# 2022 KSHCP ANNUAL REPORT

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**EXECUTIVE SUMMARY**

The three listed seabird species in Hawai‘i: the Newell’s Shearwater (NESH; *Puffinus auricularis newelli*, Hawaiian name: ‘a‘o), the Hawaiian Petrel (HAPE; *Pterodroma sandwichensis*, Hawaiian name: ‘ua‘u), and the Hawai‘i distinct population segment (DPS) of the band-rumped storm-petrel (BANP; *Oceanodroma castro*, Hawaiian name: ‘akē‘akē, hereafter band-rumped storm-petrel) are threatened by attraction to artificial lights, which has been observed and documented on Kaua‘i for decades. The Kaua‘i Seabird Habitat Conservation Plan (KSHCP) was developed and finalized in 2020 to address light attraction impacts to the listed seabirds on the island of Kaua‘i. The KSHCP also addresses the impacts of lights on the Central North Pacific distinct population segment (DPS) of the green sea turtle (*Chelonia mydas*, Hawaiian name: honu, hereafter honu). This report documents and evaluates the activities conducted in the third year of the KSHCP (2022) by both the KSHCP participants, and their selected prime contractor, towards fulfilling the objectives of the KSHCP as approved by the regulatory agencies. The report focuses on the Kahuama’a seabird preserve management, mitigation, take, and compliance effectiveness monitoring, and summarizes the financial status of the HCP.

The Kahuama’a seabird preserve site was selected during the HCP process to create a fenced, predator-free seabird preserve in the northwest region of Kaua‘i. Due to a large landslide that occurred at the originally proposed site, an alternative preserve site was selected 102m away from the original site resulting in changed circumstances being initiated almost immediately upon the adoption of the HCP. The new site selected provides comparable area and habitat to the originally proposed site. In 2021, construction was initiated and completed of the 9.2 acre seabird reserve. Biological monitoring of forest bird, seabird and habitat at the preserve site were completed prior to construction beginning in 2020 and continued in 2021 and 2022; all required surveys were completed prior to construction of the Kahuama’a seabird preserve to provide an inventory of the flora and fauna present in the area. In 2020, intensive burrow searching indicated that seabirds did not appear to be nesting in the immediate project area, but based on high rates of detection during auditory surveys they were clearly transiting the area during breeding season. Predator control was continued along the Kalalau Rim with up to 20 live traps, and an additional 15 traps along the Alakai Swamp Trail. Six cats and 122 rats were removed through direct trapping methods in 2022 over 3,556 trap nights. Additionally, cats and rats were eradicated from within the seabird preserve using rodenticide contained in secure bait stations.

In addition to the creation of the Kahuama’a seabird preserve and associated predator control activities implemented by the prime contractor, participants in the KSHCP were required to minimize and document seabird take at their facilities. Most participants ensured that lighting at their facilities was reduced and modified in order to be in compliance with the guidelines set forth in the KSHCP. In some cases, lights were completely turned off at the properties for the duration of the season. For tourism-based properties, lighting was significantly decreased as a result of closed facilities and/or greatly reduced occupancy due to the COVID 19 pandemic in 2020/2021. Most tourism based properties, with the exception of 1 Hotel Hanalei Bay, returned to more normal operating conditions in 2022.Based on the reports and photos provided, all participants have made significant efforts towards reducing light pollution and thus risk to listed seabirds, at their properties. Each Participant also conducted annual outreach and training for workers at their facilities that is specific to Covered Seabirds in order to help workers spot downed seabirds and know how to respond in a timely manner. Overall, outreach at each participant facility was adequate and professionally presented.

In addition to light reduction and training requirements, all covered facilities were required to control non-native predators to protect any downed birds on their properties. Of the 194 properties included in the KSHCP as of 2022, 47 were required to do predator control. Only 25/47 of those properties conducted predator control across all Participants, resulting in significant gaps in coverage of predator control. Properties that did not conduct predator control include 19 out of 32 covered properties owned by Kauai County. Of the remaining 25 properties that did conduct predator control, only 12 were deemed to be effective based on meeting the minimum number of trap nights and trap placement which is an improvement from only 9 done in 2021. In total, 274 feral cats were removed from participant facilities during the 2022 seabird fallout season. Predator control efficacy varied largely between participants and their properties, related

to effort, expertise and situational dependent variables such as proximity to known feral cat colonies and the efficacy of the contractor selected to conduct the work.

Compliance monitoring evaluates whether the actions described above are being properly implemented and is used to ensure that each enrolled Participant meets its obligation under this HCP and the individual PIPs. In total, 28 NESH and one BANP were found on participants' properties during the 2022 seabird fallout season. One bird was found dead and another was found alive but escaped capture and is therefore presumed dead and one had to be dead. The remaining 27 birds were brought alive to the Save our Shearwaters (SOS) facility and 26 were released and one euthanized. Therefore, 25 of 28 NESH and one BANP were released alive. No downed HAPE or Honu nests were found during the 2022 season.

Overall, the objectives of the KSHCP were partially, but not completely, met in 2022, but deficiencies continue to improve over earlier years. Details and reasons for discrepancies are described in detail below.

# INTRODUCTION

Three listed seabird species breed seasonally in Hawai‘i: the Newell’s Shearwater (*Puffinus auricularis newelli*, Hawaiian name: ‘a‘o), the Hawaiian Petrel (*Pterodroma sandwichensis*, Hawaiian name: ‘ua‘u), and the Hawai‘i distinct population segment (DPS) of the band-rumped storm-petrel (*Oceanodroma castro*, Hawaiian name: ‘akē‘akē, hereafter band-rumped storm-petrel), making the island’s essential to the conservation of these species. These species are part of the unique natural and cultural heritage of Hawai‘i, and the island of Kaua‘i provides important breeding habitat for all three species. Protecting and managing that habitat to support viable population of these species is critical for their long-term survival.

Among the threats known to impact the listed seabird species is the attraction to artificial lights, which has been observed and documented on Kaua‘i for decades. The Kaua‘i Seabird Habitat Conservation Plan (KSHCP) was developed and adopted in Year 2020 to address the light attraction impacts to the listed seabirds on the island of Kaua‘i. The KSHCP also addresses the impacts of lights on the Central North Pacific distinct population segment (DPS) of the green sea turtle (*Chelonia mydas*, Hawaiian name: honu, hereafter honu). The proposed duration of the KSHCP is for 30 years and the geographic scope of the KSHCP coverage is the island of Kaua‘i.

Light attraction fallout on the island of Kaua‘i occurs in a widespread manner, with certain geographic areas having concentrated, higher amount of observed fallout. Seasonally, most fallout occurs in the autumn months, coinciding with the seabird fledgling season. Many different entities on Kaua‘i (resorts, businesses, and governmental agencies) have documented seabird fallout on their property and at their facilities resulting from the effects of light attraction. Light attraction on Kaua‘i is an island-wide problem that negatively impacts the listed seabird species and is collectively attributable to many different entities.

The KSHCP relies on a unique structure to best meet the need for an effective and efficient response to the widespread nature of light attraction impacts on Kaua‘i. The structure of the KSHCP enables multiple individual entities on Kaua‘i to apply for take authorization for light attraction impacts to the listed seabird species under one coordinated framework. This framework takes advantage of economies of scale and enables a pooling of resources to collectively achieve conservation goals. The requirements of the KSHCP, and the enrollment and approval process for listed species take authorization are defined in the KSHCP and consist of two parts: 1. the KSHCP document with associated appendices; and 2. material submitted by each applicant providing detailed descriptions of on-site minimization measures, covered activities, a monitoring plan and the amount of take authorization being requested.

In 2020, applicants to the KSHCP were each issued approved Incidental Take Permits (ITP) from the U. S. Fish & Wildlife Service (USFWS) and Incidental Take Licenses (ITL) from the State of Hawai‘i Department of Land and Natural Resources (DLNR). The mitigation and minimization measures contained in the KSHCP were developed to inform the preparation of individual applications for listed seabird take authorization permits. The KSHCP defines a set of actions to minimize and mitigate the effects of light attraction on the listed seabirds and to meet conservation goals. The KSHCP provides a suite of minimization actions and requires that each Applicant to the KSHCP implement all the measures that are applicable to their facility and operational needs. Minimization measures emphasize reducing the amount of light that shines upward and reducing the amount of light output or intensity, which have been shown to reduce the effects of light attraction. Under the KSHCP, the minimization measures include:

- Deactivation of unnecessary lights.
- Use of full cut-off light fixtures (or their functional equivalent).
- Shielding existing light fixtures.
- Angling lights downward.
- Lowering the light output or intensity.
- Use of motion sensor light fixtures.
- Decreasing the visibility of interior lights.

Under the KSHCP, mitigation actions are designed to provide a net benefit to the covered species as required by Hawaii law. Because some seabirds grounded by light attraction are found alive and deemed healthy, or are able to be rehabilitated, those birds will be released back into the wild. For seabirds that are found dead, those not found but assumed to have been impacted by light attraction, and for those birds that could not be released back into the wild, light attraction is considered by the agencies to have caused the incidental take of the affected birds. For impacts to those birds, approved mitigation consists of predator control and the creation of a fenced seabird preserve (known as the Kahuama'a Seabird Preserve) in the northwest region of Kaua'i. In this preserve, predators are being removed and seabirds are being lured to the site via social attraction, a well-established conservation technique for the creation of new seabird colonies; details of the progress of this activity are documented below. The absence of predators will enable the seabirds to breed more successfully and with higher reproduction rates than in areas outside the preserve, thereby providing a conservation benefit to the seabird populations. The preserve site is located in Kōke'e State Park along the Kalalau rim. Predator control will be conducted in the vicinity of the preserve to reduce the impacts of predation on seabirds breeding nearby.

The funding design of the KSHCP features a cost-sharing structure. Total costs of the KSHCP, including implementation, mitigation, monitoring, Adaptive Management as needed and reporting, is shared amongst the permit recipients according to the relative amounts of take authorized. Compliance and effectiveness monitoring has been conducted to ensure that authorized amounts of take are not exceeded and to enable the wildlife agencies to determine that mitigation actions are meeting conservation goals. The purpose of take monitoring is to determine when and where take of Covered Species occurs, and documents monitoring efforts. There are three types of monitoring addressed in the KSHCP: compliance, effectiveness, and take monitoring.

1. "Compliance monitoring" verifies implementation of the HCP terms and conditions by the individual Participants and the Prime Contractor. Annual reports and reporting requirements (as outlined in Section 6.6) were provided by each Participant and the Prime Contractor to document that the Participant has performed all of the required tasks and activities. (Actions on site to reduce/eliminate light attraction).
2. "Effectiveness monitoring" evaluates the success of the HCP to minimize and mitigate take of listed species to the maximum extent practicable; evaluating whether minimization measures are effective and sufficient; and the extent to which mitigation measures are successful.
3. "Take monitoring" determines when and where take of Covered Species occurs, and documents monitoring efforts.

The purpose of this report is to compile, document and evaluate the effectiveness of the activities conducted in Year 2022 by both the KSHCP participants, and their selected prime contractor towards fulfilling the objectives of the KSHCP as approved by the regulatory agencies. An additional purpose of this report is to describe compliance and effectiveness monitoring of mitigation at the Kahuama'a Seabird Preserve as required by KSHCP 6.6.2.4 and Table 6-1. The report is divided into six sections:

1. Kahuama'a seabird preserve management.
2. Summary of KSHCP participants' annual reports.
3. Mitigation effectiveness monitoring.
4. Take monitoring effectiveness.
5. Compliance monitoring and summary of changes.
6. Financial report.

The goal is to synthesize and summarize several hundred pages of information from lengthy reports into a succinct easy to read document that will allow the participants and agencies to evaluate the annual effectiveness of the KSHCP implementation. Thus, for the sake of readability, tables and figures are used frequently in order to present information in a clear and easy to understand format.

# SEABIRD PRESERVE MANAGEMENT

The KSHCP conservation program, described in detail in *Appendix A: Kahuama'a Seabird Preserve Management Plan*, is comprised of several mitigation activities include establishment of a seabird social attraction site (SAS) and construction of a predator-proof fence (PPF) enclosing approximately 2ha of suitable seabird breeding habitat.

The specific mitigation activities associated with this component of the KSHCP include:

1. Construction and long-term maintenance of the 2ha predator proof fence enclosure.
2. Installation and long-term maintenance of social attraction equipment (speakers, solar panels, artificial burrows) within the enclosure.
3. Eradication of predators from within the enclosure and implementation of long-term predator control at the site.
4. Monitoring for predator incursions within the enclosure.
5. Barn owl control around the preserve and in the surrounding Kalalau Valley area.
6. Feral cat control at ingress points to the SAS and neighboring source colonies in the Kalalau Valley.
7. Invasive plant control and vegetation control within the 2ha PPF enclosure and along a 50m 'predator defense zone' outside the fence.
8. Monitoring of the Covered Seabirds and their burrows/artificial nest boxes, including the physical handling and banding of birds by trained, federally permitted staff.
9. Monitoring of other listed species (plants, forest birds, etc.) within the 2ha PPF enclosure; and
10. Downed seabird recovery, evaluation, rehabilitation, and release to sea.

The Participants' Committee, on behalf of all the individual Applicants, procured and entered into an agreement with Prime Contractor to perform the mitigation and project management measures outlined in the KSHCP. The Prime Contractor has conservation biology and project management experience and holds recovery permits necessary to conduct its work under Section 10(a)(I)(A) of the Endangered Species Act and/or Sections 13-124-4 and 13-124-6 of the Hawaii Administrative Rules. The Prime Contractor also compiles data for the Annual Reports on mitigation progress. The following section reports on the efforts conducted in 2022 to execute the mitigation activities associated with the Kahuama'a Seabird Preserve

*Table : Timeline of completed (2020-2021) and future (2022 onwards) activities for the Kahuama'a Seabird Preserve Management.*

| | 2020 | | | | | 2021 | | | | | | | | | | | | 2022-2025 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| **Infrastructure installation** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fence construction | | | | | | x | x | x | x | | | | | | | | | | | | | | | | | | | | |
| Install sound system | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | |
| Install artificial burrows | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Restoration** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Weeding | | | | | | | | x | | x | | x | | | x | | x | x | | | | x | | x | | | x | | x |
| Out planting | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | |
| Botanical surveys | | | x | | | x | | | | x | | x | | | x | | x | x | | | | x | | x | | | x | | x |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Predator control** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rodent trapping inside the fence | | | | | | | | x | x | x | | | | | | | | | | | | | | | | | | | |
| Cat control inside fence | | | | | | | | x | x | x | | | | | | | | | | | | | | | | | | | |
| Cat control outside fence | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Barn owl control outside fence | | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Seabird monitoring** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acoustic surveys | x | x | x | x | | | | x | x | x | x | x | x | x | x | x | | | | x | x | x | x | x | x | x | x | x | |

## Administrative Summary

Pacific Rim Conservation (PRC) was selected as the prime contractor for the KSHCP and entered into contract with the Participants Committee on 12th June 2020. Pacific Rim Conservation's responsibilities include implementing the Management Plan for the Kahuama'a Seabird Preserve as well as other KSHCP duties, such as compiling data for the annual report. Pacific Rim Conservation is a 501(c)3 nonprofit organization whose mission is to maintain and restore native bird diversity, populations, and ecosystems in Hawaii and the Pacific Region and is a 'boots on the ground' conservation organization. With more than 15 years' experience, PRC is an expert in listed seabird monitoring, project management and predator exclusion fence construction and holds current state and federal permits to conduct the work required under the HCP.

Dr. Lindsay Young, the Executive Director of PRC is responsible for overall supervision of the project and serves as the point of contact between the participants group and PRC. Two long term staff members, Allene Henderson and David Hanna, were hired in 2021 and have been with the project for two years for the conservation implementation component.

*Fence maintenance*

Fence construction was completed on 28 June 2021 and in the 18 months since then, the focus has been on maintenance of the structure. Full fence inspections are done monthly, and intermittently between then using trail cameras and visual observations when working around the fence. Fence inspections include checking the fence hood and mesh integrity, clearing out outlying branches, removing obstructions, and covering exposed areas of the fence skirt. Sloped areas of the fence showed higher rates of erosion than the flat sections.

*Figure 1: Images showing pig rooting on the skirt (right) and newly placed sod on the left*

The trail surrounding the outside of the fence experienced high levels of erosion due to high traffic from humans, pigs, goats and deer. In addition to high foot traffic, the fence skirt experiences erosion from inclement weather and rain drainage. In July, excessive pig rooting was noted on the fence skirt, and immediate action was taken by placing sod dug from the area onto the exposed skirt. The sod took well to the new placement by rooting into the soil and successfully preventing higher rates of erosion. In addition to sodding the skirt, the team responded by placing a pig trap as well as increasing fence monitoring. While the pigs were not caught, the erosion decreased with their natural departure from the area.

*Figure 2. Before and after of weed clearing the Kahuama'a fence corridor*

## Social attraction and biological monitoring

*Biological monitoring*

To facilitate effective, long-term monitoring at the site, a geo-referenced monitoring grid was installed to conduct bird, vegetation, and rodent surveys in 2020. The grid consists of stations inside the fenced area 25m apart marked with white PVC poles. The grid is maintained monthly and utilized for predator detection and control as well as biomonitoring.

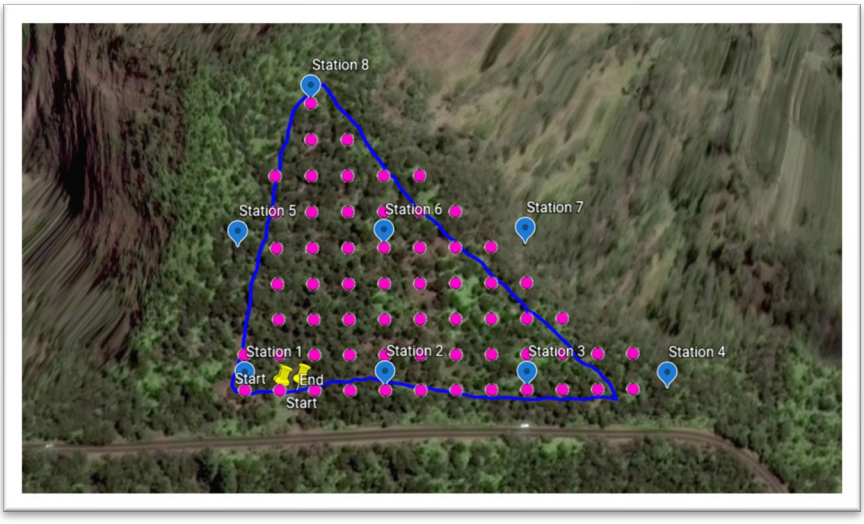


*Figure 3: Biological monitoring grid installed at the Kahuama'a Seabird Preserve*

**Seabird surveys**

*Ground searching*

Auditory surveys, burrow searching, and monitoring of natural burrows was a critical part of pre-construction surveying at the Kahuama'a Seabird Preserve to document species present and ensure that construction activities did not impact any nesting seabirds. Diurnal "cold searching" was conducted to actively search vegetation for burrow cavities with signs of seabirds (e.g., scent, feathers, guano, eggshells), or active burrows. Active breeding can be distinguished from ground activity, if breeding attempts in natural burrows are observed (such as copulation, digging out a burrow, entering the burrow with nesting material, sitting in the burrow, or an egg is laid).

Survey areas were organized into three transects covering each side of the fence line: one covering the 80 m long section of old ungulate fence line facing east, one covering the 300 m long northeastern facing fence line, and one encompassing the 50 m section facing west. All transects were measured to match the length of the designated seabird habitat perimeter along the ungulate fence line. All three transects were further divided into perpendicular transects flagged 3 m apart, and staff walked these transects checking for seabird eggshells, guano, feathers, and scent. Participating staff were equipped with pink flagging tape to mark the burrow location in the event of a burrow being found, and location recorded on a shared GPS. Two transects were created for the seabird burrow surveys inside the ungulate fence, covering a total area of .39 acres. Transects were spaced 5 m apart, running parallel to the north eastern side of the fence line. Two staff equipped with GPS and pink flagging walked each transect from east to west, checking under tree roots for seabird eggshells, guano, feathers, and scent.

The total 2020 seabird survey area covered was 14,172.1m$^2$, or 3.50 acres: a combined area of 10,614.88m$^2$ (2.62 acres) outside the fence, and 1583.48m$^2$, or .39 acres inside the fence line. No Newell's Shearwater and Hawaiian Petrel chicks, adults, or burrows were detected during Seabird Burrow Surveys.

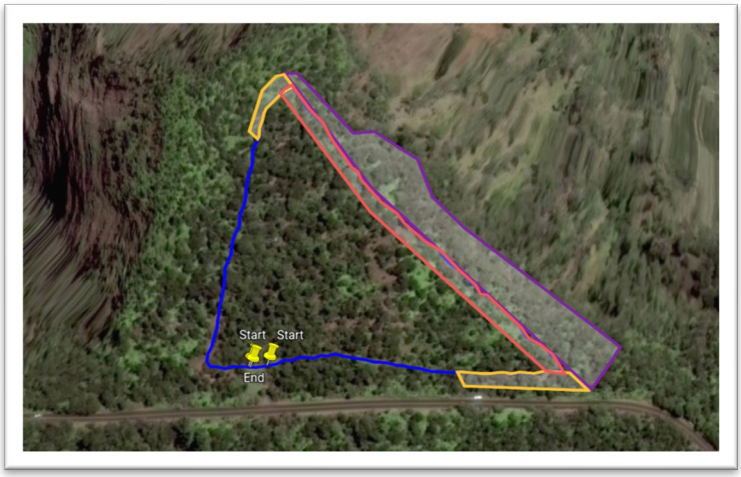


*Figure 4: Seabird survey area at Kahuama'a. The original ungulate fence line in blue, with the final enclosure fence line shown in yellow, and the seabird habitat bounded by the red and purple lines.*

During Barn Owl control operations in October 2022, contractors employed by PRC to conduct Owl hunting observed a fledgling NESH on the outside of the predator fence attempting to climb the predator proof fence to take off (Figure 5 below). As it appeared to be tiring itself out quickly, staff placed it in a pet carrier and brought it to SOS and it was released shortly thereafter. The contractors used for Barn Owl control are former employees of the Kauai Endangered Seabird Recovery Project and are trained on how to properly handle any listed seabirds they may encounter. The incident was reported to the agencies; the chick appears to have fledged from a nearby location outside of the fence and was temporarily grounded near the site.

*Figure 5. A'o found attempting to climb fence at Kahuama'a on October 6, 2022.*

*Auditory surveys*

Auditory surveys began in mid-May 2022 and were conducted every two weeks with two surveys per survey day until August. Surveys were conducted 2 hours before sunrise and 2 hours after sunset, during the peak calling times for HAPE and NESH respectively. During auditory surveys, an observer listened and looked for seabirds. When seabirds were observed the following data were collected: species, time, number of individuals detected, number of calling bouts, a compass bearing, and estimated distance from observer. During auditory surveys, the sound system broadcasting NESH calls was turned off to ensure that it didn't interfere with the survey. Distinctive behavior, such as concentrated calling, circling, ground calling, landings, and take-offs, were recorded separately with distance and direction from survey site noted specifically. These locations were then investigated whenever possible, to identify any birds that had landed. Due to the large number of other species in the immediate area, only HAPE, NESH and other listed bird species (Band-rumped Storm Petrel; BRSP and Hawaiian Goose; HAGO) were recorded.

A total of 32 Auditory surveys were done from May-August 2022, for a total of 49.6 hours of survey time. With the total number of detections and average call rate listed for each species in table 2 below:

*Table 2: Total number of listed bird species detections and average call rate during Auditory surveys at Kahuama'a in 2022*

| Species | Total # detections | Average call rates per hour |
|---|---|---|
| NESH | 1477 | 58 |
| HAPE | 17 | 1 |
| BRSP | 9 | 0 |
| BANO | 19 | 1 |

Newell's Shearwaters were detected in relatively high frequency during every survey conducted and are regularly prospecting within the area. Call rates per hour ranged from 1 to 111.3 calls per hour, for an average of 58 calls per hour at the site depending on the date and time of day. Hawaiian Petrel and Band-rumped storm petrel call rates ranged from 0-5 calls per hour, for an average call rate of 0-1 calls per hour. The high frequency and density of detections in the site bodes well for the efficacy of social attraction methods moving forward. No birds were observed on the ground during the surveys.

*Social attraction*

Once fence installation on the predator proof enclosure was complete, the social attraction component of the project was installed to encourage the target species to the project site to breed. Social attraction is a well-established conservation strategy to encourage seabirds to breed in a predator-free location by the simulation of colony activity through the playback of calls. When combined with the installation of artificial burrows, the technique can result in high productivity within a small and managed/protected area.

Speaker systems were ordered from the New Zealand Department of Conservation and were installed on 12 May 2021. The systems consist of a waterproof mp3 player and inverter system contained in a waterproof pelican case, a solar panel, and a 12V marine battery connected to omnidirectional waterproof speakers. Calls are projected towards the Northeastern facing slope to attract birds to the area that could be transiting from Kalalau Valley.

The system plays a mix of Newell's Shearwater calls from dusk until dawn to mimic natural attendance patterns at the colony during the seabird breeding season. Recordings were of multiple birds (simulating a large colony) and used a complete set of typical colony sounds to attract the most birds. The speakers turn on at sunset and continue to play species-specific calls until sunrise, drawing prospecting birds to the site to increase nesting probability within the predator free area. Broadcasting ran until October at the conclusion of the period of highest prospecting activity. During the period when acoustic surveys were being conducted, the sound system was turned off to assist in detecting live birds.

In addition to the acoustic attraction system, 100 artificial burrows suitable for both Hawaiian Petrels and Newell's Shearwater constructed and installed at the site. An integral part of best management in a social attraction site is the provision of artificial burrows to optimize seabird habitat and expedite the process of establishing breeding at a new site - burrow excavation by a newly established breeding pair can take a year or more. Artificial burrows are used in almost all the successful social attraction sites documented in the literature. Not only does this increase the likelihood of earlier success at the social attraction site and increase the density of nesting pairs in an area, it also makes the monitoring of nests much easier and less likely to cause disturbance to burrows and birds. Since monitoring of nests and nesting success is an important part of mitigation for the KSHCP, artificial burrows are key in this project. Burrows were constructed by a local contractor using the specifications below and treated with Henry Tropicool Roofing sealant to reduce the chances of rot and reduce overall temperature. Burrows were installed along the North-eastern ridge along the steepest slopes within the reserve and within the area where the sound system was deployed. Burrows are monitored weekly during the breeding season.

*Figure 6: Photographs of completed artificial nest boxes installed at Kahuama'a Seabird Preserve*

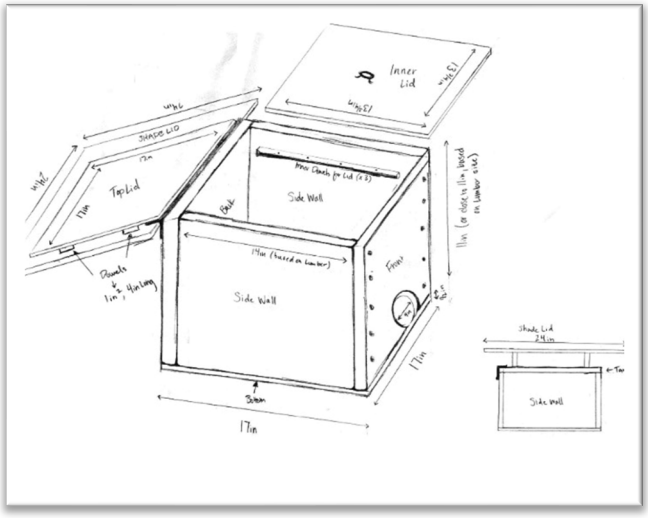


Figure 7: Diagram of artificial burrow design used for Kahuma'a Seabird Preserve

*Habitat restoration*

The Kahuama'a Seabird Preserve predator proof fence is expected to benefit native vegetation and rare plants currently being adversely affected by rats, pigs, goats and deer, and more importantly, provide high-quality seabird nesting habitat. The habitat at the site is dominated by native vegetation, but certain invasive plants are proliferating, especially within the understory. Seabird habitat suitability mapping exercises consistently identify native vegetation as a critical component for successful nesting. Conversely, habitat modification by invasive plant species has been correlated with a reduction in seabird breeding. The suite of invasive plant species that have been identified as significant seabird habitat modifiers (Table 3) are present at the Kahuama'a Seabird Preserve and are currently being targeted for removal.

*Table 3: Seabird habitat modifying plant species targeted for removal at Kahuama'a*

| **Common Name** | **Scientific Name** | **Priority** |
|---|---|---|
| Strawberry guava | *Psidium cattleianum* | *1* |
| Himalayan (kahili) Ginger | *Hedychium gardnerianum* | *1* |
| Australian tree fern | *Sphaeropteris cooperi* | *1* |
| Blackberry | *Rubus argutus* | *2* |
| Banana poka | *Passiflora tarminiana* | *2* |
| Bush beard grass | *Schizachyrium condensatum, Andropogon spp.* | *2* |
| Koster's curse | *Clidemia hirta* | *2* |
| Daisy fleabane | *Erigeron karvinskianus* | *3* |
| Air plant | *Kalanchoe pinnata* | *3* |

This list will be expanded during the project if new and important invasive seabird habitat modifiers are discovered in the area.

The Kahuama'a team removed invasive species regularly throughout their field tasks. The dominant species addressed were Himalayan Ginger, Banana Poka and Blackberry. Primary areas in which the team weeded were through the main trafficked trails of the grid and in the Social Attraction Site. The team focused on clearing weeds near the burrows so that the predominant plant present was the native uluhe, known to promote seabird breeding.

The team did not detect *Clidemia hirta* in the worked area*. C. hirta* is not fully established in Kōke'e and no known individual/population has been seen in the general area. Another factor to the absence of several of the targeted species is due to the dominant vegetation cover and the previous presence of feral animals. The dense ground cover of the various uluhe species (*Dicranopteris* and *Diploterygium*) prevents the easy establishment of many weed species. The two dominant weed species have quick vertical growth needed to rise above the surrounding vegetation and receives the protection of uluhe from feral animal herbivory. Outside of the uluhe sections, heavy grazing occurred, and the establishment of certain weed species may have been impeded.

For 2023, we are considering adding araka (*Corynocarpus laevigatus*) and Portuguese fire tree (*Morella faya*) to the targeted species is encouraged due to the potential of these species becoming a dominant canopy and subcanopy tree, and as a regulator of the surrounding vegetation. This species forms dense thickets and completely shades out the understory and causes some of the most barren forest floors. Young saplings are susceptible to grazing and with the implementation of the exclosure fence, *C. laevigatus* will potentially have a larger impact on the habitat than prior to the fence installation. *M. faya* is a non- native nitrogen fixer that can disrupt the nutrient cycles. This spike of available nitrogen encourages the recruitment of invasive plant species and suppresses the native plant species. The surrounding habitat contains many large tree populations and should not drastically affect the ʻōpeʻapeʻa (Hawaiian hoary bat).

## Predator control and eradication

The breeding phenology and susceptibility of the Covered Seabirds to predation by barn owls and feral cats suggest that barn owl and feral cat control will result in an increase in the reproduction and numbers of seabirds breeding in Kalalau Valley outside of the 2ha Preserve site. Based on the above and the locations of breeding colonies within the Kalalau Valley (Section 5.4, Figure 5-1 and *Appendix A: Kahuamaʻa Seabird Preserve Management Plan*), efficacy estimates are conservative and assume that trapping along the rim of Kalalau Valley will achieve a 30% reduction in the number of shearwaters predated by feral cats. Thus, trapping locations were selected to follow the rim of Kalalau Valley in order to protect key seabird nesting populations in Kalalau Valley, and at a key ingress points into Kalalau Valley. Feral cats are using the roads and trails in the vicinity of the Kahuamaʻa Seabird Preserve as ingress points to prey upon nearby established colonies in the Kalalau Valley and Rim, Pihea (part of the Hono O Nā Pali NARS) and Honopū, expected source populations for the Kahuamaʻa Seabird Preserve.

*Site Description*

Kalalau Rim

The Kalalau rim is an extremely high cliff area which falls over a thousand meters into the Kalalau Valley. Due to the steepness and inaccessibility of the cliff, there are many rare, endemic plants which have survived undisturbed by humans, giving the Kalalau rim unique characteristics. The vegetation at the site is a subtype of ʻŌhiʻa Lowland Mesic Forest, with ʻuluhe fern (*Dicranopteris linearis*) comprising much of the ground cover (Williams, 2016 unpublished report). Kokee road follows the Kalalau rim and was selected as a logical location for trap placement.

Pihea/Alakai swamp trail

Feral cats are observed on the road to Pihea by Hawaii DLNR staff on a near-weekly basis, and DLNR camera data reflects significantly higher numbers of cats moving along trails and fence lines than along densely vegetated areas. The Alakaʻi Swamp Trail was chosen in consultation with Hallux Ecosystem Restoration and the Hawaii DLNR, who do the majority of predator control in the Alakai region. This area covers critical ingress points into listed seabird colonies and is not currently being managed for cats and thus fills a critical need in protecting key listed seabird populations.

*Methods*

Predator eradication

Due to the large size of the fenced area and multiple species of rodents detected during trapping work, the most feasible way to eradicate rodents from within the fenced area is using a rodenticide approved for conservation use. Diphacinone has been used to control rodents in Hawaiian coastal habitats and was used to successfully eradicate Pacific rats on

Mokapu Islet off of Molokai (Dunlevy & Scarf 2007) and Black rats at Ka`ena Point and on other sites on Kauai (Young et al. 2013, Young et al. 2018). Diphacinone also has been used to eradicate black rats in a variety of locations worldwide (see Donlan et al. 2003, Witmer et al 2007 for examples), though it appears to be less effective than brodificoum, particularly for mice (Parkes et al. 2010). However, diphacinone was the only rodenticide approved for conservation purposes in Hawai`i, and thus was the only option available for this project.

Rodents were targeted for removal from within the fenced area with Ramik mini-bars® (HACCO Inc., Randolph, Wisconsin, USA) containing 0.005% diphacinone placed in tamper-resistant Protecta ® plastic bait stations (Bell Laboratories, Madison, Wisconsin, USA) to shield them from rain and reduce the risk of poisoning to non-target species. 63 bait stations were placed in a 25-m grid pattern throughout the fenced area (see figure 4) and filled with up to 8 1-oz blocks per station. Bait stations were serviced twice per week during the first month, and after that frequency was adjusted based on levels of take to ensure that an adequate supply of bait was available at all times. In addition to bait stations, 24 Goodnature A24 rat traps were deployed inside the fence the month before fence construction was completed in May. At every other grid point, rat tracking tunnels (N=31) were deployed as an additional metric to measure rodent presence and were run over a 24 hour period every 1-3 months.

Cat trapping

Detailed methods can be found in the appendix of the KSHCP, but in summary live Tomahawk traps were used for the duration of 2022 to accomplish cat trapping objectives. Tomahawk traps are walk-in live-capture traps that can either be baited (single-door) or un-baited/blind-set (double-door), capturing animals as they pass through the trap. The traps used at both sites are a combination of single door (36”x10”x9”) and double door (36”x9”x9”) Tomahawk traps. All Tomahawk Traps are either baited or have lures inside of them to attract attention of predators. Baits used included sardines in olive oil, wet cat food, and dry cat food mixed with Wildlife Control Supplies Shellfish oil contained in an empty cat food can in the rear of the trap. Lures used along these traplines include cat toys, metal lids, and pieces of foil, compact discs as flashers, and liquid lures such as Booty Call, Triple Treat, Silent Stalker, Catnip Oil, Feline Exciter. Alley Cat, and Bobcat urine. Traps were generally open five days per week for two weeks of the month for a total of ten trap nights per trap every month. For traps that are not monitored by real-time transmitting cameras (described below), they were manually checked every 48 hours. For traps with cameras attached, they are generally opened on a Monday and closed on Friday and their transmitting cameras are checked daily. When Traps are not active, they are not baited and locked open to attract curiosity even when not in use.

Fifteen live tomahawk cage traps were placed every 100m alongside the Alakai Swamp trail along the last 1.4 km of the trail about 1km from the trailhead on Camp 10 road, and well away from the high traffic part of the trail. Care was taken to locate traps off the trail where they were not visible to the public by covering them with specifically designed trap covers and/or heavy foliage so that the only visible part of the trap was the open door. An additional 18 traps were deployed along the western side of the road along Kalalau Rim extending about half a kilometer along the road from Pu’u O Kila lookout and half a kilometer surrounding the Kahuama’a Enclosure. Traps were placed 5-10m off of the road, and camouflaged using the same protocols described above.

Fifteen out of seventeen traps along the Alakai Swamp Traill, and 18 out of the 21 Kalalau Rim traps were accompanied by a Cuddelink Cuddeback camera, which transmits pictures in real time via cellular service, and pictures sent to PRC predator technicians to alert them to possible captures. These cameras are used for both camera trapping and monitoring purposes. The Cuddelink “Home” camera was located at the other end of the trail, near Pihea Junction, which allowed for traps to be checked without physically visiting each trap.

*Table 4: Trap location, type and total number of trap nights for predator control in 2022. Trap nights indicates the number of nights that traps were open and active. Numbers reflect traps deployed from January 2022 through December 2022.*

| Trap Line | Trap Type | Number Deployed | Total Trap Nights | # cats trapped |
|---|---|---|---|---|
| Alakai Swamp Trail | Tomahawks | 17 | 1746 | 3 |
| Kalalau Rim Trail | Tomahawks | 21 | 1811 | 3 |

Cameras

Game cameras were used to monitor common use trails along which the traps sit. Cuddeback Cuddelink cameras were deployed in a chain to transmit pictures to a "home" camera where all images can be quickly and easily viewed in the field or by retrieving and replacing a single SD card. Camera data was used to evaluate the level of interaction with each trap by any given predator. Images of predators are saved on an external hard drive and images of cats, specifically are saved in a shared Google drive to determine effectiveness. Although Cuddeback Cameras offer a cell version of their cameras to be used in areas skirting cell service availability, there is currently no cell service close enough to either trapline to warrant use of this type of camera.

Rat control:

Fifteen out of 17 traps on the Alakal Swamp Trail, and 18 out of 21 cameras have Goodnatures deployed near them to reduce bait removal from the traps. There are also 10 Goodnatures set up inside of the Kahuama'a fence for rat control. The Goodnatures inside of the Kahuama'a fence were deployed in January of 2022.

Barn Owl control

Barn Owl control was contracted out to a partner organization to conduct in 2022. Night hunting operations were done with a 12 or 20-gauge shotgun (Non-lead shot) and a game caller playing Barn Owl territorial calls following standard procedures used for Barn Owl control approved by the State of Hawaii. Staff utilize night vision in order to prevent accidental Pueo take during all Barn Owl hunting operations. Control efforts were focused during the Barn Owl breeding season to maximize efficacy. Pacific Rim will take over these contracted responsibilities in 2023.

***Results***

Eradication

No cats were detected within the fence upon fence construction and thus were considered to have been removed through passive methods since cats can escape from the inside of the fence, but not re-enter. While rats were thought to have been eradicated by the end of 2021, an irruption of Polynesian rats was documented in October 2022 either as a result of a small remnant population, or incursion into the area.

Bait stations were run continuously from the first baiting in January until the end of the year. Cumulative bait take was 6.65 lbs (106.5 ounces) across all stations. Take over time decreased dramatically after January when the majority of bait was initially consumed. There was an outbreak of rats in October which the bait stations were regularly checked and rebaited until rates of consumption were back to lower numbers in December. Tracking tunnels were run 6 times in 2022 with rodent detections in January, September, and October with low numbers ranging from 9.68% of mice in January, 9.68% rats in September, to 6.45% rats in October (see figure 9). Rats were last detected within the reserve on 10/06/2022 and only a small population of mice are estimated to remain. Snap traps were deployed in response to the increased number of rats in Sept/Oct. Out of 19 snap traps deployed 1 mouse, and 5 rats were captured. Of the 10 Goodnatures deployed inside the fence starting on 01/10/2022 and 6 rats removed; 4 traps accounted for all of the rat catches within the grid.

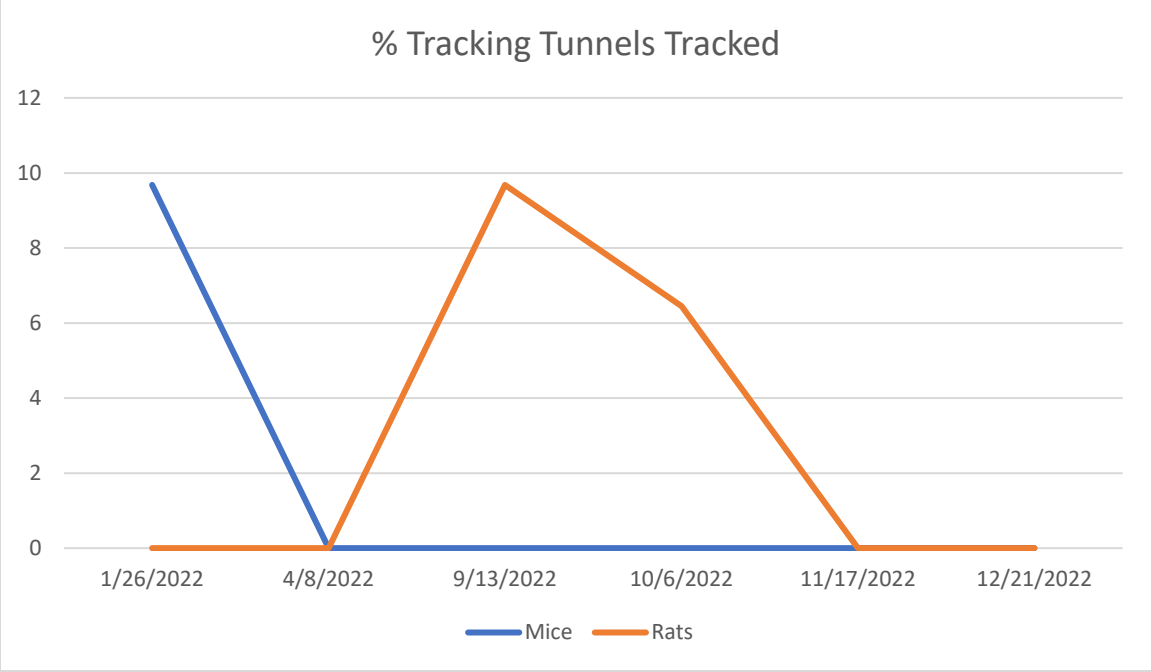


*Figure 8: Proportion of tracking tunnels tracked by rodent species over time at Kahuama'a seabird preserve*

Predator control:

A total of 3,557 cat trap nights were run in 2022- 1811 along the Kalalau Rim Trail and 1746 along the Alakai Swamp Trail. Seven cats were captured in 2022- three along KRT, and three on the Alakai Swamp Trail resulting in a total catch rate of 0.0017 cats/trap night. Cats were captured in Tomahawk single door traps that had wet cat food, or dry cat food with shellfish oil; three of the cats were captured on the game camera prior to capture. As required by the KSHCP, the cats were humanely dispatched.

A total of 130 rodent bycatch were removed via live traps between the two sites: 106 Black Rats (*Rattus rattus*) 19 Norway rats (*R. norvegicus)* and 3 Polynesian rats (*R. pacificus)* along with 2 mice; all rodents were humanely dispatched. The exterior A24 rat traps removed a minimum of 22 rats.

A total of nine (9) Barn Owl hunting sessions across six (6) site visits occurred at Kahuama'a fence in 2022. A total of 10 Barn Owls were removed, four (4) females and six (6) males. All Barn Owls were necropsied to take morphometric measurements and examine stomach contents. No avian remains were found in any Barn Owl stomachs: five (5) contained rodent and five (5) were empty.

*Table 5: Barn Owl hunting summary for the Kahuama`a seabird preserve in 2022*

| Month | Sessions | Hunting Time (hrs) | Efficiency (BANO/Hr) | BANO Killed | Misses | BANO Observations |
|---|---|---|---|---|---|---|
| Feb | 5 | 1.52 | 1.98 | 3 | 0 | 3 |
| Jun | 2 | 1.15 | 0.87 | 1 | 0 | 1 |
| Oct | 2 | 2.05 | 2.93 | 6 | 1 | 15 |
| **Total** | **9** | **3.87** | **2.59** | **10** | **1** | **19** |

Camera monitoring

Cameras have been used to monitor traps and corridors along both the Alakai Swamp Trail, and the Kalalau Rim Trail. Every trap on each trapline has camera, and there are 3 trail cameras along with fence corridor at the Kahuama'a site to track predators. Pinch point traps can be set up using Tomahawk traps if a feral cat is seen walking along the fence with evidence from the trail cameras. Three trail cameras were set up on the Alakai Swamp Trail, but were temporarily taken down after it was determined that they were too visible and accessible to the public and therefore potentially subject to vandalism or damage. The trail cameras specifically on the Alakai Swamp Trail were extremely important for tracking feral cats coming in and out of the Alakai Swamp Trail trailhead. The cameras will be put back in more discrete locations in 2023. Rats and mice have been observed on every game camera that is deployed on both Alakai Swamp Trail and Kalalau Rim. Black Rats made up the majority of game camera observations.

Cats were observed on game cameras on multiple occasions throughout the year. While most of the observations were on Alakai Swamp Trail, some were also on the Kalalau Rim Trail. Cat sightings decreased compared to 2021 which could be related to sustained cat control efforts in the area between this project, and other ongoing cat removal programs.


*Figure 9: Gray Tabby in front of trap KRT18B on the Kalalau Rim Trail (Top Photo) Gray Tabby at AST4 on the Alakai Swamp Trail sniffing top of trap (Below).*

Other animals such as pigs, dogs and black-tail deer have been observed on game cameras frequently. Dogs are very commonly observed on game cameras at both Alakai Swamp Trail and Kalalau Rim. Dogs have been observed inspecting, crawling into and sniffing traps that are baited. Black-tail deer have been observed at both sites on game cameras, specifically at the Kahuama'a site.

The Kalalau Rim trapline experienced two theft incidents during 2022. On November 5, 2022, at 11:37 AM, someone took a Goodnature A24 from AST12 trap on the Alakai Swamp Trail, and left the bracket. This was all caught on the Cuddeback camera associated with the trap with the individual's dogs (approximately 11 dogs) were interested in the Goodnature. On December 7, 2022 someone forcibly broke off one of the Cuddeback cameras from its mount at AST12 on the Alakai Swamp Trail, breaking the camera off the plastic mount. All pictures recovered were put into our Dropbox in the case they were ever needed for reporting or recovery. After the incidents occurred, trap AST12 was removed and stashed at another more discrete trap (AST9).

## Discussion

Protocols for effectiveness monitoring to evaluate progress and success are described in detail in *Appendix A: Kahuama'a Seabird Preserve Management Plan* for the KSHCP mitigation objectives. These objectives require three aspects of biological monitoring: monitoring of predator eradication/suppression, monitoring of vegetation (habitat) management, and monitoring of Covered Seabird response to management.

Biological monitoring of forest bird, seabird and habitat commenced on schedule in 2021 and all required surveys were completed during that time to provide an inventory of the flora and fauna present in the area. All listed seabird species are regularly flying by the site, with NESH being in particularly high density based on call rates during the auditory surveys. The completion of the fence construction and subsequent predator eradication and deployment of social attraction equipment have the site ready for all future years to successfully attract listed seabirds to nest at the site.

The results of predator control on Alakai Swamp trail and Kalalau Rim should act as a baseline for trapping and game-camera observations moving forward and especially for use now that the fence construction is completed. Continuance of trapping via live traps along Kalalau Rim and directly adjacent to Kahuama'a should suffice in controlling cats that enter the area. Alakai Swamp Trail has proven to be a high-use trail for cats in Kokee State Park. Seeing that this trail is a direct access to several seabird colonies that will serve as source colonies to Kahuama'a, trapping nights should increase along this trail. Rodent control, separate from cat control, can be implemented along both traplines to reserve live traps for cats. Goodnature A24s and snap traps continue to be run utside the fence.

Based on the activities to date, the activities of the Kahuama'a Seabird Preserve have met the objectives for predator control and suppression given the staffing and weather issues encountered in 2022.

*Table 6: progress towards biological objectives stated in Table 7-4 of the KSHCP:*

| Biological Objective | Status |
|---|---|
| 2.A. Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at mitigation site in Year 1 of KSHCP implementation. | Completed. |
| 2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of project. | Completed. |
| 2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation. | Not yet complete. |
| 2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation. | Not yet complete. |
| 2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 of KSHCP implementation. | Not yet complete. |
| 2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP implementation. | Not yet complete. |
| 2.G. Maintain high quality seabird habitat at the mitigation site by removing habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP. | Underway |
| 2.H. Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress | Underway |

| | |
|---|---|
| points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP. | |
| 2.I. Annual protection of any honu nests adjacent to facilities via shielding or other measures to avoid light attraction take. | Completed |

# SUMMARY OF KSHCP PARTICIPANTS' ANNUAL REPORTS

A consolidated summary of each Participant's annual report is provided below; reports are presented in alphabetical order. This includes sections on downed bird search effort, lighting and facilities, predator control, and training and outreach. For participants with multiple properties (Alexander & Baldwin, and the County of Kauai), they are grouped for the purpose of readability. The exceptions to this are State of Hawaii facilities which are presented individually.

## Alexander & Baldwin, Inc. (A&B)

Alexander & Baldwin facilities covered by the KSHCP include Hokulei Shopping Village, Waipouli Town Center, The Shops at Kukuiula (TSAK), and A&B's Port Allen commercial properties (five properties grouped together as one "facility" for reporting purposes). The Kukuiula Development was sold during the 2021 season and is no longer covered by the A&B permits. The Port Allen Solar Facility was sold during 2020 and is also no longer covered by the A&B permits. The McBryde Resources facilities (Wainiha and Kalaheo Hydroelectric Plants and Pump 3) were sold in June 2022 and are no longer covered by the A&B permits.

*Take summary:*

A total of eight NESH were found by A&B search teams: five at Port Allen (including one of which was on a property outside of A&B) two at Hokulei Village and one at the Shops at Kukuila. Of the eight birds found, six were released alive, one was found dead, and one escaped capture and is presumed to have died. One additional NESH found by someone other than an A&B searcher and turned in to SOS was reportedly found at an A&B facility (Port Allen Marina Center) prior to the normal search time and was released alive; this bird was included in the take estimate for the A&B facilities. An additional bird, reported by SOS to be a Wedge-tailed shearwater, was also turned in to the A&B search team at Port Allen by an unknown person after reportedly having been found in the Port Allen area; this bird was turned in to SOS by the A&B searchers and was reportedly released alive.

*Downed Bird search effort*

At the Port Allen Commercial properties, searches were conducted twice nightly every night during the seabird fallout season from September 15 to December 15. The first search was conducted three to four hours after sunset, and the second search was conducted one hour prior to sunrise. A science education non-profit was contracted to conduct searches at this facility.

For the Hokulei Shopping Village, Waipouli Town Center, and The Shops at Kukuiula (TSAK), searches were conducted twice nightly every night during the seabird fallout season from September 15 to December 15. The first search was conducted three to four hours after sunset, and the second search was conducted one hour prior to sunrise. In 2022, the use of on-site security staff for monitoring was discontinued after the results of the searcher efficacy trials were reported in 2021. A combination of the predator control company, contracted landscapers and other professionals that were provided training conducted searches in 2022. This change was made so that the searchers would be better able to focus on a single task while searching.

*Lighting and facilities*

Lighting at most A&B covered facilities had been previously modified in order to be in compliance with KSHCP guidelines. Plans for further lighting improvements are under development based on the most recent lighting audit. In 2022, the only light modification noted was that a tenant, McDonalds, agreed to turn off a bright, side-facing light mounted on the shopping center building near their drive-through during the season. Small, upward facing accent lights around the shopping center sign have also been turned off.

*Predator control*

At Port Allen, Hokulei Shopping Village, Waipouli Town Center, and The Shops at Kukuiula, animal control activities were contracted to a professional wildlife control firm. These efforts were executed well and appear to have been successful in reducing the number of predators on the landscape. Guidance for updating predator control plans was provided by DOFAW in 2021 and the Predator Control and Monitoring Plan for all A&B facilities was updated to comport with this guidance prior to the start of the 2022 season. Below are the summaries presented from each of the properties describing the site-specific predator control efforts and challenges experienced.

Predator control efforts at the Port Allen Properties were contracted out to a wildlife control contractor and - as in prior years - appear to have been quite effective. Pre-season trapping commenced on August 8 and continued throughout the season. During the pre-season and through mid-October three traps were placed at the Port Allen facilities, and two traps were placed during the last two months of the season (for a total of 331 trap-nights). One trap was removed due to ongoing problems with tampering. Traps were checked, baited, reset and maintained on a nightly basis except that one day of trapping was missed due to a holiday. The presence of large numbers of feral chickens in and around the property likely had a negative impact on the trapping program, due to chickens triggering traps and making them unavailable for predator control until checked and re-set.

Predator control "snapshot" surveys were conducted prior to the start of trapping and then before, during, and after the season, none of which indicated any significant predator presence on the property (no more than one to two predators were seen on-site during any of the snapshot surveys, and none were observed during the end of season survey). This is consistent with results during the 2021 surveys and contrasts sharply with the predator counts found at the start of the 2020 season. The continued low counts can be attributed to (1) highly effective control of predators during the 2020 and 2021 seasons, resulting in significant reduction in the predator population in the area; (2) discussions with nearby cat colony operators throughout the 2020 season, which encouraged them to re-locate their colonies off of the property; and (3) increased predator control efforts by neighboring property owners. Additionally, twice-nightly monitoring for the presence of predators on the properties indicated that a reduction in predator counts of more than 76 percent was achieved over the course of the season, based upon average nightly predator counts observed during the last two weeks of the season as compared to those observed during the first two weeks of the season. No more than four cats were observed on the property during any search (this maximum occurring during the first three weeks of the season), and on average less than one cat was seen per night after the first two weeks of the season. This reduction was achieved despite evidence of occasional tampering with traps. More than half of all predators caught at Port Allen were trapped during the pre-season. Evidence of cat feeding on or near the property was observed only rarely. Loose dogs were spotted by searchers on a handful of occasions; in at least half of these instances the owner was with the dog. Rats were also spotted on a few occasions, but appear to be under control as a result of the separate pest control program. A barn owl was observed over the property on one occasion. Overall, the predator control program at Port Allen appears once again to have been highly effective.

Predator control efforts at the Hokulei Shopping Village were contracted out to a wildlife control contractor and - as in prior years - appear to have been quite effective. Pre-season trapping commenced on August 8 and continued throughout the season. During the pre-season and throughout the season, two traps were placed at the facility (for a total of 259 trap-nights). Traps were checked, baited, reset and maintained on a nightly basis except that one day of trapping was missed due to a holiday. Cats were frequently observed off-site in a large grassy area immediately to the south of the property, but for the most part appeared to stay there. No more than six cats were observed on the property during any search. This peak occurred in mid-October immediately following mowing of the adjacent field but quickly returned to normal levels after multiple captures in the ensuing two weeks (half of all predators caught were trapped in October). Nearly 40% of predator captures occurred during prior to September 15, demonstrating the value of pre-season trapping efforts. On average less than one cat was seen on the property per night throughout the entire season. Evidence of cat feeding on the property was observed on a handful of occasions. No significant rat activity was observed, and pet dogs were observed (with their owners) on a few occasions. Overall, the predator control program at Hokulei appears to have been highly effective.

Predator control efforts at Waipouli Town Center were contracted out to a wildlife control contractor and appear to have been effective considering the ongoing active cat feeding occurring immediately adjacent to the facility. The vast majority of predators observed on the property during the season were at the back of the property in close proximity to the active cat colony, and a significant disparity was observed between the number of cats sighted during morning searches and the number sighted during evening searches (most likely due to the timing of feeding activities). While a modest reduction in predators was achieved during the season, markedly better results are unlikely without some outside intervention to curtail the cat colony operation on the immediately adjacent public property.

Pre-season trapping commenced on August 8 and continued throughout the season. Nearly 60 percent of predator captures occurred during the pre-season trapping effort. During the pre-season and throughout the season, one trap was placed at the facility (for a total of 129 trap-nights). As noted in previous annual reports, tampering with, damage to and theft of traps has historically been more prevalent at this property than at other A&B facilities, possibly attributable to regular trespassers of various ilk. As such, there are only a limited number of available locations where traps can be effectively concealed. Since almost all predators on the property congregate in one area, however, a single well-placed trap can nevertheless prove effective. Traps were checked, baited, reset and maintained on a nightly basis except that one day of trapping was missed due to a holiday.

Predator control "snapshot" surveys were conducted prior to the start of trapping and then before, during, and after the season. All predators observed during these surveys were located on or just off of the property in the immediate area of the normal feeding site (just off the property). The colony operator was observed to remain at the site during feeding. About ten predators were observed during the initial pre-trapping survey, six during the pre-season survey, three during the third survey, and four during the end of season survey. While these surveys indicate a general trend toward lower predator counts over the course of the season, predator numbers on the property are likely influenced by feeding times at the colony.

Twice-nightly monitoring for the presence of predators on the property indicated that a reduction in predator counts estimated at about two percent was achieved over the course of the season, based upon average nightly predator counts observed during the last two weeks of the season as compared to those observed during the first two weeks of the season. Due to the cat colony, as many as 15 or more cats were observed on or near the property during feeding events, and on average two cats were sighted on the property each night. Obviously, feeding was observed to be occurring on a regular basis. Some rat activity was noted on the property, chiefly in and around the vegetated canal just off the back of the property.

Predator control efforts at The Shops at Kukuiula were contracted out to a wildlife control contractor and - as in prior years - appear to have been effective. Pre-season trapping commenced on August 8 and continued throughout the season. During the pre-season and throughout the season, three traps were placed at the facility (for a total of 387 trap-nights). Traps were checked, baited, reset and maintained on a nightly basis except that one day of trapping was missed due to a holiday. Predator captures were consistent from month to month, owing to the very low predator population at the facility. Predator control "snapshot" surveys were conducted prior to the start of trapping and then before, during, and after the season, none of which indicated any significant predator presence on the property (one predator was sighted on the property during each survey, and appeared to be the same cat frequenting the same location by the Longs trash compactor). Additionally, twice-nightly monitoring for the presence of predators on the property indicated that a reduction in predator counts of about 34 percent was achieved over the course of the season, based upon average nightly predator counts observed during the last two weeks of the season as compared to those observed during the first two weeks of the season. No more than three cats were observed on the property during any search. On average less than 0.5 cats were seen on the property per night throughout the entire season. While direct evidence of cat feeding on the property was observed on only a few occasions, there is evidence that regular clandestine feeding is occurring in the area of the Longs Drugs trash compactor, and traps placed nearby appeared to have been tampered with on at least 17 occasions. The suspected feeder was advised not to feed cats on the property, but more forceful action may be necessary in the future to discourage this activity. Fortunately, the feeding appears to be for the benefit of a single cat, since the cat population at the facility remains quite low. Rats were observed on a handful of occasions, and three rats were caught in

predator traps, but in general the separate pest control program appears to be keeping rats under control. Additional details of predator control efforts will be provided separately.

*Training and outreach*

A total of 14 PowerPoint presentations were made for more than 56 staff members and contractors across all properties to educate staff members on the requirements of the HCP and on protocols related to searching, seabird biology and predator control. For the most part, these were developed and initiated by a contractor (HT Harvey Associates); however, an additional training session was provided to the Port Allen search team by Dr. Andre Raine. In addition, printed outreach materials were developed and distributed, including a tenant outreach letter and a tri-fold brochure to further educate tenants, employees, and visitors on the project at all facilities. Additionally, signs prohibiting the presence of loose predators and the feeding of predators were posted at all facilities.

*Changed circumstances and facility changes*

There were no changed circumstances, but there was one change in ownership prior to the season and a second change in ownership that occurred after the season, in addition to and some future facility-related changes to report.

## Kauai Coffee

Fred Cowell will be the primary contact replacing Drew Evans.

*Take*

A single downed NESH was reported on 26 October 2022, brought into SOS and was ultimately released alive. Although not a covered species, a single WTSH was also brought in and released alive.

*Downed Bird Search effort*

Searching was conducted throughout the seabird season by harvest crew (10-12 people) in the orchard, where staff was present in this area 24 hours a day. Implementation of the dedicated search routine documentation was done during the seabird fallout season in the Factory area where 1-2 people searched the factory area for downed seabirds from 5-9am and again from 7-10 pm. The route was expanded in 2022 to include looping around property and conducting mass searches with multiple staff rather than individual searchers. However, this was not sustainable due to staffing levels. Emphasis on ensuring that employees look under and around possible downed seabird locations.

*Lighting and facilities*

No new lighting changes were implemented in 2022. Landscape maintenance was conducted to provide easier visual access to possible downed bird locations as well as to decrease 'hiding' spots to improve searcher efficiency.

*Predator control*

Predator control was started in August of 2022, but was skipped for the month of October. Three traps were deployed and 17 cats were caught during that time. Feeding of feral cats continues on the property per emails received from concerned citizens; this practice should be discontinued.

*Training and outreach*

All individuals who participated in searches were provided training on seabird awareness, the seabird monitoring protocol, downed seabird response protocol, and KSHCP reporting procedures. Training included a review of the fact sheet, KSHCP Downed Wildlife Protocol and Incident Documentation and Reporting Form

Printed outreach material included posters, leaflets, and coloring activity books that were distributed to visitors to the site. A poster was put on the information board in the main office by the breakroom and the digital presentation is saved

in the central web portal for the employees to access at any time. Along with this, a seabird presentation is rotated through our digital information screens at random intervals

### Kauai County

*Downed Bird Search effort*

Searches were conducted once daily at all facilities at approximately 630am following the monitoring plan in the County's PIP. Searches were conducted by on-site staff.

*Lighting and facilities*

No substantial lighting or facility changes were reported in 2022.

*Predator control*

From 11/16/2022-12/31/2022, a contractor conducted Predator Control and surveyed the target areas for predators. Category 3 facilities (sites with lights on at night during the fledgling season for safety) with known occurrences of predators were prioritized for predator control efforts. Of the 37 category 3 properties, 32 had lights on and thus were subject to predator control and control was conducted at 13 properties as described below. The contractor worked rotating time between Bryan J. Baptiste Sports Complex (AKA Kapa'a New Town Park), Hanapepe Transfer Station, Kukui Heiau, Lima Ola Housing Development, Lihue Police Station, Vidinha Stadium, Lihue Transfer Station, Lydgate Park, Spouting Horn Park and Hanapepe Veterans Cemetery. These sites were chosen based on previous predator sightings and known public feeding of nearby colonies. The contractor worked two locations at a time (Hanapepe Stadium, Hanapepe Baseyard, Lihue Transportation Baseyard & Lydgate Park). During entire operation, 1356.5 total cat trapping nights were conducted and 0 seabird predations were observed. Substantial improvements were made in predator control operations in 2022 which included increasing the number of sites from 9 to 13, increasing both the number of animals removed in 2022 and increasing trapping efficiency through new baits and lure and camera monitoring.

The goal of the project was to reduce the presence of predators on those county properties with lighting systems which pose higher risk of seabird fallout during seabird fledging season. Additionally, the Contractor was prepared to respond to reports of downed seabirds by conducting supplementary predator control after such events. In February control efforts began on the ground, in combination with predator monitoring using game cameras and spotlight surveys. No response work was required during the 2022 period of performance, and monitoring cameras did not detect any downed seabirds.

*Training and outreach*

In 2022, 184 County staff and volunteers completed training on KSHCP. The online training is mandatory for all newly hired staff. In addition, monitors complete the training annually prior to fall out season.

## Lihue Airport

Newly appointed Director of Hawaii Department of Transportation, Edward Sniffen, replaces the previous Director, Jade Butay. Jade Butay remains listed as Principal Offer on the ITP and the ITL was signed by Mr. Butay as the authorized official.

*Downed Bird Search effort*

Systematic searches for downed seabirds were conducted twice each day at Lihue Airport as prescribed in the KSHCP and HDOT's Participant Inclusion Plan. Trained searchers performed this surveillance each consecutive day between September 15 and December 15, within 3-4 hours after sundown and then again within 1 hour of sunrise, covering all of the searchable areas that are accessible to the public at Lihue Airport. The public area consists of the terminals, parking areas, portions of the rental car facilities, several roadways and access corridors which interconnect the various parts of the airport facility, and the outer sections of the North Ramp along Ahukini Road. The Aircraft Operations Area (AOA), where active aviation activities take place, is a restricted area. The AOA is searched twice each day by USDA-Wildlife Services biologists in conjunction with the Lihue Airport Wildlife Hazard Management Program. The coordinated and

repetitive on-the-ground surveillance and dedicated search effort by multiple staff provided an effective monitoring program at Lihue Airport in 2022.

In 2022, H. T. Harvey & Associates initiated monitoring at Lihue Airport utilizing a team of 4 field biologists who conducted night and morning searches of the publicly accessible portions of Lihue Airport, outside of the secure AOA. By the first of October, once the initial training proficiency period was complete, the number of searchers sharing the search effort was reduced to 3. Two of the searchers have been conducting downed seabird surveillance and search activities at Lihue Airport for 3 years. HDOT brought in two new searchers in 2022. USDA-Wildlife Services staff biologists are highly trained professional wildlife biologists with intimate familiarity with seabirds and the annual fallout that occurs on Kauai. USDA-Wildlife Services biologists performed regular and routine wildlife surveillance inside the AOA and in public access areas with a heightened focus on detecting downed seabirds in all portions of the airport during the fallout season and coordinated closely throughout the season with the H. T. Harvey & Associates team.

Refinements to the monitoring program stem from what we observe in the field including the distribution of seabird fallout, variability in search conditions, moon phase as proxy for fallout probability, and the spatial character of Lihue Airport lighting infrastructure. In 2022, USDA-Wildlife Services conducted another searcher efficiency study to estimate discovery rates of searchers at Lihue Airport. The 2022 study estimated an 85% discovery rate for the AOA and public access areas combined. These ongoing improvements have continued to enhance the monitoring program at Lihue Airport to ensure that it remains very effective. At this time there are no substantive adjustments to the current monitoring protocols being proposed.

*Lighting and facilities*

In 2022 the public parking lot was lengthened at both the north and south ends and asphalt resurfaced. This project included the installation of some upgraded parking lot light fixtures. The upgrades consist of full cut off LED light fixtures which are expected to further reduce light attraction risk and are consistent with many previous upgrades to the lighting infrastructure at Lihue Airport. All of the work that was conducted on the resurfacing was performed either during the day or at night without the use of any additional or supplemental site lighting requirements.

*Predator control*

Trapping effort at Lihue Airport during the 2022 seabird fallout season consisted of 10 traps set for a total of 920 trap nights. Traps within the AOA were specifically placed evenly along the main terminal ramp where operational lighting is most pronounced and at strategic points in the public area to maximize catch probability. H. T. Harvey & Associates search biologists compiled observations of cats and other potential predators that were detected in the public areas for the entire fallout season. This information is used to inform trap placement and effort. Trapping in the public access portions of Lihue Airport, which is managed by USDA-Wildlife Services, was affected in 2022 due to unanticipated staffing constraints; whereas, normally a sufficient number of USDA-Wildlife Services biologists are able to maintain trapping and removal efforts in the public areas alongside critical WHMP activities. Increasing the number of active traps in the public access areas of the airport should contribute to more substantial reduction in the numbers of cats present in this portion of the facility and will be a priority in 2023. The trends in the two figures help show the diurnal shift in the numbers of cats seen in the public areas.

*Training and outreach*

H. T. Harvey and Associates trained and oversaw the management of four searchers who conducted 184 searches of the public access areas, once each evening and again pre-dawn. Training consisted of developing familiarity with the search areas, operational aspects of the facility, methods and approaches to ensure high detection capacity and thoroughness of coverage, conducting pre-season searches to enhance familiarity and aid in establishing search profiles, seabird species identification, ecology, and habits exhibited by grounded seabirds, in addition to the standard seabird awareness, rescue, and response training that is extended to a broad range of facility personnel. Airport Security and other trained personnel

also remained vigilant throughout the season and helped augment monitoring and surveillance capacity. USDA-Wildlife Services performed daily surveys consisting of early morning and evening searches of the entire AOA.

Outreach consisted of in-person visits to rental car company managers with overview of seabird light attraction and minimization tools, rescue and reporting procedures, and distribution of the Fact Sheet. HDOT also provided a "walk-through" scenario-based orientation on site to familiarize what to watch for and how to handle a downed seabird; stressed importance of Fact Sheet distribution to lot staff and pointed out how and why lights can become an attraction risk for seabirds and encouraged shut offs when possible. Kauai Airports District Manager issued Airport Notice to All Concerned parties to alert airport personal and tenants regarding the seabird fallout season, procedures for rescue and reporting when seabirds are found (dead or alive), the role of USDA APHIS Wildlife Services, and to reiterate the airport policy of no cat feeding anywhere at the airport.

A seabird light attraction Fact Sheet containing written materials covering seabird light attraction issues, minimization tools, rescue and reporting procedures was widely distributed among the Lihue Airport workforce with an emphasis on reaching employees and contractors who are active in the AOA. As part of outreach efforts, the Fact Sheet was posted in worker common areas and bulletin boards where it is visible to staff.

## Nawiliwili Harbor

Newly appointed Director of Hawaii Department of Transportation, Edward Sniffen, replaces the previous Director, Jade Butay. Jade Butay remains listed as Principal Officer on the ITP and the ITL was signed by Mr. Butay as the authorized official.

*Downed Bird Search effort*

Searches were conducted twice each day at Nawiliwili Harbor as outlined and prescribed in the KSHCP and HDOT's Participant Inclusion Plan. These surveys were performed each night within 3-4 hours after sundown and then again within 1 hour of sunrise, on consecutive days beginning on September 15th and concluding on December 15th. Nawiliwili Harbor is a secure facility and requires personnel conducting work to possess valid Transportation Workers Identification Certification and Marine Security Clearance issued by the Department of Homeland Security. H. T. Harvey and Associates assigned trained field biologists to conduct searches of Nawiliwili Harbor each night and provided training that enabled harbor security personnel to conduct dedicated seabird surveillance during the hour prior to sunrise. H. T. Harvey & Associates biologists conducted 92 searches on consecutive nights. Harbor security performed 92 consecutive searches within an hour of dawn during 2022 in addition to hourly surveillance of the entire facility.

Downed Seabird Monitoring personnel responsible for conducting searches for downed seabirds at Nawiliwili Harbor included one H. T. Harvey & Associates field biologist with extensive familiarity with the facility as well as three harbor security officers who have received training and refreshers over the last 3 years on search and reporting procedures. In addition to these dedicated and trained searchers, HDOT, Matson, and Young Brothers personnel provided incidental observational capacity that increased the probability that birds not detected during the dedicated nighttime and pre-dawn searches would be found by workers at the facility during the day. All of the individuals who participated in regular and routine searches of Nawiliwili Harbor facilities were presented with training and informational content on seabird awareness, response, rescue and KSHCP reporting procedures. Specific personnel responsible for conducting searches at Nawiliwili Harbor were Mitchell Craig (H. T. Harvey & Associates field biologists) and several security personnel under the supervision of Ryan Campos (Allied Universal Security Services) and Robert Cecconi (HDOT Harbors Division).

*Lighting and facilities*

Standard security and worker safety procedures at Nawiliwili Harbor require that high mast lights be turned on to full illuminance when active cargo operations are in progress and/or cruise ships are berthing, and only at the specific pier where those operations are occurring. When nighttime operations are completed, high mast lights are reduced to a lower setting, typically referred to as security level lighting (roughly 15% of illumination capacity). In 2017, HDOT Harbors

Division replaced the high-mast operational lights with new, full cut-off, downward-pointing LED fixtures. In 2020 and 2021, HDOT Harbors Division personnel at Nawiliwili Harbor worked closely with lighting engineers to ensure sufficient training of harbor security personnel and staff so that any necessary changes in light settings could be made quickly and effectively in situ following the completion of operations. This same close coordination with engineers and enhanced capabilities of security personnel were a priority and shown to be effective in 2022. Although not an independent stand-alone initiative in 2022, the same degree of vigilance, initially implemented to enhance minimization capacity during the seabird fallout season, is used year-round to reduce facility lighting during non-operational periods and is considered progressive in terms of continuing to advance biological goals and objectives.

*Predator control*

Prior to implementing animal control initiatives at Nawiliwili Harbor in 2022, HDOT Harbors Division personnel posted signage and communicated directives to tenants regarding the no cat feeding policy in place at Nawiliwili Harbor. These signs remain posted throughout the year. Predator control activities at Nawiliwili Harbor in 2022 consisted of initiating trapping efforts during the first week in September in an effort to reduce the numbers of animals on site prior to the beginning of the fallout season. H. T. Harvey & Associates biologists also performed three separate facility-wide surveys of Nawiliwili Harbor, enumerating the number of cats that were present in order to establish a baseline from which to assess the efficacy of trapping and removal efforts (i.e. control) during the course of the fallout season. Traps consisted of two Tomahawk-style live cage traps placed at various locations within the facility and moved regularly based on observations and reports delivered by search and monitoring personnel and harbor security. Traps were consistently baited with commercial cat food and canned tuna. Traps were furnished with bait and set Monday through Thursday, excluding weekends and state holidays, to minimize unnecessary stress on unattended captured animals. Numbers of cats observed during nightly surveys ranged from 0-4 and averaged 0.76 cats per survey. Surveys conducted prior to the beginning of the season (n = 3) yielded 3, 3, and 4 cats or an average of 3.3 cats as an initial basis for evaluating efficacy of the control program. Harbors Division retained the services of a licensed local animal controller to remove cats, same day, when cats were captured at Nawiliwili Harbor. The services provided enabled cats that were captured to be handed off to the service provider for efficient and humane evacuation from the facility. No dogs or pigs were reported inside the harbor. See Addendum Sheet 2 for additional summary information.

Cats were observed by trained seabird searchers performing concurrent surveillance for cats at Nawiliwili Harbor on 45 of the 92 survey days in 2022 (49% frequency of occurrence). Numbers of cats observed ranged from 0-4 and averaged 0.76 cats per survey. Cats were observed throughout Nawiliwili Harbor but were encountered most frequently along the property boundary adjacent to the small boat harbor. Trapping effort consisted of deploying 2 traps per day, for 53 days (excluding Friday, Saturday, and Sunday) and amounted to 106 trap days. A total of 11 cats were captured and removed from Nawiliwili Harbor, yielding an overall capture success rate of 0.10 cats/trap night, or roughly 0.75 cats/week. The number of cats observed and the frequency in which cats were detected at Nawiliwili Harbor declined by roughly 56% over the course of the season. Although the pre-season survey duration was short, it did provide a baseline from which to evaluate the effectiveness of the management program at reducing the number of cats on property and thereby reducing depredation risk.

*Training and outreach*

A total of four PowerPoint presentations were made to 14 staff members working at Nawiliwili Harbor that included a review of the Fact Sheet, KSHCP Downed Wildlife Protocol, and Incident Documentation and Reporting Form. These were developed and delivered by H. T. Harvey & Associates. Printed outreach material was posted in areas that are visible to harbor staff and tenants.

## Norwegian Cruise Lines (NCL)

After two years of limited operations in Hawaii waters during the seabird fallout season, NCL had three vessels operational through parts of the seabird season. While they initially had only anticipated two vessels (Pride of America and Norwegian Spirit), the Oceania Regatta altered its typical cruise track to include Hawaii when it became apparent it

was no longer appropriate for the vessel to call on ports in Russia. The Oceania Regatta was in Hawaii waters from October 1 – 5, 2022 and was in port in Nawiliwili harbor on October 5, 2022, with a scheduled arrival time of 07:00, and departure time of 17:00, so it was not in Nawiliwili harbor in darkness.
Significant effort was put into outreach, training and light minimization this year, particularly on the Norwegian Spirit.

*Downed Bird Search effort*
During operations within Hawaii waters, seabird monitoring was continuous every day of the year on every vessel since each crew member was tasked with inspecting their own duty stations. The onboard Environmental Officer (one per vessel) was responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and reporting.

*Lighting and facilities*

Pride of America- The NCL biologist, accompanied by the on-board environmental officer conducted the formal lighting audit of the Pride of America on September 8, 2022 in Lihue. The only corrective action identified by the NCL Biologist was to install amber sleeves on the fluorescent bulbs on Deck #13. Amber and blue sleeves were ordered, but did not arrive in time for the season, in response NCL shut off any lights identified by the NCL biologist for the duration of the season. Installation of the new sleeves is scheduled before September 15, 2023. No other changes to the lighting were necessary.

Norwegian Spirit- In preparation for seabird fledging season, a lighting audit of the Norwegian Spirit was conducted on June 17, 2022 in Victoria, Canada to determine compliance with KSHCP Appendix E: Guidelines for Adjusting Lighting at Facilities. The lighting audit was conducted in person by biologist Louise Blight of Procellaria Research & Consulting, who was accompanied virtually by NCL biologist Reginald David and who was accompanied in person by Sarah Ferguson-Brown (Director of Environmental Compliance) and several officers including the Norwegian Spirit's Environmental Officer, Staff Captain, Safety Officer, and Chief Electrician. The lighting audit identified recommendations for light minimization. These recommendations are in Attachment C, Table 1 (Recommended permanent modifications to Norwegian Spirit to minimize light attraction during seabird season), and Attachment C, Table 2 (Recommended lighting minimization measures to be applied on board Norwegian Spirit during seabird season). The recommendations in Table 1 were implemented prior to the seabird season on September 1, 2022 and the recommendations in Table 2 were implemented while the vessel was in Hawaii waters (e.g. October 15 – 23, 2022 and November 22 – 30, 2022). As necessary.

Oceania Regatta- Since this vessel joined the fleet unexpectedly mid-season, there was not time to conduct a lighting audit or lighting modifications before the Regatta arrived in Hawaii waters. To minimize the lighting of the vessel while in Hawaii waters, the Regatta kept the following lights off: flood lights, funnel and string lights, forward mooring lights, jogging track and radar lights.

*Predator control*

Biological Objective 1B relates to predator control and is not applicable on a seagoing vessel, thus NCL did not conduct predator control activities on any of its vessels.

*Training and outreach*

The onboard Environmental Officers on each individual vessel were responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and reporting. All crewmembers were responsible for searching their respective duty stations for downed seabirds on a daily basis. There were significant efforts made to conduct outreach and education to both crew and passengers. In total 108 presentations were made to 2398 staff across all three vessels. During the seabird season, the Pride of America, Norwegian Spirit, and Oceania Regatta provides information on seabirds, and seabird protocols to its passengers in the "Free Style Daily," NCL's onboard daily newspaper.

The ship's hotel staff closes cabin draperies each afternoon as part of the turn-down service (NCL Housekeeping Policy (HK), 03.28 and HD .03.80 11/30/2006 and 11/2009 respectively) and when cabins are cleaned. Passengers are requested to keep their draperies closed as part of the ship's green initiative and to conserve natural resources.

*Take*

There was take of two listed seabirds, and six non-covered seabirds during 2022 across all three vessels.

- On July 20, 2022 NCL became aware of the downed Newell's Shearwater on board the Pride of America via an email from USFWS which forwarded a picture that an NCL guest posted on Facebook. Additional records or information were not available.
- On 15 October 2022, a Band-rumped storm petrel was found alive at 00:30 on the deck of the Norwegian Spirit and was transported to Maui Nui Seabird Recovery Project on Maui where it was released alive.
- On November 25, 2022 the Norwegian Spirit experienced very strong winds of approximately 40 knots/ hour speed. There were six downed birds (non-covered species) on the Norwegian Spirit in the late evening of November 24, 2023 and early morning of November 25, 2023. These birds were delivered safely to SOS Hawaii Wildlife Center in Honolulu.

In response to USFWS' recommendation, the Pride of America will work to increase passenger awareness of the importance of informing a crew member if they locate a bird on the vessel. NCL is evaluating increasing the date range that crew training is conducted, and will expand the period of days that the Free Style Daily includes the information for the passengers from March 1st through December 15th.

## 1 Hotel Hanalei Bay

As described in Item 5 of its PIP, the 1 Hotel Hanalei Bay was under renovation for all of 2022. Construction took place during weekday daylight hours, typically 7am to 3pm. No nighttime construction was conducted. Security personnel were on site from dawn (6am) to 9pm seven days a week. While no covered seabirds were found in 2022, a single Wedge-tailed Shearwater (disposition unknown) was found.

*Downed Bird Search effort*

Dedicated searches were conducted twice daily: early morning before dawn (6-7am) and after sundown (7- 9pm) along the search route by the Director of Loss Prevention and two dedicated personnel. The sole responsibility of the dedicated search personnel was to conduct seabird and honu searches. Additionally, approximately 200 construction workers and 26 resort staff were trained to look for downed birds and predators throughout their work shifts. The Director of Loss Prevention oversaw the seabird protocols, bird searches and recovery, record keeping, and reporting during construction. The conducted searches twice daily as described above.

The PIP for 1 Hotel Hanalei Bay describes that for Honu searches, groundskeepers "rake the beach every morning shortly after daylight 365 days of the year. Lifeguards and pool attendants are in the area 365 days of the year as well and are trained to see sea turtles". During construction, 1 Hotel Hanalei Bay made temporary changes to the search protocols for detecting honu nests. Search personnel conducted searches twice daily in the early morning and after sundown along the search route, which includes Puʻu Pōā Beach. Search personnel were directed to survey the beach for honu nests. No honu nests or hatchlings were detected.

*Lighting and facilities*

There was significantly less lighting in 2022 than described in its PIP because the resort was closed to guests. The majority of outdoor lights were deactivated on April 1, 2020. During the 2022 seabird fledging season, the limited lighting included 50% of the parking lot lights, safety lighting at the loading dock, and a single light along the beach access walkway. All outdoor lighting was angled downward, shielded, and fully cutoff. No outdoor lights were visible from the beach.

*Predator control*

Due to changes to staffing, specifically hiring a new Director of Loss Prevention who was responsible for implementing KSHCP minimization measures at the hotel, there was a delay in initiating predator control activities, which began on September 22, 2022. Predator searches were conducted daily by a commercial contractor who moves traps around the property to the best locations to catch predators. The Resort Biologist consulted with the pest control company prior to the start of the seabird season and provided direction on the number of traps and site-specific locations to best catch predators. During the seabird season, on-site construction workers were directed to tell their supervisor immediately if any cats or predators were sighted. The dedicated search personnel also searched for and reported predators during the their comprehensive seabird searches (twice daily). If predators were sighted, the Director of Loss Prevention would inform the predator control company, who would deploy a trap that was best suited to catch the predator. The resort also posts signs within the resort prohibiting outdoor feeding of cats. The pest control contractor deployed and checked two to three traps daily between September 22, 2022 and December 15, 2022 for a total number of 119 trap nights.

*Training and outreach*

During construction, the entire construction crew was trained to continuously search their respective work areas for downed birds and predators during work hours (7am – 3pm). There were approximately 200 construction crew members during the 2022 seabird season, each of which received in person Seabird and Honu Awareness Training. The search personnel also received in-person Seabird and Honu Awareness Training. There are signs within the resort directing staff to report fallen seabirds to security.  1 Hotel Hanalei Bay did not conduct guest outreach activities as described in its PIP because there were no guests at the resort during the fledging season.

In 2022, twenty-eight hotel staff members completed honu training on August 8, 2022. Additionally, the Director of Loss Prevention (Moki Okami), who conducts the honu searches for the property, completed the honu training that the agencies provided on May 26, 2022 prior to being employed by 1 Hotel Hanalei Bay. The construction crew received combined honu and seabird training immediately prior to the seabird fallout season (prior to September 15). Workers are provided a hard-hat sticker, which they must wear daily to indicate that they've completed the seabird training

*Changes*

Donald "Moki" Okami, Director of Loss Prevention, replaced Sean Cahoon and is responsible for KSHCP compliance at 1 Hotel Hanalei Bay. Mr. Okami has over 25 years of experience and was previously responsible for KSHCP compliance at another Kauai resort prior to being hired at 1 Hotel Hanalei Bay. His extensive training included compliance with the KSHCP and resort's ITP/ITL. Anticipated changes for 2023 include welcoming guests back onto the property and thus modified lighting schedules to reflect guest occupancy.

## HDOT Port Allen Harbor

Newly appointed Director of Hawaii Department of Transportation, Edward Sniffen, replaces the previous Director, Jade Butay. Jade Butay remains listed as Principal Officer on the ITP and the ITL was signed by Mr. Butay as the authorized official.

*Search effort*

Searches were conducted twice each day at Port Allen Harbor as outlined and prescribed in the KSHCP and HDOT's Participant Inclusion Plan. These surveys were performed each night within 3-4 hours after sundown and then again within 1 hour of sunrise, on 92 consecutive days beginning on September 15th and concluding on December 15th. Port Allen Harbor is open to the public 24 hours per day with no on-site security presence. H. T. Harvey and Associates assigned trained field biologists to conduct the twice daily searches of Port Allen Harbor. H. T. Harvey & Associates biologists conducted 184 searches on consecutive nights and mornings in 2022.

In 2022, the downed seabird monitoring at Port Allen Harbor was conducted by two trained H. T. Harvey & Associates field biologists -- Rick Foulks and Mitchell Craig. Both biologists have been responsible for seabird search and monitoring activities at Port Allen Harbor for multiple years and are very familiar with the property. Searcher training included site orientation review, discussion of circumstances and past fallout distribution characteristics, seabird and situational awareness, downed seabird response, rescue and KSHCP reporting procedures. In addition to the dedicated searchers, HDOT staff present on site during normal daytime work hours were also trained and capable of detecting downed seabirds and initiating the proper procedures for handling and reporting downed seabird incidents.

The effectiveness of the 2022 monitoring program at Port Allen Harbor was enhanced by the skill of the trained searchers combined with the training and review of procedures prior to the beginning of the seabird fallout season. The training and preparations for the fallout season included a thorough review of the search area and past distribution of downed seabirds and circumstances associated with those incidents. We also reviewed the position of decoys used in 2021 to evaluate discovery rates of searchers and incorporated lessons learned about various factors affecting detection, such as vegetation cover and concealed spaces that grounded birds might utilize for cover. The monitoring effectiveness was evaluated following each of the two downed seabird discoveries at Port Allen Harbor in 2022 to highlight searcher attentiveness, situational awareness, and ability to quickly find and rescue downed seabirds when they are found. There were no circumstances that triggered in-season corrections or substantive retraining with respect to the standard monitoring protocols, response procedures, and reporting at Port Allen Harbor in 2022. There are no proposed adjustments to the current protocols at this time.

*Lighting and facilities*

in 2022, HDOT replaced all of the warehouse siding and applied a paint color and texture intended to reduce glare and further minimize light attraction exposure risk for seabirds at Port Allen Harbor. This work was scheduled and completed prior to the 2022 seabird fallout season. Shortly after the season got underway, a new light shield was installed on the existing main warehouse light that is used to illuminate the parking and pedestrian-way corridor between the pier and the mauka parking area utilized by many port users. The completion of the warehouse siding project and shielding of the main warehouse light have reduced the light attraction risk for seabirds considerably. No additional changes are proposed in 2023.

Standard security, worker, tenant, and public safety procedures at Port Allen Harbor require that some facility lighting remain on at night. The main light illuminating the parking lot and wall mounted lights along the seaward side of the warehouse were programmed to be on from 18:00 to 20:30 each night to provide for the safety of workers and visitors disembarking from tour boats and departing from the pier and parking area. At 20:30, the main warehouse light goes off and the wall mounted lights along the south and west sides of the warehouse are reduced to 50% capacity (i.e. every other wall mounted light is turned off) and remain at this level until dawn each day. HDOT Harbors Division replaced the warehouse siding and applied new paint utilizing a grayish color and flat texture that is intended to reduce glare caused by the wall-mounted lights. In addition, a shield was installed over the main warehouse light fixture that further reduces the amount of light cast in the horizontal plane and thereby enhancing the effectiveness of light minimization at this facility. Combined, these measures are expected to minimize light attraction exposure for seabirds and contribute to biological goals and objectives at Port Allen Harbor.

*Predator control*

Prior to the start of the 2022 seabird fallout season, biologists performed reconnaissance level surveillance of Port Allen Harbor to evaluate the initial numbers of predators of seabirds (i.e. cats) at Port Allen Harbor in order to establish a baseline from which to assess the efficacy of predator control during the course of the season. Somewhat surprising to us, there were no cats observed on three separate facility-wide surveys of Port Allen Harbor between September 9-13, 2022. Predator control activities at Port Allen Harbor in 2022 were planned to direct trapping in areas where cats are known to be present, based on past monitoring data and what was being reported by biologists in 2022. Only one cat was reported at Port Allen Harbor in 2022 -- in stark contrast to historic occurrence at this facility. Harbors Division staff

typically deploy 2 Tomahawk-style live traps at the Port Allen Harbor Monday through Thursday. Harbors Division again retained the services of a licensed animal control team to take possession of cats, if captured, the same day. However, no cats or other free-roaming animals were captured and no dogs were observed within the Port Allen Harbor facility in 2022. We observed a corresponding decline in the numbers of cats present at Port Allen Harbor beginning in 2020 and that trend has continued with 9 cats observed in 2021 and only one in 2022. Thus, evaluating the efficacy of HDOT's predator control efforts at Port Allen Harbor in 2022 was limited by small sample sizes and the overall absence of cats at this facility in 2022. What appears evident is that the densities of cats at Port Allen Harbor and adjacent properties seems to have declined considerably, and this likely corresponds to a significant reduction in the depredation risk to downed seabirds.

*Training and outreach*

A total of two PowerPoint presentations were made to eight staff members providing administrative support or working at HDOT Port Allen Harbor that included a review of the Fact Sheet, KSHCP Downed Wildlife Protocol and Incident Documentation and Reporting Form. Periodic check-ins with HDOT Harbors Division staff at HDOT Port Allen Harbor and Nawiliwili Harbor to inquire where assistance may be needed, provide advance notice ahead of periods of higher fallout probability (new moon), heighten awareness, and revisit fundamental elements of seabird awareness, rescue, response, and reporting requirements was also done in 2022.

## Sheraton Kauai Resort

Dan Sheldon replaced Lee Jay Aki as the primary contact and person responsible for managing the seabird program on the property.

*Take*

Sheraton documented eight downed NESH, all of which were released alive from SOS, and eight downed Wedge-tailed Shearwaters.

*Downed Bird Search effort*

Daily seabird searches consisted of 4-5 dedicated searchers on the built upon portion of the property. Searches were conducted 1 hour before sunrise (6-7 am) and 3-4 hours after sunset (9-11pm). Daily turtle surveys were conducted every morning before sunrise with one security officer walking the length of the SKR beach lawn and making visual observations of Poipu beach. The seabird searcher effort was conducted by the Security Department with 4-5 dedicated searchers. Searchers used flashlights to search a mapped route of property to include vegetation, under covered areas, and open areas.

Sheraton associates, contractors, and guests located 8 NESH and 8 WTSH in 2022, a marked improvement from the 2021 search which yielded 2 NESH. Searchers also recovered 13 decoys used by the State's searcher efficacy trials on property. Predator surveys were recorded in daily Security logs.

Limited searcher efficiency trials in 2021 and 2022 indicated that Sheraton's recovery of decoys was less than the 50% efficiency estimated in their PIP. Sheraton implemented several changes to their search protocols / methods during the 2022 seabird fledging season in response to the results of the 2021 searcher efficiency trials. Sheraton Kauai Resort's 2022 Seabird Search effort was conducted by the Security Department. Daily searches consisted of 4-5 dedicated searchers on built upon portion of the property, starting approximately 3 hours after sunset and 2 hours before sunrise. In 2022, SKR management introduced a $250 Incentive Program to reward qualifying associates, contractors, and guests who located a downed seabird or bird decoy. This incentive resulted in random searches by associates and guests in addition to the dedicated search by Security personnel.

SKR associates, contractors, and guests qualified for the $250 reward if the following criteria were met:
•The first associate(s)/guests to locate a downed bird or decoy must contact Security and remain with the bird until Security could recover the bird and place in SOS Aid Station or report a decoy to Project Technician.
•If multiple associates/guests found a bird at the same time, they could split the reward.

•Associates are required to be on-duty during search.
•Qualifying species included, NESH, HAPE, BRSP, WTSH, and decoys.

In total, 25 hotel associates, 1 contractor, and 1 hotel guest qualified for reward after locating covered species, WTSH, and Search Efficacy Study Decoys.

*Lighting and facilities*

Artificial lighting was previously modified in compliance with KSHCP guidelines. Pre-Season assessment was conducted by Security Department in search of areas for improvement and reduction of light attraction. SKR began switching out tree lights along the Ocean and Beach front areas with full cut off solar-powered Bluetooth motion-sensor lights. Bluetooth lights enabled Security to dim lights to 30% output or complete On/Off with motion activation during Seabird Fallout and Turtle nesting season.

*Predator control*

The Resort staff conduct predator surveys while on patrol and called on our vendor as needed to move traps to address identified incursions. The predator control vendor set traps which were checked on a daily basis with a total of 1290 trap nights during the course of the year. There was a significant increase in the number of predators removed from the property this season.

*Training and outreach*

Worker Seabird Awareness and Response Training presented to 186 SKR associates to identify covered species and establish procedures. 10 Security officers participated in Dedicated Searcher/Field Training for Seabird and Turtle Searches with the assistance of DOFAW and Kauai Endangered Seabird Recovery Project's Project Manager. Dedicated Searcher training placed emphasis on search intensity, search method, and reporting. Security staff also provided with sunrise/sunset schedule and moon phase calendar at the beginning of each month during fallout season. Brochures with a detailed description of NESH, HAPE, and BRSP were placed in guest rooms and available at Front Desk. Seabird coloring books were also available for guests and visitors. Security attended monthly department meetings of various hotel departments to remind associates of Seabird Search efforts and Predator Control.

## Sonesta Royal Kauai Resort

After two years of reduced occupancy as a result of the pandemic, the Sonesta Resort resumed normal operations in 2022. Daniel Esaki replaced Donald Moki Okami as the Director of Security and the alternative KSHCP compliance officer for the resort. Sonesta also hired Kaupena Kinimaka to assist with KSHCP compliance during the 2022 seabird fledging season.

*Take:*

Five downed seabirds, three of which were covered species (three alive NESH which were ultimately released by SOS), were found in 2022.

*Downed Bird Search effort*

Searches were conducted through the day, 7 days a week. The entire staff (~350 employees) was responsible for searching their respective work areas during work hours. During the seabird season, search patrols were conducted twice daily within 1 hour before sunrise (6-7am) ad 3-4 hours after sunset (9-11pm) with a rotating security staff team of 20 people that were trained for the targeted searches. Six searchers (three in the evening and three in the overnight shift) conducted the dedicated searches for downed seabirds, honu and predators during the seabird season. Sonesta Resorts General Manager and Director of Security were responsible for overseeing the seabird protocols, bird searches and recovery, record keeping and reporting.

Sonesta modified their searcher protocols after the searcher efficiency trials in 2021 indicated that their discovery rate was below 50% (the estimate included in their PIP). Changes include: 1) removed ground cover and vegetation on the property (including vegetation around the buildings and areas were downed birds had previously been found), 2) assigned six personnel to dedicated search efforts daily, 3) attended Downed Seabird Response Training conducted by Dilek Sahin on October 11, 2022, 4) conducted internal training for the security staff (i.e. dedicated searches) based on Downed Seabird Response Training by Dilek Sahin, 4) integrated Dilek Sahin's training and recommendations into the search methods and protocols (including increased effort searching vegetated areas), 5) used infrared scope to expand the search areas (including the vegetated area under the guest rooms), 6) increased seabird signage within the covered property, 7) provided incentives for staff responsible for daily searches, and 8) emphasized during the seabird annual training and daily employee stand-up meetings the importance of seabird searches.

The beach was searched in accordance with Sonesta's PIP Item 10: “Kalapaki Beach is approximately a quarter mile long and is located directly in front of the pool." and "Groundskeepers rake the beach twice a week”. The beach is owned by DLNR, and not the AOAO. The personnel responsible for raking and searching the beach undergo annual endangered species training.

*Lighting and facilities*

The seasonal lighting minimization described in the PIP, including Table 1, was completed on September 1, 2022. Several other permanent lighting minimization measures were made prior to the start of the seabird season and as a result of the lighting assessment completed by the Resort Biologist and Sonesta Engineer on the evening of September 14, 2022. The modifications were significant, including modifying and replacing fixtures and limiting the periods in which lights were turned on. A complete report of the modifications can be found in Attachment B to their annual report.

*Predator control*

Sonesta resort hired a commercial pest control service that systemically monitored for predator presence throughout the year. Three traps were deployed and checked daily from 16 December 2021- 15 December 2022 for a total of 1074 trap nights. During the seabird season, Sonesta staff helped the predator control company improve trapping implementation by informing them of when and where predators were identified. The resort also posts signs within the resort prohibiting outdoor feeding of cats.

*Training and outreach*

Seabird Awareness and Response Training was completed prior to September 15 and within the first day of employment for new employees hired within the fallout season. The training PowerPoint was updated with additional pictures and content and is included as Attachment C to this annual report. The search personnel also attended a Downed Seabird Response Training conducted by Dilek Sahin on October 11, 2022. Dedicated Searcher/Field Training for Turtle Searches was also conducted with the assistance of DOFAW and Kauai Endangered Seabird Recovery Project’s Project Manager.

Twenty PowerPoint presentations were made to 231 staff members that included a review of the fact sheet, KSHCP Downed Wildlife Protocol and Incident Documentation and Reporting Form. Copies of outreach and PowerPoint materials were attached to the annual report. Sonesta conducted Seabird Awareness and Response training in accordance with its PIP Item 11. Seabird Awareness and Response Training was completed prior to September 15 and within the first day of employment for new employees hired within the fallout season. The training PowerPoint was updated with additional pictures.

# MINIMIZATION COMPLIANCE SUMMARY

The purpose of this report is to summarize the results of compliance monitoring of implementation of minimization measures at participant facilities to enable the agencies to monitor compliance with minimization actions at participant facilities via review of Participant Annual reports (KSHCP 6.6.2.2(5) and 6.8.1). The agencies' effectiveness monitoring will identify if and when specific measures are effective or less effective and provides information on whether the proposed minimization or mitigation measures can or should be modified through Adaptive Management (see Section 6.9) or, whether the HCP itself should be considered for amendment.

To facilitate the agencies' effectiveness monitoring, this report summarizes methods used to minimize instances of light attraction, on-site predator control, and training and outreach to increase the likelihood of finding downed birds. The evaluation has been based on the information contained in Participant Reports. Although not required by the KSHCP, this report suggests evaluation criteria for the agencies regarding participants' minimization efforts. A separate discussion of the effectiveness of mitigation activities implemented at the Kahuama'a Seabird Preserve is provided above.

## Lighting and facilities minimization

Measures to avoid and minimize the impacts of light attraction on the Covered Species are an integral part of the KSHCP. The avoidance and minimization efforts outlined are detailed in *Appendix E: Guidelines for Adjusting Lighting at Facilities* and reflect the best available science on seabird friendly lighting. Briefly, these methods include:

- Deactivate non-essential lights
- Install full cut-off light fixtures
- Shield light fixtures
- Angle lights downward
- Place lights under eaves
- Shift lighting according to moon phase (during the fall-out period)
- Install motion sensors for motion-activated lighting
- Decrease lighting levels
- Decrease visibility of interior lights
- Use light-less technologies
- Plant vegetation around lights to reduce light visibility
- Lower height of lights
- Use longer light wavelengths

*Results*

Overall, the participants in the KSHCP ensured that lighting at their facilities was reduced and modified in compliance with the guidelines set forth in the KSHCP. In some cases lights were completely turned off at the properties for the duration of the season. For tourism-based properties (1 Hotel Hanalei Bay and NCL), lighting was significantly decreased as a result of closed facilities and/or greatly reduced occupancy due to the COVID 19 pandemic. Compared to 2020 and 2021, minimal reporting of lighting changes were contained in the annual reports, so it is assumed that lighting changes were not made if they were not reported. Based on the reports and photos provided, all participants, with the exception of Kauai County who did not report any changes, have made significant efforts towards reducing light pollution and thus risk to listed seabirds, at their properties since the implementation of the KSHCP in 2020.

## Predator control

Seabirds that are downed at Participant facilities are vulnerable to direct mortality from predation by free-roaming dogs, cats, rats, and other predators. Downed seabirds that subsequently become predated are considered lethal take (see KSHCP Section 4.2.1). In order to receive incidental take authorization from the USFWS and DLNR, Participants are required to reduce the presence of predators at their facilities for the duration of the fallout season. The HCP requires that Participants "Conduct a predator trapping and removal program throughout the Covered Property immediately prior to

and throughout the fallout season . . . unless alternative methods are included in an approved PIP . . .."(KSHCP Section 5.3.2)

One possible method for the agencies to evaluate efficacy of predator control programs is first to evaluate whether participants met the minimum number of days of predator control (i.e. conducted trapping throughout the seabird fallout season) and secondarily on the number of traps placed relative to the size of the property. While the KSHCP does not provide explicit guidelines for trapping spacing at participant facilities and allowed for each participant to develop its own agency-approved predator control plan, best practice guidelines developed and published by the Pacific Invasives Initiative that are used Pacific-wide recommend a minimum of trap spacing of one trap every 500m (1640 feet) to as dense as one trap every 50m (164 feet). Thus, the minimum of one trap every 500m (one trap for every 15 acres, equivalent to 0.067 traps/acre) was used as a baseline for the minimum number of traps required based on the size of the property. Additionally, the number of animals caught per trap per night was calculated for each facility. This metric is a useful measure of animal abundance over time and can be used to track progress over many years in removing animals from the landscape; as trapping continues we expect the number of animals/trap night to decrease as they become less dense.

Below, this report compares Participants' predator control activities against the best practice guidelines of the Pacific Invasives Initiative. Of the 194 properties included in the KSHCP as of 2022, 47 were required to do predator control. Only 25/47 of those properties conducted predator control across all Participants, resulting in significant gaps in coverage of predator control. Although it should be noted that 25 properties conducting predator control is an increase in four properties compared to 2021. Properties that did not conduct predator control include 19 out of 32 covered properties owned by Kauai County. Of the remaining 25 properties that did conduct predator control, 12 were deemed to be effective based on meeting the minimum number of trap nights and trap placement which is an improvement from only 9 done in 2021. Table 7 below summarizes the predator control efforts made by each participant and property. Table 5 also identifies recommended changes based on the KSHCP guidelines and generally accepted predator control practices.

*Table 8: Summary of predator control effort and results by property*

| Participant | Location | Conducted predator control? | # trap nights | Predator/trap night | Changes needed? |
|---|---|---|---|---|---|
| A & B | Hokulei Shopping Village | Yes | 259 | 0.031 | No |
| A & B | Port Allen Commercial properties | Yes | 331 | 0.076 | No |
| A & B | The Shops a Kukuiula Shopping Center | Yes | 387 | 0.013 | No |
| A & B | Waipouli Town Center | Yes | 129 | 0.054 | No |
| County of Kaua'i | Bryan J. Baptiste Sports Complex | Yes | 157.75 | 0.133 | Increase # trap nights |
| County of Kaua'i | Ele'ele Wastewater Treatment | Yes | 18.75 | 0 | Increase # trap nights |
| County of Kaua'i | Hanapepe Transfer Station | Yes | 220 | 0.182 | Increase # trap nights |
| County of Kaua'i | Hanapepe Veterans Cemetery | Yes | 209.5 | 0.110 | Increase # trap nights |
| County of Kaua'i | Kapaa Transfer Station | Yes | 17 | 0 | Increase # trap nights |
| County of Kaua'i | Kealia Fire Station | Yes | 67 | 0 | Increase # trap nights |
| County of Kaua'i | Kukui Heiau | Yes | 25.5 | 0.000 | Increase # trap nights |
| County of Kaua'i | Lihue Police Department/Vidinha Stadium | Yes | 111.25 | 0.045 | Increase # trap nights |

| | | | | | |
|---|---|---|---|---|---|
| County of Kaua'i | Lihue Transfer Station | Yes | 98.5 | 0.284 | Increase # trap nights |
| County of Kaua'i | Lihue Wastewater Treatment | Yes | 19.5 | 0.051 | Increase # trap nights |
| County of Kaua'i | Lima Ola Housing Development | Yes | 196.75 | 0.076 | Increase # trap nights |
| County of Kaua'i | Lydgate Park | Yes | 75.75 | 0.224 | Increase # trap nights |
| County of Kaua'i | Remaining 19 properties category 3 properties with lights | Yes | 0 | 0.000 | N/A (not required) |
| County of Kaua'i | Spouting Horn Park | Yes | 139.25 | 0.050 | Increase # trap nights |
| HDOT | Lihue Airport | Yes | 960 | 0.005 | N/A (not required) |
| HDOT | Nawiliwili Harbor | Yes | 106 | 0.104 | No |
| HDOT | Port Allen Harbor | Yes | 104 | 0.000 | No |
| Kaua'i Coffee Company | Factory and Fields-Kalaheo | Yes | 273 | 0.062 | No |
| Essex House Condominium Corporation | Sonesta Royal Kauai Resort | Yes | 1074 | 0.002 | No |
| NCL | Three vessels | No | | | N/A (not required) |
| Sheraton Kauai Resort | Sheraton Kauai Resort | Yes | 728 | 0.000 | No |
| SOF-XI Kauai PV Hotel, LP | 1 Hotel Hanalei Bay | Yes | 199 | 0.015 | No |

In total, 274 feral cats were removed from participant facilities during the 2022 seabird fallout season; an increase of 7% over 2021. Predator control efficacy varied largely between participant groups related to effort, expertise and situational dependent variables such as proximity to known feral cat colonies and the efficacy of the contractor selected to conduct the work. However, predator control effort and results were dramatically improved from 2020. The following paragraph provides recommendations for participants on how to ensure their facility-based predator control programs can be improved to ensure they are in compliance with the KSHCP.

*Conclusions and recommendations*

All entities that participated in predator control appear to have sufficient trap coverage based on the size of their facility. Of the 13 properties that did conduct predator control, but where it was not deemed sufficient, the properties did not meet the minimum number of trap nights, thus simply increasing the number of trap nights would bring the properties into compliance.

## Training and Outreach

An important step in reducing mortality of downed seabirds is quickly finding and recovering (i.e. capturing and turning birds in to the SOS facility for rehabilitation) them efficiently. This is most likely to occur when on-site staff and workers are properly able to identify Covered Seabirds, understand and fully implement the protocol for their detection and safe capture, and have a clear search strategy.

Under approved PIPs, each Participant conducted annual outreach and training for workers at their facilities that is specific to Covered Seabirds in order to help workers spot downed seabirds and know how to respond in a timely manner. The goal was to train workers who will be responsible for the monitoring of downed seabirds at facilities, and who may find a downed seabird incidentally while performing other duties. In 2022, 3448 staff and workers associated with the participant facilities were directly trained on monitoring and response of downed seabirds, a number equivalent to 4.8% of the population of Kauai (72,293 as of 2019) and a more than 300% increase over 2021 when 1,091 staff were trained. This was primarily due to NCL having multiple ships participating in their comprehensive staff training program. The quality of materials and information presented across all participant groups was high and participants should be commended for the amount of effort that was put into staff training.

In addition to training of workers and staff, each Participant was also required to produce and offer seabird outreach materials tailored to their customers, guests, or the public who may be present at their facilities during the seabird fallout season. These materials were meant to supplement efforts of Participant staff members by encouraging more "eyes on the ground" to identify and recover downed seabirds. For tourism-based facilities (Sonesta Royal Kauai Resort, Sheraton, and NCL) outreach to guests was significantly increased this year due to higher occupancy rates. These changes are discussed in the summary report for each participant. Commercial properties (HDOT, Kauai County and Port Allen Commercial facilities) posted informational fliers in staff rooms and common areas around property to further reinforce training. Retail properties owned by A&B received a tri-fold brochure, and a letter outlining seabird friendly lighting requirements. Overall, outreach at each participant facility was adequate and professionally presented.

# TAKE MONITORING EFFECTIVENESS

Take monitoring compares actual rates of take to requested amounts of take, based on each participant's approved Covered Seabird Monitoring Plan in its Participant Inclusion Plan (PIP). Methods for determining the amount of take of covered species ("take calculations") are set forth in KSHCP Section 6.2.2.1. Each Participant's ITP and ITL requires that the participant "calculate their annual lethal and non-lethal take using the methodology described in the KSHCP and with the discovery rate within their approved Participant Inclusion Plan." This summary of take monitoring first summarizes Participants' covered seabird monitoring, and then presents tables comparing Participants' actual rates of take to requested amounts.

The take calculation begins with finding downed birds. Protocols for recovery of downed seabirds set forth in KSHCP section 5.3.4.1. These general guidelines are summarized in KSHCP table 6-4 (repeated below as Table 7), but are also modified for those Participants who have different site-specific protocols in an agency-approved PIP.

*Table 9: Take monitoring components for Participants and KSHCP guidelines.*

| **Take monitoring component** | **KSHCP Guideline** |
|---|---|
| Detailed maps of the property indicating structures and property features (including all light sources); topography; any unsearchable areas; and the proposed search route | All searchable areas must be covered in defined search routes (attach map). Justify "unsearchable areas".[i] |
| Description of annual training for searchers | Must cover seabird identification, seabird handling, appropriate downed birds search methods, and response procedures. Recommend training to occur immediately prior to Sept 15 (start of fallout season).[i] |
| Time of Year of searches | Searching should occur twice nightly between Sep 15 and Dec 15.[i] |
| Frequency of searches | Minimum of twice nightly (or more frequently if possible); searching should be intensified during the peak of fallout (Oct 1 –15).[i] |
| Time of day of searches | The peak of fallout generally occurs around 2 hours after sunset – **searches should therefore commence 3-4 hours after sunset**. An additional search should take place within **1 hour before sunrise** to find birds that were grounded during the night.[i] |
| Search methods | Specify, e.g. vehicle versus walking; looking under and around objects as opposed to just patrolling; searching with flashlight, etc.[i] |
| Record keeping method | Downed Wildlife Form and photographs required for each bird found. |

| | |
|---|---|
| Presence of seabird predators on site (cats, dogs, mongoose) | Record any predators seen during searches and inform management taking actions to reduce predators at facilities, and what action(s) taken to remove predators from the area. Records should include the type and date of predators sighted, and the timing of response actions and outcome. ii |
| Number of searchers needed to cover area. | Depends on site conditions and safety considerations.[i] |

i See Section 5.3.4.1.
ii See Section 5.3.2.

*Honu Monitoring and Protection*

It is anticipated that take of honu will be avoided through monitoring and measures to protect turtle nests. These measures include avoid and minimize honu hatchling disorientation due to lighting at beachfront facilities by implementing best lighting practices as specified in PIPs, and protecting any nests at facilities via shielding as needed. Thus, participants with the potential to have honu on their property were required to determine the status of honu nests and to report on the monitoring and measures taken to avoid take of honu if nest(s) are found.

*Table 10: Summary of results of take monitoring at Participant facilities*

| Owner | Property or Facility | # of birds found | Search routes provided | Training documents? | Search dates | Search times | Methods documented? | Take log submitted | Predator presence recorded on site | Report submitted on time? |
|---|---|---|---|---|---|---|---|---|---|---|
| A & B | Hokulei Shopping Village | 2 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | No |
| A & B | Port Allen Commercial | 5[1] | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | No |
| A & B | The Shops a Kukuiula | 1 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | No |
| A & B | Waipouli Town Center | 0 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | N/A | yes | No |
| County of Kaua'i | Multiple | 0 | No | Yes | Sept 15 – Dec 15 | Once daily | Yes | N/A | yes | No |
| HDOT | Lihue Airport | 4 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | Yes |
| HDOT | Nawiliwili Harbor | 1 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | Yes |
| HDOT | Port Allen Harbor | 2 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | yes | yes | Yes |
| Essex House Condominium Corporation | Sonesta Royal Kauai Resort | 3 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | No | yes | Yes |
| Kauai Coffee | Factory and & Kalaheo | 1 | Yes | Yes | Sept 15 – Dec 15 | 3-4 hrs after sunset, and 1 hr of sunrise | Yes | Yes | yes | Yes |
| NCL | NCL | 2 | N/A | Yes | Sept 15 – Dec 15 | Continuous (min. twice per 8-hour shift) | Yes | Yes | No | Yes |
| SOF-XI Kauai PV Hotel, LP | 1 Hotel Hanalei Bay | 0 | Yes | Yes | Sept 15 – Dec 15 | Continuous searches throughout the day | Yes | N/A | Yes | Yes |
| Sheraton Kauai | Sheraton Kauai Resort | 8 | Yes | No | Sept 15 – Dec 15 | Twice daily- times unknown | Yes | Yes | Yes | No |

[1]: One of the birds found by this facility's search team was located off-site, but is included in this total because it was found by take monitoring at the facility. One bird was found at this facility by someone other than the facility's search team and is not included in this total because it was not found in the course of the facility's take monitoring. It is included in the facility's take shown in Table 11

# TAKE MONITORING AND SUMMARY OF CHANGES

This section will report on the outcomes and whether cumulatively, participants are in compliance with the KSHCP.

In total, 28 Newell's shearwaters and one Band-rumped storm petrel were found on KSHCP participant covered properties during the 2022 seabird fallout season. This is a significant increase over the nine Newell's shearwaters and one Hawaiian petrel documented in 2021. In 2022, twenty five of the Newell's shearwaters were released alive, one was found dead, one escaped capture and is presumed dead, and one was euthanized in SOS care. The one Band-rumped storm petrel was released alive.

The well documented close association between the new moon lunar period and peak fledging of Newell's shearwaters on Kauai was clearly evident in the 2022 fallout patterns. Nearly half of the downed seabirds that were documented on KSHCP participant properties were found over a single week in October (Figure 10). Adding to the "new moon effect" is the fact that moonrise during the week of October 13 (when fallout was steadily rising), never occurred before 22:24, became increasingly later, and the moon was either absent or only became visible beginning between midnight and early pre-dawn hours. This trend continued well into the week of October 20, when the greatest number of seabirds was recovered from participant properties in 2022. The reduced visibility of the moon's illumination during the last quarter and persisting into the new moon period probably exacerbated fallout risk as seabird fledging, especially for Newell's shearwaters, was reaching a seasonal maximum.

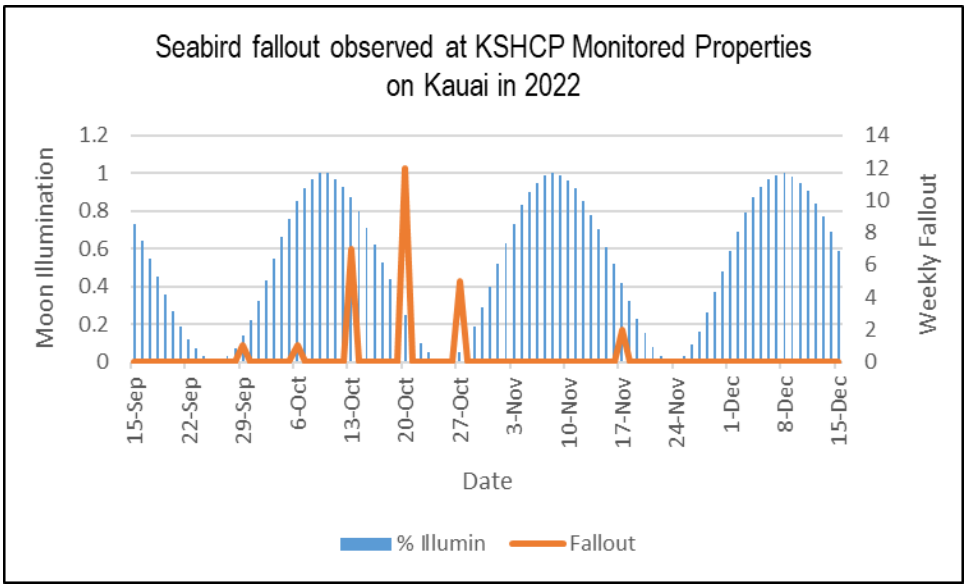


*Figure 10. Seabird fallout patterns at KSHCP participant properties on Kauai coincided closely with peak fledging of Newell's shearwaters (Puffinus newelli) and the new moon on the island of Kauai, in October, 2022.*

Understanding how the lunar cycle affects seabird fallout vulnerability allows KSHCP participants to plan accordingly for enhanced search and light attraction minimization vigilance during and leading up to the peak fledging period. While seabird fallout was higher than anticipated at KSHCP covered properties in 2022, as was the case across Kauai, this was due to a combination of factors (specifically, the impact of the lunar cycle on fledging activity and the combination of the new moon and the late moonrise exacerbating any potential impacts from artificial lights) and is not expected to represent the normal annual pattern going forward. While we can predict the moon phase and timing of moonrise, the timing of the peak in seabird fledging will help inform the degree of fallout that can be anticipated at KSHCP participant properties in 2023 and beyond. No Honu nests were reported in 2022.

*Table 11: Summary of all downed seabirds in 2022 under the KSHCP*

| Date | Time | Property | Species | Status | # |
|---|---|---|---|---|---|
| 7/20/22 | Unknown date before July 20, 2022 | NCL- Pride of America | NESH | Unknown | 1 |
| 9/29/22 | 22:20 | Port Allen Harbor (HDOT) | NESH | Alive- released | 1 |
| 10/6/22 | 18:48 | Sonesta | NESH | Alive- released | 1 |
| 10/13/22 | 20:40 | Sheraton | NESH | Alive- released | 1 |
| 10/14/22 | 20:03 | The Shops at Kukuiula | NESH | Alive- released | 1 |
| 10/15/22 | 22:00 | Hokulei Village | NESH | Alive- released | 1 |
| 10/15/22 | 0:31 | NCL- Norwegian Spirit | BANP | Alive- released | 1 |
| 10/15/22 | 21:10 | Port Allen (A&B) | NESH | Alive- released | 1 |
| 10/19/22 | 12:00 | Lihue Airport | NESH | Alive- released | 1 |
| 10/19/22 | 12:24 | Lihue Airport | NESH | Alive- released | 1 |
| 10/20/22 | 20:20 | Sheraton | NESH | Alive- released | 1 |
| 10/20/22 | 21:15 | Sheraton | NESH | Alive- released | 1 |
| 10/20/22 | 22:45 | Sheraton | NESH | Alive- released | 1 |
| 10/21/22 | 6:04 | Hokulei Village | NESH | Found dead | 1 |
| 10/22/22 | 20:00 | Lihue Airport | NESH | Found alive; euthanized | 1 |
| 10/22/22 | 21:30 | Lihue Airport | NESH | Alive- released | 1 |
| 10/22/22 | 21:00 | Sheraton | NESH | Alive- released | 1 |
| 10/23/22 | 19:20 | Sheraton | NESH | Alive- released | 1 |
| 10/25/22 | 21:00 | Port Allen Harbor (HDOT) | NESH | Alive- released | 1 |
| 10/26/22 | 21:30 | Kauai Coffee | NESH | Alive- released | 1 |
| 10/26/22 | 21:45 | Nawiliwili Harbor | NESH | Alive- released | 1 |
| 10/26/22 | 21:32 | Port Allen (A&B) | NESH | Alive- released | 1 |
| 10/27/22 | 22:23 | Port Allen (A&B) | NESH | Found alive but escaped capture and presumed dead | 1 |
| 10/27/22 | 19:10 | Sheraton | NESH | Alive- released | 1 |
| 10/29/22 | 19:44 | Sheraton | NESH | Alive- released | 1 |
| 10/29/22 | 0:42 | Sonesta | NESH | Alive- released | 1 |
| 11/2/22 | 16:34 | Sonesta | NESH | Alive- released | 1 |
| 11/21/22 | 5:05 | Port Allen (A&B) | NESH | Alive- released | 1 |
| 11/22/22 | 18:53 | Port Allen (A&B) | NESH | Alive – released (found by others) | 1 |

*Table 12:* Total Permitted Seabird Take Calculated in Participants' PIPs over 30 years

| | NESH | | HAPE | | BANP | |
|---|---|---|---|---|---|---|
| Property or Facility | Lethal | Non-lethal | Lethal | Non-lethal | Lethal | Non-lethal |
| A&B- Multiple | 104 | 80 | 3 | 3 | 1 | 1 |
| Kauai County-Multiple | 276 | 217 | 17 | 4 | 4 | 0 |
| HDOT-Lihue Airport | 22 | 43 | 3 | 6 | 1 | 2 |
| HDOT-Nawiliwili Harbor | 13 | 48 | 2 | 6 | 0 | 0 |
| HDOT-Port Allen Harbor | 53 | 68 | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Kauai Coffee | 34 | 26 | 0 | 0 | 0 | 0 |
| Sonesta Royal Kauai Resort | 33 | 21.2 | 1 | 1 | 1 | 1 |
| NCL | 30 | 30 | 6 | 6 | 6 | 6 |
| 1 Hotel Hanalei Bay | 125 | 475.2 | 6 | 6 | 1 | 1 |
| Sheraton Kauai Resort | 81 | 64 | 1 | 0 | 3 | 1 |

*Table 13 Calculated seabird take for all Participants in 2022*

| | NESH | | HAPE | | BANP | |
|---|---|---|---|---|---|---|
| **Property or Facility** | **Lethal** | **Non-lethal** | **Lethal** | **Non-lethal** | **Lethal** | **Non-lethal** |
| A&B- Multiple | 10.72 | 5.28 | 0 | 0 | 0 | 0 |
| Kauai County-Multiple | 0 | 0 | 0 | 0 | 0 | 0 |
| HDOT-Lihue Airport | 2.69 | 2.64 | 0 | 0 | 0 | 0 |
| HDOT-Nawiliwili Harbor | 0.23 | 0.88 | 0 | 0 | 0 | 0 |
| HDOT-Port Allen Harbor | 2.24 | 1.76 | 0 | 0 | 0 | 0 |
| Kauai Coffee | 1.12 | 0.88 | 0 | 0 | 0 | 0 |
| Sonesta Royal Kauai Resort | 3.36 | 2.64 | 0 | 0 | 0 | 0 |
| NCL | 1.12 | 0.88 | 0 | 0 | 0.12 | 0.88 |
| 1 Hotel Hanalei Bay | 0 | 0 | 0 | 0 | 0 | 0 |
| Sheraton Kauai Resort | 8.96 | 7.04 | 0 | 0 | 0 | 0 |
| **Total 2022 Participant Take** | 28.66 | 22 | 0 | 0 | 0.12 | 0.88 |
| Take prior to 2022 | 11.47 | 9.4 | 1.1 | 0 | 0 | 0 |
| **Cumulative Participant Fledgling Take Since May 2020** | 40.13 | 31.4 | 1.1 | 0 | 0.12 | 0.88 |
| Maximum Anticipated Total Fledgling Annual Take* | 30 | 45 | 2 | 2 | 1 | 1 |
| Maximum Anticipated Total Fledgling 30-year Take* | 900 | 1350 | 60 | 60 | 30 | 30 |

* From KSHCP Table 4-1. Table 4-1 also separately describes maximum anticipated take of adults or sub-adults and eggs/chicks.

*Facility changes-*

There were no changes in ownership during the 2022 seabird season; however, three A&B facilities were sold prior to the 2022 season and are no longer included in the KSHCP. Multiple changes were recorded in the primary point of contact for facilities; those updated points of contact are included in the summary of participants reports above.

# FINANCIAL REPORT

The financial report is attached as a separate document produced by the fiscal sponsor, the National Fish and Wildlife Foundation (NFWF). As required by the contract between NFWF and the KSHCP Participants, the report period covers 1 Oct 2021- 30 Sept 2022. Financial reports are therefore presented on this fiscal year basis. Budget calculations done by the contractor for 2022 show that the project is approximately 4% over-budget.

During years 1-2 (which are lumped since the project initiation phase spanned two years), the budgeted total for the two years was $975,387.00 and the actual spent was $1,006,163 resulting in a cost overrun of $30,775.77 (3%). This overrun was primarily due to the fence construction which was budgeted to cost $228,440 and ultimately cost $409,108.10 due to an increase in length and increases in cost associated with COVID related restrictions. While the cost overrun was projected to be $180,708.10, we were able to cut costs in other areas to keep the overage to less than 3% of the overall budget.

In years 3 onwards, overages are expected as a result of two recurring charges: 1. The need for two people on the project as opposed to the budgeted single person team ($45,000 plus 25% fringe/year) and 2. The need for rented office space which was not anticipated at the start of the project. Discussions are underway to determine ways to mitigate the rising costs associated with the project.