	5.5 m/s	7	53	0	1	Yes	0.573	0.466	0.405	0.529	115.3	132.0	26
15	2021	7/1/2020	6/30/2021	364	1	5.5 m/s	7	52	0	1	Yes	0.573	0.437	0.351	0.522	58.18	75.11	26
16	2022	7/1/2021	6/30/2022	364	1	5.5 m/s	7	52	0	1	Yes	0.573	0.477	0.414	0.54	115.1	126.2	26
17	2023	7/1/2022	6/30/2023	364	1	5.5 m/s	7	52	1	1	Yes	0.573	0.52	0.486	0.555	545.7	500.7	28
18	2024	7/1/2023	6/30/2024	365	1	5.5 m/s	7	52	0	1	Yes	0.573	0.48	0.422	0.537	137.2	149.0	28
19 (current)	2025	7/1/2024	6/30/2025	364	1	5.5 m/s	7	52	0	1	Yes	0.573	0.479	0.413	0.545	103.613	112.78	28

1. Searches performed by canine teams increases the probability that a missed carcass will be detected on the next search.
2. Where two values are represented, the searched area changed within the modeled period. Detection probability represents the cumulative detection for the year. See annual reports for details.
3. Cumulative value representing estimate of total direct take from the start of operations through the identified monitoring period at the 80 percent UCL.

Appendix 1b. Dalthorp et al. (2017) Fatality Estimation for the Nēnē at Project Through FY 2025

Modeling Period	FY	Dates		Period Length (days)	% Year	Search Interval (days)	Number of Searches in Modeling Period	Observed Fatalities (X)	K	Canine Searches	DWP[1]	ĝ			B		M*[2]
		Begin	Ending									ĝ	95% LCI	95% UCI	Ba	Bb	
1	2007	6/22/2006	6/30/2007	373	1.02	9	41	0	1	No	0.95	0.923	0.871	0.962	120.8	10.14	0
2	2008	7/1/2007	6/30/2008	365	1	9	41	2	1	No	0.95	0.923	0.871	0.962	120.8	10.14	2
3	2009	7/1/2008	6/30/2009	364	1	7	52	1	1	No	0.95	0.928	0.886	0.961	162.5	12.60	4
4	2010	7/1/2009	6/30/2010	364	1	7	52	1	1	No	0.95	0.928	0.886	0.961	162.5	12.60	5
5	2011	7/1/2010	6/30/2011	364	1	7	52	5	1	No	0.95 or 0.7	0.773	0.748	0.797	889.3	261.5	11
6	2012	7/1/2011	6/30/2012	365	1	7	52	1	1	No	0.7	0.678	0.633	0.72	299.4	142.5	13
7	2013	7/1/2012	6/30/2013	364	1	7	52	4	1	No	0.7	0.666	0.58	0.748	79.75	39.93	18
8	2014	7/1/2013	6/30/2014	364	1	7	52	3	1	No	0.7	0.683	0.626	0.737	183.9	85.39	23
9	2015	7/1/2014	6/30/2015	364	1	7	52	4	1	No	0.7	0.691	0.658	0.722	548.7	245.9	28
10	2016	7/1/2015	6/30/2016	365	1	7	52	1	1	Yes	0.29	0.284	0.265	0.302	661.2	1671	32
11	2017	7/1/2016	6/30/2017	364	1	7	52	0	1	Yes	0.29 or 0.35	0.327	0.314	0.341	1474.3	3031	34
12	2018	7/1/2017	6/30/2018	364	1	7	52	1	1	Yes	0.35	0.344	0.336	0.352	4420	8438	37
13	2019	7/1/2018	6/30/2019	364	1	7	52	2	1	Yes	0.35	0.339	0.282	0.399	84.70	165.3	42
14	2020	7/1/2019	6/30/2020	365	1	7	53	0	1	Yes	0.35	0.33	0.301	0.359	337.8	686.5	43
15	2021	7/1/2020	6/30/2021	365	1	7	52	0	1	Yes	0.35	0.336	0.315	0.357	674.4	1280	45
16	2022	7/1/2021	6/30/2022	364	1	7	52	1	1	Yes	0.35	0.345	0.315	0.375	327.5	622.8	49
17	2023	7/1/2022	6/30/2023	364	1	7	52	1	1	Yes	0.35	0.345	0.323	0.368	598.0	1133	52
18	2024	7/1/2023	6/30/2024	365	1	7	52	0	1	Yes	0.35	0.344	0.326	0.361	994.265	1898.82	53
19 (current)	2025	7/1/2024	6/30/2025	364	1	7	52	0	1	Yes	0.35	0.346	0.329	0.363	999.35	1890.48	54

1. Where two values are represented, the searched area changed within the modeled period. Detection probability represents the cumulative detection for the year. See annual reports for details.
2. Cumulative value representing estimate of total direct take from the start of operations through the identified monitoring period at the 80 percent UCL.

Appendix 1c. Dalthorp et al. (2017) Fatality Estimation for ʻUaʻu at Project Through FY 2025

Modeling Period	FY	Dates		Period Length (days)	% Year	Search Interval (days)	Number of Searches in Modeling Period	Observed Fatalities (X)[1]	K	Canine Searches	DWP[2]	ĝ			B		M*[3]
		Begin	Ending									ĝ	95% LCI	95% UCI	Ba	Bb	
1	2007	6/22/2006	6/30/2007	545	1.02	9	61	0	0.9	No	1	0.807	0.602	0.948	14.64	3.512	0
2	2008	7/1/2007	6/30/2008	365	1	9	41	1	0.9	No	1	0.786	0.593	0.928	16.78	4.580	2
3	2009	7/1/2008	6/30/2009	364	1	7	52	0	0.9	No	1	0.847	0.717	0.942	31.55	5.682	2
4	2010	7/1/2009	6/30/2010	364	1	7	52	0	0.9	No	1	0.861	0.706	0.963	22.06	3.566	2
5	2011	7/1/2010	6/30/2011	364	1	7	52	0	0.9	No	1 or 0.75	0.798	0.752	0.841	244.5	61.78	2
6	2012	7/1/2011	6/30/2012	365	1	7	52	2	0.9	No	0.75	0.581	0.431	0.724	24.57	17.70	5
7	2013	7/1/2012	6/30/2013	364	1	7	52	0	0.9	No	0.75	0.646	0.511	0.77	32.73	17.93	5
8	2014	7/1/2013	6/30/2014	364	1	7	52	1	0.9	No	0.75	0.714	0.668	0.758	281.2	112.6	6
9	2015	7/1/2014	6/30/2015	364	1	7	52	2	0.9	No	0.75	0.65	0.555	0.74	65.57	35.30	10
10	2016	7/1/2015	6/30/2016	365	1	7	52	0	1	Yes	0.204	0.197	0.18	0.214	414.2	1690	10
11	2017	7/1/2016	6/30/2017	364	1	7	52	0	1	Yes	0.204 or 0.246	0.232	0.221	0.243	1272	4216	11
12	2018	7/1/2017	6/30/2018	364	1	7	52	0	1	Yes	0.246	0.24	0.203	0.28	114.8	362.8	12
13	2019	7/1/2018	6/30/2019	364	1	7	52	1	1	Yes	0.246	0.239	0.196	0.284	85.2	272	14
14	2020	7/1/2019	6/30/2020	365	1	7	53	0	1	Yes	0.246	0.218	0.192	0.244	210.7	757.7	15
15	2021	7/1/2020	6/30/2021	365	1	7	52	0	1	Yes	0.246	0.2096	0.12	0.316	13.62	51.37	16
16	2022	7/1/2021	6/30/2022	364	1	7	52	0	1	Yes	0.246	0.24	0.224	0.25	808.5	756.0	17
17	2023	7/1/2022	6/30/2023	364	1	7	52	0	1	Yes	0.246	0.239	0.221	0.256	532.9	1701	18
18	2024	7/1/2023	6/30/2024	365	1	7	52	0	1	Yes	0.246	0.242	0.230	0.254	1257	3940	18
19 (current)	2025	7/1/2024	6/30/2025	364	1	7	52	0	1	Yes	0.246	0.237	0.223	0.251	1037.2	1155.5	19

1. FY 2013 fatality was mistakenly included in previous analyses. Based on the contemporaneous fatality report, the carcass was recovered outside of the designated search plots.
2. Where two values are represented, the searched area changed within the modeled period. Detection probability represents the cumulative detection for the year. See annual reports for details.
3. Cumulative value representing estimate of total direct take from the start of operations through the identified monitoring period at the 80 percent UCL.

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Appendix 2. Indirect Take for the Ōpeʻapeʻa, Nēnē, and ʻUaʻu at the Project in FY 2025

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Appendix 2a. Indirect Take for the ʻŌpeʻapeʻa at the Project through FY 2025

Parameter	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025 (current)	Total
A	Observed Breeding Female Take	0	0	0	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0	**0**	**4**
B	Indirect Take from Observed Breeding Female Take (A x 1.8)	0	0	0	0	1.8	0	0	3.6	0	0	0	1.8	0	0	0	0	0	0	**0**	**7.2**
C	Observed Breeding Unknown Sex Take	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
D	Indirect Take from Observed Breeding Unknown Sex Take (C * 0.5 * 1.8)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
E	All Observed Take (Search and Incidental)	0	0	1	0	1	0	2	4	0	0	2	1	1	0	0	0	1	0	**0**	**13**
F	Estimated Take Multiplier (28/13=2.15)	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	
G	Estimated Direct Take (E x F)	0	0	2.15	0	2.15	0	4.31	8.62	0	0	4.31	2.15	2.15	0	0	0	2.15	0	**0**	**28.16**
H	Unobserved Direct Take (G - E)	0	0	1.15	0	1.15	0	2.31	4.62	0	0	2.31	1.15	1.15	0	0	0	1.15	0	**0**	**15.16**
I	Indirect Take Calculated from Unobserved Take (H * 0.5 * 0.25 * 1.8)	0	0	0.26	0	0.26	0	0.52	1.04	0	0	0.52	0.26	0.26	0	0	0	0.26	0	**0**	**3.41**
Total Indirect Take (B + D + I)(juveniles)																					**10.61**
Total Indirect Take (B + D + I)*0.3) (adults)																					**3.18**

Appendix 2b. Indirect Take and lost productivity for the Nēnē at the Project through FY 2025

Parameter	Description	Fiscal Year																							
		2007	2008	2009	2010	2011		2012	2013	2014		2015		2016	2017	2018	2019	2020	2021	2022	2023		2024		2025	Total
A1	Observed Adult Take	0	2	1	1	3	2	1	4	2	1	3	1	1	1	1	2	0	1	1	2	1	**1**	**2**	**0**	**34**
A2	Observed Juvenile Take	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**0**	**1**
B	Estimated Take Multiplier (54/34= 1.59)	1.59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	1. 59	**1.59**	**N/A**
C	Estimated Adult Direct Take (A1 x B)	0.00	3.18	1.59	1.59	4.76	3.18	1.59	6.35	3.18	1.59	4.76	1.59	1.59	1.59	1.59	3.18	0.00	1.59	1.59	3.18	1.59	1.59	3.18	0.00	54
D	Observed Indirect Take Multiplier (Season Defined)	0.00	0.09	0.00	0.00	0.09	0.00	0.09	0.09	0.09	0.00	0.09	0.04	0.09	0.04	0.09	0.09	0.00	0.09	0.09	0.09	0.04	0.04	0.09	**0.00**	**N/A**
E	Observed Indirect Take (D x A1)	0.00	0.18	0.00	0.00	0.27	0.00	0.09	0.36	0.18	0.00	0.27	0.04	0.09	0.04	0.09	0.18	0.00	0.09	0.09	0.18	0.04	0.04	0.18	**0.00**	**2.41**
F	Unobserved Direct Take (C – A1)	0.00	1.18	0.59	0.59	1.76	1.18	0.59	2.35	1.18	0.59	1.76	0.59	0.59	0.59	0.59	1.18	0.00	0.59	0.59	1.18	0.59	0.59	1.18	**0.00**	**17**
G	Unobserved Indirect Take (F x 0.3*0.375*0.5)	0.000	0.066	0.033	0.033	0.099	0.066	0.033	0.132	0.066	0.033	0.099	0.033	0.033	0.033	0.033	0.066	0.000	0.033	0.033	0.066	0.033	0.033	0.066	0.00	1.125
H	Accrued Adult Take ([Previous Year's Accrued C]- N - L) (beginning 1/1/2011)							2.99	4.39	10.44		13.76		16.18	13.98	12.93	9.69	5.96	5.86	6.75	3.46		7.77		**7.32**	**N/A**
I	Lost Productivity from accrued adult take (Current year's H x 0.1) (fledglings)							0.30	0.44	1.04		1.38		1.62	1.40	1.29	0.97	0.60	0.59	0.68	0.35		0.78		**0.73**	**12.15**
J	(Indirect Take) + Lost Productivity ([E + G]+ I +A2), for fledglings							0.42	0.93	1.32		1.82		1.74	1.47	1.42	1.22	0.60	0.71	0.80	0.67		1.10		**0.73**	**14.93**
K	Mitigation fledglings (fledglings)[1]							3.00	8.00	8.00		6.00		11.00	14.00	1.00	1.36	10.00	1.00	10.00	1.77		6.00		**8.00**	**89.13**
L	Mitigation adult survival (adults)[1]							0.19	0.19	0.31		0.12		0.31	0.37	0.50	0.08	0.50	0.31	0.62	0.07		0.31		**0.50**	**4.37**
M	Net fledglings remain (Current Year K - J)							2.58	7.07	6.68		4.18		9.26	12.53	-0.42	0.14	9.40	0.29	9.20	1.10		4.90		**7.27**	**68.54**
N	Net adults 3 yrs. later (3 Years' Previous M*0.512)											1.32		3.62	3.42	2.14	4.74	6.42	-0.21	0.07	4.82		0.15		**4.71**	**31.19**
Total Direct Take from Collisions with WTGs (adults; C)																										**54.00**
Total Indirect Take (fledglings; E + G)																										**3.53**
Total Indirect Take (adults; [E + G] x 0.512)																										**1.81**
Total Lost Productivity (fledglings; I)																										**12.15**
Total Lost Productivity (adults; I x 0.512)																										**6.22**

1. Based on Haleakalā Ranch annual outcomes; FY 2019 and FY 2023 are adjusted to account for partial crediting due to sharing of credits with KWP II, all other years are allocated 100 percent to KWP I.

Appendix 2c. Indirect Take for the ʻUaʻu at the Project through FY 2025

Parameter	Description	Fiscal Year																					
		2007	2008	2009	2010	2011	2012		2013	2014	2015		2016	2017	2018	2019	2020	2021	2022	2022	2023	2024	2025	Total
A	Observed Take	0	1	0	0	0	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	**0**	**8**
B	Estimated Take Multiplier (19/8=2.38)	2.38	2. 38	2. 38	2. 38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	N/A
C	Estimated Direct Take (A x B)	0	2.38	0	0	0	2.38	2.38	2.38	2.38	2.38	2.38	0	0	0	2.38	0	0	0	0	0	0	**0**	**19**
D	Observed Indirect Take Multiplier (Season defined)	0	0.66	0	0	0	0.66	0.5	0.89	0.89	0.89	0.66	0	0	0	0.89	0	0	0	0	0	0	0	N/A
E	Observed Indirect Take (A x D)	0	0.66	0	0	0	0.66	0.5	0.89	0.89	0.89	0.66	0	0	0	0.89	0	0	0	0	0	0	**0**	**6.04**
F	Unobserved Direct Take (C - A)	0	1.38	0	0	0	1.38	1.38	1.38	1.38	1.38	1.38	0	0	0	1.38	0	0	0	0	0	0	**0**	**11**
G	Unobserved Indirect Take (D x F)	0	0.91	0	0	0	0.91	0.69	1.22	1.22	1.22	0.91	0	0	0	1.22	0	0	0	0	0	0	**0**	**8.31**
Total Indirect Take (E + G) chicks/eggs																								**14.35**
Total Indirect Take (E + G) x 0.3 adults																								**4.30**

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Appendix 3. Ōpeʻapeʻa, Nēnē and ʻUaʻu 20-year Projected Take at the Project as of FY 2025

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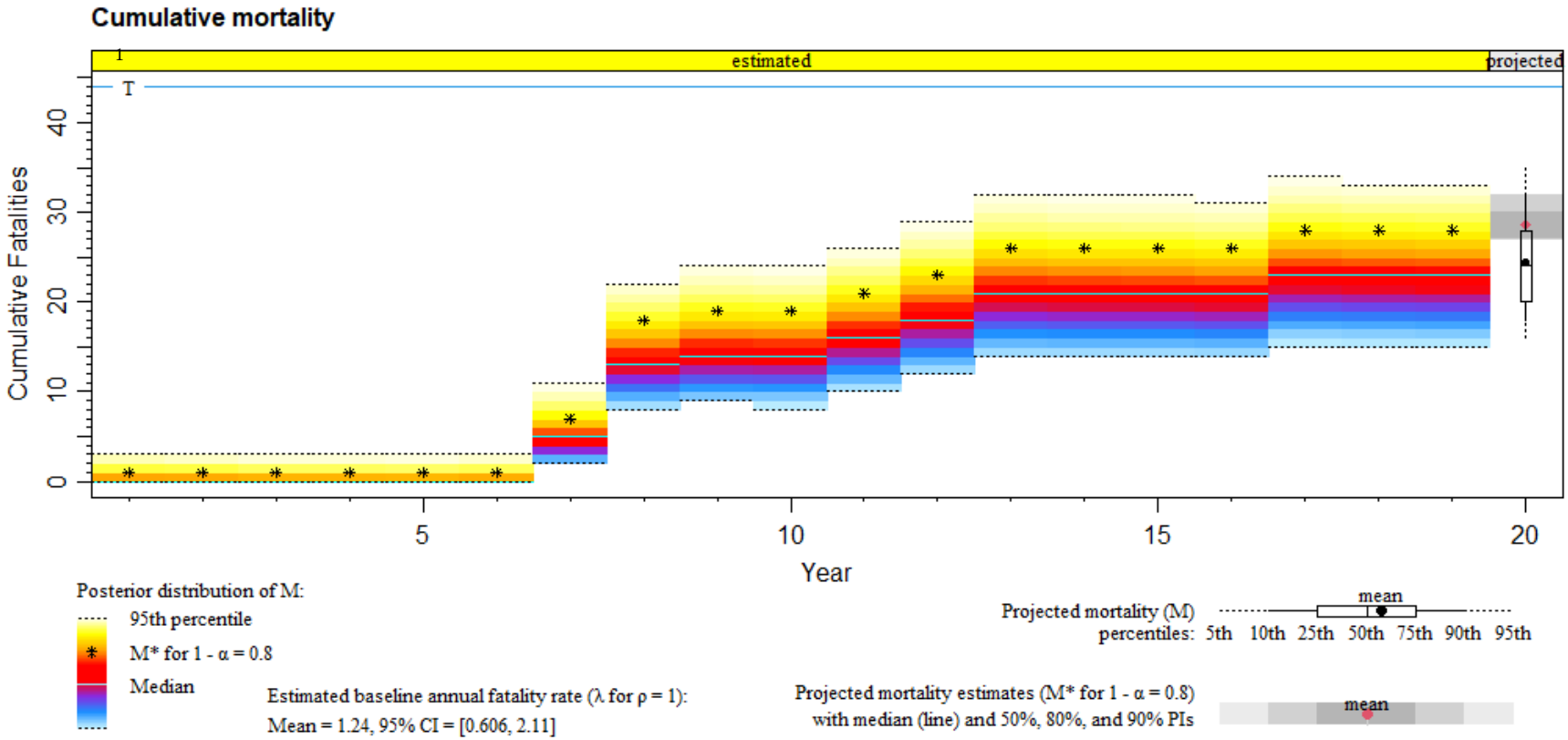
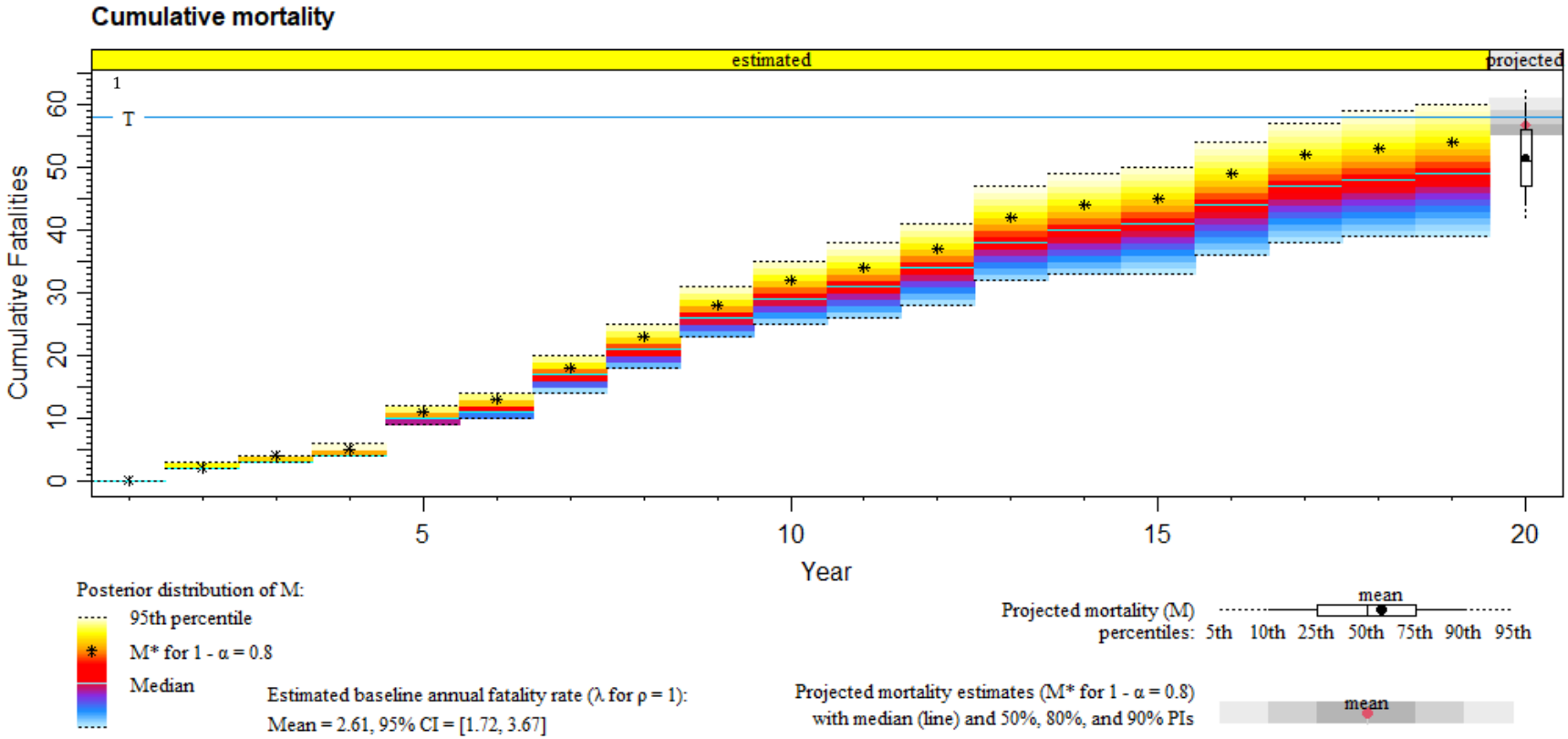
Appendix 3a. Projected Cumulative Mortality for the ʻŌpeʻapeʻa at the Project



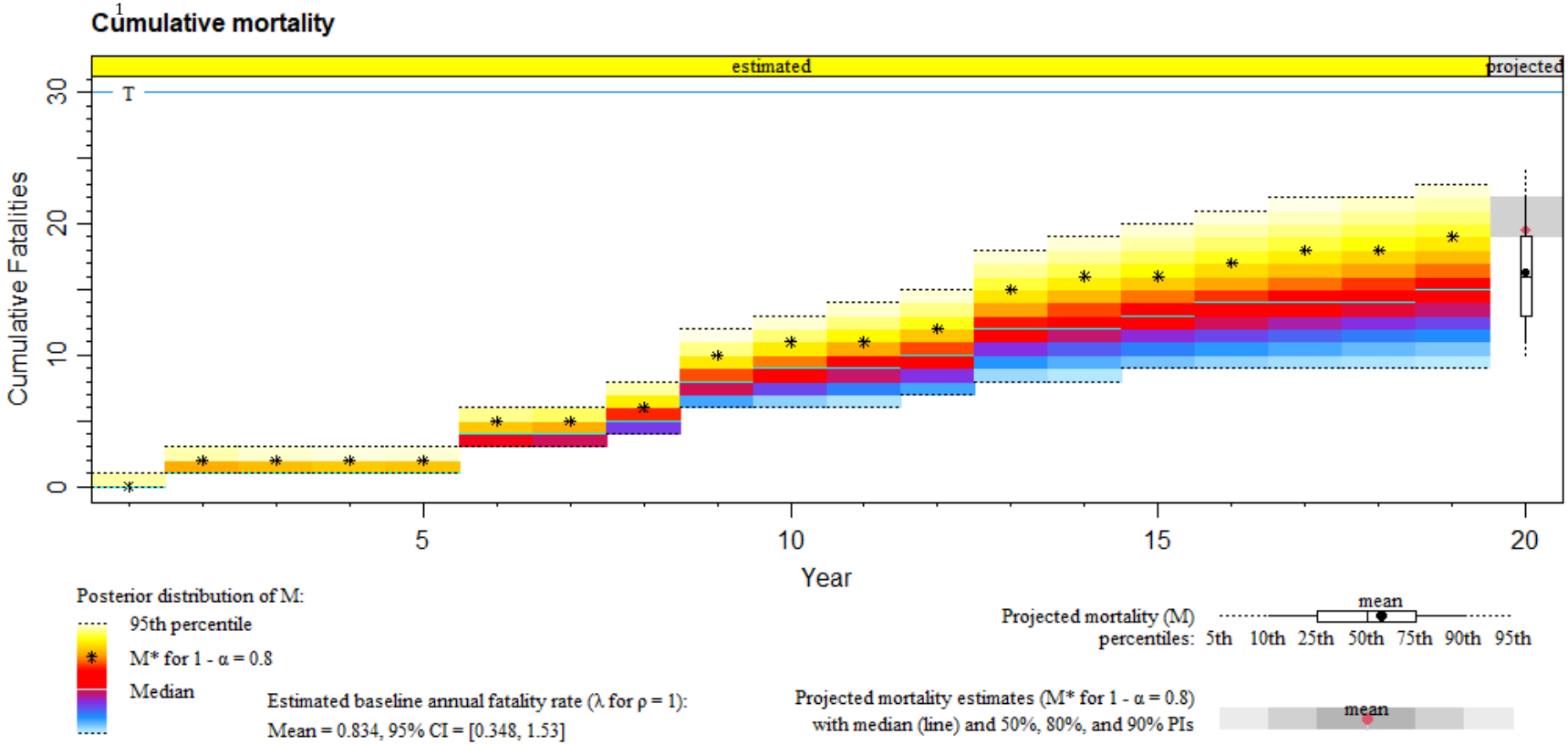
1. Permitted take for the ʻōpeʻapeʻa at the Project is 50; however, take as calculated from EoA only includes direct take. To account for indirect take in this figure, an approximate take threshold (T) of 44 is shown, representing authorized bat take (50) minus 6 adult equivalents of indirect take (12.0 percent of the authorized limit). Currently, the proportion of total take that is attributable to indirect take is 10.2 percent.

Appendix 3b. Projected Cumulative Mortality for the Nēnē at the Project with Tier 1 Threshold



1. Permitted take for Tier 1 of the nēnē at the Project is 60; however, take as calculated from EoA only includes direct take. To account for indirect take in this figure, an approximate take threshold (T) of 58 is shown, representing permitted nēnē take (60) minus 2 adult equivalents of indirect take (3.3 percent of the requested authorized limit). Currently, the proportion of total take that is attributable to indirect take is 3.2 percent.

Appendix 3c. Projected Cumulative Mortality for the ʻUaʻu at the Project



1. Permitted take for the ʻUaʻu at the Project is 38; however, take as calculated from EoA only includes direct take. To account for indirect take in this figure, an approximate take threshold (T) of 30 is shown, representing authorized petrel take (38) minus 8 adult equivalents of indirect take (21.1 percent of the authorized limit). Currently, the proportion of total take that is attributable to indirect take is 18.5 percent.

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Appendix 4. Documented Fatalities at the Project during FY 2025

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Species	Date Documented	WTG	Distance to WTG (meters)	Bearing from WTG (degrees)	Search or Incidental Find
Unknown gamebird	7/16/2024	8	25	175	Search
Euodice cantans (African silverbill)	8/6/2024	10	1	27	Search
Euodice cantans (African silverbill)	8/6/2024	10	1	27	Search
Ortygornis pondicerianus (gray francolin)	9/4/2024	4	1	342	Search
Ortygornis pondicerianus (gray francolin)	9/4/2024	8	1	50	Search
Phaethon lepturus (koaʻe kea/white-tailed tropicbird)[1]	9/17/2024	5	23	135	Search
Phasianus colchicus (ring-necked pheasant)	10/1/2024	7	3	275	Search
Francolinus francolinus (black francolin)	1/18/2025	20	1	230	Search
Ortygornis pondicerianus (gray francolin)	3/25/2025	7	1	53	Search
Phaethon lepturus (koaʻe kea/white-tailed tropicbird)[2]	4/9/2025	16	20	300	Search
Phasianus colchicus (ring-necked pheasant)	4/15/2025	4	1	26	Search
Geopelia striata (zebra dove)	6/3/2025	6	1	16	Search
1. Species protected under the MBTA.					

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Appendix 5. Nēnē Monitoring and Predator Control Management at Haleakalā Ranch, DOFAW Maui Annual Report, FY 2025

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Maui

Haleakalā Ranch Report: FY 2025

Sighting:

Management of the Haleakalā Ranch pen was transferred to KWP/TetraTech and is now carried out by a local contractor as of January 2023. This includes mowing, weed control, fence maintenance, water maintenance, predator control, trapping, and road maintenance. DOFAW conducts monthly nēnē monitoring surveys, tracks nesting success, and banding.
During this period, a total of forty-three (43) banded adult birds were observed at the pen with an additional eleven (11) unbanded adults.

Nesting:

A total of ten (10) nests were located inside the open-top release pen and one (1) in the Koa enclosure. A total of twenty-four (24) eggs hatched, and eight (8) were fledged, and five (5) were banded.

Banding:

A total of eleven (11) individuals were banded at the Haleakalā Ranch pen this past season, six (6) adults and five (5) fledglings. Of the adults banded, three (3) were rebanded.

Pen Maintenance:

Maintenance is conducted by the contractor, AES, year-round. The one-acre pen was mowed 30 times this past year. The electric fence, grounding stakes, and batteries were maintained throughout this period. The storage shed was painted, and a new hinge for the entrance to the pen was fabricated and installed.

Habitat Management:

Approximately 1 acre of alien vegetation was mechanically removed, including lantana, strawberry guava, Bocconia, fireweed, and bur.

Trapping:

Predator control conducted by AES maintained ten (10) tomahawk live traps, twenty (20) DOC200 traps, ten (10) A24s, one (1) trapinator body grip, and 2 AT220 traps. Of these traps, four (4) mongoose, two (2) cats, and seven (7) rats were removed.

Deaths:

Fifteen (15) goslings were predated by either aerial predators or possibly mongoose; no carcasses were found in the area. Four (4) goslings died of natural causes, and their bodies were salvaged and placed in the DOFAW freezer.

Appendix 6. Haleakalā Ranch Nēnē Release Pen Program Annual Report FY 2025

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HALEAKALĀ RANCH NĒNĒ RELEASE PEN MITIGATION PROGRAM

MAUI

ANNUAL REPORT

FY 2025 (JULY 1, 2024, through JUNE 30, 2025)

1.0 Introduction

In May 2011, the Hawai'i Department of Land and Natural Resources—Division of Forestry and Wildlife (DOFAW), with funding from the Kaheawa Wind Power I (KWP I) project, established a Nēnē Introduction Program (Program) at Haleakala Ranch (Ranch), Maui. The purpose of this Program was to establish a population of the endangered nēnē, or Hawaiian goose (*Branta sandvicensis*), at the Ranch. The Program contributes to the mitigation requirements for the nēnē as identified in the KWP I and Kaheawa Wind Power II (KWP II; collectively, the Projects) Habitat Conservation Plans (KWP I 2006, SWCA 2019). As part of the Program, Haleakala Ranch, LLC committed to maintaining the Ranch premises, which are considered to provide a significant amount of habitat that may be suitable for nēnē, for renewable periods of 10 years over the 50-year term of the Haleakala Ranch Safe Harbor Agreement (SHA; USFWS et al. 2019). The Program has successfully produced fledglings at the Ranch since 2012.

In 2021, DOFAW requested that the Projects assume direct management of the release pen. Under an initial Memorandum of Understanding (MOU) both parties agreed that the Projects would assume management activities on December 8, 2022. The Projects contract Aloha Environmental Services (AES) to conduct the work as laid out in the Scope of Work (SOW), which is appended to the final MOU (fully executed March 4, 2025). Key needs for establishing a population of nēnē at the Ranch were identified in the SHA as nest monitoring, pen maintenance, habitat management, and predator control. This report and the activities described herein are in compliance with the Ranch's SHA and the Projects' commitments outlined in the SOW. This report provides detail of the 2024 – 2025 breeding season at the Ranch through the end of Fiscal Year (FY) 2025 (June 30, 2025).

2.0 Funding

Table 1 shows the expenditures during FY 2025.

Table 1. Expenditures During July 1, 2024 – June 30, 2025, for the Nēnē Release Pen Mitigation Program at Haleakalā Ranch, Maui

Category	Funded Amount
Road Improvement	$10,000
Nēnē Monitoring	$14,100
Banding	$0
Pen Maintenance	$11,000
Habitat Management	$20,996
Predator Control	$11,000
Reporting	$9,000
Adaptive Management Actions	$4,700
Total Cost for FY 25	**$80,796**

3.0 Mitigation Actions

3.1 Road Improvement

The road to the pen was maintained periodically by AES staff, as needed, by moving rocks and backfilling holes with dirt and rocks. Per Right of Entry agreement with Haleakala Ranch, LLC, the Projects provided $10,000 to the ranch for road repair activities in March 2025 (see Table 1).

3.2 Nēnē Monitoring

3.2.1 Release Pen Visitation

Biweekly visitations (every 2 weeks) began in July 2024 and transitioned to weekly visitations and monitoring by AES personnel at the Ranch from August 1, 2024 to May 31, 2025 when weather permitted and Ranch personnel approved access. Biweekly visitations and monitoring were resumed during the month of June 2025 after all nēnē goslings were confirmed to be fledged.

3.2.2 Sightings

Observations of banded and unbanded birds were recorded at the Ranch to monitor movements, distribution, and survival of nēnē using both visual, binocular surveys, as well as footage from four strategically placed game cameras within the pen. In FY 2025, 31 distinct banded adults and, at minimum, eleven unique un-banded adults were observed at the Ranch (Table 3). This is an increase from last year's monitoring data which accounted for 25 distinct banded adults.

3.2.3 Nesting

During nesting season, records were kept on mating pairs and the breeding status of females found at the Ranch. Nests found at the Ranch were marked using GPS and checked weekly to determine their status. Nesting activities, nest outcomes, hatching, and fledgling success were recorded for the nesting season. Survey methods for nesting activity/success included both weekly visual (binocular) surveys, as well as daily data collection by on site game cameras.

Ten nests or nesting attempts were located within the Ranch open-top release pen this year (Table 2/Map 1, Appendix B). Of these ten nests, nine successfully hatched goslings and three nesting pairs were able to raise goslings to successful fledging. Two of the successful nests were a result of re-nesting attempts (secondary nesting) by two different breeding pairs. A total of 24 nēnē hatched between the nine successful nests. Eight juvenile nēnē successfully fledged from the Ranch open-top release pen this season. AES personnel confirmed the fledging of all eight goslings by compiling data from both visual observations, as well as by daily photo documentation taken by game cameras between October 30, 2024, and June 30, 2025 (Appendix A).

One nēnē nest was observed outside of the nēnē pen during the 2024 – 2025 breeding season, inside of the adjacent koa (*Acacia koa*) grove enclosure[1]. AES deployed additional predator control traps with bird excluders installed (see Section 3.6) in this area while nēnē were incubating on nest. One mongoose was successfully caught in a cage trap set within close proximity to the nest site during the incubation period. Four goslings were confirmed hatched from this nest, but monitoring of this family group proved difficult over time as they moved in and out of the koa enclosure freely. This family group was last observed on December 20th, 2024, and the fledging outcome is unknown.

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[1] Seed bank enclosure for wilt resistant Koa trees, managed by the Hawaii Agriculture Research Center

Table 2. Nēnē Nesting Summary for 2024-2025 Breeding Season at Haleakalā Ranch, Maui

Total Number of Nests	
Located in open-top pen	**10**
Located in Koa enclosure	**1**
Successful	**9**
Abandoned	**1**
Depredated	**0**
Failed (other reason)	**0**
Renests	**2**
Total Number of Eggs	
Known	**26**
Destroyed naturally	**0**
Depredated	**0**
Salvaged	**2**
Hatched	**24**
Total Number of Goslings/Fledglings	
Known goslings	**24**
Goslings depredated	**11**[1]
Goslings died (other reason)	**5**
Fledglings fledged from pen (credited for mitigation)	**8**
[1] Suspected depredation by aerial predators, but unconfirmed by direct evidence. See section 3.6.	

Table 3. FY2024-25 Nene observation table with leg band documentation

Solo	UNR
Solo	AL/EHR
Solo	EHT/AL
Solo	AL/EJE
Solo	AL/CXC
Solo	CXH/AL
Pair 1	AL/CUZ, CUY/AL (Four goslings hatched inside Koa pen. Pair and goslings were not documented after December 2024)
Pair 2	AL/EJJ, EJK/AL (One gosling hatched, went missing on 1/2)
Pair 3	$K10/AL, AL/$K08 (Three goslings hatched, one died in nest) 2 fledged 1/24 (one banded on 6/9 AL/ERH (female). Hatched 4 new goslings around 2/28. One gosling missing on 3/7) confirmed fledged on 5/29. All three banded on 5/9 AL/ERA (male), AL/ERC (female), AL/ERE (female).
Pair 4	EHY/AL, AL/EHX (Two goslings hatched, one missing on 1/3, one missing after 1/4
Pair 5	CXN/AL, AL/EPC (four goslings hatched 2/28. All four goslings missing on 3/7)
Pair 6	EJH/AL, AL/EJN
Pair 7	EHZ/AL, EJN/AL
Pair 8	AL/EJX, EJY/AL
Pair 9	-/AL, AL/ENX (Two goslings hatched, one found dead 12/27, one missing after 1/1
Pair 10	EJA/AL, AL/EHA

Pair 11	CXK/AL, UNR
Pair 12	AL/EAT, UNR
Pair 13	CEJ/AL, UNR
Pair 14	-/AL, AL/- . sitting on nest 2/28. Failed nesting attempt (2 eggs laid/abandoned)
Pair 15	-/AL, UNR
Pair 16	AL/EJC, EHU/AL (Four goslings hatched, two found dead 12/27, two missing on 1/3. Hatched 2 new goslings 3/4) confirmed fledged on 5/29
Pair 17	UNR, UNR
Pair 18	AL/ENU, EPZ/AL (hatched 1 gosling 3/3) confirmed fledged on 5/29. Gosling banded on 5/9. AL/EPY (male). Parent banded 5/9 *EPZ.

*Yellow highlighted pairs successfully hatched goslings. Green highlighted pairs successfully fledged goslings.

3.3 Banding

This year DOFAW staff banded a total of eight nēnē at the open-top release pen during two different site visits. The first visit was on November 7th, 2024, where DOFAW staff banded one unbanded male nēnē, and re-banded another adult male. The second visit took place on May 9th, 2025, where DOFAW staff banded 5 fledglings and re-banded one adult. Data was compiled and sent to AES on May 12th, 2025 (Table 3).

3.4 Pen Maintenance

Regular maintenance of the open-top pen followed the scope of work and included fence maintenance, vegetation management, water resource management among other tasks. The open-top pen's fence line was continuously monitored for breach points and maintained by AES throughout the fiscal year. The fence line was weed-whacked and mowed for weed control, and trees were trimmed along the exterior boundary to prevent bridge entry by predators. The water catchment system was checked for leaks regularly and bled of air buildup when needed. The large pond was cleaned and flushed twice a month, and smaller baths were cleaned and maintained weekly. The electric fence insulators, solar batteries, and grounding stakes/wires were maintained and operational throughout the nēnē nesting period. While outside of the scope of work, the on-site storage shed was given a fresh coat of weather resistant paint on October 25th, 2024, to preserve the shed's integrity for future years. A new hinged pen entrance door was fabricated, welded, and installed on February 28th, 2025, by AES technicians. This replaced the old guillotine style door that was used in the past and found damaged by wind events on multiple occasions.

3.5 Habitat Management

Short grass habitat was maintained at the open-top release pen. During the pre-breeding and breeding season (October– April), the 1-acre open-top pen was mowed once a week and the area around the outside of the pen was maintained as needed. During the non-breeding season (May – September), the open-top pen and the surrounding perimeter was mowed every other week and non-native/overgrown vegetation was cleared around potential nesting areas as needed. The 1-acre pen was mowed 30 times this year to maintain nēnē short grass habitat. Approximately 0.5

acre of alien vegetation was mechanically removed, including lantana (*Lantana camara*), strawberry guava (*Psidium cattleianum*), bocconia (*Bocconia frutescens*), and fireweed (*Senecio madagascariensis*), from both open top pens and covered secondary enclosures.

3.6 Predator Control

Predator traps are used to control rats (*Rattus rattus*), mongoose (*Herpestes javanicus*), and feral cats (*Felis catus*) that may pose a threat to nēnē. Traplines were baited and checked weekly at the Ranch during the breeding season, and biweekly during non-breeding season using 10 Tomahawk live traps, 20 DOC 200 traps, 10 A24s, 1 Trapinator body grip and 2 AT220 traps, .

In FY 2025 at the Ranch, five mongoose, seven rats and two cats were removed through predator control efforts. Of the five mongoose removed, three were trapped by Doc 200s outside of the nēnē pen, one mongoose was caught in a cage trap outside of pen, and one was caught inside the nēnē pen in a DOC 200 trap while there were active nests onsite. Of the two cats removed, one was caught in a cage trap inside of pen during the non-breeding season, and the other was caught just outside of pen with the new AT220 trap during the first week of May prior to gosling fledging. It should be noted that the A24s and AT220 traps may have removed additional rats or mongoose, and the numbers reported here are based on confirmed removals.

Multiple observations were made of pueo (Hawaiian short-eared owl, *Asio flammeus sandwichensis*) pairs hunting above and around the nēnē pen during nesting season. Between the months of January and early March, eleven hatched goslings disappeared from the site. No gosling carcass or remains of any kind were recovered after extensive searching, indicating the cause of predation may be avian given the lack of feathers which usually indicate a predation event. There is currently no formal program in place for the removal of avian predators; pueo is a culturally significant species.

Table 4. Traps Deployed and Predators Removed during 2024 – 2025

Location	Trap Type	Trap nights	Mongoose	Cat	Rat
Outside Pen	DOC200 (15)	365	3	0	2
	Cage (10)	263 [1]	1	0	0
	AT220 (2)	263	0	1	1
	Trapinator (1)	263	0	0	1
Inside Pen	DOC200 (5)	365	1	0	3
	A24 (10)	365	0	0	0
	Cage (2)	92	0	1	0
1. Live traps were closed and moved inside after all goslings were confirmed fledged. Traps were moved to avoid damage by cattle moved to the area for grazing.					

3.7 Relocations

No nēnē were reported to be relocated by DOFAW personnel throughout the 2024-2025 fiscal year.

3.8 Injury, Fatalities, Disease

Five documentable nēnē deaths occurred this season at the Ranch between the months of October and March. The first documented gosling fatality was discovered on October 18th, 2024, by AES staff, next to the nest where the first hatched nest was documented (Map 1). The carcass was not predated and looked to be less than one week old. Three additional carcasses were discovered on December 27th, 2025, by AES staff in the short grass habitat inside of the pen, away from nest sites. These goslings were less than 1 month old and had no signs of predation or scavenging visible on them. One more gosling fatality was reported by AES staff on March 7th, 2025, in the same short grass habitat, lacking any evidence to suggest predation or scavenging took place. In addition to these five documented gosling deaths, there were also a total of 11 hatched goslings that seemingly disappeared with no trace of predation left behind. Suspected depredation by aerial predators is a hypothesized cause for this but is still unconfirmed by direct evidence (e.g., game camera footage).

3.9 Adaptive Management Actions

During the breeding season, biologists on site witnessed multiple occurrences of competition/aggressive behavior between nesting pairs within close proximity to each other. Attempts continue to be made to trim back overgrown grass areas and expand the short vegetation corridors leading to favorable nesting locations inside of the pen. Nēnē continue to be seen regularly utilizing these new areas, helping to alleviate some of the pressures of other breeding pairs within close proximity. A lack of water availability from the onsite catchment system in the early months of the breeding season caused by drought was more severe than in years past. AES technicians addressed this issue by hauling large water totes to the site during each site visit to replenish the ponds. In FY 2026, the KWPs plan to increase this water hauling capacity to be better prepared for drought conditions during the critical early months of future breeding seasons.

Additionally, the site monitoring efficiency and frequency were improved with the use of newly installed solar/cellular equipped game cameras inside of the pen. Technicians can now check real time nēnē activity as well as weather conditions from a phone app. This technology has greatly improved data collection capabilities and efficiency while off site, as well as helping to efficiently schedule site visits around less than ideal weather conditions.

4.0 Results

4.1 Calculation of Nēnē Produced (Mitigation Credit)

Eight nēnē were produced and successfully fledged at the pen during the 2024 – 2025 breeding season. These fledglings, and the opportunity for increased adult survival for the thirty-one banded

and eleven unbanded occupants of the pen will contribute to mitigation credits for the Projects. Mitigation credits accrued with the 2024 – 2025 breeding year will be attributed to KWP I in FY 2025 to address lagging mitigation. Based on agency feedback early in FY 2026, mitigation credits will be allocated across multiple permits in future years so that all permits relying on this mitigation site are simultaneously fulfilling their mitigation obligations.

5.0 Literature Cited

KWP I (Kaheawa Wind Power, LLC). 2006. Kaheawa Pastures Wind Energy Generation Facility Habitat Conservation Plan. January 2006.

SWCA (SWCA Environmental Consultants). 2011. Kaheawa Wind Power II Wind Energy Generation Facility Habitat Conservation Plan. Prepared for Kaheawa Wind Power II, LLC. December 2011.

USFWS (U.S. Fish and Wildlife Service), Haleakala Ranch, and Department of Land and Natural Resources (DLNR). 2019. Safe Harbor Agreement for Nēnē at Haleakala Ranch, Island of Maui.

Appendix A

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Photo 1. First documented goslings of the 2024-25 breeding season 10/30/24. Both confirmed fledged on 1/24/25

Photo 2. New traps ready to be deployed on 10/10/2024

Photo 3. AL/CUZ, CUY/AL 4 egg clutch inside of koa enclosure

Photo 4. AL/EJC, EHU/AL and 4 fresh goslings on 12/20. Two found dead on 12/27, two missing on 1/3. Pair re-nested and successfully hatched/fledged two additional goslings on 5/29.

Photo 5. $K10/AL, AL/$K08 with their 3 new goslings after successfully re-nesting

Photo 6. AL/EJC, EHU/AL with their 2 new goslings after re-nesting on 3/20/25

Photo 7. AL/ENU, -, AL with their 1 gosling on 3/11/25

Photo 8. $K10/AL, AL/$K08 and AL/ENU, -, AL family pairs in April 2025

Photo 9-11. Custom fabricated hinged door installed before/after

Photo 12-13. Newly installed solar/cellular game camera

Photo 14-15. Tomahawk live trap and Doc200 trap with bird excluders installed

Appendix B

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Map 1. Nēnē nests/gosling fatality locations detected in 2024-2025 breeding season.

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