2021 KSHCP ANNUAL REPORT

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Pacific Rim Conservation

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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 second year of the KSHCP (2021) 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 continuing in 2021, and all required surveys were completed during that time to provide an inventory of the flora and fauna present in the area. Intensive burrow searching indicated that seabirds do not appear to be nesting in the immediate project area, but based on high rates of detection during auditory surveys they are clearly transiting the area daily during the breeding season. With the deployment of social attraction infrastructure and installation of 100 artificial burrows in 2021, it is expected they will find the site readily. Predator control was continued along the Kalalau Rim with up to 20 live traps, and an additional 12 traps along the Alakai Swamp Trail. Five cats and 132 rats were removed through direct trapping methods in 2021 over 3,017 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. 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 197 properties included in the KSHCP as of 2021, 47 were required to do predator control. Only 21/47 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 23 out of 32 covered properties owned by Kauai County. Of the remaining 21 properties that did conduct predator control, 20 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 last year. In total, 251 feral cats and 41 pigs were removed from participant facilities during the 2021 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, nine NESH and one HAPE were found on participants' properties during the 2021 seabird fallout season- one dead NESH, and all remaining birds were brought alive to the Save our Shearwaters (SOS) facility at the Kauai Humane Society for release after stabilization. Of the 8 NESH and 1 HAPE brought to SOS, 1 NESH and 1 HAPE were euthanized; the rest of the birds were released alive. Additionally, two dead NESH were found by a participant's search team in the Port Allen Commercial area on public roads (i.e., outside of any participant's facilities). No BANP were found during the 2021 season. One Honu nest was found just outside one participating property and was monitored until hatchings were gone.

Overall, the objectives of the KSHCP were partially, but not completely, met in 2021. 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 will be removed and seabirds will be 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 2021 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 effectiveness of the first year of 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 2021 to execute the mitigation activities associated with the Kahuama'a Seabird Preserve

Table 1 : 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. After staffing turnover in 2020, a good portion of 2021 was spent re-hiring and training a new team. In April 2021, a Project Manager was hired to oversee the project and assist the existing and Biologist. Unfortunately the Project Manager hired didn't pass their probationary period, and was terminated at the same time that the existing biologist left to move back to the mainland. A candidate search for the two open positions was initiated in August 2021; over 90 applications were received and 12 candidates were interviewed. Allene Henderson was hired and started on Sept 21st, 2021. Allene has worked for KESRP, the USFWS at Hanalei and for the New Zealand Department of conservation. She has extensive experience in animal trapping and on listed seabird management on Kauai. She has lived on Kauai for the last three years. Dave Hanna started on Oct 18th as the second biologist. Dave has lived on Maui for the last 9 years and has worked for the National Park Service doing Hawaiian Petrel management, for USDA doing cat control at the Kahului airport, and at a variety of other conservation projects in Hawaii and across the country. He has extensive experience in every aspect of the project and relocated from Maui.

The final months of 2021 were spent with the two new staff members undergoing extensive training and to inventory all project materials to assist with the transition from active fence construction to maintenance with the project.

Fence alignment and construction

The final fence alignment is shown below in figure 1.

Figure 1: Kahuama'a Seabird Preserve location (yellow) with suitable seabird habitat in purple and artificial burrow area in white

Two local fence contractors were approached and asked to provide cost estimates for construction of the fence at Kahuama'a. JBH Ltd., was selected as the fence contractor and the contract was finalized on 10 October 2020. JBH built the Nihoku fence at Kilauea Point and assisted Xcluder in constructing the Ka'ena Point predator fence and thus is familiar with the technology and specific needs of such a project.

The fence design has three main elements: base fence, predator-proof mesh and skirt, and predator-proof rolled hood (see Figure 2 below). The base fence provides the structural strength and framework on which predator-proof components may be added, and was made of 2 inch square stainless steel posts and stainless steel fastenings. Posts were set into the ground two meters (6.6 feet) apart. One meter of the post is buried, while two meters remains above ground. Marine grade (316) stainless steel mini chain link mesh with an aperture of 10 x 8 millimeters was attached to the entire face of the base fence, and was also used to form a skirt of horizontal mesh at ground level, to prevent predators from tunneling under the fencing. The mesh extends from the top of the posts to just below ground level, while the skirt extends 300 millimeters from the fence, and is partially buried 2-4 inches underground.

The fence is high enough that animals cannot jump over it (2m), has a curved hood to prevent climbing, small aperture mesh (10 x 8mm) to prevent animals from squeezing through, and a skirt under the ground to prevent animals from digging underneath. Since the area where the fence was placed was not accessible to the public, a single door gate design was used for pedestrian gates compared to the double door gates at the public access Kaena Point fence (Young et al 2012). Additionally, a vehicle gate was added at Nihoku to allow heavy equipment into the area for restoration activities. All materials, including hood and posts, were 304 grade stainless steel.

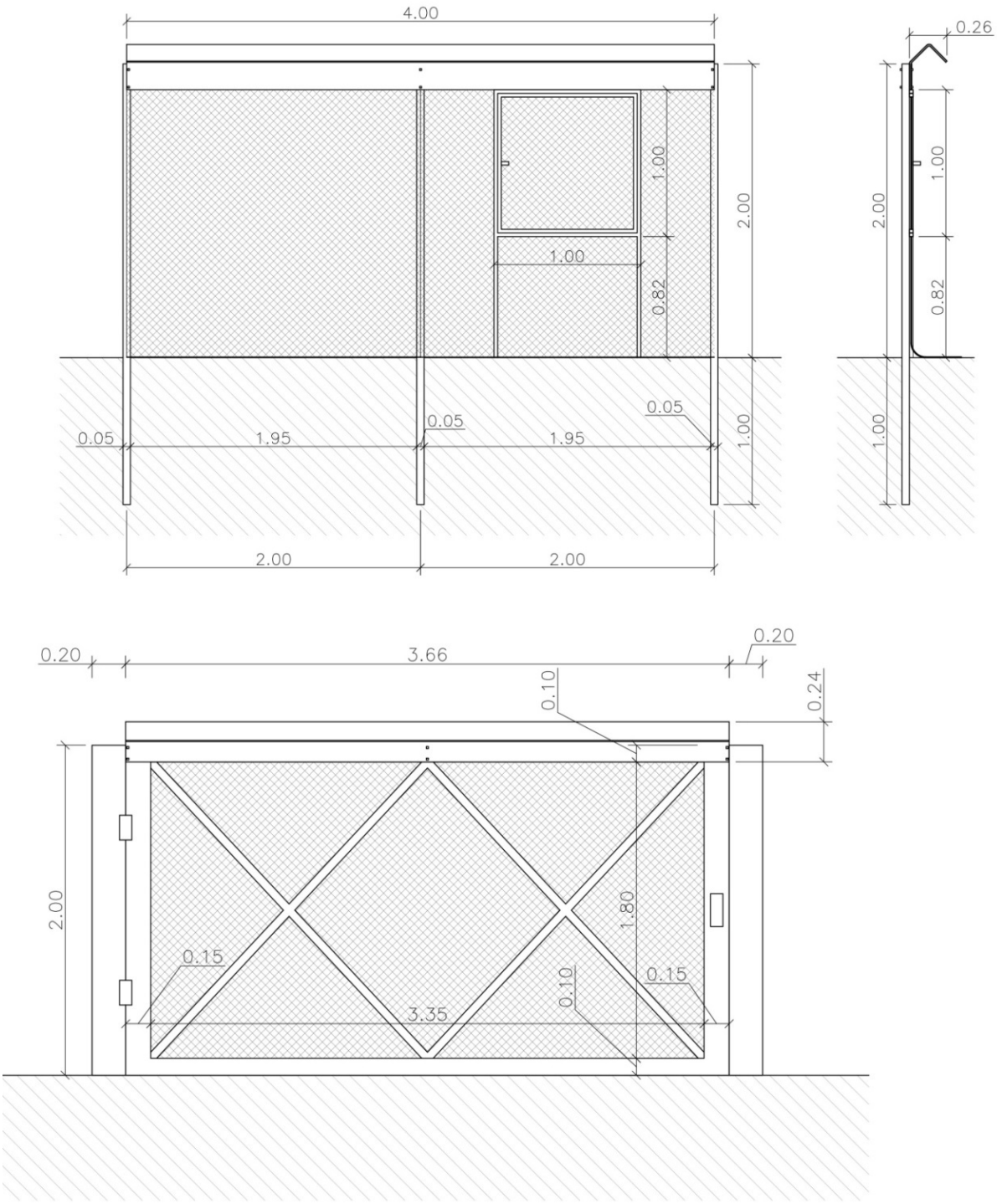

Figure 2: Kahuama'a Seabird Preserve predator exclusion fence technical specifications

Figure 3: Kahuama'a Seabird Preserve predator exclusion fence

Fence construction began on 17 January 2021 and was completed on 28 June 2021. Permit regulations dictated construction logistics to a certain extent as the project could not start until all permits were obtained in November 2020.

Immediately prior to construction, the fence contractor was given oral as well as written instructions by project staff on appropriate behavior at the site as well as training on endangered species identification. The area where machinery was allowed was clearly flagged, and any native plants or other notable features were flagged to prevent damage to the landscape. Contractors were notified of authorized walking trails, and were required to pack out any waste. Finally, a physical copy of all permits was given to the contractor and they were required to have these with them at all times on the job site and abide by the conditions set forth in the permits at all times.

The project consisted of the following stages of work:

- Clearing of fence-line (removing vegetation from a 3-4-meter wide swath, with machinery if possible or else by hand with chainsaws and hand tools). All tools were cleaned per guidelines to prevent the spread of Rapid Ohia Death pathogens
- Fence platform formation (earthworks, drainage works and culverts) with use of heavy equipment
- Installation of posts
- Attachment of cat-proof hood sections
- Attachment of mesh (including ground pinning/cementing)
- Installation of waterway and access components.
- Installation of gates

Since an existing ungulate fence enclosed the majority of the area, the ungulate fence was removed only when the section of predator fence was replacing it, and thus, the area was kept ungulate free for the duration of construction. For the most part, construction went as planned with no major issues encountered.

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 a white PVC pole.

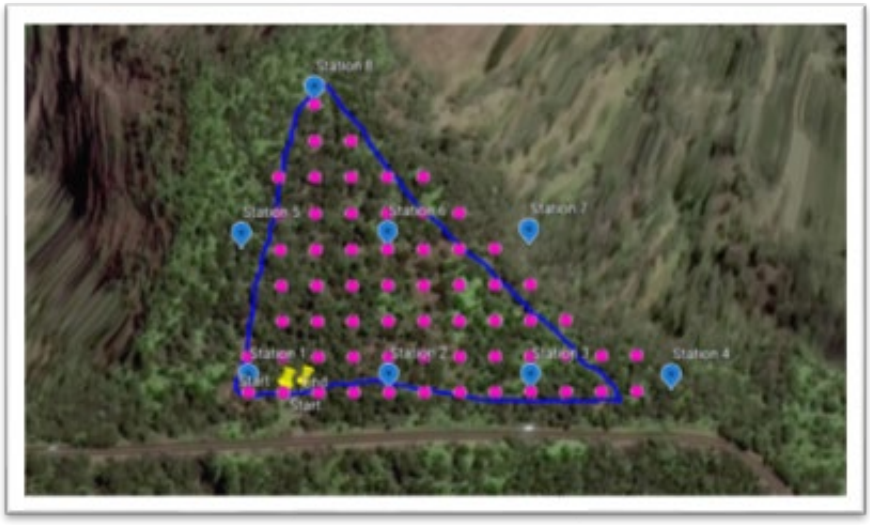

Figure 4: Biological monitoring grid installed at the Kahuama'a Seabird Preserve

Seabird surveys

Ground searching

Auditory surveys, burrow searching, and monitoring of natural burrows is a critical part of pre-construction surveying at the Kahuama'a Seabird Preserve to document species present and ensure that construction activities do 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 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 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.

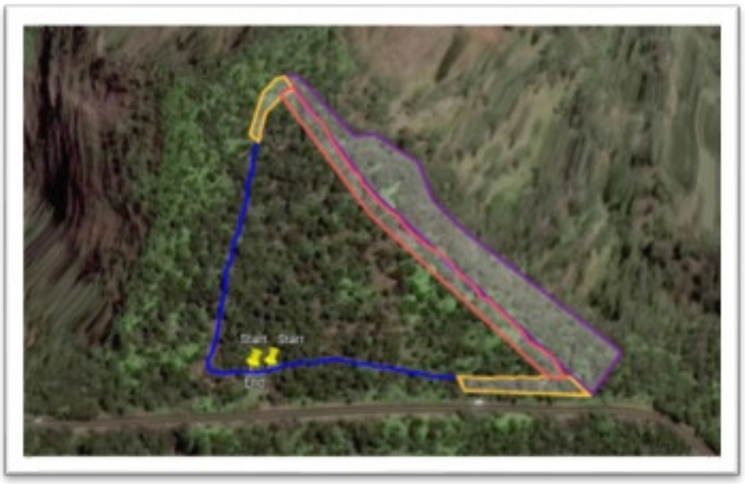

Figure 5: Seabird survey area at Kahuama'a. The original ungulate fence line in blue, with the final enclosure fence line shown in yellow, and the seabird habitat bounded by the red and purple lines.

Auditory surveys

Auditory surveys began in mid-May 2021 and were conducted every two weeks by PRC biologists 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 18 Auditory surveys were done from May-August 2021 with the total number of detections listed for each species in table 2 below:

Table 2: Total number of listed bird species detections during Auditory surveys at Kahuama'a in 2021

Species	Total # detections
NESH	1459
HAPE	42
BRSP	23
HAGO	27

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 23.5 up to 415 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 0-3 calls per hour. The high frequency and density of detections in the site bodes well for the efficacy of social attraction methods moving forward.

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. While the predator eradication had not been completed, active predator control was underway within the fence to protect any prospecting birds during this time. 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 being 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. 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.

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

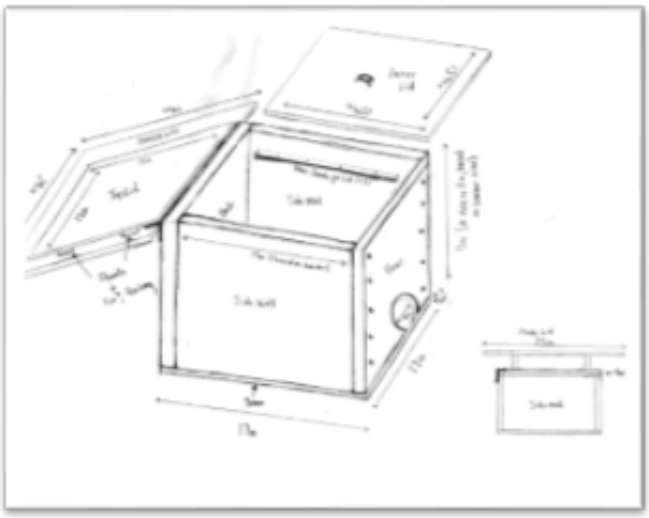

Figure 7: Diagram of artificial burrow design used for Kahuma'a Seabird Preserve

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 2) 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 Kōke'e Resource Conservation Program (KRCP) conducted selective invasive weed control in the newly established Kahuama'a predator-proof exclosure on August 11, 12, and 23, 2021. Figure 8 displays the two main areas covered by KRCP for the selective invasive weed treatments in the endangered seabird habitat zone. The following tables summarizes the herbicides used, acres covered, and the number of targeted species treated.

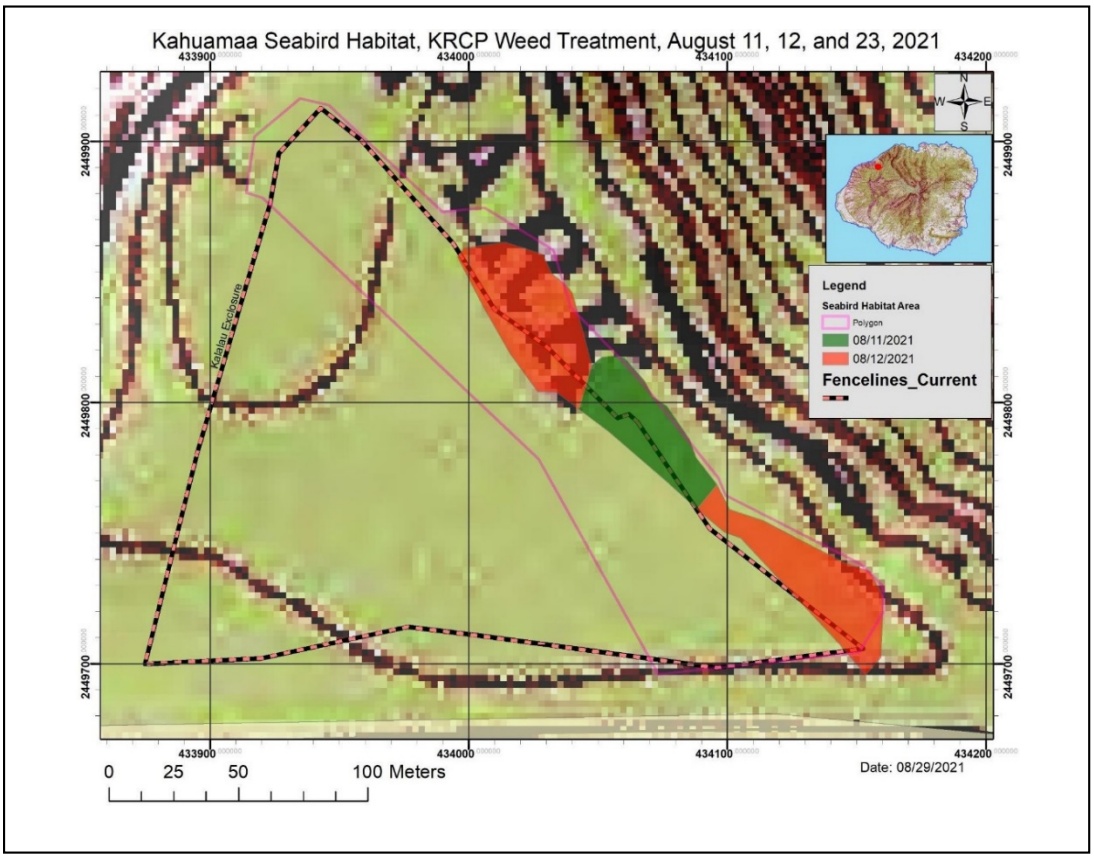

Figure 8: Worked area of selective invasive weed treatment by KRCP at the Kahuama`a Seabird Habitat area in Kokee, Kauai

Table 4: Summary of selective weed species targeted in the Kahuama`a Seabird Habitat area in Kokee, Kauai

Invasive Weed Treatment Summary				
Species	Common Name	Immature	Mature	Total
Corynocarpus laevigatus	Karaka	30	0	30

Erigeron karvinskianus	Fleabane daisy	0	500	500
Hedychium gardnerianum	Himalayan ginger	1185	305	1490
Passiflora tarminiana	Banana poka	150	550	700
Psidium cattleianum	Strawberry guava	109	4	113
Rubus argutus	Prickly blackberry	3160	755	3915
				6748

The dominant species addressed were blackberry and banana poka. A sprayer was used to treat large patches/sections of blackberry and other targeted weed species. A total of 1.15 acres was covered and 6748 weeds were treated. Three species from the priority list were not detected in the worked area: *Sphaeropteris cooperi, Kalanchoe pinata, and Clidemia hirta. 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.

Consideration to add Karaka (*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 ‘uluhe 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 Alaka’i 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 2021 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, dry or wet cat food, Tomahawk Shellfish Paste and fresh fish parts contained in a small tray in the rear of the trap. Lures used along these traplines include cat toys, metal lids, and pieces of foil. 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 24 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 were baited and locked open to attract activity even when not in use.

Twelve 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 20 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.

Each trap along the Alakai Swamp Trail, and 13 of the 20 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 5: Trap location, type and total number of trap nights for predator control in 2021. Trap nights indicates the number of nights that traps were open and active. Numbers reflect traps deployed from January 2021 through December 2021.

Trap Line	Trap Type	Number Deployed	Total Trap Nights
Alakai Swamp Trail	Tomahawks	12	269
Kalalau Rim Trail	Tomahawks	20	2748

Cameras

Game cameras were paired with Tomahawk traps to monitor the trap itself as well as 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:

From 12-23 goodnatures deployed immediately outside the fenceline, and paired with cat traps to reduce bait removal from the traps from 05/12/2021-11/30/2021. Those goodnatures were re-allocated and 20 traps were placed along the KRT on 12/15/2021.

Barn Owl control

Barn Owl control was contracted out to a partner organization to conduct in 2021. 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.

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.

Of the 24 Goodnature traps deployed inside the fence starting on 05/06/2021 and 51 rats removed; two traps accounted for 56% (N=29) of rat catches within the grid.

Bait stations were run continuously from the first baiting in July until the end of the year. Cumulative bait take was 43.3 lbs across all stations. Take over time decreased dramatically after July when the majority of bait was initially consumed. Tracking tunnels were run four times in 2021 with rodent detections decreasing over time (see figure 9). Rats were last detected within the reserve on 12/02/2021 and only a small population of mice are estimated to remain.

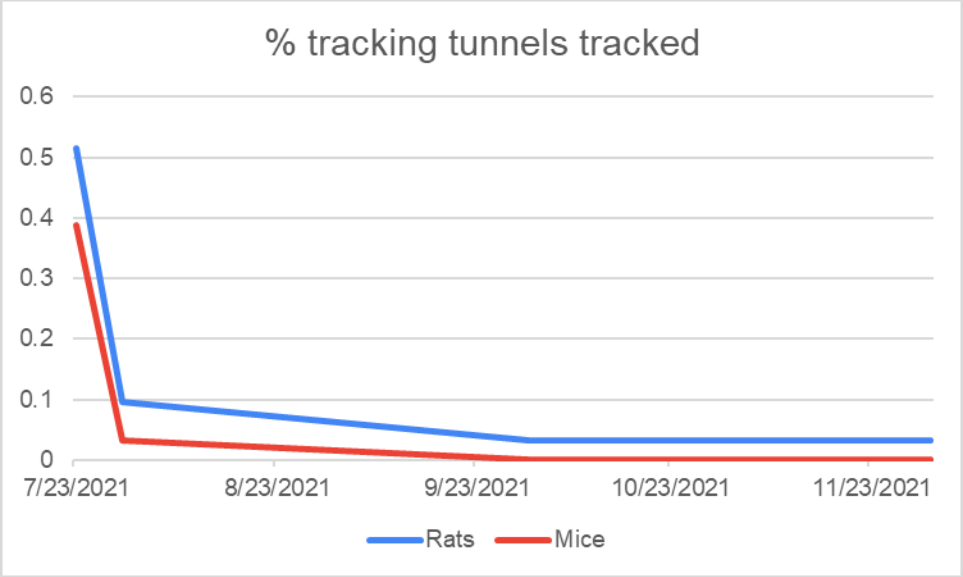

Figure 9: Proportion of tracking tunnels tracked by rodent species over time at Kahuama'a seabird preserve

Predator control:

A total of 3,017 cat trap nights were run in 2021- 2748 along the Kalalau Rim Trail and 269 along the Alakai Swamp Trail. Five cats were captured in 2021- three along KRT, and two on the Alakai Swamp trail resulting in a total catch rate of 0.002 cats/trap night. Cats were captured in Tomahawk single door traps that used a cat toy as a lure; the cat was not captured on the game camera prior to capture. As required by the KSHCP, the cat was humanely dispatched.

A total of 81 rats were removed via live trap between the two sites: 75 Black Rats (*Rattus rattus*) three Norway rats (*R. norvegicus)* and three Polynesian rats (*R. pacificus)* along with one mouse; all rodents were humanely dispatched. The exterior A24 rat traps removed a minimum of 25 rats.

Barn Own hunting effort for 2021 at the KSHCP mitigation site totaled 12.37 hours across 14 hunting sessions. All Barn Owl removals occurred during the estimated Barn Owl breeding seasons, when owl reactivity is highest (spring and fall). A total of 11 Barn Owl detections occurred in 2021, most concentrated in May and October. One owl may cause multiple detections in a single session, as each call or visual detection separated by at least 5 minutes in time is counted as a unique detection. One pueo (Hawaiian Short Eared Owl) was detected in October.

Table 6: Barn Owl hunting summary for the Kahuama`a seabird preserve in 2021

Month (2021)	Apr	May	Jun	Jul	Oct	TOTAL
Hunting Sessions	1.00	2.00	2.00	4.00	5.00	**14.00**
Owls Removed	0	1	0	0	1	**2**

Camera monitoring

Early in October and November, when trapping commenced, 10 traps along Alakai Swamp trail were located at the far northern end of the trail but traps were moved due to mounting evidence of significantly more cat use of the southern end of the trail as part of adaptive management in order to avoid tampering with trap activity. Rats and mice have been observed on every game camera that is deployed on both Alakai Swamp Trail and Kalalau Rim. Black Rats make 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 2020 which could be related to sustained cat control efforts in the area.

Figure 10: Photographs of cats observed on two separate occasions along Alakai Swamp Trail.

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 only been observed on game cameras on Kalalau Rim, specifically at the Kahuama'a site.

The Kalalau Rim trapline experienced two theft incidents during 2021. On July 18, 2021, at 5:36 PM, someone forcibly broke off one of the Cuddeback trail cameras from the mount, breaking the camera off and bending the metal mount and leaving it behind. It appears that they tried to take the trap, but did not get past the cable lock. The camera took a picture of the person's face before they either turned it off, or got out of range. On Sunday, August 8th around 3:30-4:30 PM, someone stole 3 tomahawk live traps, and 3 cuddeback cameras from our trapline, closest to the Pu'u O Kila lookout. They cut the cable locks with wire cutters and broke the cameras off of the mounts, again forcibly as the metal was bent and there was plastic left over from the broken cameras. All pictures recovered from the trail cameras during these incidents were submitted and police reports were filed for both incidents. After those incidents, we relocated the entire Kalalau Rim trapline to new locations to prevent future thefts. As of the writing of this report, there are no leads in the case, but no additional theft has occurred either. All cameras and traps that were stolen were replaced and re-deployed.

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 will be deployed inside and outside the fence after fence construction.

Based on the activities to date, the activities of the Kahuama'a Seabird Preserve have partially met the objectives for predator control and suppression given the staffing and weather issues encountered in 2021.

Table 7: 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 with the exception of mice, which remain.
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 points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP.	Underway
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. The results of searcher efficacy trials conducted in 2021 are not presented below and are addressed in a separate stand-alone report produced by the Hawaii Department of Land and Natural Resources.

Alexander & Baldwin, Inc. (A&B)

Alexander & Baldwin facilities covered by the KSHCP include the Pump 3 Irrigation Pumping Facility, Kalaheo Powerhouse, Wainiha powerhouse, 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.

Take summary:

Four NESH were found at Port Allen by A&B search teams. Two dead NESH were found beneath power lines on public roads in the Port Allen area; these were not located at A&B facilities. The other two NESH were found alive at A&B facilities and were released. Aside from the two live birds, no other take was experienced at the other properties covered for A&B.

Downed Bird search effort

Due to the large number (seven) and diverse nature of the covered facilities owned by A&B, searching effort was variable and is presented by property type below.

For the Pump 3 Irrigation Pumping Facility, Kalaheo Powerhouse, and Wainiha powerhouse operated by McBryde Resources, Inc. (all of which are remote, unmanned facilities that are visited only periodically for operational and maintenance purposes), searches were to be conducted by in-house personnel twice nightly every night during the seabird fallout season from September 15 to December 15 whenever exterior lights were turned on at the facility. During the 2021 season, no searches were conducted at these sites because the facilities were dark for the entire season. If lights are turned on, the searches will depend upon when and for how long the lights at the facility are on. As currently drafted, the A&B Downed Seabird Searching and Monitoring Plan includes the following requirements for McBryde facilities. All facility exterior lighting, including dark sky compliant fixtures, are kept turned off, so there is normally no exterior lighting of any kind at any of these facilities during the seabird fallout season. Since light attraction fallout is not expected to occur (and has never been documented) at these facilities, routine nightly searches for downed seabirds will not be conducted at these facilities. On occasion, however, the McBryde sites may need to be visited by staff at night to address urgent repair/maintenance needs or other emergencies. In the event that such an emergency requires the use of exterior lighting, there is a potential for fallout to occur during the time that the lighting is energized. Under these specific circumstances, a search of the facility for downed seabirds will be conducted just prior to the maintenance staff leaving the facility. No follow-up search will be conducted because no additional fallout will occur once the lights have been turned off. In the unlikely event of a prolonged maintenance or repair period requiring exterior lighting to be energized at a facility for most or all of one or more nights, searches will be conducted at the facility 3-4 hours after sunset and one hour prior to sunrise for as long and the lighting remains energized.

At the Port Allen Commercial properties, searches were conducted twice nightly every night during the seabird fallout season from September 15 to December 15 with the exception of two nights when searching was not conducted due to severe weather and a third search missed on the morning of December 16 (98% search completion rate). 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 with the exception of one search missed at the Waipouli Town Center due to an employee failing to show up for work (search completion rates of 100%, 99%, and 100%, respectively). The first search was conducted three to four hours after sunset, and the second search was conducted one hour prior to sunrise. These searches were conducted by shopping center security personnel.

Lighting and facilities

Lighting at most A&B covered facilities had been previously modified in order to be in compliance with KSHCP guidelines. Additional modifications were made at some facilities prior to the 2021 seabird season, and a plan for further modifications at Port Allen and TSAK is being implemented. At Port Allen, additional adjustments were made to walkway sconce lighting at the Port Allen Marina Center to further reduce their potential for light attraction. Changes made at Port Allen in 2021 included modifying the sconce lights to make them full cut-off fixtures by inserting foil strips inside the lamp enclosure to completely cover the bulb and also to seal decorative openings at the top of the fixtures. Changes at The Shops at Kukuiula that were implemented during, or just before the 2020 seabird season were installing temporary shielding on some non-compliant lights for the 2020 season to direct lighting downward and modifications were made to various types of lighting fixtures throughout the facility to convert them to full cut-off fixtures. Prior to 2021, additional fixtures were modified at TSAK to further reduce their potential for light attraction, which included modifying existing lights to make them full cut-off fixtures by inserting foil linings inside the lamp enclosures to completely cover the bulbs. Photographs of these lighting modifications can be found in the full A&B report. The need for further modifications is being evaluated.

Predator control

Due to the large number and diverse nature of the covered facilities owned by A&B, predator control effort was variable and site specific. The Pump 3 Irrigation Pumping Facility, Kalaheo and Wainiha Powerhouses are remote unmanned facilities only visited periodically by operations staff. Animal control efforts are initiated only if predators are observed during such visits and there is a potential for light attraction. Since no lighting was turned on during the 2021 season, and no predators were observed, no trapping was conducted at these three sites. The facility operator reported no predators were observed at these facilities during the 2021 season.

The remaining properties, Port Allen, Hokulei Shopping Village, Waipouli Town Center, and The Shops at Kukuiula, contracted out animal control activities. These efforts were executed well and appear to have been successful in reducing the number of predators on the landscape. 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 2020 - appear to have been quite effective. Throughout the season, four predator traps were deployed at the Port Allen properties (for a total of 372 trap-nights) and were checked, baited, reset and maintained on a nightly basis.

Predator control "snapshot" surveys were conducted before, during, and after the season, none of which indicated any significant predator presence on the property. This contrasts sharply with the predator counts found at the start of the 2020 season and can be attributed to (1) highly effective control of predators during the 2020 season, 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 five cats were observed on the property during

any search (this maximum occurring during the first two nights of the season), and on average less than one cat was seen per night after initial predator control efforts early in the season (about half of all predators caught at Port Allen were trapped during September). This reduction was achieved despite evidence of occasional tampering with traps. Trespassers feeding cats on or near the property appeared to have dramatically reduced from 2020, as there were almost no references to cat feeding made in the 2021 search logs or predator control logs. Overall, the predator control program at Port Allen appears once again to have been highly effective.

Hokulei Shopping Village - Predator control efforts at Hokulei Shopping Village were contracted out to a wildlife control contractor. Four traps were initially deployed at the facility but one was removed due to repeated tampering and eventually an attempted theft; thus, for most of the season, three predator traps were deployed at the property (for a total of 303 trap-nights) and were checked, baited, reset and maintained on a nightly basis. Predator control "snapshot" surveys were conducted before, during, and after the season, none of which indicated any significant predator presence on the property (three cats were identified during the pre-season survey, two at mid-season, and one at the end of the season). Additionally, twice-nightly monitoring for the presence of predators on the properties was conducted but since no cats were observed during the first two weeks of the season it was not possible to determine a percent reduction in the predator count over the course of the season; on average less than one cat was seen per night after initial predator control efforts early in the season (about 75% of all predators caught at Hokulei were trapped during September). Effective predator control was achieved despite evidence of occasional tampering with traps and at least one attempted theft. Trespassers feeding cats on or near the property appeared to have dramatically reduced from 2020, as there were almost no references to cat feeding made in the 2021 search logs or predator control logs. Overall, the predator control program at Hokulei appears once again 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, and it appears cats on this property might have been completely controlled were it not for the active colony being maintained just off-site. During the first month of the season, at least two and sometimes three predator traps were deployed at the Waipouli Town Center and were checked, baited, reset and maintained on a nightly basis; however, the theft of two traps, several instances of tampering with traps, and the limited number of available locations where traps could be effectively concealed, coupled with regular trespasser/homeless activity, resulted in only one trap being deployed for the remainder of the season (for a total of 137 trap-nights). More than 80% of predators trapped at the facility were captured during the first month of predator control activities. Predator control "snapshot" surveys conducted before, during, and after the season indicated a reduction in the presence of predators, from nine cats on or around the property at the beginning of the season to two by the end of the season; all cats identified during these surveys were sighted near the routine off-site feeding location near the northwest corner of the property. Additionally, twice-nightly monitoring for the presence of predators on the properties indicated that a reduction in predator counts of over 90 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. On average, less than one cat was observed per night at the facility after the first two weeks of the season. Consistent with the "snap shot' surveys, the vast majority of cats observed during the nightly monitoring were located near the off-site feeding location. While feeding of cats on the property was almost non-existent during 2021, feeding of cats on adjacent properties appears to have continued throughout the season and is largely responsible for the continued presence of a limited number of cats on the property through the end of the season.

Predator control efforts at TSAK were contracted out to a wildlife control contractor and appear to have been effective. For the majority of the season three predator traps were deployed at TSAK, with the number briefly increased to four, and were checked, baited, reset and maintained on a nightly basis (for a total of 300 trap-nights). The number of traps was briefly increased to four but was again reduced to three due to evidence of tampering and a perceived threat of theft. Predator control "snapshot" surveys conducted before, during, and after the season indicated a reduction in the presence of predators, from three cats on or around the property at the beginning of the season to none by the middle and end of the season; however, moderate to high populations of rodents were observed in all three surveys, suggesting that improvements to the existing rodent control program may be warranted at this facility (although rodent control is

managed by a separate pest control operator, several rats were found in cat traps at the facility during the season). Additionally, twice-nightly monitoring for the presence of predators on the properties indicated that a reduction in predator counts of over 80 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. On average, less than one cat was observed per night throughout the season.

Guidance for updating predator control plans was provided by DOFAW in July 2021. Although A&B intended to update its predator control plan prior to the start of the 2021 season (and in fact notified the agencies of its intent to do so), this was not accomplished as planned owing to time constraints and that fact that existing predator control practices were already largely compliant with the guidance, irrespective of whether all aspects of the guidance are specifically addressed in the plan. Nevertheless, some aspects of the guidance were incorporated into the predator control program in advance of the 2021 season, and the plan itself will be formally updated well in advance of the 2022 season.

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 and several future facility-related changes to report. The Kukuiula Development was sold during the season and is no longer covered under the A&B permits. A 14,820 square foot building pad (Pad 2) leased to Walgreens remains undeveloped at Hokulei. The pad will be developed at an unknown date in the future, either by Walgreens or another tenant, and such development will include additional lighting. When developed, lighting will be compliant with KSHCP requirements. With the closure of the Foodland grocery store in 2020, and at least one other vacancy, significant changes to the tenant makeup at the Waipouli Town Center are possible in the near future, which may alter the existing lighting. Any new lighting will comply with KSHCP requirements.

Kauai Coffee

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 7-9pm.

Lighting and facilities

No new lighting changes were implemented in 2021.

Predator control

Predator control was conducted for the duration of the seabird season by deploying three traps and 17 cats were caught during that time. Additional predator control was done from 03/01-03/12 and again from 06/09- 06/18 with two traps and seven cats and six pigs were caught during that time.

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. One PowerPoint presentations was made to 3 staff and another 29 were educated through an educational handout. 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 a coloring activity books that was distributed to visitors to the site. A posted 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 anytime.

Kauai Coffee

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 7-9pm.

Lighting and facilities

No new lighting changes were implemented in 2021.

Predator control

Predator control was conducted for the duration of the seabird season by deploying three traps and 17 cats were caught during that time. Additional predator control was done from 03/01-03/12 and again from 06/09- 06/18 with two traps and seven cats and six pigs were caught during that time.

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. One PowerPoint presentations was made to 21 staff and another 32 were educated through an educational handout. 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 anytime. 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 in 2021.

Predator control

The County Council has proposed a bill to prohibit the abandonment of cats and dogs at County facilities. In addition, the County is actively working with agencies, advocacy groups and the general community to provide alternatives to humanely dispatch predators.

In 2021, the County rotated trapping throughout the island. The control efforts were rotated among the sites to increase efficiency. 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 9 properties as described below. The occurrence of predators and known colonies were criteria used to prioritize predator control for Category 3 facilities with lights on at night during fledgling season.

Throughout 2021, a contractor conducted Predator Control and surveyed the target areas. 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.

During the entire operation, the contractor achieved the following:

- 165 Cats Removed from county properties
- 1528 total cat trapping nights
- 35 Pigs Removed
- 4 Pig Trapping Nights
- 0 Seabird predations observed

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.

After three months of spotlight surveys, staff concluded that such surveys were inadequate measure of predator detection probability at county properties due to the infrequency of surveys (due to staff limitations) and small sample size when compared to camera data. Game cameras were the sole monitoring tool used throughout the entire performance period to great success. The Contractor developed behavior assessment standards for cat intake in order to safely discern between adoptable and unadoptable feral cats. The goal of this assessment protocol was to ensure that animals brought to KHS would not cause harm to their staff or other animals. Chipped pet cats were brought to KHS to be reunited with their owners.

Overall, trapping and monitoring operations at most sites experienced little to no theft or vandalism.

No response work was required during the 2021 period of performance, and monitoring cameras did not detect any downed seabirds.

165 cats and 35 pigs were removed from county properties during the period of performance. All cats were captured using cage traps with bait and/or lure. Pigs were captured using the Pig Brig trap at LO and LT properties, where pig presence was the most regular and problematic.

Sites where known or observed predator feeding occurred had higher hourly detection probability when compared to other sites. In regards to theft and vandalism, all traps and cameras were locked with large padlocks and cables, and clearly labeled with "Property of County of Kaua'i."

Training and outreach

In 2021, 387 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. For 2022, the County intends to update the training to better prepare monitors and staff for their roles and responsibilities.

Lihue Airport

Downed Bird Search effort

In 2021, dedicated Lihue Airport Downed Seabird Monitoring Personnel included H. T. Harvey & Associates field biologists conducting night and morning searches of the public access portions of Lihue Airport, outside of the secure AOA; USDA-Wildlife Services staff 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; although not their primary duty, airport security personnel received training that they employed during early pre-dawn security surveillance rounds within the public portion of the airport each day. Several of the individuals who participated in searches of the Lihue Airport public access facilities in 2021 have been participants in the monitoring program for multiple seasons and receive annual refresher training on downed seabird response protocols, seabird fallout patterns, overall seabird awareness, and procedures for proper reporting prior to initiating search and monitoring activities on September 15.

Searches for downed seabirds were conducted twice each day at Lihue Airport as prescribed and outlined in the KSHCP and HDOT's Participant Inclusion Plan. Monitoring surveys were conducted nightly, 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. Lihue Airport is separated into two distinct search areas: the Aircraft Operations Area (AOA), a restricted area that requires security clearance and the public access areas, which consist of the terminals, parking areas, portions of the rental car facilities, and several roadways and access corridors which interconnect the various parts of the airport facility. The AOA is searched twice each day by USDA-Wildlife Services biologists as part of the airport Wildlife Hazard Management Program. H. T. Harvey and Associates trained searchers conducted the evening and pre-dawn searches of the public access areas, and Airport Security conducted pre-dawn surveillance of the public access areas which augmented the morning search efforts by dedicated search personnel. USDA-Wildlife Services performed 184 surveys comprised of early morning and evening searches of the AOA and including substantial portions of the public access area consisting of Lihue Airport Gate 3 Jetway, Lihue Airport Gate 4 Jetway, Lihue Airport Gate 5 Jetway, Lihue Airport Gate 6 Jetway, Lihue Airport Gate 7 Jetway, Lihue Airport Gate 8 Jetway, Lihue Airport Gate 9 Jetway, Lihue Airport Gate 10 Jetway, Lihue Airport Security Access Alpha Gate, Lihue Airport Security Access Bravo Gate, Lihue Airport Security Access Charlie Gate, Lihue Airport Security Access Delta Gate, Lihue Airport Rental Car Gates, Lihue Airport Terminal Passenger Drop Off, Lihue Airport Cargo Ramp, Lihue Airport Cargo Parking, Lihue Airport Fuel Farm, Lihue Airport Employee Temporary Parking, Lihue Airport Maintenance Baseyard Area. H. T. Harvey & Associates personnel conducted 184 searches of all searchable portions of the public access areas of Lihue Airport on consecutive nights and mornings. Furthermore, Airport Security and USDA-Wildlife Services conducted additional surveillance of the AOA and public access areas of the airport throughout the day from sunrise to 2 hours after sunset. The coordinated and repetitive on-the-ground surveillance and dedicated search effort by multiple staff provided an effective monitoring program at Lihue Airport.

Lighting and facilities

In 2021, a new general aviation services building was constructed for Air Services Hawaii in the General Aviation area on the north ramp. The newly constructed features are fixed based support facilities located within the existing light field along the North Ramp and include a new building to replace temporary trailer style offices, parking area, and installation of five parking lot lights equipped with LED and full cut off fixtures. In 2020, Lihue Airport implemented a portion of Phase 3 lighting upgrades of 18 new High Mast Light fixtures with full cut-off LED fixtures along the main Commercial Terminal ramp (10), Cargo Terminal ramp (3), Commuter Terminal ramp (2), and General Aviation and north ramp (3), and operated with these new lighting configurations in 2021; See Addendum Sheet 1 and Appendix 3 for photographs of these upgraded fixtures at Lihue Airport. Note the high mast light photographs were taken in 2020 and reflect current conditions.

Lighting upgrades were implemented in 2020 as part of the Phase 3 lighting improvements for Lihue Airport. A total of 18 high mast high pressure sodium light fixtures in the Airside ramp area were replaced with LED full cut off heads. Lihue Airport also turned off portions of the high mast ramp lights during seabird fallout season on the following schedule: a.) Commercial terminal ramp are set to turn off at 12:30am – 3:30am, after last flight, and before Hawaiian Airlines crew begins early morning ramp operations in preparation of their morning flights, b.) Cargo, Commuter and Life Flight ramp lights remain on due to their activity, and c.) North ramp and T-hangar lights turn off at 12:00am – 5:30am. Combined,

these measures are considered to advance the efficacy of seabird light attraction minimization and contribute to achieving biological goals and objectives.

Predator control

Cats were observed and reported by downed seabird monitors in the public access areas of Lihue Airport on 57 of the surveys that were performed (31% presence, n=184 individual surveys) in 2021. Numbers of cats observed ranged from 0-6 and averaged 1.08 per day. Cats were most frequently observed in the vicinity of the rental car facilities and public parking area, and to a lesser degree adjacent to air cargo facilities and UPS; cats were reported much less frequently from Ahukini Road in 2021. The trapping effort at Lihue Airport consisted of 8 traps set in the public area and 16 traps in the AOA for a total of 24 traps and 2,208 trapping days. The capture success rate was 0.005 cats/trap day.

USDA-Wildlife Services staff conduct a year-round animal control program at Lihue Airport with an emphasis on free-roaming cats but also includes dogs, pigs, and any other free-roaming animals that might present a threat to downed seabirds or represent an aviation hazard. USDA-Wildlife Services normally set and maintain traps for cats in the AOA and public access areas year-round. Tomahawk-style live traps are set for free-roaming cats as they are reported or observed. The trapping effort at Lihue Airport during the 2021 seabird fallout season consisted of 8 traps set in the public area and 16 traps in the AOA for a total of 24 traps and 2,208 trapping days. A total of 12 cats were captured and removed from Lihue Airport during the seabird fallout season yielding a capture success rate of 0.005 cats/trap day. Historically, captured cats were delivered to the Kauai Humane Society. However, this practice of delivering captured cats to the Kauai Humane Society has changed and now USDA-Wildlife Services handle the processing and removal of predators directly. H. T. Harvey & Associates searchers provided daily or as-compiled reports of predators that were observed in the public areas at Lihue Airport during the daily search and monitoring surveys and conveyed this information to USDA-Wildlife Services to facilitate trap placement and effort.

Training and outreach

All individuals who participated in searches of Lihue Airport facilities were provided training on seabird awareness, the seabird monitoring protocol, downed seabird response protocol, and KSHCP reporting procedures. A total of six PowerPoint presentations were made to 103 staff members across that included Maps, Training Module, Fact Sheet, discussion of search area characteristics, historic fallout distribution, demonstration of seabird search methods and procedures, rescue techniques, review of 2021 data sheets, and additional resources as needed. These were developed and presented by a contractor (H. T. Harvey & Associates).

Outreach conducted in 2021 was substantial and included five presentations to airport personnel, airport staff and contractors, rental car company employees and managers and visitors. Written correspondence was delivered to teams of rental car company managers with overview of seabird light attraction and minimization tools, rescue and reporting procedures, distribution of Fact Sheet; engaged in follow up with several managers to reinforce awareness and offer support and encourage staff to review and become familiar with the material in the training module. Information was presented to rental car staff with information on seabirds and light attraction risk, how to minimize by turning off unnecessary lights; regular check-ins with staff on duty during search activities. Kauai Airports District Manager issued memorandum to All Parties Concerned 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. Finally, a seabird light attraction Fact Sheet containing written materials with overview of 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. A fact sheet was also posted in the public areas of the airport to inform the general public.

Nawiliwili Harbor

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 2021 in addition to hourly surveillance of the entire facility.

Downed Seabird Monitoring Personnel assigned to Nawiliwili Harbor included H. T. Harvey & Associates field biologists and harbor security personnel. In addition, HDOT, Matson, and Young Brothers personnel provided incidental observational capacity that increased the probability that birds not detected during the dedicated nighttime 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).

Implementing the monitoring protocols at Nawiliwili Harbor was achieved by coordinating search and monitoring effort among H. T. Harvey & Associates field biologists, harbor security and HDOT. The effectiveness of the monitoring program was enhanced by the training that was provided to each group of monitors prior to the beginning of the seabird fallout season and continued outreach as needed throughout the season to ensure continuity and adherence to fundamental procedures. We monitored the thoroughness of the survey effort by tracking quality and timeliness of coordination, documentation and reporting of downed seabird incidents when they occurred, and there were no circumstances that triggered mid-term corrections or retraining with respect to the standard monitoring protocols and response procedures that were followed in 2021.

Lighting and facilities

In 2017, all high-pressure sodium light fixtures were replaced with downward pointed, full cutoff LED light fixtures. High-mast light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5. Further, lights are dimmed when no pier operations are in progress. No further proposed changes are presently being considered.

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 (no cruise ships visited Nawiliwili Harbor during the 2021 seabird fallout season) and only at the specific pier where those operations are in progress. When nighttime operations are completed, the tall mast lights are reduced to a lower setting (roughly 15% of illumination capacity). In 2017, HDOT Harbors Division replaced the high-mast flood lights with new, full cut-off, downward-pointing LED fixtures. In 2021, HDOT Harbors Division personnel at Nawiliwili Harbor worked to fine-tune the strategy to ensure timely reduction to security level setting as quickly as possible following the completion of operations and by completely shutting off some high mast lights after cargo operations were completed in an effort to ensure low light attraction exposure for seabirds. This same approach, 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 advancing biological goals and objectives.

Predator control

Cats were observed by downed seabird monitors at Nawiliwili Harbor on 50 of the surveys that were performed (54% frequency of occurrence) in 2021. Numbers of cats observed ranged from 0-4 and averaged 1.62 cats per survey, with only 1 cat observed after November 21st. Cats were observed in the open yard, in the vicinity of the north fenceline adjacent to the public beach park, near the entrance to Young Brothers, and near the Matson and Young Brothers warehouses. The trapping effort at Nawiliwili Harbor operated for approximately 100 days with 2 traps set per day, for a total of 200 trap days. The overall capture success rate of 0.035 cats/trap night, or 1 cat/13 trap days, amounting to roughly one cat captured and removed every 12-14 days. The frequency of occurrence for cats observed at Nawiliwili was 0.54 (n=50 days) and the average number of cats observed per day was 1.62 (n=81).

Predator control activities at Nawiliwili Harbor in 2021 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 searcher personnel started recording the number and locations of free-roaming animals (cats only were present) that were observed during downed seabird search and monitoring activities beginning on September 15 and reporting those observations quickly and efficiently to HDOT Harbors Division personnel. Cats were observed by downed seabird monitors at Nawiliwili Harbor on 50 of the surveys that were performed (54% frequency of occurrence) in 2021. Numbers of cats observed ranged from 0-4 and averaged 1.62 cats per survey, with only 1 cat observed after November 21st. Harbors Division staff deployed 2 Tomahawk-style live traps at the harbor and checked and maintained these daily and set locations were selected based on descriptions of the locations of free-roaming cats during nightly monitoring activities. Prior to implementing KSHCP initiatives at Nawiliwili Harbor in 2021, HDOT Harbors Division personnel at Nawiliwili Harbor produced signage and communicated directives to tenants regarding the no cat feeding policy in place at Nawiliwili Harbor (see Addendum Sheet 2). Harbors Division retained the services of a licensed local animal control group 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 quick and efficient removal. A total of 7 cats were captured and removed from Nawiliwili Harbor between September 13 and December 1 during the 2021 monitoring season; six of these were removed between September 13-28 and the last cat was captured and removed on December 1. No dogs or pigs were reported inside the harbor.

Training and outreach

A total of four PowerPoint presentations were made to 12 staff members working at Nawiliwili Harbor across that included a review of the Fact Sheet, KSHCP Downed Wildlife Protocol and Incident Documentation and Reporting Form. These were developed and initiated by a contractor (H. T. Harvey & Associates). Printed outreach material was posted in all visible staff areas for occupants of the harbor.

Outreach for non-harbor staff was extensive. Beginning of the season outreach with tenants on seabird light attraction fallout and procedures for notifying facility POCs and implementing proper rescue procedures was conducted. This included Matson supervisors and staff, Young Brothers managers and lead foreman, and other HDOT and Nawiliwili Harbor tenants. Periodic check-ins with HDOT Harbors Division staff at Nawiliwili Harbor, Matson, and Young Brothers were done to provide advance notice of periods of higher fallout probability, heighten awareness, and revisit fundamental elements of seabird awareness, rescue, response, and reporting requirements. The seabird awareness Fact Sheet was posted in the main harbor office, in worker common areas, and on the bulletin board in the staff break room in clear view of HDOT-H staff. The seabird awareness factsheet was also posted in common areas of the Young Brothers office trailer and in the Matson office and staff staging area in the warehouse, in clear view of staff, and in the security shack at the main entrance to Nawiliwili Harbor. Finally, the seabird awareness factsheet was posted on the public bulletin board in the Harbor Office, in clear view of visitors and the public.

Norwegian Cruise Lines (NCL)

The ship was based outside of Hawaii during the seabird fallout season and thus did not participate in typical searching or training efforts.

Downed Bird Search effort

During operations within Hawaiian waters, seabird monitoring is continuous, 24/7 every day of the year. The onboard Environmental Officer is responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and reporting. All crewmembers are responsible for searching their respective duty stations for downed seabirds on a daily basis.

Lighting and facilities

No lighting changes were reported in 2021.

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.

Training and outreach

No training and outreach presentations were made to staff since the ship was based outside of Hawaii during the seabird fallout season.

1 Hotel Hanalei Bay[1]

As described in Item 5 of its PIP, the 1 Hotel Hanalei Bay is under renovation and is anticipated to reopen in 2022. The resort was closed on April 1, 2020 and construction began on August 1, 2020. Construction takes place during weekday daylight hours, typically 7am to 3pm. No nighttime construction is proposed or warranted. Security personnel are on site from dawn (6am) to 9pm seven days a week

Downed Bird Search effort

Security personnel conduct searches twice daily: early morning before dawn (6-7am) and after sundown (7-9pm) along the search route provided in Attachment A. Security staff cannot conduct nighttime searches during renovation as it is unsafe for staff to walk through the unlit construction site. Additionally, there are approximately 100-150 construction workers and three resort staff that have been trained to look for downed birds throughout their work shifts. There are signs within the resort directing staff to report fallen seabirds to security (See Attachment B: Photo Log). Search protocols will be revisited for the 2022 seabird season based on the status of construction.

Lighting and facilities

Due to COVID-19 There was significantly less lighting in 2021 than described in 1 Hotel Hanalei Bay's PIP because the resort was closed to guests. The majority of outdoor lights were deactivated. During the fledging season, the approved limited lighting included 50% of the parking lot lights and safety lighting at the loading bay, guard shack, and along the public beach access walkway (See Attachment B: Photo Log). All outdoor lighting was angled downward, shielded, and fully cutoff.

Predator control

Predator searches were conducted daily by a contractor who moved 10 traps around the property as best served to catch predators. Ten traps were run for 91 days throughout the seabird fall out season by a contractor resulting in the removal of nine cats from the property. Workers on-site helped the predator control company to better implement trapping by informing them of when and where predators were sighted. There are signs within the resort prohibiting outdoor feeding of cats.

[1] As explained below in the "facility changes" section of this report, the former Princeville Resort Kauai was rebranded as 1 Hotel Hanalei Bay in 2021. It is therefore referred to in this report as "1 Hotel Hanalei Bay."

Training and outreach

1 Hotel Hanalei Bay conducted training in the form of a single PowerPoint presentation to four workers during the 2021 fledging season. Workers are provided a hard-hat sticker, which they must wear daily to indicate that they've completed the seabird training. 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.

HDOT Port Allen Harbor

Search effort

Searches were conducted twice each day at HDOT 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. HDOT 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 HDOT Port Allen Harbor. H. T. Harvey & Associates biologists conducted 184 searches on consecutive nights and mornings in 2021.

The downed seabird monitoring at HDOT Port Allen Harbor was assigned to two trained H. T. Harvey & Associates field biologists, Rick Foulks and Mitchell Craig, in 2021. Training included orientation to the searchable area and informational content that included seabird awareness, response, rescue and KSHCP reporting procedures, in addition to important characteristics and features of seabird fallout and those associated with the facility itself. 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.

Implementing the monitoring protocols at HDOT Port Allen Harbor was achieved by closely coordinating monitoring activities with HDOT Harbors Division staff and H. T. Harvey & Associates field biologists. The effectiveness of the monitoring program was enhanced by the training that was provided to the monitors prior to the beginning of the seabird fallout season and continued outreach, as needed, throughout the season to ensure continuity and adherence to fundamental procedures. We monitored the effectiveness of the survey effort by tracking quality and timeliness of coordination, documentation, and reporting of survey data, and level of preparedness for responding to and handling downed seabird incidents in the event they occurred.

Lighting and facilities

In 2017, all wall mounted light fixtures were replaced with downward pointed, full cutoff LED light fixtures. The upgraded downward pointing wall mounted light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5. HDOT is also moving into the implementation phase of a project to replace portions of the warehouse siding and will apply a paint color and texture that once completed should reduce glare and further minimize light attraction exposure risk for seabirds at HDOT Port Allen Harbor. This work is expected to be complete prior to the 2022 seabird fallout season. No additional changes are proposed in 2022.

Standard security, worker, tenant, and public safety procedures at HDOT Port Allen Harbor require that some facility lighting remain on at night. The lights in the parking lot and along the seaward side of the warehouse are programmed to be on from 18:30 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 wall mounted lights 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 will be applying a new paint color and texture to the south side of the main warehouse that is intended to reduce glare caused by the wall-mounted lights and this is expected to further minimize light attraction exposure for seabirds and contribute to biological goals and objectives at HDOT Port Allen Harbor once complete prior to the 2022 seabird fallout season.

Predator control

Predator control activities at HDOT Port Allen Harbor in 2021 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 searcher personnel recorded the number and locations of free-roaming cats that were observed during downed seabird search and monitoring activities, during both evening and pre-dawn survey periods and reporting those observation quickly and efficiently to HDOT Harbors Division personnel. Cats were observed by downed seabird monitors at HDOT Port Allen Harbor on only 9 of the 184 surveys (<1.0 % frequency of occurrence) that were performed in 2021. Numbers of cats observed ranged from 0-2 and averaged 0.11 cats observed per monitoring day (n=92). Harbors Division staff deployed 2 Tomahawk-style live traps at the harbor Monday through Friday. Traps were not set on weekends because of concern that traps won't be checked on days when HDOT staff are not present on site. Because Port Allen is a small facility (just over 1 acre in area) and very few cats were being observed and reported by monitors, traps were moved and set locations chosen based largely on descriptions of the locations reported by the monitors. Harbors Division retained the services of a licensed local animal control group to take possession of cats, if captured, and remove them from the facility the same day. However, no cats or other free-roaming animals were captured and no dogs were observed within the HDOT Port Allen Harbor facility in 2021. We understand that adjacent properties and facilities have active cat control programs in place, which began in earnest in 2020. We observed a corresponding decline in the numbers of cats present at HDOT Port Allen Harbor beginning in 2020 and that trend was evident and more pronounced in 2021.

Training and outreach

A total of three PowerPoint presentations were made to 12 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 2021.

For outreach, the seabird awareness Fact Sheet was posted in the window of the harbor agent's office facing the pier where visible to staff, tenants, and the public and inside the storage warehouse in plain view to all facility users including worker common areas. Copies of the seabird awareness Fact Sheet were also delivered to tenants (charter and sightseeing tourboat operators) during the first week of the fallout season. Multiple copies of the 2021 Seabird Light Attraction Fact Sheet were provided and managers and vessel captains were encouraged to post the Fact Sheet in plain view and make copies available to customers and staff.

Sheraton Kauai Resort

Downed Bird Search effort

The Sheraton Resort General Manager and Director of Security is responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and reporting. The entire staff was responsible for searching their respective work areas during work hours. There were approximately 250 daily employees during the 2021 fledging season. Twelve Security officers, one Supervisor, were also responsible for patrolling the property for downed seabirds, honu nest sites, and predators during the seabird season.

The entire built upon portion of the property is inspected each day year-round. Searches were conducted throughout the day, 7 days a week. During the seabird season, Four property searches per officer per shift (Twelve search efforts per night). Search times varied but included within 1 hour before sunrise (6-7am) and 3-4 hours after sunset (9-11pm) per KSHCP requirements. Additional searcher Assistance is provided by Nokaoi Landscaping in the mornings. This season two Newell's Shearwaters were found on the site on the nights of October 21, and 27, 2021. Additional searches were conducted during the 2021 seabird fledging season in response to the agencies' discovery rate validation testing and consultation with the Resort's Seabird Biologist.

Lighting and facilities

No lighting or facility changes were reported during the 2021 season.

Predator control

The Resort staff conduct predator surveys while on patrol and called on our vendor as needed. During the seabird season, the predator control vendor set eight traps which were checked daily for a total of 728 trap nights; no cats were caught.

Training and outreach

Four PowerPoint presentations were made to 233 staff members that included a review of the fact sheet, KSHCP Downed Wildlife Protocol and Incident Documentation and Reporting Form. Posters and fliers posted around the property. Coloring books were ordered and offered to arriving Owners.

Sonesta Royal Kauai Resort[2]

Downed Bird Search effort

Searches were conducted at least twice a day for all built-upon areas, more frequently for other areas. Inspections were conducted throughout the day. During the seabird season, patrols made two rounds of the property in each 8 hour period (shift). Search times varied but included within 1 hour before sunrise (6-7am) and 3-4 hours after sunset (9-11pm) per KSHCP requirements. Search personnel conduct pedestrian surveys (on foot) with flashlights and in golf carts. Searchers look under and around objects and within vegetation for downed birds and evidence of predators. In addition to the dedicated patrol team, the Director and Assistant Director of Security spent approximately 6 hours daily searching the Sonesta property. One Wedge-tailed Shearwater was found on September 30 and handled in accordance with the KSHCP Downed Wildlife Protocol. No covered species or honu nests were found on the property, although a Honu nest (described below) was found on the adjacent beach owned by DLNR.

Sonesta's General Manager and Director of Safety & Security was responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and reporting. The entire staff was responsible for searching their respective work areas during work hours. There were approximately 350 daily employees during the 2021 fledging season. The Safety & Security officers, one Supervisor, and one Duty Engineer were also responsible for patrolling the property for downed seabirds, honu nest sites, and predators during the seabird season.

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" (pg. 29). The beach is owned by DLNR, and not the AOAO. The personnel responsible for raking and searching the beach undergo annual endangered species training. Prior to the seabird fledging season, twenty-six honu hatchlings were detecting at the beach and surrounding area. Sonesta staff assisted by notifying DLNR DOFAW of the hatchlings on August 18, 2021 and by keeping hotel guests away from hatchlings. The hatchlings were released back into the ocean per DOFAW instructions. No honu nests were detected

Lighting and facilities

There was significantly less lighting in 2021 than described in Kauai Marriott Resort's participant inclusion plan (PIP). In addition to the Seabird Fledging season lighting minimization measures described in Table 1 of Marriott's PIP, the following accommodations were made in the 2021 season: in the Dukes parking lot: Two 250w 22,000 lumen 4200K Metal Halide light fixtures were eliminated and replaced with one 110w 12,281 lumen 4000k LED light fixture. The Resort Biologist conducted a lighting audit in September 2021 and the following changes were made within 48 hours of the audit: (1) the light above the Da Life shop facing the promenade was turned off; (2) the Haupu parking lot light was redirected to face straight down; (3) the Haupu parking lot lights have one more layer of tint; and (4) predator control contractor increased the number of traps to five

[2] As explained below in the "facility changes" section of this report, the former Kaua'i Marriott Resort was transitioned to new management in 2021 and rebranded to Sonesta Royal Kauai Resort. It is therefore referred to in this report as either "Sonesta Royal Kauai Resort" or "Sonesta."

and placed the traps in more logical places to catch predators. The Resort Biologist also made periodic trips to Kauai to check the hotel lighting and provide additional guidance and training on searches.

Predator control

Predator searches were conducted daily by a commercial contractor who moves five traps around the property to the best locations to catch predators; two cats were caught in 2021. 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 met with the pest control company prior to the start of the seabird season to consult and provide direction on the number of traps and site-specific locations to best catch predators. 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

Thirteen PowerPoint presentations were made to 235 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 and is included as Attachment C to this annual report. Sonesta implemented the following outreach activities during the 2021 seabird fledging season in accordance with its PIP Item 12:

1. Displayed SOS informational posters in break rooms and common staff areas.
2. Put it in the daily hotel newsletter for all Employees.
3. Staff attended the annual Worker Seabird Awareness Training.
4. Reminded staff about seabirds during department stand up meeting (pre-shift meetings) to bring additional awareness.
5. Discussed seabird requirements and protocols in other daily manager stand up meetings.
6. Invited a qualified biologist to speak at staff meeting(s).
7. Displayed SOS informational posters in the lobby to promote guest awareness.
8. Put an informational flyer put into each room as awareness to guests and asking them to keep curtains closed during the season.

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, such as the Powerhouse and Irrigation facilities owned by A&B, 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, 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 Invasive 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 Invasive Initiative. Of the 197 properties included in the KSHCP as of 2021, 47 were required to do predator control. Only 21/47 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 23 out of 32 covered properties owned by Kauai County. Of the remaining 21 properties that did conduct predator control, 20 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 last year. Table 5 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?	# nights	Predator/trap night	Changes needed?
County Kaua'i	Bryan J. Baptiste Sports Complex	Yes	87	0.103	No
County of Kaua'i	Hanapepe Transfer Station	Yes	222	0.185	No
County of Kaua'i	Kukui Heiau	Yes	5	0.000	Increase # nights
County of Kaua'i	Lima Ola Housing Development	Yes	192	0.125	No
County Kaua'i	Lihue Police Department/Vidinha Stadium	Yes	235	0.077	No
County of Kaua'i	Lihue Transfer Station	Yes	160	0.106	No
County of Kaua'i	Lydgate Park	Yes	249	0.008	No
County of Kaua'i	Spouting Horn Park	Yes	242	0.186	No
County of Kaua'i	Hanapepe Veterans Cemetery	Yes	83	0.108	No
HDOT	Port Allen Harbor	Yes	130	0	Evaluate trapping efficacy
Kaua'i Coffee	Factory and Fields-Kalaheo	Yes	273	0.062	No

Essex House Condominium Corporation	Sonesta Royal Kauai Resort	Yes	455	0.004	No
SOF-XI Kauai PV Hotel, LP	1 Hotel Hanalei Bay	Yes	910	0.010	No
A & B	Hokulei	Yes	303	0.026	No
A & B	Port Allen Commercial	Yes	372	0.062	No
A & B	The Shops at Kukuiula	Yes	300	0.003	No
A & B	Waipouli Town Center	Yes	137	0.088	No
HDOT	Nawiliwili Harbor	Yes	200	0.035	No
Sheraton	Sheraton Resort	Yes	728	0	Evaluate trapping efficacy
A & B	Kalaheo Powerhouse	No	0	0	N/A (not required)
A & B	Pump 3 Irrigation	No	0	0	N/A (not required)
A & B	Wainiha Powerhouse	No	0	0	N/A (not required)
County of Kaua'i	Remaining 23 properties	No	0	0	Increase # nights and # properties
NCL (Bahamas) Ltd.	NCL	No	0	0	N/A (not required)
HDOT	Lihue Airport	Yes	2208	0.005	No

In total, 251 feral cats, and 41 pigs were removed from participant facilities during the 2021 seabird fallout season. 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 four properties that did conduct predator control, but where it was not deemed sufficient, all but one 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 2021, 1,091 staff and workers associated with the participant facilities were directly trained on monitoring and response of downed seabirds representing 1.4% of the population of Kauai (72,293 as of 2019). 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, Sheraton, 1 Hotel Hanalei Bay and NCL) outreach to guests was significantly increased this year due to higher occupancy rates and included presentations, handouts and coloring books. 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.
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.

Results

HDOT properties and the A&B Port Allen properties used independent contractors to conduct searches and performed the most effective searches based on the maps and data provided. A complete summary of searcher efficacy trials is presented as a stand-alone report rather than being discussed in this document.

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	Changes needed
A & B	Hokulei Shopping Village	0	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	N/A	yes	
A & B	Kalaheo Powerhouse	0	Yes	Yes	Sept 15 – Dec 15 (only on nights when facility is lighted)	3-4 hrs after sunset, and 1 hr of sunrise or prior to departing facility	Yes	N/A	No	
A & B	Port Allen Commercial	4*	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	Yes	yes	
A & B	Pump 3 Irrigation	0	Yes	Yes	Sept 15 – Dec 15 (only on nights when facility is lighted)	3-4 hrs after sunset, and 1 hr of sunrise or prior to departing facility	Yes	N/A	No	
A & B	The Shops a Kukuiula	0	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	N/A	yes	
A & B	Wainiha Powerhouse	0	Yes	Yes	Sept 15 – Dec 15 (only on nights when facilities are lighted)	3-4 hrs after sunset, and 1 hr of sunrise or prior to departing facility	Yes	N/A	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	
County of Kaua'i	Multiple	0	Yes	Yes	Sept 15 – Dec 15	Once daily	Yes	N/A	yes	
HDOT	Lihue Airport	3	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	Yes	yes	
HDOT	Nawiliwili Harbor	3	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	Yes	yes	
HDOT	Port Allen Harbor	0	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	yes	yes	
HPTMI Hawaii, Inc.	Sonesta Royal Kauai Resort	0	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	N/A	yes	
NCL	NCL	0	N/A	Yes	Sept 15 – Dec 15	Continuous (min. twice per 8-hour shift)	Yes	N/A	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	no	
HPTMI Hawaii, Inc.	Sonesta Royal Kauai Resort	0	Yes	Yes	Sept 15 – Dec 15	3-4 hrs after sunset, and 1 hr of sunrise	Yes	N/A	yes	
Sheraton Kauai	Sheraton Kauai Resort	2	Yes	No	Sept 15 – Dec 15	Twice daily-times unknown	Yes	Yes	Yes	

* Two of the four birds found by this facility's search team were located off-site in public roads.

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, nine NESH and one HAPE were found on participants properties during the 2021 seabird fallout season. Eight NESH and the one HAPE were alive and were brought to the Save our Shearwaters facility at the Kauai Humane Society for release after stabilization; seven of those birds were released and one NESH and the one HAPE were euthanized. One NESH was found dead. Two of the 10 NESH located were dead. Additionally, two downed NESH were found off-site from any participant's properties; both of these were found dead.

One Honu nests was reported on the DLNR owned section of beach in front of the Sheraton; the nest was reported to both DLNR and the USFWS.

Table 11: Summary of all downed birds in 2021 under the KSHCP

Date	Time	Property	Species	Status
10/3/2021	530	Port Allen Commercial (A&B)	NESH	Alive- released
10/6/2021	21:05	Nawiliwili Harbor	NESH	Dead
10/26/2021	1918	Sheraton	NESH	Alive- released
10/27/2021	2040	Sheraton	NESH	Alive- released
10/29/2021	21:00	Lihue Airport	NESH	Alive- released
11/1/2021	10:00	Lihue Airport	NESH	Alive- released
11/2/2021	23:04	Nawiliwili Harbor	NESH	Alive- released
11/3/2021	21:38	Port Allen Commercial (A&B)	NESH	Alive- released
11/15/2021	22:03	Lihue Airport	NESH	Found alive; euthanized
11/27/2021	21:20	Nawiliwili Harbor	HAPE	Found alive; euthanized

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

	Compliance monitoring	NESH		HAPE		BANP	
Property or Facility	Annual Report submitted on time?	Lethal	Non-lethal	Lethal	Non-lethal	Lethal	Non-lethal
A&B- Multiple	No	104	80	3	3	1	1
Kauai County-Multiple	No	276	217	17	4	4	0
HDOT-Lihue Airport	Yes	22	43	3	6	1	2
HDOT-Nawiliwili Harbor	Yes	13	48	2	6	0	0
HDOT-Port Allen Harbor	Yes	13	48	2	6	0	0
Kauai Coffee	Yes	34	26	0	0	0	0
Kaua'i Marriott Resort	Yes	33	21.2	1	1	1	1
NCL	Yes	30	30	6	6	6	6
Princeville Resort Kaua'i	Yes	125	475.2	6	6	1	1
Sheraton Kauai Resort	No	81	64	1	0	3	1

Table 13 Calculated seabird take for all Participants in 2021

	NESH		HAPE		BANP	
Property or Facility	Lethal	Non-lethal	Lethal	Non-lethal	Lethal	Non-lethal
A&B- Multiple	2.24	1.76	0	0	0	0

Kauai County-Multiple	0	0	0	0	0	0
HDOT-Lihue Airport	2	2	0	0	0	0
HDOT-Nawiliwili Harbor	2.2	0	1.1	0	0	0
HDOT-Port Allen Harbor	0	0	0	0	0	0
Kauai Coffee	0	0	0	0	0	0
Sonesta Royal Kauai Resort	0	0	0	0	0	0
NCL	0	0	0	0	0	0
1 Hotel Hanalei Bay	0	0	0	0	0	0
Sheraton Kauai Resort	0	0	0	0	0	0
Total 2021 Participant Take	6.44	3.76	1.1	0	0	0
Maximum Anticipated Total Fledgling Annual Take*	30	45	2	2	1	1
Cumulative Participant Fledgling Take Since May 2020	9.23	7.64	1.1	0	0	0
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 was one ownership transfer in 2021- A&B sold the Kukuila Development to Brue Baukol Capital Partners during the 2021 seabird season.

Two additional properties were re-named and/or rebranded:

The management of the Association of Apartment Owners of the Kaua'i Marriott Resort transitioned in 2021 from Essex House Condominium Corporation (an affiliate of Marriott International, Inc.) to Sonesta International Hotels Corporation. Although management has changed, the property continues to be owned by HPTMI Hawaii, Inc. after this transition. On October 26 2021, the parties requested that USFWS transfer the incidental take permit TE74393D-O from Essex House Condominium Corporation to Association of Apartment Owners of Marriott's Kauai Resort and Beach Club on behalf of itself and its members, including without limitation HPTMI Hawaii, Inc., HPT TRS MRP, Inc., Marriot Kauai Ownership Resorts, Inc. and Marriott Ownership Resorts Inc. (collectively the "AOAO"). On October 27, 2021, a similar request was submitted to DLNR DOFAW to transfer incidental take license no. ITL-24. In those letters, the parties also notified the agencies that the AOAO of Marriott's Kauai Resort and Beach Club will undergo a name change sometime in 2022 to reflect rebranding of this resort by Sonesta International Hotels Corporation. Until the permit is transferred it continues to be held by Essex House Condominium Corporation and implemented by current management.

The property owned by SOF-XI Kauai PV Hotel, LP also experienced a name change from Princeville Resort to 1 Hotel Hanalei Bay. The facility owner and permit holder (SOF-XI Kauai PV Hotel, LP) remain unchanged. The property is under renovation with plans to reopen in 2022.

FINANCIAL REPORT

The financial report is attached as a separate document produced by the fiscal sponsor, the National Fish and Wildlife Foundation (NFWF). Due to NFWF reporting restrictions, the report period covers 1 Oct 2020- 30 Sept 2021. We are working with NFWF to change the reporting period for 2022 to match the KSHCP needs. To date, there are no anticipated changes in budget expenditures and the financial status of the KSHCP is on budget.