Kaua‘i Seabird Habitat Conservation Plan

State of Hawai‘i
Department of Land and Natural Resources,
Division of Forestry and Wildlife

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Executive Summary

Three listed seabird species breed seasonally in Hawaiʻi: the Newell's Shearwater (*Puffinus auricularis newelli*, Hawaiian name: ʻaʻo), the Hawaiian Petrel (*Pterodroma sandwichensis*, Hawaiian name: ʻuaʻu), and the Hawaiʻi distinct population segment (DPS) of the band-rumped storm-petrel (*Oceanodroma castro*, Hawaiian name: ʻakēʻakē, hereafter band-rumped storm-petrel), making the islands essential to the conservation of these species. These species are part of the unique natural and cultural heritage of Hawaiʻi, and the island of Kauaʻi provides important breeding habitat for all three species. Protecting and managing that habitat to support viable populations of these species is critical for their long-term survival.

Among the threats known to impact the listed seabird species is attraction to artificial lights, which has been observed and documented on Kauaʻi for decades. The Kauaʻi Seabird Habitat Conservation Plan (KSHCP) has been developed to address light attraction impacts to the listed seabirds on the island of Kauaʻi. 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 Kauaʻi.

Seabird attraction to artificial lights is a commonly-observed phenomenon affecting petrel and shearwater species around the world, in many cases negatively altering their behavior. Fledgling seabirds are more affected by light attraction than adult seabirds, although adult birds also demonstrate altered behavior in the presence of unshielded lights, particularly near breeding colonies. At night, as the fledglings make their first flight from nesting sites to the sea, artificial lights degrade and impact their migratory corridor habitat. In the presence of light, the seabirds circle repeatedly and can become exhausted and often grounded as a result (commonly termed "fallout") or collide with structures in the process. Once grounded, the seabirds experience difficulty in resuming flight, and are vulnerable to introduced predators and vehicle traffic, such that unless rescued, they are assumed to have died, based on decades of seabird observations and reports. On Kauaʻi, birds that are rescued are sent to the Save Our Shearwaters program for rehabilitation and released back into the wild where possible.

Light attraction fallout on the island of Kauaʻi occurs in a widespread manner, with certain geographic areas having concentrated, higher amounts of observed fallout. Seasonally, most fallout occurs in the autumn months, coinciding with the seabird fledgling season. Many different entities on Kauaʻi (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 Kauaʻi is an island-wide problem that negatively impacts the listed seabird species and is collectively attributable to many different entities.

Of the three listed seabird species, the ʻaʻo is the species most impacted by light attraction. The ʻuaʻu and the ʻakēʻakē are impacted to a much lesser degree.

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 each 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. materials submitted by each Applicant which provide detailed descriptions of on-site minimization measures, covered activities, a monitoring plan, and the amount of take authorization being requested.

Applicants to the KSHCP are seeking an Incidental Take Permit (ITP) from the U. S. Fish & Wildlife Service (USFWS) and an Incidental Take License (ITL) from the State of Hawai‘i Department of Land and Natural Resources (DLNR). The mitigation and minimization measures contained in the KSHCP have been 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 of 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; and
- Decreasing the visibility of interior lights.

Under the KSHCP, mitigation actions are designed to be commensurate with the degree of impact caused by the taking of a listed seabird. 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 to have caused the mortality of the affected birds. For impacts to those birds, mitigation will consist of predator control and the creation of a fenced 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. 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, will be shared amongst the permit recipients according to the relative amounts of take authorized.

Compliance and effectiveness monitoring will be 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. In response to monitoring results, Adaptive Management will be implemented in the event that mitigation actions require changes to meet conservation goals as new information is obtained during implementation of the KSHCP.

Acronyms for this Document and all Associated Appendices

BLNR	Board of Land and Natural Resources
DAR	Division of Aquatic Resources
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESRC	Endangered Species Recovery Committee (State of Hawaiʻi)
FFS	French Frigate Shoals
GIS	Geographic Information Systems
ha	hectare
HAPE	Abbreviation for Hawaiian Petrel
HCP	Habitat Conservation Plan
HNP	Hono O Nā Pali
HNP NARS	Hono O Nā Pali Natural Area Reserve System
HRS	Hawaiʻi Revised Statutes
IA	Implementing Agreement
IE	Implementing Entity
ITL	Incidental Take License
ITP	Incidental Take Permit
IUCN	International Union for Conservation of Nature
KESRP	Kauaʻi Endangered Seabird Recovery Project
KISC	Kauaʻi Invasive Species Committee
KIUC	Kauaʻi Island Utility Cooperative
Km	Kilometer
KPNWR	Kilauea Point National Wildlife Refuge
KSHCP	Kauaʻi Seabird Habitat Conservation Plan
KWA	Kauaʻi Watershed Alliance
mya	Million years ago
MBTA	Migratory Bird Treaty Act
MHI	Main Hawaiian Islands
NARS	Natural Area Reserve System
NEPA	National Environmental Policy Act
NESH	Abbreviation for Newell's Shearwater
NHPA	National Historic Preservation Act
NLCZ	No Light Conservation Zone
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NTBG	National Tropical Botanical Garden
NWHI	Northwest Hawaiian Islands
OEQC	Office of Environmental Quality Control

PCSU	Pacific Cooperative Studies Unit
PIP	Participant Inclusion Plan
RCUH	Research Corporation at the University of Hawaiʻi
SHPO	State Historic Preservation Officer
SOS	Save Our Shearwaters
SST	Surface Seawater Temperature
TMK	Tax Map Key
TNC	The Nature Conservancy
ULP	Upper Limahuli Preserve
UMP	Underline Monitoring Program
USDA	U.S. Department of Agriculture
USGS-PIERC	U.S. Geologic Survey Pacific Island Environmental Research Center
USFWS	U.S. Fish and Wildlife Service
WSART	Worker Seabird Awareness and Response Training

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1. INTRODUCTION

Nighttime lighting is an essential activity in most homes, businesses and industry centers. The Kaua‘i Seabird Habitat Conservation Plan (hereinafter referred to as “KSHCP” or “Plan”) was developed to provide an island-wide conservation program to support the use of wildlife-friendly nighttime lights; to mitigate for unavoidable incidental take impacts[1] to listed seabirds caused by nighttime lighting; to avoid and minimize take, and to facilitate the regulatory processes for Applicants to obtain authorization, as appropriate; to incidentally take listed seabirds (**Table 1-1**). The KSHCP was developed by the State of Hawai‘i, Department of Land and Natural Resources (DLNR) with technical assistance from the U.S. Fish and Wildlife Service (USFWS), and in consultation with various scientific experts in the field of seabird and turtle biology.

The KSHCP is similar to a general conservation plan (GCP) as described in USFWS policy (USFWS 2007) except that it is being prepared by DLNR rather than USFWS; this approach is further discussed in Chapter 3. It was developed to support incidental take permit (ITP) and incidental take license (ITL) applications from multiple, qualifying non-Federal entities that have the potential for causing unavoidable take of Kaua‘i’s listed seabirds or honu. The seabirds covered in the KSHCP are the ‘a‘o, ‘ua‘u and the ‘akē‘akē, collectively referred to as “Covered Seabirds”. The honu is also covered under this HCP. All of these species are collectively referred to as the “Covered Species” (**Table 1-1**).

Based on the potential for incidental take of these Covered Seabirds, Applicants may request an ITL under §195D-4(g) of the Hawai‘i Revised Statutes (HRS), and an ITP pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. It is anticipated that take of honu will be avoided through monitoring and measures to protect turtle nests. Federal agencies have a separate process to address take and other impacts to listed species, as provided for under the consultation processes of Section 7 of the ESA.

Table 1-1. KSHCP Covered Species.

Hawaiian name	Common Name	Latin Name	Conservation Status
‘a‘o*	Newell’s shearwater	*Puffinus auricularis newelli*	Federally Threatened State Threatened IUCN Red List Endangered
‘ua‘u	Hawaiian petrel	*Pterodroma sandwichensis*	Federally Endangered State Endangered IUCN Red List Vulnerable
‘akē‘akē	band-rumped storm-petrel	*Oceanodroma castro*	Federally Endangered State Endangered IUCN Red List Least Concern
honu	green sea turtle	*Chelonia mydas*	Federally Threatened State Threatened IUCN Red List Endangered

*Throughout the KSHCP Hawaiian names of Covered Species are used.

Non-Federal entities or Applicants seeking ITLs and ITPs (also collectively referred to below as a "permit" or "permits") under the KSHCP would be seeking authorization for incidental take of the Covered Seabirds under specific terms and conditions defined by the Plan. Under the KSHCP, the impacts of any authorized incidental taking of the Covered Seabirds would be minimized and mitigated to the maximum extent practicable and offset with a net recovery benefit for the species affected. The duration of the Plan is 30 years; however, the term of individual permits under the Plan may vary within that 30-year KSHCP period. Other components of the HCP specific to individual Applicants include minimization and monitoring at Applicant facilities.

Covered Activities addressed under the KSHCP are: (1) the placement and operation of current light structures that can cause disorientation of fledgling and adult seabirds, and hatchlings of the honu; (2) the placement and operation of new or future lights that have similar effects; and (3) implementation of conservation measures to mitigate the impacts of the taking on the Covered Species. The location of Covered Activities encompasses anywhere on the island of Kaua‘i where light structures may occur, and State Lands where mitigation will occur.

1.1 PLANNING BACKGROUND OF THE KSHCP

The KSHCP is an atypical HCP and unique in several important respects. Planning for and development of the KSHCP was influenced by the following factors described below.

First, on the island of Kaua‘i, interactions of listed seabird species with existing lights has been a longstanding issue impacting the species. For the last three decades, as development on Kaua‘i has steadily increased, take of listed seabirds by their attraction to artificial lighting has been documented (Ainley et al. 1995, 2001). Island-wide estimates point to high amounts of incidental take occurring (involving hundreds of individuals of the covered listed seabird annually), that are negatively impacting the Covered Species (especially the ‘a‘o) and presenting challenges for achieving seabird conservation on Kaua‘i. The creation of the KSHCP was viewed as a critical tool to minimize and mitigate the effects of lighting on the Covered Species. The annual, ongoing nature of the take impacts on Kaua‘i contrasts with typical HCPs where the impacts of the taking on listed species are likely to occur *after* approval of an HCP and issuance of an ITP or ITL.

Second, the distribution of light attraction-related impacts to listed seabirds is widespread across the island. Downed birds are found wherever there is concentrated use of artificial outdoor lighting. Thus, the incidental take of Covered Seabirds involves multiple entities across different sectors, including private businesses and resorts as well as public agencies. Individual Applicants to the KSHCP will have differing take levels due to site-specific factors such as the specific location and extent of their facilities.

Third, conducting conservation actions to mitigate for the effects of unavoidable take of Covered Seabirds is difficult and costly due to the low reproductive capacity of the Covered Seabirds, their cryptic nature, the remote and rugged terrain on Kaua‘i in which they now breed and other factors. The challenging conditions for implementing actions in and near seabird colonies on Kaua‘i make it especially important to coordinate conservation efforts under the KSHCP to achieve the most cost-effective mitigation.

Another unique aspect of the KSHCP is its extended planning history. The concept of an island-wide HCP was developed, and initial outreach to potential Applicants began in 2005. Over 100 businesses and other entities were contacted, resulting in many voluntary changes at facilities to avoid and minimize take of the Covered Seabirds by installation of seabird friendly lighting and an overall reduction in the number of lights of Kaua‘i. Changes to lighting at some specific facilities were the result of litigation and settlement agreements. During the subsequent decade-long development process, some entities have determined that minimization alone will not completely avoid incidental take, and these entities are the expected pool of Applicants under the KSHCP.

1.2 REGULATORY FRAMEWORK

1.2.1 FEDERAL ENDANGERED SPECIES ACT (ESA)

The purpose of the ESA is to protect and recover endangered and threatened species and the ecosystems upon which they depend. Section 9 of the ESA and Federal regulation pursuant to Section 4(d) of the ESA prohibit the "take" of endangered and threatened species without special exemption. Under the ESA, "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (16 USC § 1532(19)). "Harm" is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Pursuant to Section 11(a) and (b) of the ESA, any person who knowingly violates Section 9 of the ESA or any permit, certificate, or regulation related to Section 9, may be subject to civil penalties of up to $25,000 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to one year for each violation.

Individuals and State and local agencies proposing an action that is expected to result in the incidental take of Federally listed species are encouraged to apply for an incidental take permit (ITP) under Section 10(a)(1)(B) of the ESA to be in compliance with the law. Such permits are issued by USFWS when take is not the purpose of the action and is incidental to otherwise lawful activities. An application for an ITP must be accompanied by a habitat conservation plan, commonly referred to as an HCP. The regulatory standard for an ITP under Section 10(a)(1)(B) of the ESA requires that the applicant's HCP minimize and mitigate the impacts of take on the listed species to the maximum extent practicable; not appreciably reduce the likelihood of the survival and recovery of the affected listed species in the wild; and provide adequate funding for its implementation and provide procedures to deal with unforeseen circumstances.

Section 7(a)(2) of the ESA requires Federal agencies to ensure that their actions, including the issuance of permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species' designated critical habitat. "Jeopardize the continued existence of…" pursuant to 50 CFR 402.2, means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Therefore the proposed issuance of an ITP under Section 10(a)(1)(B) of the ESA by the USFWS is a Federal action subject to Section 7 of the ESA. On that basis, the USFWS is required to conduct an internal consultation to affirm compliance with the requirements of Section 7(a)(2).

1.2.2 NATIONAL ENVIRONMENTAL POLICY ACT

The purpose of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. § 4321 *et seq.*) is to ensure that, before Federal agencies make decisions (in this case deciding

whether to issue an ITP), they consider the effects of their actions on the human environment. NEPA serves as an analytical tool to assess direct, indirect, and cumulative impacts of a proposed action and alternatives. The USFWS must comply with NEPA before it makes an ITP decision. The USFWS is preparing a programmatic NEPA compliance document on the KSHCP with the intent of streamlining NEPA compliance for individual permit decisions.

1.2.3 National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. 300101 *et seq.*) established a comprehensive program to preserve the historical and cultural foundations of the nation as a living part of community life. Section 106 of the NHPA requires Federal agencies to consider the effects of projects they carry out, approve, or fund on historic properties included on or eligible for inclusion on the National Register of Historic Places. Historic properties also include properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization, so long as that property also meets the criteria for listing in the National Register. The issuance of ITPs is considered a Federal undertaking under Section 106 of the NHPA. Section 106 requires that the USFWS assess and determine if the undertaking has the potential to impact historic properties. This assessment may require consultation with the State Historic Preservation Office (SHPO) and appropriate Native Hawaiian groups and other affected parties.

1.2.4 Federal Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC § 703-712), prohibits the take of migratory birds and makes it unlawful to pursue, hunt, take, capture, kill, possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product without proper authorization. The avian Covered Seabird Species are protected under the MBTA. Pursuant to USFWS policy, an ITP also constitutes a Special Purpose Permit under 50 CFR § 21.27 for the take of ESA-listed migratory bird species (in this case, the ʻuaʻu, ʻaʻo and ʻakēʻakē), as long as the permit holder maintains compliance with the ITP terms and conditions. Under those circumstances, the take of ESA-listed migratory birds will not be considered a violation of the MBTA.

USFWS regulations require a permit for the banding or marking of migratory birds protected under the MBTA. Any bird banding conducted as part of the KSHCP conservation program will be conducted by persons with Federal and State banding permits.

1.2.5 Hawaiʻi Revised Statutes, Chapter 195D

Chapter 195D of the HRS defines the State's responsibilities with respect to species listed as endangered or threatened to protect and conserve native wildlife and their habitats, including species Federally listed as endangered or threatened. Under the provisions of HRS § 195D, species listed as endangered or threatened pursuant to the ESA are also listed as an endangered or threatened species by the State of Hawaiʻi law (HRS §195D-4). Section 195D-2 defines "take" similarly to the Federal ESA. Section 195D-3 expressly prohibits, except as permitted by rules, any person to take, possess, transport, transplant, export, process, sell, offer for sale, or ship any species that the DLNR has determined to be in need of conservation (see also §195D-4(e)).

Section 195D-21 states that the State of Hawaiʻi may enter into an HCP if standards are met as defined in the statute. Section 195D-25 defines the composition and role of the Endangered Species Recovery Committee (ESRC) to provide guidance to the DLNR and the Board of Land and Natural Resources (BLNR) on matters relating to endangered, threatened, proposed, and candidate species. The ESRC is comprised of biological experts, representatives of relevant Federal and State agencies (e.g., USFWS, United States Geologic Survey (USGS), DLNR), and other appropriate governmental and non-governmental members. The ESRC reviews all HCP permit applications and makes recommendations to the BLNR on whether they should be approved, amended, or rejected. The ESRC also reviews all existing HCPs and ITLs annually to ensure compliance, and recommend any necessary changes to HCPs. Chapter 343 of the HRS and its implementing regulations (HAR §11-200) establish a system of environmental review to ensure that environmental concerns are given appropriate consideration in decision-making along with economic and technical considerations. The Hawaiʻi Office of Environmental Quality Control (OEQC) is responsible for environmental oversight and review under Chapter 343. Section 343-5 mandates the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) for activities by agencies [§343-5(a)] or applicants [§343-5(b)] meeting certain conditions.

The KSHCP proposes use of State lands as part of its conservation program and the potential use of State and County of Kauaʻi funds, both of which trigger the need for compliance with HRS 343. KSHCP compliance with Chapter 343 will be satisfied by a joint document prepared for NEPA and HEPA compliance.

2. ENVIRONMENTAL SETTING

2.1 ISLAND OF KAUAʻI

The island of Kauaʻi lies at the northernmost end (22°03'N, 159°30'W) of the Main Hawaiian Islands (MHI) and is the oldest of the eight main islands (**Figure 2-1**). Measuring 884km² - 51km east-west and 35km north-south - Kauaʻi is the fourth largest of the main islands in the Hawaiian archipelago. The island is characterized by steep cliffs and deeply eroded canyons and valleys. The north and east coasts receive wind and moisture carried on the trade winds and support lush vegetation, streams, and waterfalls, while the south and west coasts receive minimal moisture and are typically hot and arid. The island supports many valuable natural plant and animal communities including montane bogs, montane wet forest, lowland mesic forest, lava tube caves, long stretches of sandy beach, and many streams and rivers. Because of the age of the island and its relative isolation, Kauaʻi contains higher levels of endemism than elsewhere in the State (Mitchell et al. 2005).

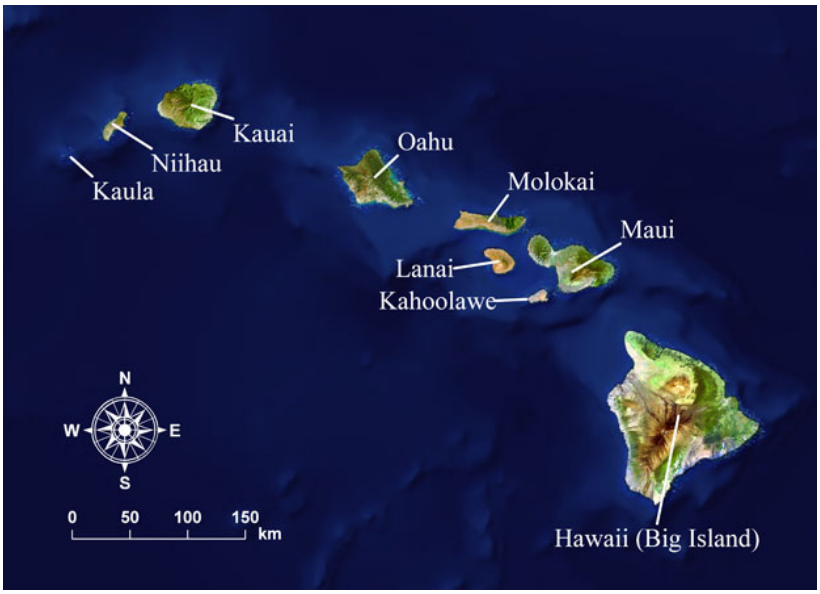

Figure 2-1. Map of the southeastern Hawaiian Islands, also referred to as the Main Hawaiian Islands (MHI). Source ccma.nos.noaa.gov

2.1.1 CLIMATE

The climate and weather of Kauaʻi is a function of isolation and its location in the tropical North Pacific Ocean, approximately 3540km from the nearest continent. There are significant contrasts in average precipitation and temperatures in different locations on the island. Like the other MHI, the climate varies around the island based on elevation above sea level, altitude-related temperature changes, topography, relative exposure to sunlight, and prevailing winds, especially the trade winds originating from the northeast (NOAA 1985). Trade winds are prominent drivers of climate and weather from May through September when the trades are prevalent 80 to 95% of the time. From October through April, the effects of the trade winds are less prominent across the island (NOAA 1985).

Kaua‘i receives varied amounts of annual rainfall at different locations on the island (**Figure 2-2**). Mount Wai‘ale‘ale is one of the wettest spots on earth receiving an average of more than 1117cm of rain a year (State of Hawai‘i 2010). As a whole, the island of Kaua‘i receives an average of over 100cm of rainfall. Three-quarters of this total, on average, falls during the seven-month wet season, from October through April. Average precipitation in January, the wettest month, is over 15cm; June, the driest month, receives only about 9.66cm of rain.

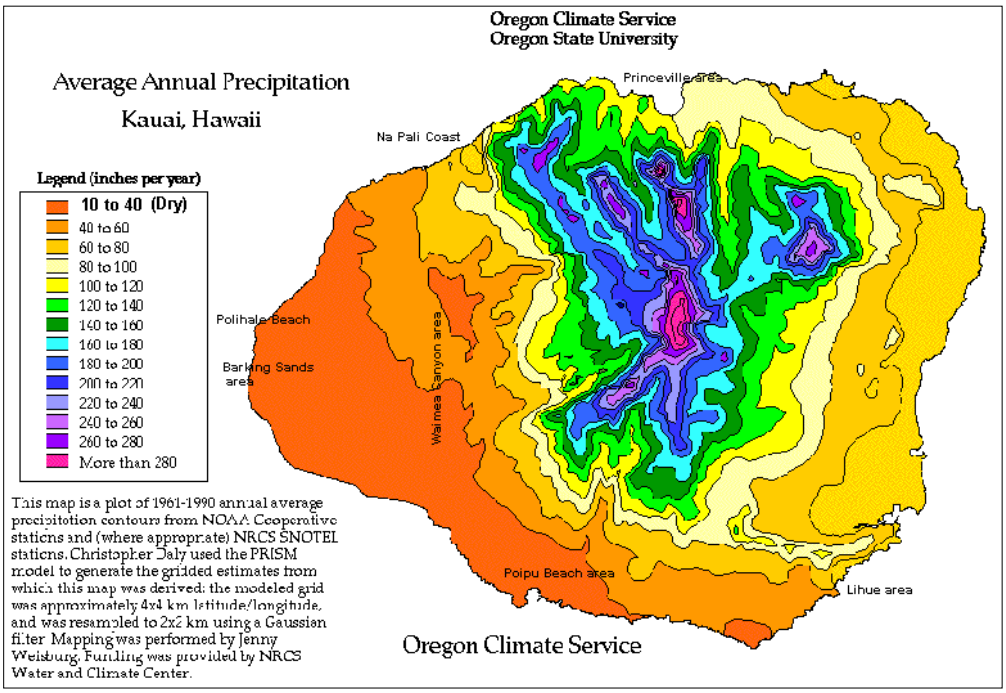

Figure 2-2. Average annual precipitation on Kaua‘i. Source: Oregon Climate Service (August, 1998).

Hurricanes, (storms with winds in excess of 120km/h) have occurred in the MHI five times over a 62-year period (State of Hawai‘i 2010). Tropical storms caused by low pressure systems are more frequent and may be similar to hurricanes but with more modest winds, below 120km/h. Studies based on weather satellite photographs suggest that tropical storms affect areas within the State of Hawai‘i every year or two (NOAA 1985). Hurricanes and tropical storms are most likely to occur during the last half of the year, from July through December.

In the past 50 years, strong winds, heavy rains and storm surges caused by periodic hurricanes have resulted in devastating effects (**Table 2-1**). Hurricanes ‘Iwa (1982) and ‘Iniki (1992) caused extensive damage to native plant communities and ‘Iniki also damaged buildings, roadways, utility structures and outdoor lighting.

Table 2-1. Major hurricanes affecting Kaua‘i, 1950-2016

Name	Date	Maximum winds recorded onshore (km/h)		Saffir-Simpson Hurricane Scale	Deaths	Property Damage (mil. $)
		Sustained	Peak gusts			
Hiki	Aug. 15-17, 1950	109	(NA)	Tropical Storm	1	0.2
Niña	Dec. 1-2, 1957	(NA)	148	1	1	0.1
Dot	Aug. 6, 1959	130	165	2	-	5.5+
‘Iwa	Nov. 23, 1982	104	188	3	1	234
‘Iniki	Sept. 11, 1992	148	230	4	8	1,900

Source: Adapted from Table 5.45 in State of Hawai‘i (2010)

2.1.2 Topography/Geology

Kaua‘i, as well as Ni‘ihau and Ka‘ula, are the eroded emergent remains of three shield volcanoes that stand in over 3600m of water. Kaua‘i was formed during two periods of volcanism between 5.6 million and 3.6 million years ago (mya) (Blay and Siemers 2004). Originally a broad basaltic shield volcano, Kaua‘i was formed by thin sheets of lava gently sloping from the summit. Following the initial period of volcanism, rain, streams, and waves eroded more than 143,226 ha of the island creating: steep sea cliffs; deep canyons and valleys that extend from the interior of the island to the coast; a mountainous interior; a broad coastal plain with deep soil; and extensive beaches (Blay and Siemers 2004).

Roughly circular in shape, Kaua‘i contains striking physiographic features: a high central plateau topping out at over 1500m at the summits of Wai‘ale‘ale (1570m) and Kawaikini (1600m); steep cliffs and deeply incised valleys along the northern Nā Pali coast; the 1100m deep Waimea Canyon; the broad Līhu‘e Basin on the southeastern quadrant of the island; and the extensive coastal dunes of Polihale.

The northern area of the island extends from Kalihiwai to Hā‘ena, where the Nā Pali coast begins, the roads end, and the landscape transitions to regions of incised valleys and steep sea cliffs (300-600m tall). The north shore valleys include Hanalei, Lumaha‘i, Wainiha, Hanakāpī‘ai, Hanakoa, Kalalau, Honopū, Nu‘alolo, and Miloli‘i. The area around Līhu‘e has a low, sloping topography flanked by the Hā‘upu Ridge to the south.

2.1.3 Hydrology/Streams, Rivers, Drainages

Kaua‘i’s hydrology is dominated by 61 streams that radiate out from the Wai‘ale‘ale-Kawaikini massif in all directions, 45 of which are perennial (State of Hawai‘i 2010). All significant slopes on Kaua‘i, except the west slope, carry these perennial streams.

2.1.4 Existing Land Use

In recent history, the economy of Kaua‘i has been a blend of agriculture, tourism and military sectors. Today, the service sectors provide most of the jobs on Kaua‘i, in particular tourism. For most of the past decade, the annual visitor count for Kaua‘i was approximately 1 million people (DBEDT 2016).

The 2010 Census counted the Kaua‘i total population at 67,091 persons (U.S. Census Bureau 2011). Concentrations of development and human populations occur primarily in the coastal areas of the west, south, east and north shores, excluding the undeveloped and rugged Nā Pali Coast in the northwest. The west side of Kaua‘i is sparsely populated. The highest human population densities exist in the towns of Līhu‘e and Kapa‘a on the east coast while the rest of the island features smaller towns and resort areas along the coast.

Kaua‘i has experienced a conversion of land use from agriculture to residences, with many subdivisions featuring large-scale estates. For seabirds, this pattern may have potential to result in increased light attraction effects from lights encroaching into previously dark areas.

3. PLAN DESCRIPTION

The KSHCP is an island-wide conservation plan under which each individual Applicant may receive a separate ITP and ITL authorizing incidental take of the Covered Species. The intent in developing the KSHCP was to make it similar to a GCP as described in USFWS policy (USFWS 2007) for streamlining the regulatory processes associated with developing HCPs under Section 10(a)(1)(B) of the ESA. This approach allows for the development of a programmatic HCP suitable to meet the needs of a local area (e.g., the island of Kaua‘i) that will streamline NEPA and other requirements and allow issuance of individual ITPs and ITLs to landowners who apply for such permits and demonstrate compliance with the terms and conditions of the GCP.

The GCP-level approach allows coordinated, cost-efficient and effective conservation actions (Section 5.4) to occur under the KSHCP to achieve long-term biological goals and objectives (Sections 5.1 & 5.2) needed to offset incidental take impacts by individual applicants, and to provide a net benefit to the Covered Species as required by State of Hawai‘i law (HRS § 195D-30). The KSHCP involves multiple Participants (entities that receive an ITP and ITL) under one plan, and recognizes that many entities on Kaua‘i have a desire to comply with Federal and State endangered species statutes, and to adequately address the adverse effects of light attraction on the Covered Species. This sentiment reflects the fact that lights are widespread on Kaua‘i and involve nearly all sectors of industry. By creating the KSHCP to meet the requirements of ITP/ITL issuance criteria, it eliminates the need for each non-Federal entity on Kaua‘i to develop their own HCP for the purposes of receiving an ITP and ITL addressing take of the Covered Species.

Under the KSHCP, private businesses, landowners, cruise ships that dock at Kaua‘i ports, and non-Federal public agencies on Kaua‘i that conduct actions with the potential to cause incidental take of the Covered Species may submit an application for an ITP and an ITL and request incidental take authorization as appropriate to their site-specific situation. The application will be in the form of a Participant Inclusion Plan (PIP) specific to Applicant facilities (see Section 6.2.2 for details on PIPs). The KSHCP defines acceptable scientific approaches for estimating an Applicant’s anticipated level of take, for monitoring the effect of the applicant-authorized taking, and for establishing minimization measures and mitigation actions, including long-term management, monitoring and reporting responsibilities to adaptively manage and implement the KSHCP. Evaluation of permit issuance criteria for individual permit applications will be based on adherence to the standards and actions delineated in the KSHCP, and acceptable minimization actions for individual applicants as outlined in PIPs.

Participation in the KSHCP is voluntary and is based on individual Applicant’s risk assessments, which in turn are based on records of take of listed seabirds at their facilities. The conservation program under the KSHCP was designed to offset anticipated take impacts of listed seabirds based on pre-application PIPs submitted to the USFWS and DLNR by prospective participants. The location of Covered Activities encompasses light attraction anywhere on the island of Kaua‘i where light structures may occur, and State Lands where mitigation will occur.

3.1 ACTIVITIES COVERED BY THE PERMITS

Two primary categories of Covered Activities likely to cause take of Covered Seabirds are addressed under the: (1) artificial nighttime lighting; and (2) conservation program activities. Each of these categories is discussed below. The mechanism and effects of each of the Covered Activities are described in Chapter 4 (Section 4.2).

3.1.1 ARTIFICIAL LIGHTING

The KSHCP covers incidental take requests involving a full range of lighting types present on Kaua'i. Kaua'i contains a variety of lighting types, the specific type and intensity of which depend upon the purpose for the lighting. Under the KSHCP, all types of artificial lighting including land-based lights found at parks, retail stores, resorts, condominium complexes, agribusiness and industrial facilities, as well as lighting on ocean-going vessels such as cruise ships, can be addressed in PIPs. Artificial lighting includes the placement and operation of current light structures, as well as the placement and operation of new or future lights that have similar effects.

Outdoor lighting fixtures may include, but are not limited to:

- Parking lot lights;
- Security lights;
- Searchlights, spotlights and floodlights;
- Building and structural or architectural lights;
- Building overhang and canopy lights;
- Landscape lights;
- Recreational lights;
- Signage lights; and
- Product display area lights.

Applicants to the KSHCP must submit a PIP, which provides detailed information on outdoor lighting, such as:

- Light type
- Make & model
- Light output (e.g. lumens) & bulb type
- Bulb color
- Quantity (number of fixtures)
- Location
- Purpose of the lights
- Direction of light angle (e.g. up, down, out)
- Full cut-off/shielded fixture (yes/no)
- Time on/Time off

In addition, PIPs must describe any lighting standards required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations) and any plans for future lights.

3.1.2 Conservation Program Activities

The KSHCP conservation program, described in detail in *Appendix A: Kahuama'a Seabird Preserve Management Plan*, is comprised of several activities that collectively may have the potential to "take" individuals of the Covered Seabirds. These 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.

Comprehensive take-avoidance measures and protocols have been developed to prevent adverse impacts to the Covered Seabirds as a result of these mitigation activities. The specific mitigation activities are summarized below. A complete description of these mitigation actions is provided in the Management Plan (*Appendix A*).

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

KSHCP biologists, contractors and technicians implementing mitigation activities will be required to adhere to the take-avoidance measures and protocols referred to as Best Management Practices (BMPs) in the Management Plan (*Appendix A*). The KSHCP Prime Contractor will ensure that all individuals with 1) a designated role to perform research or any handling of listed species necessary for mitigation monitoring activities and/or 2) a designated role to conduct removal of barn owls protected under the MBTA, shall have the necessary required qualifications and permits in advance of doing the work.

The KSHCP Prime Contractor will also ensure that all BMPs are followed and when necessary recommend changes or additions to these BMPs that will be included in the annual KSHCP reports to the USFWS and DLNR for approval and implementation.

3.2 COVERED WILDLIFE SPECIES

As discussed above, the KSHCP addresses: the ʻaʻo (*Puffinus auricularis newelli*), the ʻuaʻu (*Pterodroma sandwichensis*) and the ʻakēʻakē (*Oceanodroma castro*). Each of these birds is vulnerable to light attraction, particularly during their post-fledging departure from the breeding colony site, but also as adults. The distribution, abundance, population trends, life history, habitat selection and threats for each of these species are described in detail in *Appendix B: Covered Species Biological Details*.

The KSHCP primarily addresses the effects of light attraction on the Covered Seabirds, but also addresses the effects of artificial lighting on the honu (*Chelonia mydas*). Honu also breed on Kauaʻi, and hatchlings may become disoriented by artificial night time lighting (one of the Covered Activities, Section 3.1). No take of honu is anticipated under the KSHCP due to take avoidance and minimization provisions under the Plan. All relevant turtle information that was relied upon in the KSHCP (e.g. see the sections on effects of Covered Activities, estimating take, monitoring and minimization) is presented in Chapter 9. Information on honu distribution, abundance, population trends, life history, habitat selection and threats on Kauaʻi is described in detail in *Appendix B: Covered Species Biological Details*.

3.3 WHAT IS NOT COVERED IN THE KSHCP

The KSHCP does not address incidental take of any other listed species, including plants[1] or invertebrates, resulting from any of the Covered Activities, including installation of new lights. The maintenance and operation of all facilities and other structures covered under an ITL or ITP in association with the KSHCP shall avoid take of other listed species. If incidental take of species not covered under the KSHCP is likely to occur in conjunction with a specific ongoing or proposed Covered Activity, the Applicant would be ineligible to participate in the KSHCP (unless this take was covered under a separate HCP or through a similar regulatory process). Under those circumstances, the Applicant would need to obtain take authorization for all requested activities and species through a separate ITL and ITP, as appropriate.

[1] While the ESA does not prohibit take of listed plants, the State of Hawaiʻi under HRS 195D-4 does prohibit take of listed plants and may issue temporary incidental take licenses under its provisions.

4. EFFECTS OF THE KSHCP COVERED ACTIVITIES ON THE COVERED SEABIRDS

This chapter describes the effects of KSHCP Covered Activities (artificial lighting and the KSHCP conservation program) on the Covered Seabirds. The effects of KSHCP Covered Activities on honu are discussed in Chapter 9.

4.1 EFFECTS OF THE KSHCP CONSERVATION PROGRAM

The KSHCP conservation program includes a social attraction project to establish an ʻaʻo population within a 2ha fenced area. Predator fencing, predator removal and invasive plant species management are proposed as part of the social attraction project to protect seabird breeding habitat from degradation and non-native terrestrial predators which prey on seabird eggs, chicks, juveniles and adults. The KSHCP conservation program also includes barn owl and feral cat management activities to protect populations of the ʻaʻo, ʻuaʻu and ʻakēʻakē from these predator species. The social attraction project and barn owl and feral cat management activities will be conducted to facilitate successful seabird reproduction and survival to an extent that provides a net conservation benefit over the 30-year duration of the Plan relative to the number of Covered Seabirds that are likely to be subject to take due to nighttime lighting activities on Kauaʻi. As noted above in Chapter 2, the KSHCP conservation program also includes recovery, evaluation, rehabilitation and release to sea of "downed" (i.e. those who land from exhaustion after being attracted to artificial lights) Covered Seabirds.

4.1.1 SEABIRD SOCIAL ATTRACTION PROJECT - KAHUAMAʻA SEABIRD PRESERVE

Implementation of the seabird social attraction project at the Kahuamaʻa Seabird Preserve is expected to benefit the ʻaʻo. These benefits were estimated in terms of the increase in protected habitat as well as enhancement of the reproduction, numbers and distribution within the Preserve compared to existing baseline conditions for the species in this region of Kauaʻi.

The 2ha mitigation/social attraction site is located on Kalalau Rim in northwestern Kauaʻi at approximately 1,050m in elevation (i.e. mid- to high-elevation) at a similar elevation to occupied ʻaʻo nesting colonies in that region of the island. The habitat and topography were determined to be suitable for predator-proof fencing (L. Young, 2017, pers. comm.). Construction of a predator-proof fence around the native plant dominated habitat at the site will create a montane ecological system closed to terrestrial predators. Within the fenced site, breeding pairs will be attracted using a sound system after eradication of feral cats, rats, and ungulates (pigs, goats, and deer) is implemented. A cat and rodent control grid will also extend 50m around the outside perimeter of the fence to minimize or avoid future terrestrial predator invasion into the fenced site. Barn owl trapping and shooting will be carried out around the perimeter of the fence to protect seabirds recruited to and breeding within the preserve. Non-native, invasive weeds will also be removed within the fenced site to protect existing, native-dominated vegetation and prevent degradation of suitable seabird habitat.

Given the close proximity of known ʻaʻo breeding colonies to the social attraction site and the estimated flight paths of shearwaters using this area (USFWS 2017c, a) there is a high likelihood that prospecting shearwater adults and sub-adults will visit the site and be exposed to social

attraction cues. The social attraction site will be managed for the 30-year term of the KSHCP. Therefore, benefits to the ʻaʻo population on Kauaʻi are anticipated to occur until the end of the 30 year period, once the predator-proof fence is completed, predators are removed from the fenced area, and the social attraction is initiated and successful in establishing breeding seabirds within the fenced area.

The long-term management of the 2ha site, which currently contains high quality breeding habitat for seabirds at a level that may support large numbers of nesting seabirds, is critical to support recovery of the ʻaʻo. This will establish a new breeding colony within a fully protected, terrestrial predator-free area in a native-plant dominated montane ecosystem on the island of Kauaʻi. Predation and light impacts contribute to the range-wide endangerment of the ʻaʻo (USFWS 2017c). The KSHCP conservation program will support the recovery needs of the ʻaʻo as those needs are described in the Newell's Shearwater Landscape Strategy (USFWS 2017c), by creating and managing a new colony through social attraction in an area with minimal light impacts while mitigating threats at the colony.

Population modeling was used to calculate the anticipated increase in ʻaʻo reproduction of the population that will be recruited to and breed within the protected, fenced and managed site (*Appendix C: Social Attraction Benefit Estimator*). ʻAʻo reproduction and survival are impacted by predation at nesting colonies, from late March/early April through mid-November (Raine et al. 2017h). Thus, the beneficial effects for individual shearwaters are anticipated to occur during the breeding season. The beneficial effect on reproduction can be expressed as a change in the number of fledglings produced by the ʻaʻo pairs anticipated to breed within the fenced site compared to the existing condition for pairs breeding outside the fence. Based on surveys conducted at the site, there may already be some level of on-site breeding activity (*Appendix A: Kahuamaʻa Seabird Preserve Management Plan*). Between May 31 and June 3, 2016 and August 28-30, 2017, KSHCP staff conducted auditory surveys at the site and observed ʻaʻo transiting over the site, circling, and possibly calling from the ground on more than one occasion. However, because breeding is unconfirmed, the modeling of population change within the fence is assumed to have a starting population size of zero.

Based on the results of the population modeling, implementation of the seabird social attraction project over a 30 year period is anticipated to provide a reproductive benefit of 697 fledglings to the Kauaʻi ʻaʻo population (*Appendix C: Social Attraction Benefit Estimator*, Table 7). This benefit relies on the following assumptions: (1) completion of a predator exclusion fence protecting 2ha of native habitat by Year 2 of the KSHCP, (2) eradication of terrestrial predators within the fence (100% efficacy of removing feral cats, rats and ungulates) by Year 2, (3) initiation of social attraction in Year 2, (4) initiation of barn owl control around the perimeter of the fence in Year 1 (80% efficacy, discussed in Section 4.1.2), and (5) 10% of prospecting sub-adult birds are available for recruitment to the site (i.e., sub-adults, ages 2-5 years old, returning to Kauaʻi during the breeding season to prospect for nest sites and potential breeding partners). The 100% efficacy in terrestrial predators (ungulates, cats, rats) removal was considered achievable based on the successful eradication of these species in densely forested habitat within the Nihoku predator exclusion fence located at the Kīlauea

Point National Wildlife Refuge (PRC 2017). Additional information on ‘a‘o modeling assumptions for site fidelity, flight paths, burrow density and Kaua‘i population size are provided in *Appendix C: Social Attraction Benefit Estimator*. Although model outputs indicate the social attraction project could provide a reproductive benefit up to a maximum of 1,045 fledglings, the conservative estimate of 697 fledglings (*Appendix C: Social Attraction Benefit Estimator*, Table 7) was selected to provide a very high level of confidence and certainty in the reproductive outcome that will result from implementation of the project.

Establishing a seabird breeding colony in a terrestrial predator-free enclosure through the broadcasting of breeding calls is an effective and proven conservation tool (Gummer 2003, Sawyer and Fogle 2010, McIver et al. 2016). Jones and Kress (2012) evaluated 128 seabird restoration projects implemented to protect 47 seabird species in 100 locales in 14 countries worldwide. Many of the projects (73 of the 128) used either only acoustic playback or a combination of decoys and acoustics to attract seabirds. Thirty-four percent (16 of 47) of those projects aimed to restore threatened or critically endangered seabird species populations. The most successful seabird restoration projects worldwide (83% of successful projects) involved seabird species in the taxonomic family *Procellariidae*, in which the ‘a‘o belongs, demonstrating the high level of confidence in this restoration approach for the ‘a‘o.

4.1.2 Barn Owl and Feral Cat Control in Kalalau Valley

The benefits to the Covered Seabird populations from implementation of barn owl control and feral cat control in Kalalau Valley were estimated in terms of seabird distribution, reproduction, and numbers. Barn owl control will consist of trapping and shooting, carried out monthly, or as-needed, in identified territories of barn owls within Kalalau Valley. Observations by DLNR-DOFAW avian predator control technicians on Kaua‘i suggest a continuing invasion every 3 to 12 months of new individual barn owls, into territories where control efforts are carried out (G Reid 2017, pers. comm.). Feral cat control will consist of regular trapping, along the rim of the Kalalau Valley, an area where cats have been observed on a near-weekly basis (K Pias 2016, pers. comm.). The trapping and shooting of barn owls and feral cats will benefit existing nesting colonies of Covered Seabirds in Kalalau Valley throughout the term of the 30-Year plan duration. The effects of the barn owl and feral cat control in Kalalau Valley on the Covered Seabirds discussed in this section are in addition to the effects of the barn owl and feral cat control around the perimeter of the fence at the Kahuama‘a Seabird Preserve on ‘a‘o (discussed above).

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. According to population distribution models and data collected on seabird occurrence and threats, seabird predation by non-native barn owls and feral cats during the breeding season contributes to limiting the distribution of Covered Seabirds on the island of Kaua‘i (Troy et al. 2014, Raine et al. 2017e, USFWS 2017c). The Covered Seabirds are primarily susceptible to predation by barn owls and feral cats during the 6-9 months following breeding periods when they are present at nesting colonies. The specific period is species dependent: ‘a‘o, late

March/early April through mid-November (Raine et al. 2017i); ʻuaʻu, early April through end December (Raine et al. 2017i); and ʻakēʻakē, late May through mid -October (Raine et al. 2017c).

Immediate actions in Year 1 of the KSHCP to protect occupied breeding habitat of the Covered Seabirds from barn owls and feral cats, will address an important component of the survival and recovery needs of these species within the Kalalau Valley. The control of barn owls and feral cats will enhance adult survivorship and reproductive success of pairs breeding in the affected area (USFWS 2017b).

4.1.2.1 Benefits to the ʻAʻo from Barn Owl and Feral Cat Control

The ʻaʻo population in Kalalau Valley that will be protected is estimated at 2,700 birds, using statistical methods employed in USFWS (2017a). This meta-population size was projected by USFWS, based on statistical analyses of ʻaʻo calling data from auditory surveys conducted by the Kauaʻi Endangered Seabird Recovery Project (KESRP). The KESRP calling data was compiled by USFWS in Geographic Information Systems (GIS) that allows mapping of numbers of calls and their locations relative to specific areas on Kauaʻi. This information is packaged into separate polygons (i.e., shapes linked to geographic areas). As the data contained in KESRP polygons do not have an estimate of colony size, a statistically rigorous assessment relating calling data to information on environmental variables (e.g., slope, aspect) collected at known seabird breeding burrows was developed to proportion out the ʻaʻo population estimate into each polygon, allowing for meta-population estimates (Joyce 2013). The subset of the ʻaʻo meta-population within Kalalau Valley that is breeding outside the proposed 2ha fenced site is estimated to include 2,700 individuals.

The benefit of barn owl and feral cat control on ʻaʻo reproduction was estimated using a mitigation efficacy calculator (USFWS 2017a) and adjusted based on additional information on adult and chick distributions across the populations projected in the models, provided by the USFWS in May 2017. The effect on reproduction was expressed as a change in the number of fledglings produced by the breeding pairs estimated to breed in Kalalau Valley (outside of the 2ha Preserve site) compared to the existing condition. Implementation of barn owl control is anticipated to provide a reproductive benefit of five ʻaʻo fledglings per year and 150 fledglings over the 30-year duration of the KSHCP, based on the following assumptions: 80% decrease in barn owl predation of ʻaʻo in the Kalalau Valley; beginning barn owl control in Year 1 of the KSHCP; and otherwise low ʻaʻo predation levels within the Kalalau Valley (as defined in *Appendix C: Social Attraction Benefit Estimator*). These results (as well as the estimated benefit of feral cat control below) rely on the assumption that breeding adults protected by predator control (above the baseline level) will contribute to the anticipated fledglings increase in reproduction annually. Model estimates will be updated as needed with results of monitoring data, as described in Section 12.1.3 of *Appendix A: Kahuama'a Seabird Preserve Management Plan*.

The effectiveness of barn owl control in the Kalalau Valley will likely be limited by the level of barn owl detection, which is influenced by a frequency of monitoring and control activities.

Therefore, the KSHCP estimates assume an 80% reduction in the number of shearwaters predated by barn owls. For example, in 2015 in an area which has received intensive predator control since 2011 (Upper Limahuli), an adult ʻaʻo was found predated by a barn owl and at least one barn owl was observed hunting on multiple occasions (Raine et al. 2016b).

Implementation of feral cat control is expected to provide a reproductive benefit of ten ʻaʻo fledglings per year and 300 fledglings over the 30-year duration of the Plan. This is based on the following assumptions: 30% decrease feral cat predation of ʻaʻo in the Kalalau Valley; beginning feral cat control in Year 1 of the KSHCP; and otherwise low ʻaʻo predation levels within the Kalalau Valley (as defined in *Appendix C: Social Attraction Benefit Estimator*). This predation level is described in USFWS (2017a), and is consistent with modeling for the social attraction project (discussed above).

The spatial coverage of feral cat trapping will likely limit effectiveness of the feral cat control in the Kalalau Valley. Under the KSHCP, the feral cat control will suppress the ingress of feral cats via the rim of the valley (a known movement corridor of feral cats) into ʻaʻo breeding sites. The control is not expected to stem the influx of feral cats from the valley floor, where feral cats occur in high numbers (Pias 2016, pers. comm.). Further surveys are needed to evaluate the movement patterns of cats in the valley to determine the extent of primary cat corridors up valley walls to breeding sites. At nearby ʻaʻo nesting colonies within Hono o Nā Pali Natural Area Reserve (NAR), at least 11 ʻaʻo (8 adults and 3 chicks) were predated by feral cats over the two year period, 2014 -2015. During this same time cat control was ongoing in montane areas within the NAR (Raine and Banfield 2015a, Raine and Banfield 2015b, c, Raine et al. 2016a, Raine et al. 2016d, Raine et al. 2016e). Based on the above and the locations of ʻaʻo 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.

In addition, the estimated ʻaʻo reproductive benefit of predator control was based on the 2018 projected ʻaʻo population size. This estimate did not take into account the changes to the population in the valley throughout the Plan term from 1) ongoing impacts of remaining predation (rats, cats, pigs and barn owls) or 2) beneficial effects of establishing a breeding colony of ʻaʻo within the fully protected, terrestrial predator-free, fenced social attraction site (Section 4.1.1).

4.1.2.2 Benefits to the ʻUaʻu and ʻAkēʻakē from Barn Owl and Feral Cat Control

Due to the low amount of ʻuaʻu and ʻakēʻakē take anticipated to be covered under the KSHCP (described in Section 4.2.1), no modeling of these species populations was conducted to estimate the potential increase in their reproduction due to mitigation measures, inclusive of barn owl and feral cat control. However, these species are expected to experience some benefits from these mitigation measures.

One of the largest ʻuaʻu populations outside of the Haleakalā colony on the island of Maui breeds in Kauaʻi at Hono o Nā Pali NAR, adjacent to Kalalau Valley. In Hono o Nā Pali NAR, a minimum of 240 burrows were documented across several colonies, including the Pihea, Pohakea, and North Bog colonies (Raine et al. 2017h, f, g). The ʻuaʻu population breeding in native-dominated forest on the southwestern rim of Kalalau Valley is likely an extension of the Pihea colony.

Song meters and auditory surveys have been used to monitor the populations in this area because the terrain is often too steep to allow safe searching for burrows (Raine et al. 2017h). The same song meters monitored populations of both ʻaʻo and ʻuaʻu in this area, on 450 total nights and 501 total hours (Raine et al. 2017h). The song meters in this study were programmed to record 1 out of every 5 minutes, for 5 hours starting at sunset, then record 1 out of every 10 minutes for the 5 hours preceding sunrise.

In 2015, the highest number of calls detected by these song meters in the Kalalau rim area equaled approximately six ʻaʻo calls per minute (6.37 +/- 6.56 calls/minute +/- sd) and five ʻuaʻu calls per minute (4.77 +/- 4.24 calls/minute +/-sd) (Raine et al. 2016a). These sites were also surveyed in 2013 and 2014, and no significant differences were found between years for all three years of both ʻaʻo and ʻuaʻu monitoring (Raine et al. 2016a). Barn owls and feral cats regularly predate ʻuaʻu at their nesting colonies. For example, the carcasses of adult ʻuaʻu depredated by barn owls were found in the Upper Limahuli colony in 2011 (n=2) and in the Pohakea colony in 2013 (n=1) (Raine et al. 2017f). In Hono o Nā Pali NAR over the two year period (2014-2015) at least 36 seabirds were predated by feral cats of which seven carcasses were confirmed to be ʻuaʻu (4 adults and 3 chicks), 11 confirmed to be ʻaʻo, and the rest (n=18) could not be identified to species (Raine and Banfield 2015a, Raine and Banfield 2015b, c, Raine et al. 2016a, Raine et al. 2016d, Raine et al. 2016e).

Evidence of an ʻakēʻakē population in Kalalau Valley is based on detections of ʻakēʻakē vocalizations during their breeding season (Wood et al. 2002, Raine et al. 2017c). Additional ground and auditory surveys are needed to estimate the population of ʻakēʻakē in Kalalau Valley; however, auditory detections of high rates of calling indicate that ʻakēʻakē is likely breeding throughout the valley (Section 5.4, Figure 5-1 and *Appendix A: Kahuamaʻa Seabird Preserve Management Plan*). Raine et al. (2017c) reported that ʻakēʻakē calling rates in this area, detected during auditory surveys (conducted in 2006-2015), exceed 128 calls per hour. The carcass of a depredated ʻakēʻakē found on the Nā Pali Coast and observations of barn owls attracted to broadcast calls of ʻakēʻakē during banding sessions (Raine et al. 2017c) suggest barn owls regularly hunt this species. Feral cats are known to occur on the rim above the valley, between Honopū Valley and Kalalau Valley (Banfield et al. 2014), and are likely also preying on ʻakēʻakē breeding near the top of walls of Kalalau Valley (where calling has been heard, see Section 5.4, Figure 5-1 and *Appendix A: Kahuamaʻa Seabird Preserve Management Plan*).

It is reasonable to assume that the barn owl and feral cat control will provide an annual benefit of at least 2 fledglings and 2 adult or sub-adult ʻuaʻu and at least 1 fledgling and 1 adult ʻakēʻakē on Kauaʻi. This is based on known breeding activity of ʻuaʻu and ʻakēʻakē (discussed further

below) in the Kalalau Valley, records of predation by barn owls and feral cats of these species in nearby colonies, and the anticipated increase in reproduction and adult survival resulting from barn owl and feral cat control. Over the 30-year term of the KSHCP, this benefit totals 60 fledglings and 60 adults or sub-adults of ʻuaʻu as well as 30 fledglings and 30 adults or sub-adults of ʻakēʻakē.

4.1.3 Recovery and Release of Downed Seabirds

Reducing mortality of fledglings and adult seabirds that have been grounded (i.e. those that have landed and cannot regain flight from fatigue due to attraction to artificial lights) will contribute toward recovery of the Covered Seabird populations on Kauaʻi. All three of the Covered Seabirds are impacted by light attraction on Kauaʻi, although at different rates based on the Save our Shearwaters (SOS) program recovery data (Reed et al. 1985, Harrison et al. 1990, Cooper and Day 1998, DLNR 2016). The SOS is a nonprofit that collects, treats, and releases all native Hawaiian wildlife as well as grounded birds on Kauaʻi.

Research comparing the survival of SOS-released ʻaʻo fledglings to survival of fledglings that naturally disperse out to sea from montane breeding colonies (i.e., naturally-fledged) was carried out over 3 seabird fledging seasons (2014, 2016, and 2017). The research relied on tracking birds using satellite tags and comparing their survival rates over time.

The objective of the 2014 study was to evaluate attachment technique and tagging technology. The study selected only the healthiest SOS birds that were most likely to survive; birds deemed suitable for *immediate release* (within 1-2 days). The study found that all ʻaʻo fledglings in the study travelled to an area 2km southwest of the Hawaiian Islands. The tags transmitted location data for an average of 20-days (min = 11 d, max = 31 d, median = 18.5 d) (Raine et al. 2015, p. 6). All birds ceased to transmit movement activity within 2-weeks, based on an activity sensor in the tag that measures the animal's head tilt. The 2014 study demonstrated that SOS-released ʻaʻo fledglings were able to successfully travel to their pelagic foraging areas, however, the degree to which fitness levels of individuals of the Covered Species are improved by the SOS program after an injury, was unclear.

Therefore, research was conducted again in 2016 and 2017 to compare the survivability of birds beyond 14 days of SOS-released ʻaʻo fledglings to the survival of naturally fledged shearwaters. Fourteen days is expected to be the maximum time period in which a hatch-year bird would need to learn how to feed itself or succumb to starvation (Mougin et al. 2000), and is the time period in which we would expect the hatch-year bird to succumb to any unknown injuries from being grounded, if those injuries were present but not observed prior to release (Raine et al. 2017a). The 2016 study included individuals submitted to SOS and deemed healthy (e.g. good release weight, plumage, body condition, and lack of physical injuries) and suitable for immediate release (within 1-2 days). Data from 2016 resulted in 83% of both naturally fledged (from Upper Limahuli) and SOS-retrieved fledglings (n=12) that survived beyond 14-days. The 2017 tagging study used both SOS-birds suitable for immediate release and SOS-birds that had spent up to 14 days in rehabilitation to compare with naturally-fledged birds (Raine et al. 2018).

The 2017 study used only the individuals that met SOS standard release requirements[2]. One-hundred percent of SOS birds suitable for immediate release (n=4); 77% of SOS-rehabilitated birds (n=13); and 100% of a naturally fledged bird (n=1) survived at-sea beyond the two week threshold.

All SOS-released and naturally fledged hatch-year birds in the 2014, 2016, and 2017 studies, successfully traveled to foraging grounds at-sea southwest of the Hawaiian Islands and exhibited normal movement patterns as indicated from tagging data (Raine et al. 2015, Raine et al. 2017a, Raine et al. 2018). The length of time tags transmitted in 2016 and 2017 suggest that the 2014 cohort of tagged birds likely suffered due to weather or climatic conditions affecting food availability (Raine et al. 2016, Raine et al. 2017, p. 21) rather than effects from the tagging.

Additionally, in 2016, an adult ʻuaʻu that had collided with a powerline and was recovered and tagged with a satellite transmitter by KESRP and subsequently flew just under 50,000 km to foraging sites, transmitting for 159 days until the tag battery fell off (Raine et al. 2017b). The distance and time traveled by this ʻuaʻu suggests that some seabirds discovered and collected under powerlines following a serious injury (collision), and rehabilitated for a period of more than two days, may also experience the same foraging and movement patterns as a seabird that did not collide. However, the Hawaiian petrel, which was a breeding adult, did not return to its burrow that year and thus was a failed breeder. Nonetheless, it is important to note that without recovery and rehabilitation of downed birds, the potential for rehabilitation and survivability would not be possible.

4.2 IMPACT OF TAKING ON THE COVERED SPECIES

4.2.1 TAKE DUE TO ARTIFICIAL LIGHTING

Artificial lights affect the Covered Seabirds by degrading the transitory habitat for movement of fledglings in particular from the breeding colonies to the ocean. Fledgling seabirds may become confused or disoriented and suffer extreme fatigue when attracted to artificial lights. Seabirds affected by light attraction exhibit the following typical sequence of behaviors. Seabirds initially approach light sources from higher altitudes and exhibit a period of rapid flight and circling of lit areas. This is followed by descent and slowing of flight, and ultimately “fallout” by landing on the ground at locations where they normally would not have landed (Reed et al. 1985, Telfer et al. 1987) or colliding during flight with artificial structures such as wires, poles, or buildings (Ainley et al. 2001, Travers et al. 2016). Grounded seabirds can suffer injury, starvation, predation, or collision (e.g., with vehicles). Seabirds that collide in flight with artificial structures are commonly injured or killed.

[2] The SOS standard release requirements include no apparent injuries, good body condition (at least a 2 on a 3-point scale), normal mentation, good flap test, and non-damaged/non-contaminated plumage. Waterproofing also needs to be demonstrated for birds spending time in rehab (Raine et al. 2018). This group does not include birds which SOS consider ‘marginal’ releases (e.g., compromised due to feather condition).

Grounding Covered Seabirds due to light attraction is considered "take" in the form of 'harm and harass' under the ESA and State of Hawai'i laws; however, not all grounded seabirds experience the same level of injury. The KSHCP conservation measure of recovering, evaluating, rehabilitating (if needed), and releasing Covered Seabirds in adequate condition is anticipated to mitigate the injury or harm of the affected individual caused by light attraction when the individual released meets the SOS release standard and is released within 48 hours (2 days) of being grounded (see Section 4.1.3). Therefore, seabirds that receive this treatment are considered "non-lethal" take. Grounded seabirds that are not recovered (i.e., undiscovered seabirds) are considered to have been taken in the form of harm, however, these undiscovered seabirds are anticipated to eventually suffer mortality due to predation, vehicle collision, or starvation and dehydration. Therefore, seabirds that are killed due to collisions or other factors related to a grounding event, and grounded seabirds that are not recovered are referred to hereinafter as "lethal take".

Covered Seabirds turned into SOS that cannot be rehabilitated and released (e.g. due to severe injury or poor body condition) are euthanized. These seabirds and those that die under rehabilitation are also considered to be taken in the form of harm, and referred to hereinafter as "lethal take". Of the 'a'o recovered by SOS in the ten-year period (2006-2016), an 88% average were deemed to be in good condition and released back into the wild (SOS, unpublished data). The remaining average 12% resulted in mortality of downed 'a'o (i.e. seabirds turned in dead, those that died while in care, and those deemed unfit for release back into the wild (i.e. euthanized)).

This statistic is generalized for all birds turned in to SOS, and does not account for site-specific circumstances at each Applicant's facility. Each Applicant will review their individual SOS records to make a determination on the anticipated number of seabird injuries or mortalities that will result from their Covered Activities. The methods for KSHCP Applicants to determine the amount of take of Covered Seabirds at their facilities and to account for estimated injuries or mortalities are described in Section 6.2.2, which specifies the requirements for preparing a PIP. Rapid discovery of Covered Seabirds, proper handling, as well as awareness and education of seabird fallout is expected at a Participant facility(s) as part of minimization efforts required under the KSHCP (see Section 5.3). If carried out diligently, rapid discovery will contribute towards lower seabird mortality rates, and thus overall lower levels of lethal take at a Participant facility(s).

The timing of take of fledgling Covered Seabirds is primarily during the period when they leave their natal colony (the fledging period) from September 15 - December 15 each year. Adult Covered Seabirds may also be attracted to lights while transiting to and from their nesting colony, during the species' specific nesting periods (i.e. 'a'o, late March/early April through mid-November (Raine et al. 2017h); 'ua'u, early April to end December (Raine et al. 2017i); and 'akē'akē, late May through mid-October (Raine et al. 2017c)). Higher levels of seabird fledgling take are expected during new moon periods than during full moon periods, likely because the moon is one of the visual clues seabirds use for first time navigation to the sea (Telfer et al. 1987).

It is anticipated that the annual take of Covered Seabirds will remain constant over the 30-year duration of the KSHCP and its associated ITPs and ITLs, based on recent trends of SOS recoveries island-wide in Kaua‘i (‘a‘o, years 2011-2015; ‘ua‘u, 2000-2015). Over these years, SOS island-wide recoveries of the ‘a‘o and the ‘ua‘u have been stable (DLNR 2016), indicating a stable/consistent rate of threats to the current populations. It is important to note this stable annual downed rate of seabird recovery is at the latter half of the total time durations since first documentation of these threats occurred and after a ten year period (1993-2013) when the populations of ‘a‘o and ‘ua‘u were estimated to have declined by 94% and 78% respectively (average annual rate of ~13% and 6% respectively) (Raine et al. 2017d). One exception to the steady annual recovery rate during this period was a large fallout event in 2015 at the Kōke‘e Air Force base near ‘a‘o breeding colonies. Significant modifications to the light regime have since been made to minimize fallout threats at the base (USAF 2016). This indicates that even though development on the island of Kaua‘i may have increased lighting levels during these respective periods of time, island-wide, the threat of fallout of ‘a‘o and ‘ua‘u have been stable.

Because the KSHCP functions as a plan under which multiple entities may apply for incidental take authorization, it cannot be known exactly how much take will be covered under the KSHCP until potential permit recipients submit take requests and receive permits from the regulatory agencies. Therefore, estimates summarized in this section are considered the maximum take amounts that could be permitted under the KSHCP. An amendment to the KSHCP would be necessary if take requests exceed these maximum take amounts (see Section 6.13.1 and 6.13.2 on minor and major amendments). Individual take requests of entities participating in the KSHCP will be presented in PIPs and not described in this section.

4.2.1.1 Direct Take of Fledglings, Adults, and Sub-adults

The amount of take anticipated under the Plan, including annual and 30-year take amounts, is based on analyses of available data provided by DOFAW, USFWS, and prospective Applicants for an ITP and ITL under the KSHCP. During the development of the KSHCP, prospective Applicants were identified, contacted and encouraged to join the KSHCP. DOFAW provided pre-application technical assistance to interested parties using data analyses of SOS recovery records of the Covered Seabirds.

The annual take amounts under the KSHCP are totals of specific estimates derived using methodologies to estimate Applicant take as described in Section 6.2.2. The five-year average (2011-2015) of SOS recoveries at an Applicant’s facility(s) was used to estimate take amounts for ‘a‘o for individual Applicants. A 15-year period (2000-2015) of SOS recoveries was used to estimate take of the ‘ua‘u and ‘akē‘akē for individual Applicants because fallout of these species is a much rarer occurrence. Considerably fewer ‘ua‘u, and even less ‘akē‘akē, are grounded by light attraction according to recent SOS program recovery records (DLNR 2016). Of the total SOS recoveries of the Covered Seabirds in the years 2011 to 2015 (n=853, including fledglings, adults, and sub-adults), 5% were ‘ua‘u (n=43) and 0.6% were ‘akē‘akē (n=5).

The majority of the light attraction take on the island of Kaua‘i involves fledgling seabirds. Adults and sub-adults are occasionally found in association with bright lights, usually near

breeding colonies (e.g. northern region of the island of Kaua‘i). The percentage of adult ‘ua‘u and ‘akē‘akē (~20%) of the total for each species, is higher than ‘a‘o (~5%) in island-wide SOS recoveries of the Covered Seabirds. Less is known of the likelihood of adult take of petrels occurring at prospective Applicant facilities.

The background information described above on island-wide SOS recoveries, pertaining to the species composition, the percentage of seabirds deemed to be in good condition and released, and the likelihood of adult take per species, is not necessarily reflective of the fallout records of prospective Applicants. However, fallout of the prospective Applicants is expected to be stable, consistent with the recent, island-wide fallout trend. Table 4-1 describes the take anticipated under the KSHCP, including lighting impacts to Covered Seabirds resulting in mortality (lethal take) and impacts resulting in injury or harm with subsequent recovery, evaluation, rehabilitation (if needed) and release to sea (non-lethal take). In addition, take estimates assume implementation of ongoing lighting modifications (see Section 5.3) which may reduce impacts to seabirds, but do not completely eliminate lighting threats.

4.2.1.2 Indirect Take of Dependent Eggs or Chicks

The numbers of Covered Seabird chicks or eggs that are likely to be killed as a result of its parent’s death) due to light attraction were estimated (Table 4-1) using information on population demographics. Based on this information, up to two ‘a‘o chicks or eggs (1.75 rounded to 2) are likely to be killed over the 30-year KSHCP duration. This assumes 70% of adults killed due to light attraction would have been breeding and 50% of breeding attempts would have resulted in a chick fledging the nest (i.e. breeding probability of 70% and reproductive success of 50%) (Griesemer and Holmes 2011). Also, based on this information, up to 10 ‘ua‘u chicks or eggs (9.6 rounded) are likely to be killed over the 30-year term of the KSHCP, assuming a breeding probability of 89% (Simons 1984) and reproductive success of 72% (Simons 1985).

No data exists on the population demographics of ‘akē‘akē in the Hawaiian Archipelago. However, breeding probability and reproductive success of adult pairs in the European storm-petrel (*Hydrobates pelagicus*), a similar sized small seabird (Dunning 2008) in the same family (*Hydrobatidae*; order *Procellariiformes*) as the ‘akē‘akē, was estimated at 69% (Hemery et al. 1986 in Mougin et al. (1997)) and 53% to 63%. This range is from four studies, 1980 to 2001, in Cadiou (2001) and consistent with Sanz-Aguilar et al. (2008). Based on these data from an analogous species, three ‘akē‘akē chicks or eggs are likely to be killed over the 30-year Plan duration, assuming 69% breeding probability and 58% reproductive success (mid-point of above range).

An injury of a parent Covered Seabird and its subsequent rehabilitation and release of an adult (its survival) may disrupt incubation or provisioning patterns, and result in the loss of a chick or egg. Both ‘a‘o and ‘ua‘u parents take turns incubating the egg and provisioning the chick. Therefore, the number of Covered Seabird chicks or eggs that are likely to be killed as a result of this disruption of adult care was estimated using the population demographic information explained in the previous paragraph (Table 4-1).

Table 4-1. Maximum anticipated take amounts for the ʻaʻo, ʻuaʻu, and ʻakēʻakē under the KSHCP.

	Total Annual		Total 30-year	
	Mortality (Lethal)	**Injury (Non-lethal)**	**Mortality (Lethal)**	**Injury (Non-lethal)**
ʻaʻo				
Fledglings	30	45	900	1,350
Adults or sub-adults	0.33	0.33	10	10
Eggs/chicks	<0.1		2	
ʻuaʻu				
Fledglings, adults, or sub-adults	2	2	60	60
Eggs/chicks	0.33		10	
ʻakēʻakē				
Fledglings, adults or sub-adults	1	1	30	30
Eggs/chicks	0.1		3	

4.2.2 Take Impacts in Relation to Covered Seabird Population Size and Reproduction

To provide perspective on the impact to the affected Covered Seabirds' adult population and reproduction, the estimated take is expressed as a proportion of the adult population size and the number of fledglings produced annually for the Covered Seabirds' Kauaʻi populations. This value was calculated using the reproductive rates described in Section 4.1 and population estimates in *Appendix C: Social Attraction Benefit Estimator*.

In the Kauaʻi population of ʻaʻo, the annual mortality of 30 fledglings and less than 0.1 eggs or chicks (Table 4-1) represents 1.44% of the total fledglings produced or 2,086 fledglings. This assumes 63.7% of the population is adults, the reproductive rates are as described above, and a Year 1 population of 18,720 birds (*Appendix C: Social Attraction Benefit Estimator*, Table 3; 80% of this population in flight path estimates equals 14,976 birds). The mortality of 0.33 adult ʻaʻo per year represents less than 0.01% of the total estimated Kauaʻi adult population (11,925 adults).

The ʻuaʻu population residing on the island of Kauaʻi is estimated at 1,200 to 1,600 pairs (Ainley et al. 1997a, Pyle and Pyle 2009). At this level, the mortality of one adult per year due to light attraction would represent up to 0.03% to 0.04% of the Kauaʻi adult ʻuaʻu. In comparison, the mortality of 1.33 fledglings (or 4 fledglings over 30 years) and 0.33 eggs or chicks of the ʻuaʻu per year equals 0.16% to 0.22% of the total fledglings produced on Kauaʻi (an estimated population of 769 - 1,025 fledglings given the Kauaʻi breeding adult population range and reproductive rates as described above).

Based on the estimated Kauaʻi population of ʻakēʻakē of 171-221 breeding pairs, (Wood et al. 2002) and reproductive data of European storm petrel discussed above, the mortality of 0.6

fledglings and 0.1 eggs or chicks of the ʻakēʻakē per year represents 0.80% to 1% of the estimated total fledglings produced annually by this species (68 – 88 fledglings). Comparatively, the mortality of 0.6 adult ʻakēʻakē per year equals 0.14% to 0.18% of the Kauaʻi (342-442) adult population of this species.

4.2.3 Proportion of Island-wide Light Attraction Effects Covered under KSHCP

The total amount of take potentially covered under the KSHCP will be less than the total island-wide light attraction effects to the Covered Seabirds. Approximately 50% of the total downed birds recovered by SOS are not currently attributable to any specific, consistent, or known source of light attraction. For this portion of light attraction impact, there is currently no identifiable entity to apply for take authorization, though future efforts may be more successful in identifying such entities. Additionally, there are several entities with identified ongoing take that will be mitigated through other means (e.g., federal entities, KIUC, etc.). Finally, not all of the identified, eligible entities expressed interest in participating in the KSHCP.

Of the total island-wide light attraction fallout of the Covered Seabirds, the following is expected to be covered and mitigated for directly by the KSHCP (Table 4-2): about 18% of ʻaʻo take, 18% of ʻuaʻu take, and 50% of ʻakēʻakē take. Annual island-wide take estimates (rounded to whole numbers), denoted by the asterisk (*) in Table 4-2, are calculated from average SOS recoveries (2011–2015) with a 50% searcher efficiency rate to account for grounded birds present but not found (Ainley et al. 1995). Estimates of island-wide take and total amount addressed under the KSHCP do not include indirect effects to chicks or eggs.

Table 4-2. Proportion of island-wide light attraction take impacts covered under the KSHCP.

ʻAʻo	Annual	30-year	ʻUaʻu	Annual	30-year	ʻAkēʻakē	Annual	30-year
Total island-wide take estimate	322*	9,660	Total island-wide take estimate	17*	516	Total island-wide take estimate	2*	60
Total amount addressed under KSHCP	58	1,738	Total amount addressed under KSHCP	3	73	Total amount addressed under KSHCP	1	26
Proportion addressed under KSHCP	18%		Proportion addressed under KSHCP	18%		Proportion addressed under KSHCP	50%	

4.2.4 Timing of KSHCP - Impact of Delay in Mitigation Benefits in Relation to Take Impacts

As discussed in Section 4.1.3 above, under the KSHCP, light attraction-related take of fledgling, sub-adult, or adult Covered Seabirds resulting in injury (but not mortality), is likely to be offset

in the same year (i.e., in-year) by mitigation consisting of recovery, evaluation, rehabilitation (if necessary), and release to sea of downed seabirds. Seabird recovery and rehabilitation services will be provided throughout the duration of the Plan, either through the SOS program, or another rehabilitation provider (see Chapter 7 - Funding).

Barn owl control and feral cat control in the Kalalau Valley to be implemented under the KSHCP is anticipated to provide a complete, possibly greater than in-year offset of the total anticipated lethal take of ʻuaʻu and ʻakēʻakē proposed under the KSHCP (Section 4.1.3). Therefore, no delay in accruing reproductive benefits for these species is anticipated. While we expect the reproductive benefits from barn owl and feral cat control in the Kalalau Valley, to provide benefits to ʻaʻo reproduction (15 fledglings) beginning the first year of the KSHCP, given the estimated level of take of the ʻaʻo as a result of light attraction and the delay in accruing benefits to ʻaʻo reproduction from the seabird social attraction project, only a partial in-year offset of ʻaʻo take is anticipated in the first 12 years of the KSHCP implementation.

ʻAʻo reproductive benefits (i.e., via an increase in fledgling production) being provided by the seabird social attraction project are expected to be delayed due to a combination of factors. These primarily include: (1) the conservative estimate of the starting population within the fenced 2-ha site (zero); (2) the several years to recruit breeding adults and increase breeding adult numbers at the social attraction site; and (3) the time delay to breeding age (6 years old) of fledgling birds that return to breed at the site.

Under the KSHCP, the standard for mitigating take of the ʻaʻo resulting in mortality will be as follows: increasing ʻaʻo reproduction by one fledgling will be necessary to offset each fledgling or egg/chick mortality, and by 3 fledglings to offset the mortality of one adult, given an juvenile/sub-adult survivorship of 0.33 (Ainley et al. 2001). One out of the 15 ʻaʻo fledglings produced annually as a result of barn owl and feral cat control provides for a complete in-year offset for the adult ʻaʻo mortalities anticipated to be covered under the KSHCP (1 adult every 3 years or 0.33 annually). This means the reproductive benefits of the seabird social attraction project increases each year beginning in year 4 (*Appendix C: Social Attraction Benefit Estimator*). When these benefits are added to the remaining benefits of the barn owl and feral cat control (14 fledglings annually), there is a partial in-year offset of fledgling mortalities in Years 1 to 12 of the KSHCP, a complete in-year offset in Year 13, followed by a greater than in-year offset in Years 14-30 (Figure 4-1).

The delay in achieving mitigation benefits for the ʻaʻo as a result of the seabird social attraction project (*Appendix C: Social Attraction Benefit Estimator*) and the partial in-year offset of ʻaʻo fledgling take in Years 1 to 12 results in a loss of ʻaʻo productivity over the term of the KSHCP. Because of the delay, the Kauaʻi ʻaʻo population is likely to experience a loss in breeding productivity due to the mortality of fledglings that would have returned to breed as adults and the loss of productivity of their progeny and subsequent progeny. The number of ʻaʻo fledglings subject to take impacts that are not mitigated for in the same year as the take impact is shown in Figure 4-1, including 16 fledglings in Year 1, with a decreasing, in-year mitigation deficit from Years 4 until Year 12.

The loss in ‘a‘o reproduction represented by these impacts that are not mitigated in-year, represents progeny that would have survived to breeding as well as the loss in reproduction of their progeny and subsequent progeny. These effects were calculated for each year of the 30-year KSHCP, based on an ‘a‘o juvenile to adult survival of 0.28, breeding probability of 70%, and reproductive success of 50% (*Appendix C: Social Attraction Benefit Estimator*; Griesemer and Holmes (2011) low predation). The number of ‘a‘o fledglings that the surviving breeding adults, their progeny, would have produced is equal to 81 fledglings over 30 years.

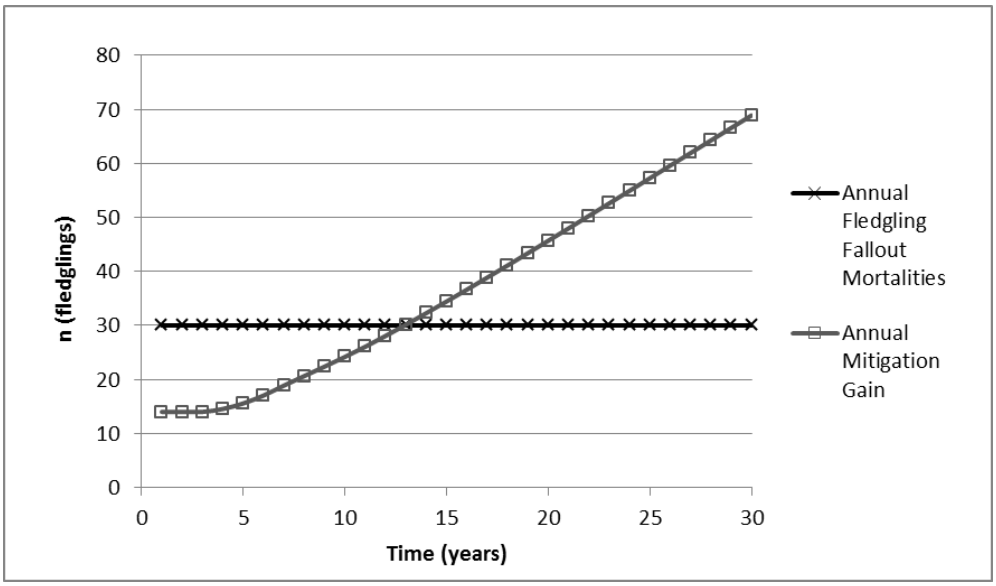

Figure 4-1. Annual take of fledgling ‘a‘o and annual increase in ‘a‘o fledglings (i.e. annual mitigation gain) likely to result from KSHCP conservation program*#

*Note: An annual increase of one out of the 15 fledgling ‘a‘o is not included in the annual mitigation gain, because the one ‘a‘o fledgling is anticipated to mitigate the proposed annual adult take of 0.33.
#This is a graph of a simplistic deterministic assessment to show the probable projected population increase in growth rate given the 5 year lag time that a protected fledgling reaches reproductive age.

4.3 NET EFFECTS OF ANTICIPATED TAKE IMPACTS AND THE KSHCP CONSERVATION PROGRAM

Over the 30-year term of the KSHCP, the seabird social attraction project, the barn owl control, and feral cat control are likely to result in a positive ‘a‘o reproduction output trajectory relative to the fledgling take impacts covered by the KSHCP. Due to the expected delay in productivity at the social attraction site, the Kaua‘i ‘a‘o population is likely to decrease by ~25 breeding adults (0.21% of the Kaua‘i adult population in 2018) by Year 16 of the KSHCP. However, in Year 27 of the KSHCP, the cumulative ‘a‘o fledglings produced by the conservation program (fledglings produced at the social attraction site plus by nesting ‘a‘o in areas subject to barn owl and feral cat control) is likely to exceed the total fledgling take and total loss of productivity in fledglings from the delay in mitigation (980.7) (Figure 4-2).

From Year 27 through Year 30, the KSHCP conservation program is likely to provide a net benefit to the ʻaʻo population of 136 fledglings (Figure 4-2). Note: if the requested take amount by KSHCP Participants is below the maximum level of take anticipated under the KSHCP (see Table 4-2), the conservation program would likely offset the take impacts more quickly than Year 27. Subtracting the 2 fledglings required to offset the chick/egg loss from mortality of 10 adult ʻaʻo over the 30-year term of the KSHCP results in a total net benefit of 134 fledglings. The resulting ʻaʻo fledgling mitigation replacement ratio (fledgling mortalities: fledglings produced) therefore would be 1:1.14 at the end of the plan term.

A complete in-year offset of adult ʻaʻo lethal take impacts covered under the KSHCP (an average of 1 adult every 3 years) is likely to be provided annually by the barn owl control and feral cat control along the rim of Kalalau Valley.

The net effect of the KSHCP is therefore predicted to be a positive impact on the range-wide population of the ʻaʻo by more than offsetting the adverse take impacts covered under the KSHCP. The overall effects of the take and the conservation program on the ʻaʻo population would result in a total net benefit of 134 fledglings. In Year 30, a population of ~372 shearwaters, growing at a rate of 8% per year (lambda of 1.08), would reside within the protected fence site; this represents ~6% of the projected total Kauaʻi ʻaʻo population at Year 30 (6,200 individuals; *Appendix C: Social Attraction Benefit Estimator*). While the annual level of ʻaʻo take under the KSHCP represents 1.44% of the anticipated total fledgling production and less than 0.01% of the Kauaʻi adult population (Section 4.2.1), the conservation program would result in protection of ~6% of the Kauaʻi population by year 30. This equals ~5.4% of the range-wide ʻaʻo population (6,888 individuals; 90% of ʻaʻo breed on Kauaʻi (Ainley et al. 2001).

The barn owl and feral cat control in Kalalau Valley is also predicted to have a positive impact on the range-wide population of the ʻuaʻu and ʻakēʻakē. Beginning in the first year of the KSHCP, the fledglings, adults or sub-adults, and eggs/chicks produced will exceed the annual take of one ʻuaʻu and 0.5 'akē'akē. Thirty years of barn owl and feral cat control is likely to provide a total net benefit to the Kauaʻi ʻuaʻu population of up to 82 individuals (Figure 4-3). This control will also provide, over the 30 years, a total net benefit to the Kauaʻi ʻakēʻakē of up to 44 individuals (Figure 4-3). Although the magnitude of the range-wide beneficial effect of KSHCP mitigation on the ʻuaʻu and the ʻakēʻakē is small, it is nevertheless positive and commensurate with the impact of the KSHCP on these species.

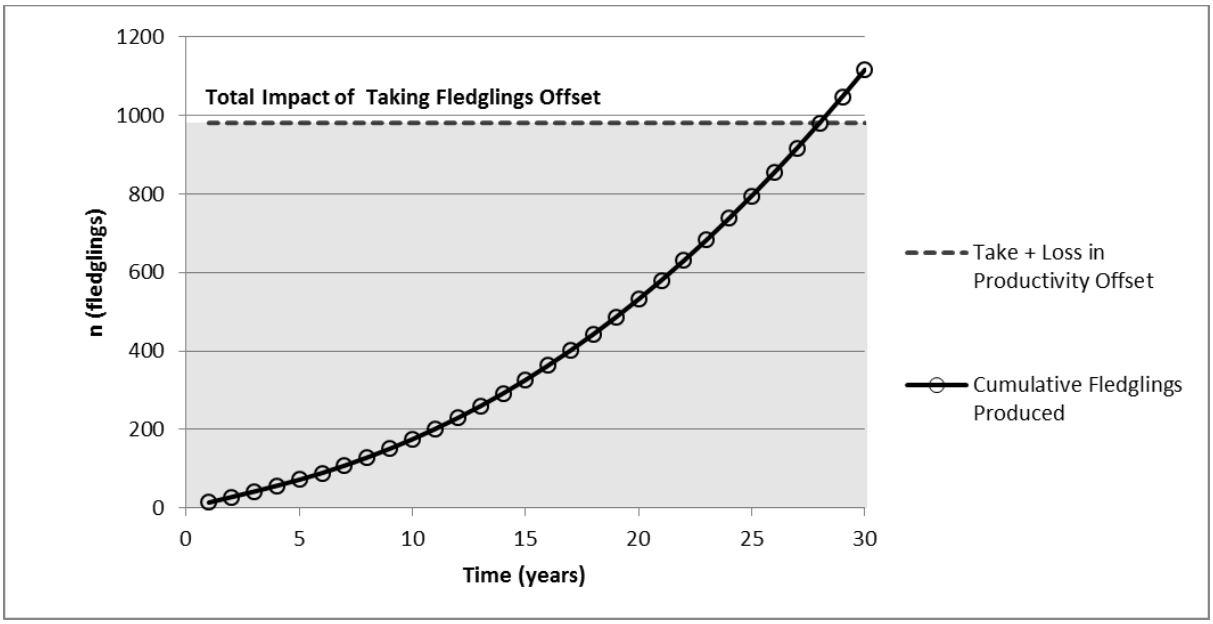

Figure 4-2. Cumulative ʻaʻo fledglings produced, in relation to the total fledgling production required to offset the total impact of the taking of the fledglings (including loss in productivity) in the KSHCP.

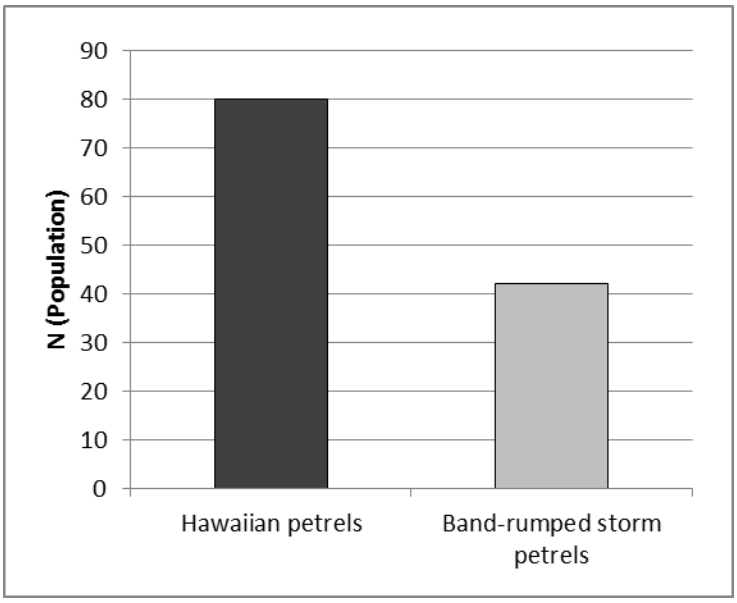

Figure 4-3. Total net benefit of 30 years of barn owl and feral cat control expressed in the number of individuals added to the Kauaʻi ʻuaʻu population and Kauaʻi ʻakēʻakē population.

5. KSHCP CONSERVATION PROGRAM

This chapter identifies the KHSCP conservation goals and objectives and outlines the:

- Avoidance and minimization measures to reduce take of the Covered Species
- Conservation measures to mitigate for the unavoidable effects of authorized take of the Covered Seabirds

5.1 BIOLOGICAL GOALS

Section 10(a)(2)(AB) of the ESA requires that an HCP Participant specify the measures that will be implemented to minimize and mitigate, to the maximum extent practicable, the impacts of the taking of any Federally listed animal species as a result of activities addressed by the plan.

As part of the "Five Point" Policy adopted by the USFWS and NMFS in 2000, HCPs must establish biological goals and objectives (65 *Federal Register* 35242, June 1, 2000). The purpose of the biological goals is to ensure that the operating conservation program in the HCP is consistent with the conservation and recovery goals established for the species. These goals are developed based on the species' biology, threats to the species, the potential effects of the Covered Activities and the scope of the HCP.

The biological goals described below serve as the foundation for the conservation measures that will be undertaken as part of the KSHCP.

Goal 1: Under the KSHCP, avoid and minimize take impacts to the Covered Seabirds caused by nighttime lighting on Kaua'i to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Seabirds represent a major threat to their survival and recovery.

Goal 2: Under the KSHCP, mitigate authorized take impacts of the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua'i to facilitate successful fledgling production at a level that over the 30-year Plan term offsets or exceeds the take impacts caused by Covered Activities on the production of fledglings in the wild.

5.2 BIOLOGICAL OBJECTIVES

The biological objectives defined below are intended to **provide specific and measurable targets** for achieving the KSHCP goals. The regulatory requirements to minimize and mitigate the impacts of the taking of the Covered Species form the foundation for the goals and objectives described in **Table 5-1**. This table lists all goals and objectives relevant to the KSHCP; however, not all objectives are relevant to all Participants. The explicit responsibilities that each Participant must uphold in order to meet the objectives of the KSHCP are described in detail in the individual Participant Inclusion Plans (PIPs) (see *Appendix D: PIP Template*).

It is important to note that since ʻaʻo take impacts comprise the majority of the take anticipated to be covered under the KSHCP, mitigation strategies under the KSHCP are primarily geared towards increasing productivity for this species. The minimization measures and conservation actions of the KSHCP will also serve to minimize the impacts on and offset requested take for the ʻuaʻu and the ʻakēʻakē.

Each PIP submitted in support of an ITL/ITP application must define the specific combination of minimization strategies to be implemented by the individual Participant (permittee) at their respective facility. The PIP must also define the level of funding that the Participant will provide to support implementation of KSHCP conservation measures to mitigate for the effects of their unavoidable take of the Covered Species. The proposed minimization plan should consider the needs and uses of lights, any regulations pertaining to the uses of lights, and the guidelines defined in Section 5.3 (Avoidance and Minimization) below.

Under the KSHCP, conservation measures will be implemented to mitigate the impacts of authorized take on the Covered Seabirds by all Participants in the Plan. While the KSHCP conservation measures follow the goals and objectives of approved recovery plans for the Covered Species, the actions are not, in and of themselves, intended to achieve recovery of the Covered Species. State of Hawai'i law (HRS Ch. 195D) requires that mitigation provide a net benefit to the Covered Species and the HCP shall "increase the likelihood that the species will survive and recover."

Federal law requires that in order for an ITP to be issued, the taking will be minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of survival and recovery of the listed species in the wild (16 USC 1539). In that regard, a combination of applicable minimization and mitigation measures in a PIP should be applied that are likely to avoid and/or minimize the impacts of the taking and mitigate unavoidable take impacts commensurate with the impact on the Covered Species. That determination will be made on an individual PIP basis according to the requirements for issuance of an ITP under Section 10(a)(2)(B) of the ESA.

Development of the conservation objectives (Table 5-1) for the KSHCP relied on various USFWS and DLNR recovery and management planning documents, including:

- USFWS Newell's Shearwater Landscape Strategy (USFWS 2017c);
- USFWS Appendix II. Modelling Methods and Results used to Inform the Newell's Shearwater Landscape Strategy (USFWS 2017a);
- Newell's Shearwater and Hawaiian Petrel Recovery: Five-year Action Plan (Holmes et al. 2015);
- Newell's Shearwater Population Modeling for HCP and Recovery Planning (Griesemer and Holmes 2011);
- USFWS Seabird Conservation Plan – Pacific Region (USFWS 2005);
- DLNR Hawaiʻi's Comprehensive Wildlife Conservation Strategy (Mitchell et al. 2005); and

- USFWS Recovery Plan for the Hawaiian Dark-rumped Petrel and the Manx Shearwater (USFWS 1983).

An emphasis was placed on considering most current available scientific information in developing the conservation objectives of the KSHCP relative to Covered Seabirds. Much of the current data (including the results of colony-based conservation and monitoring work) has been gathered by KESRP funded under the KIUC Short-term Seabird HCP (Raine et al. 2017h, f, i, g). Funding has also been provided by the National Fish and Wildlife Foundation (NFWF), St. Regis, and the State Wildlife Grant (SWG) program.

Table 5-1 lists the biological goals and objectives of the KSHCP. These are key to the KSHCP conservation framework. Objectives will be met annually if a year is not specified. Additional tables in subsequent sections and in *Appendix A: Kahuamaʻa Seabird Preserve Management Plan* detail how these objectives will be achieved and monitored, and how mitigation credit will be determined for each objective. Objectives 1.E and 2.I address honu; all other honu objectives are detailed in in Chapter 9.

Table 5-1. Biological goals and objectives of the KSHCP.

Biological Goals	Biological Objectives
Goal 1: Under the KSHCP, avoid and minimize take impacts to the Covered Species caused by nighttime lighting on Kauaʻi to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Species represent a major threat to their survival and recovery.	1.A. Avoid and minimize the impacts of the taking of Covered Seabirds due to light attraction by removing or turning off lighting, and altering light structure and function by the end of Year 1, as specified in PIPs.
	1.B. Minimize mortality of Covered Seabirds downed due to light attraction by implementing actions to reduce presence of free-roaming seabird predators such as cats and dogs at Participant facilities, as specified in PIPs.
	1.C. Minimize mortality of Covered Seabirds downed due to light attraction by conducting annual Worker Seabird Awareness and Response Training (WSART), as specified in PIPs.
	1.D. Minimize mortality of Covered Seabirds downed due to light attraction by implementing seabird awareness outreach to the public, guests, and customers at Participant facilities as specified in PIPs.
	1.E. 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
	1.F. Implement recovery and release of Covered Seabirds downed due to light attraction through the Save Our Shearwaters (SOS) program or other certified rehabilitation facility.

Goal 2: Under the KSHCP, mitigate authorized take impacts to the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua‘i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of light attraction take caused by Covered Activities on the production of fledglings in the wild.	2.A. Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at the mitigation site in Year 1 of KSHCP implementation.
	2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project.
	2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation.
	2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation.
	2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 of KSHCP implementation.
	2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP implementation.
	2.G. Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP.
	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.
	2.I. Annual protection of any honu nests adjacent to facilities via shielding or other measures to avoid light attraction take.

5.3 MEASURES TO AVOID AND MINIMIZE TAKE IMPACTS (BIOLOGICAL GOAL 1)

Measures to avoid and minimize the impacts of light attraction on the Covered Species are an integral part of the KSHCP. Avoidance measures and minimization measures aim to reduce the potential for take of a Covered Species. The avoidance and minimization efforts outlined below, and detailed in *Appendix E: Guidelines for Adjusting Lighting at Facilities* reflect the best available science on seabird friendly lighting.

5.3.1 Adjusting Lighting at Facilities

Appendix E: Guidelines for Adjusting Lighting at Facilities includes the following measures to avoid and minimize take impacts to Covered Seabirds:

- 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

These guidelines are intended to be used in individual PIPs submitted to the USFWS and DLNR as part of the application process. Under the KSHCP, all minimization measures must be implemented within Year 1 of an ITP/ITL and maintained throughout the life of the permit/license. Compliance with the avoidance and minimization measures in PIPs will be monitored and reported at the onset of the KHSCP, and annually thereafter (see Section 6.8.1). New facilities or expansion of existing facilities identified in PIPs shall use, as appropriate, the avoidance and minimization measures described in this section.

The installation of "new" lights (those that are proposed or planned but do not exist at the time of the application for take permit/license) has the potential to exacerbate existing adverse light attraction impacts on Covered Seabirds and cause fallout (i.e. take) of seabirds. Participants in the KSHCP shall consult with the USFWS and the DLNR in advance on their plans to install new lights at existing facilities or to construct new facilities to determine the required avoidance and minimization measures. Depending on their potential impact, installation of new lights at an existing Participant's facility may require an amendment to a PIP and the permit that has been issued to a Participant.

5.3.2 Reducing Predators at Facilities (Objective 1.B)

Where minimization measures are not likely to result in the avoidance of seabird take, minimizing mortality of downed seabirds is critical. 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 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.

The following measures are required, to reduce the potential for Covered Seabird predation at Participant facilities:

1) Prohibit loose, free-roaming cats and dogs (e.g. leash and/or restrain). This prohibition will be clearly communicated with appropriate signage; and
2) Conduct a trapping and removal program at the facility for feral cats and dogs; feral animals should be taken to the Humane Society and not returned to the facility even if neutered.

Minimization measures will be described in individual PIPs submitted to the USFWS and DLNR as part of the application process. All measures to reduce presence of predators must be implemented within Year 1 of an ITP/ITL, and as needed throughout the life of the permit/license, if predators are present at Participant facilities (see Section 6.8.3 and requirement to record predator presence).

5.3.3 Conducting Seabird Awareness Training and Outreach (Objectives 1.C & 1.D)

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 is required to conduct annual outreach and training for workers at their facilities that is specific to Covered Seabirds, beginning in Year 1 of the KSHCP. A detailed slideshow presentation was developed on this subject will be provided by the Prime Contractor staff on request; handouts are also provided in this document under *Appendix F: Training and Outreach Materials*. Other presentations or programs could be developed to meet this objective, subject to approval by the Prime Contractor. The goal is to properly 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.

Each Participant will also produce 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 will supplement efforts of Participant staff members by encouraging more "eyes on the ground" to identify and recover downed seabirds. Outreach at facilities can also help increase general awareness of endangered species issues on Kaua'i.

Outreach materials may include, but are not limited to:

- Making guests/residents aware of the requirement to close blinds/curtains during seabird fallout season to reduce light attraction caused by interior lights;
- Seabird identification information;
- Location of nearest SOS aid stations;
- Instructions for handling seabirds and notifying appropriate staff; and

- Coloring books, children's activity books, cartoon depictions, or other means of educating young age groups.

5.3.4 Recovery and Release of Downed Seabirds (Objective 1.E)

5.3.4.1 Recovery of Downed Seabirds

To adequately achieve Objective 1.E, all Participants are required to strive to recover all downed birds at their facilities and to notify the SOS program and the wildlife agencies as soon as possible as to the location, time and condition of all Covered Seabirds found and recovered. This objective requires that PIPs include a formal, organized search strategy to find downed seabirds. Participant Monitoring Plans, included in PIPs are required to include details on the search strategy, including a map of search routes (which should vary), the frequency of searches, likely problem locations and how these locations will be searched, the personnel involved, time required to complete the searches, date(s) on which searching will be conducted and how data will be collected and presented. PIPs will also include specific procedures for handling downed seabirds that are found and recovered. See *Appendix D: PIP Template*.

5.3.4.2 Rehabilitation and Release of Downed Seabirds

KSHCP Participants must submit downed seabirds to an appropriately permitted rehabilitation facility where the birds can be evaluated, treated as needed, and released if possible. Currently all downed birds on Kaua'i are turned into the SOS program. This program has been in existence since 1978, when the DLNR initiated this community-based conservation effort. Funding to perpetuate the SOS program has come from various sources, but has been primarily funded via the KIUC since 2005, initially as part of their Short Term HCP. KIUC has stated their intent to continue funding the SOS program for a portion of their long term HCP (i.e. the KIUC Long Term HCP, in prep). In the event that the SOS program is no longer available, a veterinarian with appropriate permits to handle listed species would be hired by the Prime Contractor to accomplish this minimization measure (see Section 6.11.12).

The SOS program facility is Federal and State licensed. SOS staff process all downed seabirds and rehabilitate those that require additional care to improve their health and overall condition before release. Downed seabirds are assumed to be able to contribute successfully to population productivity if they are deemed healthy and are successfully released in a timely manner. Through the SOS evaluation process, downed seabirds receive a thorough physical examination including testing of feather waterproofing and treatment of injuries as necessary. In addition, any downed seabirds found dead at a Participant facility property will be turned into the SOS program for research (autopsy, discovery of cause of death, stomach contents analysis) and record keeping purposes.

5.4 CONSERVATION MEASURES TO MITIGATE UNAVOIDABLE IMPACTS (BIOLOGICAL GOAL 2)

Mitigation to offset authorized incidental take of the Covered Seabirds consists of conservation activities to increase breeding probability, breeding success and survival of the Covered Seabirds, and provide a net conservation benefit over the 30-year duration of the KSHCP.

To achieve this objective, a seabird preserve (the Kahuamaʻa Seabird Preserve) will be created. Conservation actions at this site will include terrestrial predator proof fencing, predator eradication and the implementation of social attraction (playing Covered Seabird calls to attract birds on the flyway from neighboring colonies to breed inside the protected predator proof fence). Feral cat control will be conducted to prevent the ingress of cats into the Kalalau Valley colonies as well as keep cats away from the fenceline to prevent reinvasion inside the predator proof fence. Barn owl control will be conducted to further reduce the threat from predation.

Predation at breeding colonies is a primary threat to the survival of the Covered Seabirds (Ainley et al. 2001, Griesemer and Holmes 2011, Raine et al. 2017c, Raine et al. 2017e). Abating the threat of predation through fencing, predator removal, and social attraction is predicted to mitigate the effects of the take authorized under the KSHCP by increasing the breeding production of the Covered Seabirds from the baseline existing condition. The seabird preserve site is located in the north-west of Kauaʻi, along the rim of the Kalalau Valley, straddling two State parks: Kōkeʻe and the Nā Pali Coast (Figure 5-1). The site is located in a geographic area known as Kahuamaʻa Flats. Full details on the creation and management of this seabird preserve are included in *Appendix A: Kahuamaʻa Seabird Preserve Management Plan*.

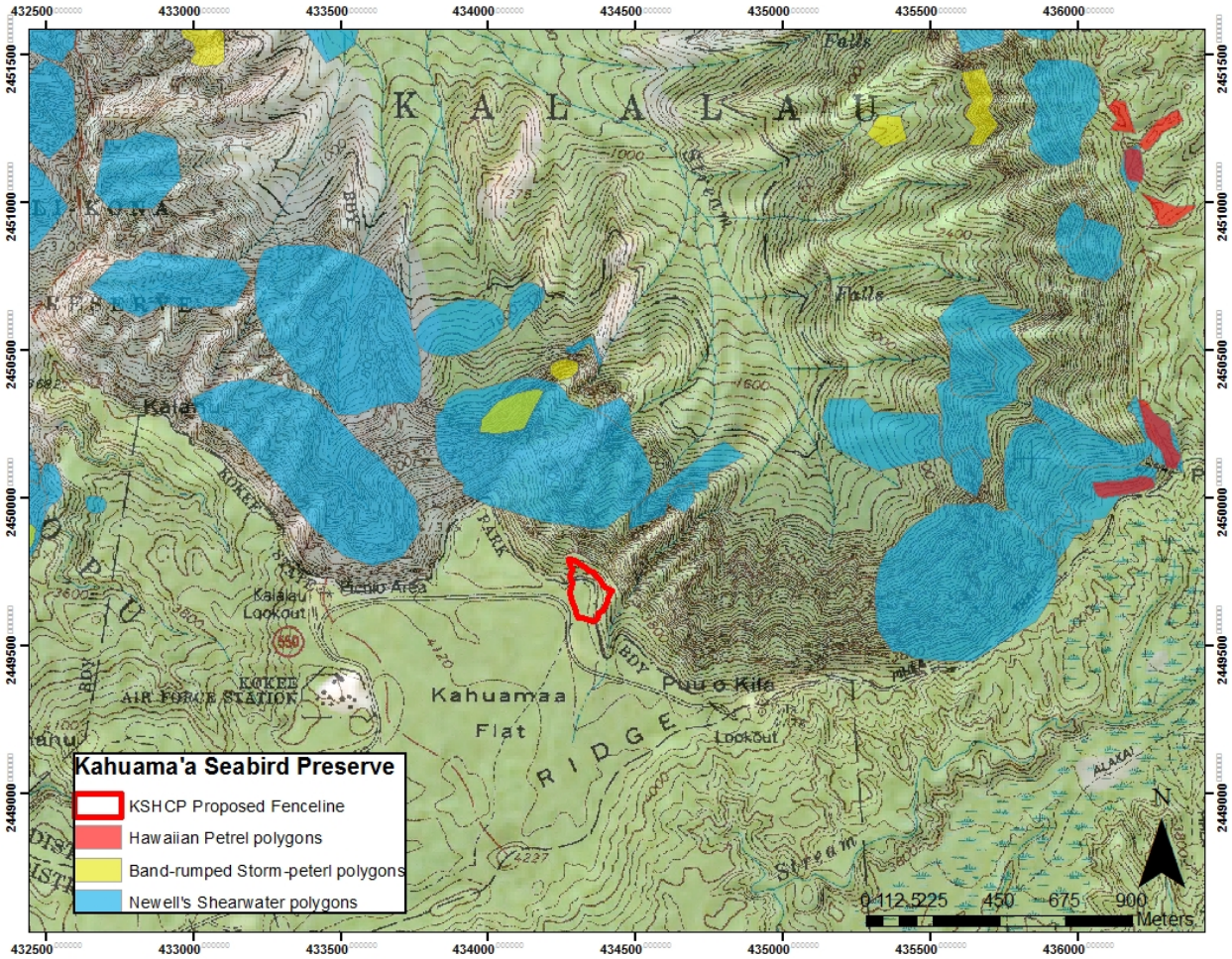

Figure 5-1. Kahuama‘a Seabird Preserve, located on the rim of the Kalalau Valley.

‘A‘o are the primary target of the conservation measures proposed at the Kahuama‘a Seabird preserve because the amount of take is higher than the other Covered Species and, therefore, likely to be requested by the ITP/ITL Applicants in their respective permit/license requests. The lower levels of anticipated take of ‘ua‘u and ‘akē‘akē by Participants will be offset through active predator control for the introduced barn owl around the preserve and the Kalalau Valley, where both of these seabird species are known to nest (see Figure 5-1).

The selection of a site for a predator proof fence and social attraction project as the primary mitigation strategy to offset take impacts under the KSHCP was based on extensive consultation with conservation agencies and experts in seabird biology using the latest scientific information and analysis. Construction and maintenance of a fenced, predator free enclosure is a preferred conservation measure because it creates a sanctuary for seabird breeding, and is the only assured way to remove all predators. Predator control work alone (without a fence) is not sufficient to prevent all depredation of seabird eggs, chicks, and adults and guarantee a sufficient level of productivity to offset the take impacts anticipated under the KSHCP.

Table 5-2 lists the selection criteria that were used to evaluate the preserve site, how the site ranked in relation to these criteria, and the data source used for the evaluation. These criteria were adapted from an unpublished social attraction site ranking system that was developed by KESRP and a group of experts working on Hawaiian seabirds in 2014 (A. Raine, 2016, pers. comm., Raine et al. 2014). Local experts, such as the KESRP Coordinator, fencing experts and other seabird biologists were consulted in the evaluation process. Through this process, it was clear that this site is ideal for the purposes of creating a mitigation site that is likely to contribute to the conservation of ‘a‘o.

Table 5-2. Ranking of mitigation site selection criteria.

Criteria	**Kahuama‘a Seabird Preserve ranking**	**Data Source**
Presence of breeding seabirds (at site, adjacent or transiting)	**Yes**: Adjacent and transiting	KESRP auditory surveys in surrounding area (2011_2016); song meter deployed at site in 2016; KSHCP auditory surveys on site (2016 & 2017)
Habitat Quality	**High** presence of native plant communities	Site visits; initial plant surveys
Line collision threat	**Low**	Powerline distribution maps
Light attraction threat	**Low**	No Light Conservation Zone (NLCZ) mapping (USFWS 2016)
Feasibility of predator removal	**High**	Expert opinion
Feasibility of fence construction	**High**	Expert opinion
Socio-political feasibility	**High**	Low hunting use; State Parks (land owner) willing
Site Access	**High**	Easy road access to site

The Kahuama‘a Seabird Preserve will enclose 2ha of high quality seabird breeding habitat and provides terrain desirable for nesting colonies in terms of slope, aspect and access. The proposed size of the preserve is consistent with other seabird social attraction sites in Hawai‘i (e.g. Makamaka‘ole on west Maui, Nihoku on Kaua‘i). An enclosure of this size allows for adequate space for both installation of artificial burrows, and also excavation of natural burrows.

A social attraction site has a lag time between the inception of seabird social attraction activities and the successful breeding of seabirds using the site. This is due to several factors, including seabird life history (birds usually begin breeding in year 6), and the time needed for the newly created colony to become established. In order to offset the seabird take impacts

that will occur during this lag time, the KSHCP conservation program will provide immediate benefit to the Covered Seabirds via a barn owl and feral cat control in the Kalalau Valley.

Barn owls are a known predator of endangered seabirds on Kaua‘i (Raine et al. 2017e). They are aerial predators with a large home range of up to 31 km^2 (Martin et al. 2014) which makes multiple seabird colonies vulnerable to predation. In addition, when one barn owl is removed from its territory, others quickly move in to occupy the empty territory (G. Reid, 2016, pers. comm.), thus barn owl control needs to be ongoing in any given area. Barn owl control removal is likely to provide both immediate and ongoing benefit to seabirds that breed inside the fence site, in the area around the fence site, and in surrounding source colonies. In this way, this action is likely to offset the take impacts of ‘ua‘u and ‘akē‘akē and help offset the take impacts of the ‘a‘o covered under the KSHCP.

Feral cat removal is also key to fulfilling Biological Goal 2 as it provides direct benefit to ‘a‘o source populations by removing a significant predator of seabird colonies in the Kalalau Valley. It also provides secondary benefit to the Kahuama‘a Seabird Preserve by reducing the number of feral cats in the vicinity that might attempt to scale the fence.

Barn owl and feral cat control are components of the KSHCP mitigation package that have the potential to be scaled marginally as an Adaptive Management response (Section 6.9.2). For example, cat trapping lines could be extended into hanging valleys where topography allows or barn owl control could be conducted in smaller adjacent valleys. However, at this time, based on known information on breeding colonies, Covered Seabird life history and habitat, it is not anticipated that expanding predator control within Kalalau Valley alone would provide benefits to completely offset take impacts anticipated under the Plan.

If Covered Activities under an HCP cause take in the form of harm by permanently altering or destroying the habitat of a listed species, then permanent mitigation must occur to offset this impact. In the case of the KSHCP, the Covered Activities will impact individual birds, not habitat (see Chapter 4). Under these circumstances, the mitigation offset must occur for the duration of the period where the take impacts caused by the Covered Activities are expected, but not into perpetuity. For the KSHCP, it is expected that at the end of the 30 year term the social attraction site will be heavily colonized and productive for seabirds, and will be a desirable ongoing project for either extension of the KSHCP, or as mitigation for a different program that must offset take impacts on the ‘a‘o. In the latter case, implementation of management activities as the social attraction site would then transfer to the appropriate program. However, in the circumstance that there is no funding available to continue management at this site past the current KSHCP permit term, then funds for Changed Circumstances/Adaptive Management will be used for decommissioning of the fence (see Contingency Funding discussion in Section 7.1).

The details on how the fence and social attraction site will be implemented are presented in *Appendix A: Kahuama‘a Seabird Preserve Management Plan*. This plan includes methods and

protocols for specific tasks, timelines, work plans, expected staffing requirements, best management practices, as well as monitoring.

5.4.1 Conservation Measure Alternatives Not Selected

A larger predator proof fence enclosure was considered, but modeling results showed that due to expected high density of nesting within the enclosure that will result from management at the site, an enclosure larger than 2ha would not reach carrying capacity within the 30 year permit term. Thus, expanding the size of the enclosure would not result in higher seabird production (see Discussion in *Appendix C: Social Attraction Estimator Model*).

The potential for a smaller predator proof fence enclosure was also considered, to determine if this could achieve necessary production of Covered Seabirds to offset the impacts of take under the KSHCP for a lower cost. It was determined that a minimum of approximately 2ha was necessary to allow for creation of a productive ʻaʻo colony and management of native vegetation for seabird habitat. Since the fence site needs to include sloped terrain to facilitate seabird takeoff, a 2ha site or larger minimizes the potential for fence collision during takeoffs and landings of seabirds and fledglings. A smaller unit would also not support enough suitable area for the installation of artificial burrows and habitat restoration for breeding birds to naturally create burrows and nest within the enclosure.

Another conservation measure alternative that was considered was translocation of Covered Seabird chicks to "jump start" the Preserve population within the social attraction site. This was considered not feasible for the following reasons. Considering the rarity of the ʻaʻo, the number of active and accessible source burrows is the primary limiting factor for translocation in any given year. Despite ongoing efforts to identify other breeding areas and locate active burrows, there are currently only five stable breeding colonies (Upper Limahuli Preserve, Pohakea, Hanakāpīʻai, Hanakoa, and Kīlauea Point National Wildlife Refuge) considered appropriate as a source for chicks for translocation (due to existing predator control and colony monitoring). All available chicks from these colonies are already being considered for another existing long-term translocation effort (the Nihoku site within Kīlauea Point NWR).

In addition, translocation of chicks requires extensive monitoring of remote colonies to locate nest sites that may be available for chick removal, predator control in these remote locations to offset human traffic during monitoring, and an extended period of care for translocated chicks. All of the above are costly, time intensive, and not likely necessary given the proximity of source seabird colonies to the Kahuamaʻa Seabird Preserve. Finally, unlike the Nihoku site, the selected fence enclosure site is located adjacent to the highest concentration of ʻaʻo nesting colonies on the island of Kauaʻi, thus providing high confidence that social attraction alone will attract birds to nest within the fence site. It is anticipated that social attraction at the Preserve will provide beneficial seabird production earlier than translocation would, because it attracts juvenile and breeding birds to the site immediately, instead of waiting five to seven years for the translocated chicks to return to begin prospecting and breeding.

Other conservation measures that were considered but not selected include rodent and feral pig control in colonies; predator proof fencing an existing seabird breeding colony; and contributing to a large scale watershed protection project with the Kaua‘i Watershed Alliance (KWA) that is planning to construct ungulate fencing in areas with active seabird nesting. Each of these options was not selected for multiple reasons. Rodent and feral pig control alone, without a fence, requires constant removal of predators to maintain benefit to breeding seabirds, has a lower nesting productivity than a fenced site and creates long lasting human trails within breeding colonies that may facilitate ongoing and enhanced predator presence. Building a predator proof fence directly around existing seabird colonies would provide immediate benefits, however most of the seabird nesting colonies that remain on Kaua‘i are in areas that are difficult to access, are in terrain where fencing is not feasible, or are already targeted for other fencing projects. Contributing to the KWA fencing program was considered infeasible because it (1) targets only removal of ungulates, and does not address feral cats and rats, and (2) logistically, ungulate removal would be carried out predominantly in areas with low endangered seabird numbers, and would have been very hard to quantify and monitor.

5.5 PERFORMANCE AND SUCCESS CRITERIA

The performance and success criteria for achieving the Goals and Objectives of the KSHCP are provided in detail in Section 7.6 on Mitigation Credit.

6. PLAN IMPLEMENTATION

This chapter discusses the implementation of the KSHCP and related aspects that reflect its programmatic structure and defines the roles, responsibilities, and obligations of all participating entities.

Each Participant in the KSHCP must submit a complete application for an ITP/ITL that will be processed by DLNR and USFWS. If applicable issuance requirements are met, an ITP/ITL will be issued to the Applicant. The ITP/ITL will authorize the Participant to incidentally take the Covered Seabirds in the course of implementing Covered Activities, provided all terms and conditions of the ITP/ITL are met.

Under the KSHCP, the Participants will oversee the implementation of the conservation and other plan-related actions and activities with the assistance of the National Fish and Wildlife Foundation (NFWF) and a Prime Contractor. NFWF will hold the funds received from the Participants for the term of the HCP and will make payments as described below to implement the conservation and other plan-related activities. A Prime Contractor selected by the Participants' Committee will implement the conservation and other plan-related activities.

6.1 ROLES AND RESPONSIBILITIES

6.1.1 PARTICIPANTS

A Participant in the KSHCP is defined as a non-Federal entity that has been issued an ITP from USFWS and an ITL from the DLNR (collectively referred to as "permits") under the KSHCP. Each Participant is responsible for ensuring compliance with the terms and conditions of their individual permits, including required funding assurances, implementation of minimization measures, monitoring of take, and fulfilling reporting requirements.

Participant roles and responsibilities include:

1) Compliance with the terms and conditions of their ITP/ITL and Implementing Agreement (IA);
2) Ensuring KSHCP implementation by:
    a. Funding and implementing all required site-specific minimization measures for Covered Activities as set forth in the PIP;
    b. Funding implementation of KSHCP conservation measures commensurate with the amount of take authorized under their ITP/ITL;
    c. Paying all applicable KSHCP-related fees according to the schedule;
    d. Implementing incidental take monitoring for Covered Seabirds;
    e. Monitoring for honu nests if Participant facilities are located on beachfront property(s) with suitable honu habitat and visible lights;
    f. Implementing honu nest protection measures as set forth in the PIP if an active nest(s) is found;

g. Submitting Annual Reports to the Prime Contractor, according to the schedule, that summarize all ITP/ITL related activities implemented, and results for that year;
h. Participating in periodic reviews of their facilities.

Under the KSHCP, Participants will provide funding which will be held by the National Fish and Wildlife Foundation and which will be used to conduct Plan-level mitigation actions according to the schedule established in the KSHCP and in accordance with the provisions of an approved PIP. The Participants' Committee made up of representatives from each of the Participants will select and contract with a Prime Contractor to conduct the required work to meet mitigation obligations under an ITP/ITL. The Prime Contractor may choose to sub-contract specific work to another entity as appropriate. This arrangement is 'Participant-initiated' mitigation and Participants remain ultimately responsible for implementing mitigation (including actions that may be necessary in response to Adaptive Management provisions of the Plan and the PIP) as defined herein.

6.1.2 National Fish and Wildlife Foundation (NFWF) and Prime Contractor

NFWF will establish two accounts in its fiduciary capacity to receive, manage and disburse certain funds to be deposited by the Participants for the purpose of implementing the KSHCP. The KSHCP Conservation Measures Implementation Funding Account will receive the annual payments from the Participants and act as the operating account of the KSHCP. Funds in this account will be used in the near term for mitigation (e.g. predator proof fence, seabird social attraction, barn owl and feral cat control, etc.) and project management (annual reports, coordination with agencies, etc.). The KSHCP Reserve Account will hold funds set aside for financial assurance, early withdrawal, and changed circumstances. NFWF will manage the accounts for the 30-year term of the KSHCP. NFWF will provide semi-annual accounting of the funds in its accounts to the Prime Contractor for use in the Annual Report to the agencies.[3]

NFWF will provide written notice to the wildlife agencies of its receipt of each of the payments required in Chapter 7, as represented in Table 7-2, from each Participant. Written notice may be provided by either U.S. mail or email to the addresses set forth in the Implementing Agreement, attached as Appendix G. The Participants will provide written notification to the wildlife agencies when disbursements are made from the Reserve Account.

The Participants' Committee, on behalf of all the individual Applicants, will procure and enter into an agreement with a Prime Contractor to perform the mitigation and project management measures outlined in the KSHCP. The responsibilities include implementing the Management Plan for the Kahuama'a Seabird Preserve as well as other KSHCP duties. The Prime Contractor

[3] The Participants anticipate that NFWF will be the financial institution. If NFWF is not the financial institution, the replacement for NFWF shall be capable of performing duties similar to NFWF for the KSHCP as agreed with approval from USFWS and DLNR.

will have conservation biology and project management experience and will hold 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. [4] The Prime Contractor will compile data for the Annual Reports on project progress.

Table 6-1. Duties and responsibilities for the Prime Contractor.

Responsibilities	Description of Duties
Budget requirements for field work and administrative tasks	Provide annual budget and requests funds to be allocated as necessary to cover field and administrative tasks
Annual meeting to update Participants	Update Participants; receive feedback
Annual reporting	Compile, write, and submit Annual Report pertaining to mitigation actions
Attend ESRC meetings, as requested; Annual ESRC presentation	Submit documents; attend meetings
Serve as liaison between mitigation work and regulatory wildlife agencies	Data collation as requested; conference calls; meetings; arrange site visits as needed
Serve as liaison between Participants and regulatory wildlife agencies	Conference calls; meetings
Seabird social attraction / terrestrial predator proof fence project / feral cat & barn owl control / effectiveness monitoring	Manage field operations
Minimization monitoring	Compile Participant reports for Annual Report
Seabird recovery and rehabilitation	Coordinate with SOS or contracted entity as needed; assist in coordination of Participant downed bird pick-ups
Take monitoring	Compile and review Participant reports and third-party facility monitoring reports
Adaptive management	Facilitate annual meetings; notify agencies of results and recommendations

[4] The Participants anticipate that the initial Prime Contractor will be Pacific Rim Conservation for the initial five years, with options to extend. If a Prime Contractor other than Pacific Rim Conservation is selected, Participants shall consult with USFWS and DLNR regarding selection of an alternate Prime Contractor. Participants shall not be required to obtain approval from USFWS and DLNR of an alternate Prime Contractor, provided that the alternate Prime Contractor has the qualifications stated above.

The Prime Contractor will compile, prepare, and submit necessary information to the USFWS and DLNR to enable the agencies to evaluate compliance with the terms and conditions of each ITP/ITL issued under the KSHCP. Table 6-1 below outlines the responsibilities of the Prime Contractor.

Under the terms of the permits issued, the Participants' Committee, on behalf of all the individual Applicants, will be responsible for ensuring that the actions and activities of the KSHCP are carried out properly and for selecting another Prime Contractor, if that becomes necessary.

6.1.3 STATE OF HAWAIʻI DEPARTMENT OF LAND AND NATURAL RESOURCES (DLNR)

6.1.3.1 Regulatory Role

The DLNR provides regulatory oversight for the State of Hawaiʻi, as authorized by statute, to ensure that all HCPs and ITLs issued by the Board of Land and Natural Resources (BLNR) comply with the provisions of applicable State of Hawaiʻi regulations. This section briefly outlines the regulatory role of DLNR as it pertains to the KSHCP if the Plan is approved and ITL/ITPs are issued (Table 6-2).

In 2011, the State Legislature approved HRS 195D-23 allowing the DLNR to collect fees and payment for costs incurred for use of DOFAW's technical assistance program in the development, review, or monitoring of a specific HCP. This service was not applicable to the development of the KSHCP which was funded by a series of ESA Section 6 HCP planning assistance grants from the USFWS, which also supported application assistance to an initial set of Applicants that participated during the development of the KSHCP.

Section 195D-21(f) of the Hawaiʻi Revised Statutes requires that Participants in an HCP submit an Annual Report to the DLNR. The DLNR through the Division of Forestry & Wildlife will review KSHCP Annual Reports for thoroughness, compliance, and effectiveness to ensure that the KSHCP is meeting its objectives and that Participants are each complying with the terms and conditions of ITLs issued.

Table 6-2. DLNR – DOFAW regulatory responsibilities and duties.

DLNR Regulatory Responsibilities	DOFAW ITL Section Duties
Authorize, amend, or revoke ITLs (as approved by BLNR)	• Coordinate with Endangered Species Recovery Committee (ESRC) to recommend approval, major amendments, or revoking of an ITL
Verification of compliance with each ITL issued under the KSHCP.	• Coordinate and ensure DOFAW Administrator is aware of any compliance issues
Funding and Mitigation Implementation Schedule	• Verify that funding was provided and track funding assurances • Review mitigation reports and implementation schedule • Verify implementation of mitigation actions
Effectiveness Monitoring	• Communicate with Prime Contractor regarding effectiveness monitoring • Visit seabird mitigation site as needed
Take Monitoring and Minimization Compliance	• Review downed wildlife or observed take reports
Adaptive Management	• Review KSHCP Annual Reports to determine if Adaptive Management triggers have been met • Attend and arrange meetings as needed • With USFWS, make determinations on appropriate Adaptive Management measures if required.
Consider recommendations from the ESRC	• Ensure ESRC receives Annual Reports to provide adequate recommendations for Adaptive Management as needed.
Submit for OEQC 60-day public comment period any new or significantly revised Participant Inclusion Plans (PIP)	• Assist Applicants with new or revised PIP(s)

6.1.4 Endangered Species Recovery Committee (ESRC)

As an advisory body to the Board of Land and Natural Resources (BLNR), the overall role of the ESRC is to makes recommendations to the BLNR regarding issues relating to endangered species, including the adequacy of HCPs and the issuance of ITLs. The role of the ESRC as defined in statute is to review the KSHCP and any applications for an ITL and to make a

recommendation to the Board for approval, disapproval, and recommendations for changes to the KSHCP and/or applications for ITLs. Under HRS §195D-25(b)(2) the ESRC shall also review the KSHCP annually to ensure compliance with the terms of the KSHCP and any ITLs issued and make recommendations for any necessary changes.

6.1.5 U. S. Fish and Wildlife Service (USFWS)

The USFWS is the Federal agency responsible for determining whether an ITP associated with an HCP for listed species under its jurisdiction meets issuance criteria and for monitoring and enforcing compliance with issued permits. The following points further describe the roles of the USFWS in the KSHCP:

1) As feasible, provide technical assistance to potential Applicants seeking incidental take authorization from the KSHCP in the drafting of their PIPs.
2) Process applications for ITPs under the KSHCP including providing an opportunity for public review and comment and environmental compliance, as applicable;
3) After considering public comments and all relevant information, issue decisions for applications for ITPs under the KSHCP;
4) Review KSHCP reports, ensure compliance with terms and conditions of each Participants' ITP, determine the effectiveness of monitoring, minimization, and mitigation actions conducted under the KSHCP, and provide technical assistance to the Participants, and with DLNR, make determinations regarding appropriate Adaptive Management measures;
5) Participate to provide technical assistance at ESRC meetings and KSHCP annual review meetings as needed;
6) Review and process amendments to the KSHCP and to ITPs; and
7) Take enforcement action as necessary and appropriate.

6.2 ENROLLMENT AND APPROVAL PERMITTING PROCESS

Enrollment refers to the process by which each Applicant applies for incidental take authorization under the KSHCP.

Each non-Federal entity requesting incidental take authorization will submit a PIP that incorporates the KSHCP by reference and addresses all criteria for permit/license issuance under both State and Federal regulations. The PIP demonstrates how each potential Participant will meet the terms and conditions set forth in the KSHCP. A PIP template is provided in the appendices (*Appendix D: PIP Template*) as a reference for future applicants. This PIP template is a suggested format. Applicants may, but are not required to, follow this suggested format.

The Applicant submits the following documents to USFWS and DLNR which together comprise a complete KSHCP "enrollment package":

a. Written request (e.g. cover letter) from the landowner, facility operator, or other responsible party that the wildlife agencies formally process the KSHCP enrollment package;
b. State and Federal application forms (with Federal application fee);
c. A completed PIP
d. The final KSHCP by reference.

The KSHCP "enrollment package" application will then be processed through the State and Federal approval processes, outlined below.

The initial enrollment period under the KSHCP will occur for Applicants who complete their enrollment packages prior to the start of the KSHCP public review process, and go through this process in conjunction with the KSHCP document. Going through public review in conjunction with the KSHCP minimizes the workload for initial Applicants, USFWS and DLNR. However, since each Applicant will be applying for a separate ITP/ITL, individual permits are not issued until each PIP has been accepted and approved.

If the BLNR and/or the USFWS issue an ITP/ITL to an entity, the Participant shall convey requisite funds for KSHCP fees to the designated NFWF accounts within 30 days of ITL/ITP issuance. Upon receipt of those funds, the effective date of the ITP/ITL will commence.

6.2.1 Pre-application Process

Applicants are encouraged to meet with DLNR and USFWS to discuss the requirements of the KSHCP and determine if enrollment application is advisable, including:

- Discuss the general effects of the Covered Activities on the Covered Species;
- Discuss measures to avoid take and determine if potential for take can be avoided or minimized as per guidelines in the KSHCP;
- For landowner or business Applicants considering new developments (or additions to existing facilities), the design of new developments offer opportunities to incorporate minimization measures that may be more difficult to implement after developments have been constructed. Those Applicants are encouraged to consult with the wildlife agencies early in the design process to:
    - Incorporate minimization measures in design of the development/facility addition;
    - Incorporate operational measures that minimizes the need for night lighting;
    - Consider other design options that would minimize or avoid potential for take of the Covered Species;
- Review terms and conditions of the KSHCP and the enrollment application process; and
- Review preparation of the PIP as well as the overall schedule for processing KSHCP applications through the State and Federal processes.

6.2.2 Completion of a Qualifying Participant Inclusion Plan (PIP)

A qualifying PIP is prepared by each Applicant and reviewed by the USFWS, the DLNR, and the ESRC as part of the State and Federal approval processes. The following list summarizes the required content that must be included in an Applicant's PIP:

- Facility ownership and contact information;
- Maps and legal descriptions (such as Tax Map Key) of the property boundaries;
- Maps depicting the locations of the Covered Activities (lights and utilities);
- A thorough and complete description of the Covered Activities, both existing and proposed over the life of the 30 year KSHCP duration;
- A minimization plan for the Covered Activities to reduce the effects of the activities, based on KSHCP guidelines. This section of the PIP will also describe alternatives to the taking that were considered and the reasons these alternatives were not selected;
- Honu minimization and monitoring plan (if applicable);
- Description of training for staff, and any outreach for guests/clients/residents that will occur to maximize seabird recovery at the facility through increased awareness;
- Predator control plan;
- Incidental take estimates for the Covered Species (see methodology below);
- The amount of incidental take authorization requested by species class;
- An incidental take monitoring plan that is based on KSHCP guidelines; and
- A description of the mechanisms that will assure funding over the requested ITP/ITL term (see Chapter 7).

New facilities, whether additions to existing Covered Activities or entirely new facilities, should consult early in the project design phase to evaluate the potential risks of incidental take and to ensure that avoidance and minimization measures are factored into project design to the maximum extent practicable.

As noted above, the DLNR and the USFWS may be able to assist Applicants by providing technical assistance in the preparation of the PIP. Such technical assistance may include, but is not limited to:

- Assist with the description of existing and proposed facilities containing the Covered Activities;
- Site assessments for Covered Activities;
- Assistance with identifying appropriate light attraction minimization measures;
- Refinement of facility take estimates; and other topics as needed.

6.2.2.1 Methods for Determining the Amount of Take of Covered Seabirds

a. Data from the SOS Program

The primary data source for determining annual take of Covered Seabirds is the Save our Shearwaters (SOS) program. This program has a long term and ongoing data set on downed seabirds. These data include information on species, age class, location where the bird was found, and the condition of the bird. Since SOS relies on the public to find and turn in downed birds, a system has been established to standardize collection and reporting. There are eleven SOS shearwater 'aid stations' located around the island. Each aid station contains individual cubbies to house birds, a whiteboard and instructions on recording relevant data for each bird. The aid stations are visited daily during the fledging season (September 15-December 15) by SOS staff. The SOS headquarters at the Kaua'i Humane Society is open year-round to accept any seabirds that might be downed outside of this time period. In addition, several of the potential Participants identified during development of the KSHCP have aid stations located at their facilities and have protocols in place to inform SOS when a downed seabird is found. The take calculation for an individual application may also include consideration of other site specific monitoring collection data where available to refine the SOS numbers. The assessment of where a downed seabird should be attributed to an Applicant's facility will be based on the best available data.

b. Calculating the Amount of Light Attraction Take

The calculation of light attraction take requires the following information:

1. The average number of downed birds on the Applicant's property that are found and turned into SOS;
2. The amount of "lethal" take calculated from the average number of downed birds that are found and turned into SOS ("observed lethal take");
3. The amount of "lethal" take attributable to downed birds that are not found on the property and assumed to be "lethal" take ("unobserved take");
4. The total estimated annual lethal take from light attraction; and
5. The Applicant's requested annual lethal take.

The sections below explain how each of these determinations is made.

1. Determining the annual average number of downed birds.

The first step is to determine the annual average number for downed birds. For the 'a'o (NESH), the annual average number of downed birds over the most recent 5-year period is used.

For the ʻuaʻu and ʻakēʻakē (HAPE and BRSP), the annual average number of downed birds over the most recent 15-year period is used. This longer period is used because the fallout of these species is a rarer occurrence.

In most instances an Applicant will choose to use SOS records to calculate its annual averages. However, the Agencies may permit an Applicant to use its own records of downed birds for this calculation if Applicant can demonstrate the reliability of those records.

2. Determining the annual average of observed lethal take.

All live birds discovered on an Applicant's property, whether they are discovered by Applicant or by another party, are turned in to SOS. For purposes of observed take estimation, an Applicant must account for the number of birds that are released to the wild by SOS and the number of birds that die in captivity. Of all discovered birds turned in to SOS (100 percent), 88 percent are released and 12 percent die in captivity (Unpublished SOS data, DOFAW 2018). Consequently, the Applicant multiplies its total observed take by 12% to determine its observed lethal take. The remaining 88% of the total is non-lethal take.

3. Determining the annual average of unobserved lethal take.

SOS data represents the "observed" take, i.e., the number of downed birds that are discovered annually on an Applicant's property and turned in to SOS. Ainley et al. (1995) conducted surveys to locate downed birds and reported an average 50% discovery rate. In other words, 'best available data,' indicates that only half of the birds that fallout from the effects of light are actually found and turned in to SOS. In order to account for "unobserved" take, the Applicant must assume that an equal number of birds is not found. The undiscovered birds are considered lethal take as they are likely killed due to injury, starvation, predation or collision (e.g., with vehicles).

Applicants have the option of demonstrating that they have a better discovery rate than the 50% discovery rate found in the literature. For example, at a small facility, with highly trained staff and excellent searching conditions, an Applicant may be able to demonstrate a higher searcher efficiency rate. In order to do so, an Applicant must demonstrate with supporting information (1) that it has higher searcher efficiency than the 50 percent searcher efficiency found in the literature; and (2) that it has created a predator control program that sufficiently minimizes the chance that carcasses will be carried away by predators and not counted. If an applicant believes it has met these requirements it may request in its PIP the assignment of a higher discovery rate. The wildlife agencies will each determine whether they will grant an Applicant's request to assign it a higher discovery rate which would reduce the unobserved lethal take.

4. Determining the total estimated annual lethal take from light attraction.

If the standard assumptions are used, the following formula summarizes the calculation of an annual estimate of lethal take:

Lethal take =100% undiscovered birds + 12% of birds that are discovered and turned into SOS

5. Determining the Applicant's requested annual lethal take.

After determining its estimated annual take from light attraction, the Applicant determines the annual take it will seek. An Applicant may wish to request additional take as a cushion so that it does not have unpermitted take over the life of the permit. Also, as set forth next, while most downed birds are fledglings, an Applicant may wish to increase its take request to account for an occasional downed adult.

The following table illustrates how take is calculated. In this scenario, the applicant's SOS data shows an average of three Newell's Shearwaters each year over the last five years, one-half a Hawaiian Petrel each year over the last fifteen years and one Band-rumped Storm Petrel each year over the last fifteen years. This applicant is unable to demonstrate better than 50% searcher efficiency.

Annual Take Calculation

	Newell's Shearwater	Hawaiian Petrel	Band-Rumped Storm-Petrel
1. Annual average number of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)	3	.5	1
2. Annual observed lethal take estimate (12% of 1, all downed birds)	.36*	.06	.12
3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)	3	.5	1
4. Total estimated annual lethal take from light attraction (2+3)	3.36**	.56	1.12
Requested Annual Lethal Take	4***	1***	1.12

* 3 x .12 = .36

** 3 + 0.36 = 3.36

*** This applicant has elected to request more take than projected because it anticipates an occasional downed adult (see discussion in item 5, above) and to provide a cushion so that it does not have unpermitted take.

c. Adult Light Attraction Take

Most downed seabirds, especially ʻaʻo, are fledglings (see Section 4.2.1); however, KSHCP Applicants may request incidental take coverage for adult/sub-adults due to light attraction. These take requests must also address indirect take of dependent eggs or chicks.[5] As described in section 4.2.1.1, an average take in total of all applicant take combined of 2 ʻaʻo adult every 3 years (1 lethal and 1 non-lethal), 2 ʻuaʻu every year (1 lethal and 1 non-lethal), and 1 ʻakēʻakē (0.5 lethal and 0.5 non-lethal) are anticipated under the Plan. As described in Section 4.3, a complete in-year offset of adult lethal take impacts covered under the KSHCP is likely to be provided annually by the barn owl control and feral cat control at Kalalau Valley.

The number of adult age-class birds must be converted to the equivalent number of fledgling age-class birds because costs are shared and most Applicants' take is anticipated to be for fledgling age-class. For the purposes of this HCP, the take of one adult of any Covered Seabird will equal take of 3 fledglings, assuming juvenile/sub-adult survivorship (i.e., percentage surviving till age 6) of 0.33.[6] In addition, the amount of indirect take associated with each direct take of an adult, lethal or non-lethal[7], will be as follows, assuming the reproductive information described in Section 4.2.1.2 (authorities for this information cited in parentheses):

- 0.18 chicks or eggs for each ʻaʻo take (Griesemer and Holmes 2011);
- 0.32 chicks or eggs for each ʻuaʻu take (Simons 1984, Simons 1985); and
- 0.20 chicks or eggs for each ʻakēʻakē take (Hemery et al. 1986 in Mougin et al. 1997, Cadiou 2001).

Consequently, the total fledgling offset for each direct adult take will equal 3.18 fledglings for each ʻaʻo take, 3.32 fledglings for each ʻuaʻu take, and 3.20 fledglings for each ʻakēʻakē take.

d. Extrapolating 30-year Take Estimates

The methods described above are used to determine estimates of annual lethal and non-lethal light attraction take for fledglings of each of the Covered Seabird species. For the purposes of the KSHCP, each Participant also needs to estimate a 30-year amount of fledgling light attraction take to determine overall take estimates for the permit term of the ITP and ITL. This is accomplished by simply multiplying the annual light attraction take estimates by 30.

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[5] Indirect impacts of covered activities are analyzed in the intra-Service section 7 consultation on ITP applications associated with an HCP (section 1.2.1 and 50 CFR 402.02). Indirect impacts are considered reasonably certain to occur when an adult(s) are attracted to artificial lighting (section 4.2.1.1). Therefore, applicants requesting coverage for direct take of adults must also request coverage of indirect take of eggs/chicks.
Indirect impacts of covered activities are analyzed in the intra-Service section 7 consultation on ITP applications associated with an HCP (section 1.2.1 and 50 CFR 402.02). Indirect impacts are considered reasonably certain to occur when a
n adult(s) are attracted to artificial lighting (section 4.2.1.1). Therefore, applicants requesting coverage for direct take of adults must also request coverage of indirect take of eggs/chicks.
patterns, and result in the loss of a chick or egg.

This method assumes that take due to the effects of light attraction will remain constant over the 30-year duration of the KSHCP and associated ITPs and ITLs. However, the population of ʻaʻo is estimated to have declined by 94% (at an average rate of ~13% per year) from 1993-2013 and is predicted to continue to decline (Raine et al. 2017d). Populations of ʻuaʻu are estimated to have declined by 78% (at an average rate of ~6% per year) during the same period (Raine et al. 2017d). Figures are not available for ʻakēʻakē. This would suggest a future decline in SOS program fallout numbers if fallout patterns track the overall population. However, between 2010 and 2015 fallout numbers have been stable for the ʻaʻo (Figure 6-1). Fallout numbers have been relatively constant for the ʻuaʻu since the year 2000. It is important to note that the up-tick in adult take numbers for 2015 represents one large fallout event that occurred at the Kōkeʻe Air Force base (see Raine et al. (2015) for details). Since this event, lights have been drastically reduced (or eliminated) to address this light attraction issue and KESRP surveys in 2016 found no downed birds when lights were turned off (Raine et al. 2016c, USFWS 2017b); new ground lighting is yet to be assessed.

Given this recent SOS program trend, the KSHCP assumes that light attraction take estimates will remain constant for the 30-year duration of the Program. This assumption, while conservative, also serves to ensure sufficient take coverage and mitigation are provided for KSHCP Participants. Recovery actions and conservation associated with this and other seabird HCPs may also contribute to significantly reducing the current declining population trends of the Covered Species.

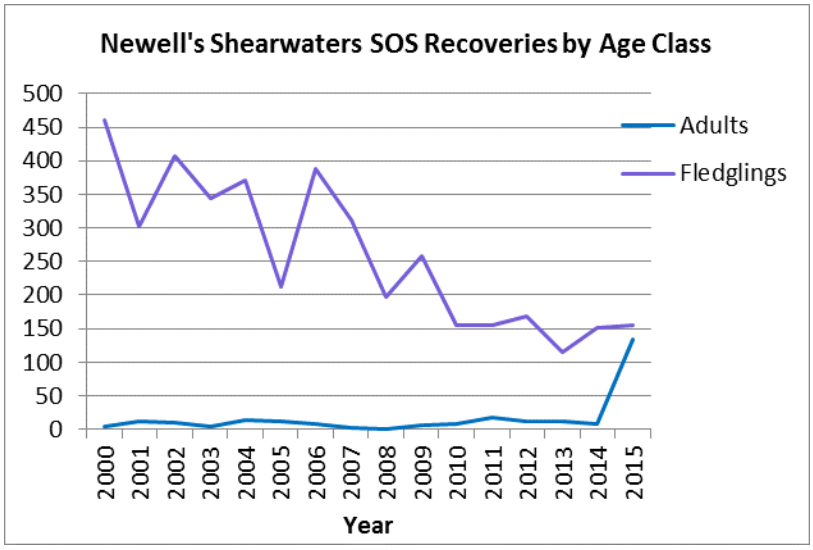

Figure 6-1: SOS program recoveries of ʻaʻo by age class 2000 -2015.

6.2.3 STATE APPROVAL PROCESS

The State of Hawaiʻi Board of Land and Natural Resources (BLNR) approval process of the KSHCP and ITL issuance decision process is outlined below. The process is separated into two steps: (a) approval of the KSHCP document and (b) approval of each PIP when submitted:

1. Review of the KSHCP document:
    a. The DLNR reviews the KSHCP for consistency with State regulations on the take of a listed species (HRS § 195D);
    b. The Office of Environmental Quality Control (OEQC) publishes in the periodic bulletin a notice of availability of the KSHCP document and associated PIPs for a 60-day (minimum) public comment period (HRS § 195D-21(6)); During the 60-day comment period:
    c. The DEA will post for a 30-day comment period;
    d. The Endangered Species Recovery Committee (ESRC) meets to review and comment on the KSHCP document;
    e. DOFAW holds a public meeting on Kauaʻi (HRS § 195D-4(g)(9);
    f. The ESRC conducts a public site visit/meeting;
    g. DOFAW addresses comments received in coordination with USFWS;
    h. ESRC meets to review the revisions resulting in the final draft and make a recommendation on the KSHCP package, to the BLNR;
    i. The BLNR issues a decision on the KSHCP and ITLs.
2. Review of each PIP when submitted for approval:
    a. OEQC publishes in the periodic bulletin a notice of availability of each completed PIP for a 60-day (minimum) public comment period;
    b. Endangered Species Recovery Committee (ESRC) reviews the PIPs, including take request and any staff recommendations, for consistency with the KSHCP terms and conditions and applicable State laws;
    c. The Applicant responds to comments received and revises PIP, if needed;
    d. The ESRC makes a recommendation to the BLNR on each PIP;
    e. The BLNR holds a public hearing on each ITL application (HRS § 195D-4(g)(9);
    f. BLNR Board Meeting to review applications;
    g. The BLNR issues a separate issuance decision for each ITL.

6.2.4 FEDERAL APPROVAL PROCESS

The USFWS ITP issuance decision process for an ITP is outlined below.

1. To streamline review of individual permit applications, USFWS publishes a Notice of Availability of the KSHCP document, each PIP submitted as part of the enrollment process, and a draft environmental assessment on the potential issuance of incidental take permits based on the KSHCP in the *Federal Register* for a public comment period;
2. USFWS responds to public comments received, advises DLNR of revisions or additional measures it believes are necessary or appropriate for purposes of the KSHCP, works with each Applicant to revise the PIP(s), if needed, and revises the EA, as appropriate;

3. USFWS prepares a Biological Opinion in accordance with the requirements of ESA Section 7 on the KSHCP to evaluate whether implementation of the KSHCP is: (1) likely to jeopardize listed species or destroy or adversely modify critical habitat;
4. USFWS determines whether it is appropriate to issue a NEPA Finding of No Significant Impact (FONSI) based on information in the EA, or to prepare an Environmental Impact Statement (EIS);
5. If necessary, USFWS conducts scoping and prepares an EIS;
6. USFWS prepares findings on the proposed ITP request for each PIP application to inform the permit decision and makes a decision whether to issue the permit.

6.3 LATE ENROLLMENT

The KSHCP is designed to be available as a mechanism for all non-Federal entities with ongoing take of Covered Seabirds to obtain an ITL/ITP. Throughout the development of the KSHCP (~10 year period), there were many attempts to recruit eligible Applicants, and distribute information regarding this unique opportunity. These efforts have included: public meetings, visits to potential Applicant facilities, producing informational flyers, maintaining a KSHCP website, and presentations at conferences.

After the initial decisions on the applications of Applicants who have completed the public review process simultaneously with the review of the KSHCP itself, other Applicants may be able to join the KSHCP during the 30 year term of the KSHCP provided that certain conditions, described below, are met. These Applicants must submit their PIPs to the Participants for review and concurrence, to the wildlife agencies for processing (which will include an opportunity for public review), and obtain permits. Permits issued would cover the added Participants' incidental take through the remaining duration of the KSHCP. For example, a new Applicant in the tenth year of implementation would request coverage for the remaining 20 years of the KSHCP. In the review of any Applicant's PIP, Participants may not engage in any discrimination that is prohibited by any applicable federal, state, or county law.

The KSHCP has been developed to accommodate a maximum annual and 30-year take number (see Section 4.2) for each of the Covered Seabirds. If the inclusion of additional Participants past the initial enrollment period does not exceed the maximum annual take threshold (Table 4-1), new Applicants may enroll as described above, and shared costs will be adjusted (see Section 7.4), provided however that such joinder shall not increase the costs to the Participants. If the addition of a new Applicant would exceed the maximum take number, then an amendment to the KSHCP would be required to revise the Plan as needed, provided however that such amendment shall not increase the costs to the Participants. Nothing in this section is intended to alter the changed circumstances and "no surprises" provisions of this KSHCP. If it is considered more cost effective for the Applicant seeking take coverage to initiate their own HCP, rather than amending the KSHCP, this will be recommended during pre-application discussions.

6.4 EARLY WITHDRAWAL AND DISCONTINUANCE OF PERMITTED ACTIVITY

Similarly, due to the unique nature of the KSHCP and the need to make it flexible to accommodate individual Participant needs, it is anticipated that some Participants may request Early Withdrawal. For this to occur, a Participant will need to provide written notice to the other Participants and the regulatory agencies sufficiently demonstrating: (1) that it has made all payments required up to the time of withdrawal and will pay any remaining funds required to ensure full mitigation for take that has occurred; and (2) why Covered Activities/incidental take will cease to occur at facilities. If, for example, all lights will be deactivated, then funds to cover requested take up to the point of Early Withdrawal will be collected, and the Financial Assurances and Changed Circumstances Payments will be retained in the NFWF accounts for use by the remaining Participants to defray KSHCP implementation costs (see Section 7.4.2). The Participants may elect to initiate a Major Amendment if there is a reduction of greater than 10% of the initial authorized take (see Section 6.13.2).

In addition, after surrendering the permit, the Participant will remain responsible for any outstanding minimization and mitigation measures required under terms of the permit for take that has occurred prior to surrender of the permit. Notice to USFWS must comply with the regulations applicable at the time of withdrawal (currently codified at 50 C.F.R. § 13.26.). Costs will be adjusted for remaining Participants as described in Section 7.4.

6.5 REVISED INCIDENTAL TAKE REQUEST

Another possibility is that Participants will wish to revise their initial incidental take requests. Take requests may be increased or decreased, depending on specific circumstances at facilities such as a need for additional lights, or in response to the results of take monitoring. Any proposed change to a Participant's take requests would require an amendment to the permit and PIP pursuant to regulations in effect at the time the Participant submits their request (as described in Section 6.14). If the incidental take request increases, the request will be evaluated to determine whether the conservation program can mitigate for additional take, and if so, the Participant will be responsible for increased funding to offset the additional take request, provided however that such take increase shall not increase the costs to the other Participants. If the incidental take request decreases, as described above with Early Withdrawal, Participants must ensure that their take amount is fully mitigated. Requests to amend take in PIPs should be submitted as part of Participant Annual Reports for review by regulatory agencies. Costs will be adjusted for remaining Participants as described in Section 7.4.

6.6 REPORTING REQUIREMENTS

Reporting is necessary to provide regular information and updates to the USFWS and the DLNR to ensure that the KSHCP is meeting its objectives and to demonstrate that each Participant is in compliance with the terms and conditions of its permit. Reporting will provide information to address compliance with the terms of the ITP/ITLs issued and effectiveness both of permits issued and of the KSHCP as a whole. This section outlines the reporting requirements of the responsible parties.

6.6.1 PARTICIPANTS' REPORTING REQUIREMENTS

6.6.1.1 Reporting Take of Covered Species

Within 24 hours of discovery, any Participant shall submit notice of any incidental or other take of any of the Covered Species at the authorized covered facilities via phone, email, or other written form to the USFWS, DLNR, Kaua'i DOFAW and SOS, including date, time and exact location where found, species (if known), and condition of the animal. The agencies will provide names, phone, and email contact information to the participants on a regular and updated basis of those individuals to be contacted.

Within one week of discovery, any Participant shall provide USFWS and DLNR Honolulu the completed "KSHCP Downed Seabird Form" and a description of any further actions taken or considered to minimize fallout at the incident location.

In addition to reporting take as required by the above protocols, a full take monitoring report will be submitted annually as part of Participant Annual Report, following protocols from Participant Monitoring Plans, which will be described in PIPs. The Participant Annual Report should include information as described in the next Section.

6.6.1.2 Participant Annual Reports

KSHCP Participants shall provide annual status updates covering the preceding calendar year to the Prime Contractor no later than **Jan 15** of each year. Photographs should be included in the Annual Report to illustrate any proposed changes to lighting, facility predator control programs, outreach and training or downed bird recovery protocols on site.

The status updates shall provide the following information:

a. Facility name, ownership and contact details;
b. Summary of any proposed changes to the facilities with potential to affect the Covered Species;
c. Changes to facility management or other key personnel involved in the KSHCP;
d. Request from a Participant to change minimization measures conducted at the facility and the reasons for the requested change (as needed);
e. Summary of the results of self-monitoring of take of the Covered Seabirds and monitoring for honu nests, including:
    i. Map of search route used for conducting searches;
    ii. Frequency of searches conducted;
    iii. Personnel involved in search efforts;
    iv. A summary table of the search effort results to include: number of birds or honu nests found, the date, time, and exact location where each was found, disposition of the birds or nests (if known), including description of any honu nest protection efforts implemented;
    v. A discussion of the efficacy of the current self-monitoring protocols and whether adjustments need to be made;
f. Summary discussion of the results of on-site animal control efforts;

g. Summary of worker training and outreach efforts;
h. Other relevant information that the wildlife agencies may require to verify compliance with permit issued.

6.6.1.3 Other Relevant Reporting

Some changes at facilities may require immediate reporting outside of the Annual Report time window. Participants must inform USFWS and DLNR prior to any of the following changes:

1. Changes in property ownership (may require permit transfer or amendment), Participant must report:
    a. New ownership name, company/organization;
    b. Primary and alternate contact information;
    c. Changes to property boundaries, planned or proposed, with updated map/survey of property.

    Any transfer of the Federal permit must be accomplished in accordance with the applicable regulations in existence at the time of transfer (currently codified at 50 C.F.R. § 13.25.). If change in ownership involves discontinuance of permit activities or requests for changes in incidental take amounts, these changes must also be made in accordance with federal regulations. See Sections 6.4 and 6.5 above. In these cases, Participants should report any planned or proposed change in ownership well in advance of the change.
2. Changes to the permitted facility, both proposed and planned, with potential to affect the Covered Species (may require an amendment to the permit) including, but not limited to:
    a. Expansions or additions to existing facilities;
    b. New facilities and facility light changes;
    c. Reasons why changes were made.

    Any additional incidental take due to changes at a permitted facility will require an amendment to the permit in advance of the change occurring. Amendments to authorize additional take must comply with all applicable Federal and State requirements; therefore, it is important for, Participants to report any planned or proposed change well in advance so that they can work with the wildlife agencies to determine if a permit amendment is possible.

3. Changes to take requests (increase or decrease). Any potential changes to take requests will require an amendment to the permit in advance of the change. Amendments to authorize additional take must comply with all applicable Federal and State requirements; therefore, it is important for Participants to report any planned or proposed change well in advance so that they can work with wildlife agencies to determine if a permit amendment is possible.
4. Any material changes in the Participant's financial ability to fulfill its obligations under the permit.

6.6.1.4 Certification

All reports will include the following certification from a responsible company official who supervised or directed preparation of the report:

> I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

6.6.2 KSHCP Annual Report

The Prime Contractor shall prepare and submit to the DLNR and the USFWS an Annual Report on behalf of the Participants, according to the Annual Report requirements (Section 6.6.2.1 through 6.6.2.8) and Reporting Schedule detailed below (Section 6.7).

6.6.2.1 General Topics

1) Summary of any non-substantive changes made to the KSHCP Appendices in the preceding year (e.g., final Memorandums of Agreement(s), contracts, etc.);
2) Any changes in the reporting schedule for the KSHCP, as determined by the ESRC, the USFWS, and the DLNR;
3) Description of all amendments initiated, underway or completed during the preceding year and their status;
4) Any other pertinent information of a general nature that would illustrate the status of the KSHCP and compliance and effectiveness of the KSHCP.

6.6.2.2 Summary of KSHCP Participants' Annual Reports

The Annual report should provide a summary of the KSHCP Participants' Reports including:

1) Name, location, facility type, ownership, and permitted incidental take (by species) of existing Participants;
2) Summary of any changes to the facilities of existing Participants (may require permit amendment);
3) Any changes in ownership of existing Participants (may require permit amendment);
4) Summary of results of take monitoring at Participant facilities;
5) Summary of results of compliance monitoring of implementation of minimization measures at Participant facilities;
6) Summary of KSHCP financial status of existing Participants, including any KSHCP mitigation fees owed;
7) Any other information that would demonstrate compliance with the terms and conditions of permits issued;
8) The status of any KSHCP Applicants in process and anticipated take level by species and age class.

6.6.2.3 KSHCP Finances

The Financial status of the KSHCP should be provided to include:

1) An accounting of funds received to date and KSHCP fees paid by each Participant;
2) An accounting of funds expended;
3) Overall financial status of the KSHCP;
4) Any changes in anticipated budget expenditures (e.g., through Adaptive Management).

6.6.2.4 Compliance and Effectiveness Monitoring of Mitigation

1) Overall status of mitigation action including:
    a. Progress towards KSHCP mitigation objectives;
    b. Updates on schedule for the mitigation project;
    c. Description of any issues encountered and successes towards implementing the project;
    d. Recommendations to initiate any Adaptive Management as needed.
2) Evaluation of the effectiveness of conservation/mitigation projects including:
    a. Summary of results from effectiveness monitoring to date;
    b. Updates and status of any projects or components pending implementation; and
    c. Status of any anticipated plans for initiating projects during the upcoming year

6.6.2.5 Compliance Monitoring of Take of the Covered Seabirds

1) Status reports and an evaluation of take monitoring including:
    a. Status of monitoring of take of the Covered Seabirds from light attraction, including self-monitoring conducted by Participants;
    b. A summary of take to date, by species and age class, resulting from take monitoring.

6.6.2.6 Honu Monitoring and Protection

1) Status of honu nest monitoring and measures taken to avoid take of honu if nest(s) are found.

6.6.2.7 Adaptive Management

1) A summary of all changes made to date resulting from Adaptive Management, triggers encountered, and responses initiated;
2) Discussion of any proposed changes to management based on Adaptive Management framework.
3) Discussion of any issues encountered as part of implementing Adaptive Management.

6.6.2.8 Additional Topics

1) Descriptions of KSHCP-related public meetings held during the reporting period;
2) Areas of KSHCP implementation meriting technical and/or scientific review;
3) Summary of any new relevant findings, reports, or published studies that pertain to seabird and/or honu conservation;

4) Any other pertinent information that would demonstrate the compliance and effectiveness of the KSHCP and permits issued under the Plan.

6.7 KSHCP REPORTING SCHEDULE

The KSHCP reporting schedule provides the anticipated due dates of reporting deliverables, responsible parties and review actions. The Annual Report shall consolidate all reports and updates of the KSHCP according to the reporting schedule (Table 6-3). In order to best use reports to make annual Adaptive Management changes to the minimization and mitigation, the season for reporting will fall during the interim season when seabirds are not present on the island (December-April). The Annual Report will be discussed at the KSHCP Annual Meeting mid-March.[8] At this meeting any changes in management, monitoring, or minimization actions at Participant facilities will be discussed (see Section 6.9 for Adaptive Management process). A final version KSHCP Annual Report shall be submitted to the USFWS and the DLNR by April 15.

If a Participant report is not submitted on time or is inadequate (e.g., missing information), the responsible party shall be notified by the wildlife agencies in writing and must demonstrate compliance with the reporting requirement within thirty (30) days. If a Participant fails to comply within the allotted time, the USFWS and the BLNR may initiate permit suspension procedures or revocation procedures (50 CFR 13.27 - 13.28)(HRS § 195D-21(d)).

Table 6-3. KSHCP Reporting Schedule by Report Type, Responsible Party, and Due Dates.

Report Type/Action	Who	Due Date
Submit draft Participant Annual Report to the Prime Contractor	Participants	Jan 15
Submit draft KSHCP Annual Report to USFWS and DLNR	Prime Contractor	Feb 28
Annual KSHCP Review meeting	Participants, Prime Contractor, USFWS, DLNR	March 15-21
Final KSHCP Annual Report	Prime Contractor	April 15
Final KSHCP Annual Report to State (legislative deadline)	Prime Contractor	Aug 1

[8] AG/AS will revisit report dates and suggest revisions.

6.8 MONITORING

There are three types of monitoring addressed in the KSHCP: compliance, effectiveness, and take monitoring.

- "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) will be 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).
- "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.
- "Take monitoring" determines when and where take of Covered Species occurs, and documents monitoring efforts.

6.8.1 COMPLIANCE MONITORING

The KSHCP objectives delineate minimization and mitigation actions that will achieve specific desired outcomes for the Plan duration (see Table 5-1). Each individual PIP identifies actions specific to each Participant. Compliance monitoring evaluates whether those actions are being properly implemented and is used to ensure that each enrolled Participant meets its obligation under this HCP and the individual PIPs.

Monitoring compliance with minimization actions at Participant facilities will occur via agency review of Participant Annual Reports. As described in Section 6.6.1, these reports will contain summaries, maps and photographic evidence of minimization actions that are implemented at facilities. Follow up visits by regulatory agency staff may occur as needed to validate compliance.

Monitoring compliance with mitigation actions will similarly occur via agency review of the KSHCP Annual Report. These reports will describe status of the mitigation project and progress towards meeting KSHCP objectives (see Section 6.6.2), including supporting data. Staff from regulatory agencies will also visit the mitigation site as needed.

6.8.2 EFFECTIVENESS MONITORING

Effectiveness monitoring is necessary to review whether the measures being implemented as part of the HCP and associated PIPs are as effective as predicted at the time of development of this HCP. Effectiveness monitoring identifies if and when a specific measure is ineffective and provides information if the measure is ineffective, to ultimately support a determination on whether the proposed minimization or mitigation measures can be modified through Adaptive Management (see Section 6.9) or whether the HCP itself needs to be amended.

At Participant facilities the following will be evaluated: the efficacy of methods used to minimize instances of light attraction, the success of on-site predator control, training and

outreach to increase the likelihood of finding downed birds. The evaluation will be based on Participant Reports (see details in Section 6.6.1.2). Additional effectiveness monitoring visits by the regulatory agencies may take place if necessary.

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.

6.8.3 Take Monitoring

Take monitoring to compare actual rates of take to requested amounts will also be conducted at Participant facilities. Each participant will provide a Covered Seabird Monitoring Plan in their PIP. The components that will be included, and the KSHCP guidelines/standards are presented in Table 6-4.

As provided in Section 6.2.2.1.1, the take calculation for an individual application may also include consideration of other site specific monitoring collection data where available to refine the SOS numbers. The assessment of where a downed seabird should be attributed to an Applicant's facility will be based on the best available data.

Table 6-4. 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".
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).
Time of Year of searches	Searching must occur twice daily between Sep 15 and Dec 15.
Frequency of searches	Minimum of twice daily (or more frequently if possible); searching should be intensified during the peak of fallout (Oct 1 – 15).
Time of day of searches	The peak of fallout generally occurs around 2 hours after sunset – **searches should therefore commence 2-3 hours after sunset**. An additional search should take place within **3 hours after sunrise** to find birds in the daylight which might have been missed the night before.
Search methods	Specify, e.g. vehicle versus walking; looking under and around objects as opposed to just patrolling; searching with flashlight, etc.
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 (actions described in Section 5.3.2), and what action(s) taken to remove predators from the area.
Number of searchers needed to cover area.	Depends on site conditions and safety considerations.

6.9 ADAPTIVE MANAGEMENT

USFWS policy defines Adaptive Management as "a formal structured approach for addressing uncertainty in natural resources management using the experience of management and the results of research as an ongoing feedback loop for continuous improvement" (USFWS and

NMFS 1996). Uncertainties may include limited biological information for the Covered Species, a lack of knowledge about the effectiveness of mitigation or management techniques, or doubt about the anticipated effects of Participants' facilities on Covered Species. Adaptive management recognizes that full information necessary to make decisions is often unavailable, and allows for change of management practices when supported by data or other information. It allows for the incorporation of new information into conservation and mitigation measures during KSHCP implementation.

6.9.1 Adaptive Management of Minimization Measures

Although KSHCP uses the best available information to evaluate measures to minimize incidental take of Covered Species, new or untested minimization measures to reduce incidental take of Covered Species may be introduced over the course of the KSHCP. Participants may consult at any time with USFWS and DLNR to determine if implementation of new technologies is practicable and appropriate, and develop monitoring protocols to measure the effectiveness of new measures. This might include a different design of lighting, different bulbs or more effective searching strategies.

Participants will also identify the need for Adaptive Management of minimization measures in their Participant Annual Reports, and suggest options to alter currently implemented measures. These will be discussed during the KSHCP Annual Review Meeting or in individual meetings with the regulatory agencies, and will be implemented as soon as reasonably possible.

In addition, a running 5 year average of take will be evaluated annually to enable Adaptive Management of minimization efforts. The 5 year averages will serve as triggers to inform individual Participants, the Prime Contractor and the regulatory agencies that changes are needed to increase minimization and reduce annual take to avoid exceeding the 30 year take request. In the event that take monitoring results indicate potential take exceedance, additional avoidance or minimization measures would be required through Adaptive Management. Specific measures will be tailored to relevant Participant facilities and will follow minimization guidelines outlined in Section 5.3 and *Appendix E: Guidelines for Adjusting Lighting at Facilities*.

Adaptive Management is intended to provide an opportunity to improve programs based on implementation efforts and results. As a result, successes and failures at individual Participant facilities will be evaluated and the results shared among all Participants so that best practices for lighting, predator control on facility, worker training, and guest outreach can be constantly refined, improved, and shared among all Participants.

6.9.2 Adaptive Management of Mitigation Measures

Uncertainties exist regarding the long-term effectiveness of the mitigation site. Social attraction efforts have shown excellent results in other projects worldwide, but there exists some uncertainty that may influence the effectiveness of the KSHCP social attraction project, including, for example, changes in the projected decline of the Covered Seabirds' population which might affect the number of birds available to colonize the social attraction site.

A conservative estimate of fledgling reproduction (*Appendix C: Social Attraction Benefit Estimator*) was selected to provide a high level of confidence and certainty in the reproductive outcome that will result from implementation of the social attraction project and associated barn owl and feral cat control. However, in the event that KSHCP Objectives (see Section 5.2) are not reached as scheduled (e.g. prospecting birds have not been observed at the mitigation site by year 4 after fence construction, or birds have not begun breeding by year 5-7, etc.), the Participants and the Prime Contractor will meet with USFWS and DLNR to evaluate probable reasons and possible options using the Adaptive Management process described above.

Failure to meet KSHCP objectives by target dates is the trigger for Adaptive Management discussions, and implementation, as needed. Specific management options to address delays in meeting mitigation objectives are outlined in Section 16 of *Appendix A: Kahuamaʻa Seabird Preserve Management Plan,* but Adaptive Management is not limited to those options.

The Year 10 KSHCP objective (Cumulative upward trend in Covered Seabird breeding documented at mitigation site) is a significant milestone in terms of Adaptive Management. Absent a catastrophic event, it is anticipated that this is the first year of the KSHCP that abandonment of the social attraction site, and redirecting existing funds towards an alternative mitigation project would be considered. Given the life history of ʻaʻo, with long generation times (5-6 years), any earlier would likely not provide enough time and data to justify this decision. At Year 10, if this target is not met, and the USFWS and DLNR, with input from the Prime Contractor and Participant representatives, determine further Adaptive Management strategies will not be successful, funds may be shifted to a different mitigation alternative and funded as specified in Section 6.11.11 to achieve mitigation benefits committed to by the KSHCP.

Mitigation options may include (but are not limited to) expanding predator control (barn owl, feral cats or rats) and / or funding conservation actions implemented by DOFAW, the Kauaʻi Watershed Alliance (KWA), the Kauaʻi Endangered Seabird Recovery Project (KESRP), or another entity approved by USFWS and DLNR that provide direct benefit to Covered Seabirds. These in-depth changes to the management protocols or the scope of the mitigation actions may be addressed as an amendment to the KSHCP as determined by USFWS and DLNR, which would require compliance with applicable requirements, including possibly supplemental NEPA analysis.

The Adaptive Management process for the KSHCP mitigation measures consists of the following steps:

1. The draft KSHCP Annual Report will include a thorough review and analysis of biological data. Through these analyses, the Prime Contractor will identify whether biological objectives are being met by the target dates, and if not, will suggest any necessary Adaptive Management responses to be implemented. Responses may correspond to the preliminary list of potential Adaptive Management for proposed actions, as described in

Section 16 of *Appendix A: Kahuamaʻa Seabird Preserve Management Plan* or may result from consultation with experts. The need for Adaptive Management may also be identified by DLNR and/or the USFWS. Adaptive management measures are not limited to those described in *Appendix A*.

2. During the KSHCP Annual Review meeting, the Prime Contractor will receive input from USFWS, DLNR, and Participant representatives on suggested Adaptive Management options, and the USFWS or DLNR as regulatory agencies can disapprove of proposed measures, if necessary. The Prime Contractor will make the final decisions on Adaptive Management after discussion and input by the USFWS, DLNR and Participant representatives, but Participants remain responsible for meeting the biological objectives of the KSHCP.
3. Adaptive management of minimization and/or mitigation measures will occur as soon as reasonably possible following a decision(s).
4. The final KSHCP Annual Report will include the Adaptive Management measures selected by the Prime Contractor after consultation with USFWS and DLNR.

6.9.2.1 Applying Results of Covered Seabird Monitoring through Adaptive Management

Results of biological monitoring for Covered Seabirds will be compared against predictions from the social attraction estimator model. Model results reflect possible outcomes for the number of seabird burrows likely to be present, fledglings produced, and population trends within the fenced enclosure. **Table 6-5** presents initial model results (see *Appendix C: Social Attraction Benefit Estimator* for details on model inputs) for the number of seabird burrows predicted at 5-year time intervals for the life of the mitigation project. These give context for the KSHCP Objectives and will help to direct Adaptive Management decisions.

Although the total number of seabird burrows predicted is presented here, seabird burrows are very cryptic and it can be difficult to determine their exact location. One study found a human searcher efficiency rate for burrow searching to be ~57% effective, (versus detection dogs) (Kaheawa I HCP 2015 Annual Report). While exact searcher efficiency is a function of experience, terrain, and other factors, Adaptive Management triggers described below are linked to modeled outputs on the number of seabird burrows after applying a 50% searcher efficiency rate. Note that the USFWS, DLNR, or Prime Contractor may re-run the model during KSHCP review periods to use real-time data to inform Adaptive Management discussions. Thus, the active burrow numbers in **Table 6-5** below may be modified by the time Adaptive Management triggers are evaluated. The most up-to-date model results will always be applied before implementing Adaptive Management actions. However, updating the model results does not change the biological objectives, including the total cumulative number of fledglings that must be produced by year 30 of the KSHCP.

Table 6-5. Model-estimated number of active ‘a‘o burrows at the social attraction site at five-year project intervals.

Project Year	Objective	Model Predicted # of active burrows	# of known active burrows assuming 50% searcher efficiency
Year 5	**2.D** Successful breeding documented	4	2
Year 10	**2.E** Cumulative upward trend in breeding	21	10
Year 15		37	18
Year 20	**2.F** Cumulative upward trend in breeding	52	26
Year 25		67	33
Year 30		80	40
TOTAL cumulative number of fledglings produced	**923***		

*This number represents the total number of fledglings produced at the mitigation site in 30 years and not the mitigation benefit (697 fledglings) which is the difference between the number of birds produced inside the fence and those that would have been produced in the absence of the conservation program.

6.10 NO SURPRISES RULE

The USFWS “No Surprises” rule (50 CFR 17.22, 17.32) provides that once an Incidental Take Permit has been issued and as long as the HCP, including its Adaptive Management program, is being properly implemented, the USFWS will not require the commitment of additional conservation or mitigation measures by the permittee (including additional land, water, or financial contribution, or additional restrictions on the use of land, water or other natural resources) beyond the level provided in the HCP, without the permittee’s consent. The State of Hawai‘i provides similar assurances in HRS § 195D-23. However, the “No Surprises” policy is not applicable to situations where authorized take levels are exceeded or the minimization or mitigation measures are not functioning to provide the conservation benefits anticipated by the HCP and consequently relied upon to meet permit issuance criteria.

No surprises assurances also do not apply to Changed Circumstances. An HCP must identify and analyze reasonable Changed Circumstances that could affect a species or geographic area during the permit term. Should such a Changed Circumstance occur, the permittee is required to implement the measures specified in the HCP to respond to the change.

Conditions that are not analyzed, and for which the “No Surprises” assurances are designed, are called Unforeseen Circumstances – those that 1) could not reasonably have been anticipated by the Applicant, USFWS, and DOFAW during the development of the HCP and 2) which result in a substantial and adverse change in the status of a Covered Species. The USFWS bears the burden

of demonstrating that Unforeseen Circumstances exist, using the best scientific and commercial data available.

6.11 CHANGED CIRCUMSTANCES

Changed Circumstances are specific foreseeable events or circumstances adversely affecting a species or geographic area covered by a habitat conservation plan. Such circumstances and planned responses are treated as part of the plan's operating conservation program. The following section describes Changed Circumstances identified by the USFWS and DLNR that are addressed under the KSHCP.

When a Changed Circumstance is detected there will be communication between the Participants and the Wildlife Agencies within seven (7) calendar days. As soon as practicable thereafter, but no later than thirty (30) calendar days after a Changed Circumstance(s) is detected, the Participant, as appropriate, shall begin implementing the planned responses identified in Section 6.11 for the specific Changed Circumstance to the extent necessary to minimize or mitigate the adverse effects of the Changed Circumstance on Covered Species.

If the Wildlife Agencies determine that a Changed Circumstance has occurred and the Participants have not responded in accordance with Section 6.11 of the KSHCP, the Wildlife Agencies shall so notify the Participants, as appropriate, and direct the Participants to implement the appropriate plan response(s) to the changed circumstance within thirty (30) calendar days after receiving such notice, and report to the Wildlife Agencies on its actions.

Under the KSHCP and in accordance with Federal and State regulation, the Participants are responsible for ensuring the minimization and mitigation of take impacts to the Covered Species to achieve the biological goals of the HCP. Planned responses would be implemented using available funds described in funding Section 7.1. Exceptions to this funding approach are noted below.

Beyond the Changed Circumstances and thresholds identified in this section, no other Changed Circumstances affecting a Covered Species or geographic area covered under the KSHCP were reasonably anticipated by the DLNR or USFWS at the time the KSHCP was prepared. Other changes in circumstances affecting a Covered Species or a covered geographic area under the KSHCP that result in a substantial and adverse change in the status of the Covered Species are considered as Unforeseen Circumstances as defined by Federal regulation (50 CFR §17.3) (see Section 6.12).

6.11.1 HURRICANES, SEVERE TROPICAL STORMS, WILDFIRES, AND OTHER NATURAL DISASTER

Severe storms and hurricanes occur periodically in the Main Hawaiian Islands (MHI). The two most recent hurricanes that directly impacted Kaua'i were 'Iwa in 1982 and 'Iniki in 1992. Hurricane 'Iniki caused widespread and devastating damage to infrastructure, property, and natural resources. Wildfire is also a threat on Kaua'i, particularly in times of drought. The Hawai'i Wildfire Management Organization did a Wildfire Hazard Analysis in 2013 and the area

of the KSHCP operating conservation program (Kōkeʻe State Park) was identified as a moderate to high risk in all assessment categories (Hawaiʻi Wildfire Management Association 2013)). Because Hawaiʻi's native forest evolved with infrequent naturally occurring fires, most native plant species are not fire adapted and do not recover quickly, making the landscape vulnerable to erosion and non-native weed invasion.

Detailed storm records have been kept for the state of Hawaiʻi since 1950. In the time period from 1950-2017, hurricane and/or tropical storms have impacted Kauaʻi on average every 10 years (see Table 7-1, in Section 2.1.1). This is the basis for the planned response threshold described below. Climate change trends indicate increases in storm frequency (IPCC 2014) and changes in rainfall patterns. On that basis, hurricanes, severe storms, wildfire events, and other natural disasters can reasonably be anticipated during the 30-year term of the KSHCP and are regarded as a Changed Circumstance.

Natural disasters have potential to adversely affect the KSHCP in several ways. First, a hurricane or severe storm may pose a threat to the overall population of Covered Seabirds by killing adult birds, fledglings and chicks, destroying eggs and severely altering vegetation in breeding colonies, and damaging or destroying burrows. Second, a hurricane or severe storm may cause significant damage or destruction to Participant facilities and/or to the KSHCP operating conservation program, which may alter the effectiveness of minimization and mitigation measures and/or the amount of take requested by Participants. A hurricane or severe storm may alter the natural and human environment in areas surrounding Participant facilities and the operating conservation program in ways that increase the potential effects of those facilities or sites on the Covered Species.

Finally, fire could alter the natural environment in breeding colonies, making it unsuitable as nesting habitat, and it could cause damage to the KSHCP operating conservation program, which could alter the effectiveness of mitigation measures.

Planned Response. In the event of a hurricane, severe storm, or other natural disaster, the Participants, DLNR and USFWS will evaluate the extent of the damage as it pertains to the KSHCP operating conservation program and the Participants' facilities and the resulting impacts on the Covered Species, as determined based on the best available information at that time. If determined to be necessary by USFWS and DLNR, following consultation with the Participants, damage to the conservation program (i.e. fence enclosure or social attraction equipment) may be repaired or replaced or alterations to the conservation measures may be needed to achieve the mitigation objectives of the KSHCP. The estimated cost of full fence replacement, social attraction equipment replacement and vegetation restoration is presented in Chapter 7.

Up to 2 events requiring complete replacement of the fence and social attraction equipment are considered a Changed Circumstance. Subsequent event(s) would be treated as an Unforeseen Circumstance (see Section 6.12 below).

6.11.2. Vandalism at the Mitigation Site

Over the course of the 30-year permit term, the predator proof fence, predator control equipment and/or social attraction equipment may experience vandalism. This may occur with malicious intent or at random. Fences on public lands are often perceived as a threat to full public access (e.g., for hunting and hiking) and this may draw negative attention that leads to destructive acts of vandalism.

Planned Response. In the event of vandalism the Participants, DLNR and USFWS will evaluate the extent of the damage as it pertains to the KSHCP operating conservation program and the resulting adverse effects on the Covered Species, as determined based on the best available information at that time. If determined to be necessary by USFWS and DLNR, following consultation with the Participants, damage to the mitigation site will be repaired or replaced. Additional Adaptive Management actions intended to reduce occurrences of vandalism at the mitigation site will be implemented as necessary if vandalism events occur (e.g., the installation of additional cameras and/or additional signage on the mitigation site). The estimated cost of fence repair in the event of vandalism, and the cost of additional vandalism prevention measures is less than the cost of a single full fence replacement. Up to 2 events requiring complete replacement of the fence and social attraction equipment are considered a Changed Circumstance. Subsequent event(s) would be treated as an Unforeseen Circumstance (see Section 6.12 below).

6.11.3. Listing of New Species or Delisting of a Covered Species

Species not listed as threatened or endangered under the Federal ESA or HRS Chapter 195D at the time this HCP is approved and that are not addressed as Covered Species in this HCP will not automatically be included in the Incidental Take Permits should they become listed during the term of this HCP. Over the 30-year term of the KSHCP program, it is possible that changes in the listing status of species present at Participant facilities or in the mitigation areas associated with the KSHCP could occur.

Planned Response. If a new species on Kaua‘i becomes listed under the ESA or HRS Chapter 195D, the Participants, DLNR, and USFWS will evaluate the likelihood of incidental take of a newly listed species caused by KSHCP Covered Activities.

If adverse effects to the new species or incidental take are likely, the Participants, DLNR, and USFWS will meet to discuss whether conservation measures in place can avoid incidental take, what additional measures should be put in place to address newly listed species, and whether an amendment to the HCP is required to address these issues. Unless and until a Participant’s permit is amended to authorize incidental take of new species, the Participant shall take all necessary steps to avoid incidental take of that species. The costs of minimization and mitigation measures for newly listed species are not covered by the current funding mechanisms for the KSCHP.

If the USFWS determines that Participant-covered activities or mitigation, individually or collectively, may affect the newly listed species, the USFWS will reinitiate ESA section 7

consultation on the issuance of ITPs for Participant plans. If the consultation determines that any such activities are likely to jeopardize the newly listed species, the USFWS will provide reasonable and prudent alternatives (RPAs), if any, to the Participant(s) to avoid such an outcome. Failure to implement RPAs could result in revocation of the permit(s).

If any of the Covered Species become delisted over the term of the KSHCP, measures for that species will continue in accordance with the KSHCP, but the Participants may initiate discussions with the USFWS and DLNR to determine if such actions may be discontinued.

6.11.4. Critical Habitat Designation

The Covered Species do not currently have designated Critical Habitat. If the USFWS designates Critical Habitat, and such Critical Habitat may be adversely affected by the activities covered in the KSHCP, such an occurrence is regarded as a Changed Circumstance.

Planned Response. If the USFWS determines the covered activities or mitigation may adversely affect Critical Habitat, it will reinitiate consultation on the issuance of ITPs for Participant plans to determine if the covered, minimization and mitigation activities under the KSHCP, individually or cumulatively, would be likely to destroy or adversely modify critical habitat. If so, the USFWS shall develop reasonable and prudent alternatives to the KSHCP and/or Participant plans, in consultation with the Participants, to avoid this outcome that will be implemented by the Participants as necessary.

6.11.5. Global Climate Change

The vast body of scientific evidence supports the concept that warming of global temperatures is occurring and will continue into the future and that a contributing factor is the release of greenhouse gases from human-caused actions (IPCC 2014). Predicted impacts of climate change include changes in ocean temperatures and acidity levels, and the spread of invasive organisms (IPCC 2014). The impact and timing of climate change is uncertain, but is anticipated to impact the Covered Seabirds in at least two ways:

1. Ocean acidification and increased ocean temperatures could result in changes to seabird prey base (Kroeker et al. 2013) impacting prey abundance and foraging; and
2. Increasing temperatures could increase the spread of disease or invasive species that either impact Covered Seabirds directly or negatively impact seabird breeding habitat (Oro 2014).

Appendix B: Covered Species Biological Details provides more detailed information on the potential impacts of climate change on the Covered Seabirds.

Planned Response. If the USFWS and DLNR determine that climate change is negatively impacting anticipated benefits of the conservation measures of the KSHCP, the USFWS and DLNR shall evaluate the extent of the impact and the resulting effects on KSHCP mitigation measures, based on the best available information at that time. As determined necessary by DLNR and USFWS, following consultation with the Participants, adjustments to conservation measures will be implemented to achieve mitigation benefits committed to by the Participants

under the KSHCP program. Climate change impacts will be considered a Changed Circumstance only if impacts are directly affecting the KSHCP operating conservation program. For example, if climate change is impacting habitat conditions at the mitigation site, this could be addressed by altering vegetation management.

6.11.6. Invasive Species

Invasive species of both plants and animals have had, and will continue to have, a detrimental effect on the Covered Species and their habitat.

Introduction of a New Predator Species. Predation by alien mammalian species has been shown to constitute a very substantial threat to the Covered Species on Kaua‘i, and other, non-mammalian, predators also have had significant impacts to seabirds in the MHI. The possibility exists that the small Asian mongoose (*Herpestes javanicus*) will become established on Kaua‘i during the term of the KSHCP, which would be highly likely to have a negative impact on the overall populations of Covered Species. Several individuals have been caught on Kaua‘i in recent years and ‘credible sightings’ are reported to the Kaua‘i Invasive Species Committee annually from multiple locations on the island. Other potential predators on the Covered Species such as the brown tree snake (*Boiga irregularus*), a new species of rodent or a harmful insect such as yellow crazy ants (*Anopolepis gracilipes*) may be introduced during the 30-year permit term as well.

Alien plants have displaced native vegetation from former breeding colony areas, reducing or eliminating the suitability of the area for Covered Species. In addition, invasive species of insects, fungus, nematodes, mites and other plant pests may be introduced, which may adversely affect native species, and seabird habitat suitability within the mitigation site over the term of the HCP.

In general, the threat of new invasive species is heightened by the challenge of maintaining biosecurity on imports into the MHI. The likelihood that invasive species will be introduced or increase during the term of the KSHCP is sufficient to warrant treating this species introduction or increase as a Changed Circumstance.

Planned Response. Proposed monitoring at the KSHCP mitigation site, including predator control, vegetation and burrow monitoring (see Section 6.8.2) should be sufficient to provide early detection of any new invasive plants or animals at the site. In the case of introduction of a new mammalian predator (such as a mongoose), the predator proof fence at the mitigation site would prevent access to the social attraction site. Outside of the predator proof fence, within the geographic area where feral cat trapping will occur, mongoose will be removed by using existing cat traps. In the event that other types of invasive species (e.g., insects, amphibians, reptiles, non-native plants, etc.) impact the KSHCP operating conservation program, necessary management actions would be evaluated and implemented after discussion with the Participants. These include but are not limited to trapping insects, disinfecting artificial burrows within the social attraction site, or trapping snakes where seabird burrows occur along cat trap lines outside of the enclosure. The estimated cost of these adaptive management solutions to

additional invasive species are expected to be minimal and within the current KSHCP operations budget.

In the event habitat enhancement and/or vegetation management measures at the KSHCP operating conservation program sites are compromised by new and/or increased populations of invasive plant or insect species, vegetation management activities (including increased monitoring) may be modified. The USFWS and DLNR will determine, after discussion with Participants, that such a response is necessary to achieve the mitigation objectives of the KSHCP.

6.11.7. Disease Outbreaks in a Covered Species

Hawaiian endemic species evolved in the absence of many pathogens. As a result, their lack of resistance to some diseases may have played an important role in their decline. The estimated risk to the Covered Species of disease outbreaks varies by species or is unknown. Among the ‘a‘o populations, fledglings have been found with mild symptoms of avian pox (Ainley et al. 1997b) and avian malaria (Warner, 1986; A Raine, 2017, pers. comm.). The likelihood that the threat from disease will occur during the term of the KSHCP is sufficient to warrant treating this threat as a Changed Circumstance.

Planned Response. Conservation measures may be implemented if USFWS and DLNR determine, after discussion with Participants, that it is necessary to respond to the increased prevalence of disease and its threat to the KSHCP operating program. For example, mosquito trapping would be evaluated and implemented should avian malaria impact populations of Covered Seabirds breeding in the social attraction enclosure or along trap lines. The estimated cost of these adaptive management solutions to disease are expected to be minimal and within the current operations budget.

6.11.8. Changes in Survival of Birds Rehabilitated and Released

The SOS program is the anticipated means to achieve the KSHCP objective of recovering, rehabilitating and releasing all downed birds found at Participant facilities (see Section 5.3.4). Given the 30-year term of the KSHCP, it is reasonable to anticipate that the SOS Program may not be available to serve this function during the entire term of the KSHCP, which warrants treating this as a Changed Circumstance.

It is also foreseeable that, during the course of the KSHCP, new information will become available on the survival of birds released through the SOS Program or any replacement program. The KSHCP, using the best available science, assumes that all birds evaluated and released through the SOS program in a timely manner will survive at the same rate as wild fledglings not recovered and released through SOS (see Section 4.1.3 for details). It is foreseeable that new data will become available that alters this assumption on SOS survival. In addition, if the SOS program is no longer available as a means to achieve the KSHCP minimization objective of recovering, evaluating and releasing downed seabirds, survival of released birds may be different under the care of separate veterinarians.

If the survival of recovered and released downed seabirds changes, this will impact the ratio of lethal versus non-lethal take in the KSHCP. If released seabirds do not survive at the same rate as wild birds that do not experience fallout and subsequent release, then the changed ratio may require a response as explained below.

Planned Response if SOS Program is no Longer Available: The KSHCP intends to rehabilitate and release downed seabirds that are recovered by Participants via the SOS Program. The SOS Program provides expertise, cost effective rehabilitation, established aid stations and more. However, the KSHCP provides for the contingency that the SOS Program may not be available for the life of the program by collecting funds adequate to provide the required services (rehabilitation and release of downed seabirds) independent of the continued existence of the SOS Program. If necessary, the Participants would use a certified veterinarian to handle and rehabilitate downed seabirds from the Participants' premises. Each Participant would be responsible for arranging for the required services for its downed seabirds. The KSHCP funds would not be necessary to meet this contingency.

Planned Response Based on Changes in Survival: If information shows different survival of recovered and released birds than is assumed in the current KSHCP, this information could result in higher or lower take levels. If this results in higher take levels, individual Participants would need to determine whether this higher level is likely to exceed the amount of take authorized by their permit and, if so, may apply for a permit amendment. If the increased lethal take can be accommodated under the current KSHCP, the process for re-evaluating costs is described in Section 6.5. If it cannot be accommodated under the current KSHCP, Participants or an individual Participant may elect to initiate a Major Amendment pursuant to Section 6.13.2. Each participant is responsible to address its additional minimization and mitigation as necessary.

If the information results in a lower take level for a Participant, the Participant may request to amend its permit pursuant to Section 6.5.

6.12 UNFORESEEN CIRCUMSTANCES

Unforeseen circumstances are defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that cannot be reasonably anticipated by the Participant or the wildlife agencies. In the event that USFWS or DLNR makes a finding that unforeseen circumstances have arisen during the term of the KSHCP, the USFWS and DLNR will notify the Prime Contractor and Participants in writing. If it is demonstrated by USFWS and DLNR that unforeseen circumstances exist during the permit term, and additional conservation measures are recommended, the Prime Contractor and the Participants will have the opportunity to evaluate the feasibility of implementing any measures recommended by USFWS and DLNR and propose other conservation measures.

Provided the KSHCP is being properly implemented, additional conservation measures are limited in that the USFWS and DLNR:

1) shall neither require the commitment of additional land, water, or financial compensation by Participants without Participants' consent nor shall they impose additional restrictions on the use of land, water, or other natural resources otherwise available for use by Participants under the original terms of the KSHCP;
2) shall have the burden of demonstrating that such unforeseen circumstances exist, using the best scientific and commercial data available. Their findings must be clearly documented and based upon reliable technical information; and
3) shall not require additional mitigation than originally agreed (i.e. may not increase the number of birds required to mitigate for lethal take) for a species where the terms of the properly functioning KSHCP were designed to provide an overall net benefit for that species and contained measurable criteria for the biological success of the KSHCP, which have been or are being met.

Notwithstanding these provisions, an ITP may be revoked if continuation without additional mitigation would be inconsistent with the requirement that the incidental taking not appreciably reduce the likelihood of the survival and recovery of the species in the wild (50 C.F.R. §§ 17.22(b)(8), 17.32(b)(8).

6.13 CHANGES AND AMENDMENTS TO THE KSHCP

There are two types of changes which may be made to the KSHCP; Minor Amendments and Major Amendments. All revisions and amendments will be processed in accordance with all applicable legal requirements.

6.13.1 MINOR AMENDMENTS

Minor Amendments are changes to the KSHCP provided for under the operating conservation program, including Adaptive Management changes and responses to Changed Circumstances. They include revisions that do not materially modify the scope or nature of effects on the Covered Species, do not diminish the level or means of mitigation, or do not increase the take threshold of the HCP. Minor Amendments may include, but are not limited to, the following:

- Correction of any maps or exhibits or documents to correct errors or spelling;
- Routine administrative revisions;
- Modifying reporting protocols or formats for Annual Reports;
- Minor changes to monitoring or reporting protocols;
- Minor changes to the size, design, and management of the mitigation site to enhance the potential for success;
- Minor changes to the schedule of mitigation milestones;
- Any other modifications to the KSHCP that are consistent with its biological goals and objectives that will not:
    - result in operations under the KSHCP being materially different from those analyzed in connection with the KSHCP as approved,

- have adverse impacts on the environment that are new or materially different from those analyzed in connection with the KSHCP as approved,
- result in take of Covered Species not analyzed in connection with the KSHCP as approved.

Such Minor Amendments do not alter the terms of the incidental take permit or incidental take license. Upon the written request by the Participants, the USFWS and DLNR may approve Minor Amendments to the HCP.

6.13.2 Major Amendments

Amendments that substantively alter the total take of the KSHCP, the term of the KSHCP, or the mitigation provided to compensate for take, would be considered a Major Amendment.

Examples include but are not limited to the following:

- Mitigating for take of honu;
- Adding a new species to the list of Covered Species contained in the KSHCP;
- Abandoning the predator proof fence and/or associated barn owl and feral cat control, and redirecting mitigation funding to a new project
- Extending the term of the KSHCP and associated incidental take permits beyond the original term;
- Additional take requests that would exceed the maximum amount of take in the KSHCP;
- A reduction in initial authorized take amount of greater than 50%;
- Changes to the Covered Activities which were not addressed in the KSHCP as originally approved, and which otherwise do not meet the criteria for a Minor Amendment.
- Changes to the mitigation which were not addressed in the KSHCP as originally approved, and which otherwise do not meet the criteria for a Minor Amendment.
- Changes to take levels due to survival of downed seabirds rehabilitated and released through the SOS Program or certified veterinarian.

A Major Amendment requires submittal to USFWS and DLNR of a written application and implementation of all permit processing procedures applicable to an original incidental take permit. The specific documentation required to comply with the Federal ESA, HRS Chapter 195D, the National Environmental Policy Act, and HRS Chapter 343 may vary based on the nature of the amendment.

Costs for submitting and processing a Major Amendment would be paid by relevant Participant(s). For example, if only one Participant needed take coverage for honu, or a new species, they would be responsible for associated costs. In contrast, an amendment required for multiple Participants may result in adjustments to shared costs.

6.14 AMENDMENTS TO PERMITS

Any increase or material change to minimization plans or take requests would require an amendment to the permit according to applicable regulations at that time. Permit changes may

need to be made to reflect amendments to the KSHCP as determined by the USFWS and DLNR. The USFWS is not required to approve amendments made to the incidental take license by DLNR, and DLNR is not required to approve amendments made to the incidental take permit issued by USFWS.

6.15 SUSPENSION/REVOCATION

USFWS and DLNR may suspend or revoke a Participant's permit if the KSHCP Participant is not in compliance with the terms of its permit/license (which incorporates the KSHCP and PIP) or as otherwise provided for by State or Federal law. Suspension or revocation of the permit/license shall be done in accordance with applicable Federal or State law and regulations.

6.16 PERMIT TRANSFER

In the event of sale or transfer of ownership of facilities covered under the KSCHP during the term of the permits, the permit/license may be transferrable to the new owners. Participants must notify USFWS and DLNR in advance of the sale or transfer of ownership for information on the requirements for transfer in effect at that time.

6.17 KSHCP EXTENSION AND RENEWAL OF PERMITS

At the end of the 30-year duration, the KSHCP may be extended and permits renewed under certain circumstances and to the extent permitted by law. Two years prior to the end of the KSHCP, interested Participants, DLNR and USFWS will meet to gauge the extent of interest in extending the KSHCP and discuss whether biological circumstances (e.g. threats and conservation needs) and the nature of effects to Covered Species make the KSHCP still the appropriate vehicle to mitigate incidental take. If so, the Prime Contractor will work with the Participants and the wildlife agencies to make any necessary changes to the KSHCP. Participants may apply for renewal of their permits in accordance with State and Federal regulations in effect at that time. (Federal regulations governing permit renewal are currently codified at 50 C.F.R. 13.22.)

7. FUNDING

The KSHCP consists of a unique payment scheme and funding assurance approach. The combined funding provided by multiple Participants (entities issued with incidental take authorization) enables the Plan to take advantage of economies of scale to conduct conservation actions and allows for cost-sharing of some project components.

Cost sharing is achieved by dividing the total costs among the KSHCP Participants in accordance with the amount of take requested per Participant. With a defined mitigation project and identified Plan costs, the cost per Participant becomes a function of how many Applicants join the KSHCP, how much total, combined take will be authorized by the regulatory wildlife agencies, and the amount of take for a given Participant. **Table 7-1** provides a summary list of cost categories of the KSHCP, and which are shared. Costs that are specific to individual Participants and Participant facilities are not shared costs.

Table 7-1. Cost components of the KSHCP and cost sharing.

Cost Item	Payment	Description	Shared
Project Administration	Paid to KSHCP Conservation Measures Implementing Fund	Administration and coordination of the KSHCP	Shared
Mitigation through predator proof fence, seabird social attraction, associated barn owl and feral cat control & effectiveness monitoring	Paid to KSHCP Conservation Measures Implementing Fund	Build fence, implement social attraction, predator control and associated actions and measure results	Shared
Changed Circumstances/Adaptive Management fund	Paid to KSHCP Reserve Account	To fund Changed Circumstances, including Adaptive Management measures that exceed operating budget	Shared
Financial Assurances	Paid to KSHCP Reserve Account	To cover costs for remaining Participants if other withdraws or fails to make required payments	Shared
State compliance & annual review	Paid to DLNR by Participants	Conduct annual review and HCP compliance	Shared
Avoidance and minimization measures	Costs incurred by each Participant but not paid to KSHCP accounts	Measures to reduce the effects of light attraction and reduce on-site predation	Not shared (cost is facility-specific)
On-site take monitoring	Costs incurred by each Participant but not paid to KSHCP accounts	Participant must provide trained monitors to search property for impacted wildlife and report the results	Not shared (cost is facility-specific)
Beach honu nest monitoring and light avoidance	Costs incurred by each Participant but not paid to KSHCP accounts	Measures to prevent honu disorientation at nests	Not shared (cost is facility specific)

7.1 SHARED COST COMPONENTS

Section 10(a)(2)(B)(iii) of the ESA requires that "the Applicant will ensure that adequate funding for the plan will be provided." This issuance criterion requires that the Applicant detail the funding that will be available for all shared and facility specific funding components of the KSHCP.

HRS Chapter 195D states that the Applicant shall provide adequate funding for the plan. This may be accomplished by "depositing a sum of money in the endangered species trust fund created by Section 195D-31, or provid[ing] other means approved by the board…" HRS § 195D-4(g)(3). Similarly, each HCP shall also "identify … an adequate funding source to ensure that the actions or measures, including monitoring, are undertaken in accordance with the schedule." HRS § 195D-21(b)(2)(D).

In connection with the KSHCP, the National Fish and Wildlife Foundation ("NFWF") will establish two accounts to receive, manage, and disburse certain funds to be deposited by Participants in the KSHCP for purposes of the Participants' implementation of the 30-year KSHCP. The KSHCP Conservation Measures Implementation Funding Account will receive the Annual Payments, adjusted for inflation, paid by Participants under Section 7.1, below. The KSHCP Reserve Account will receive the Financial Assurances Payments and the Changed Circumstances/Adaptive Management Payments paid by the Participants under Section 7.1, below.

The proposed funding required in any given year of Plan implementation is derived from cost estimates for implementing conservation actions as specified in Chapter 5 and *Appendix A: Kahuama'a Seabird Preserve Management Plan*. A summary of costs is presented in Section 7.7. The costs are based on similar seabird projects.

Upon issuance of the ITP and ITL, each Participant will, within 30 days make payments indicated below as due for year one. Initial payments must be made before the ITP and ITL can become effective. Thereafter, payments must be made on or before the anniversary of the effective date of either the ITP or ITL, whichever occurs earlier. NFWF will send an email confirmation of receipt of payments to the Payor, USFWS and DLNR and Participants.

Payment descriptions are as follows (also see **Table 7.2**):

Annual payments

Annual Payments will be used for the implementation of the mitigation measures on an annual basis. These funds will be paid to the KSHCP Conservation Measures Implementing Funding Account. The first year's collective payment will be greater than the following years' payments to provide sufficient funds for construction of the fence, predator removal, and social attraction site equipment. The first year collective payment will be $600,000.

A Participant shall have the right, but not the obligation, to pre-pay its annual payments for the remainder of the KSHCP term or a portion thereof, accounting for inflation.

Reserve Funds for Financial Assurance and Changed Circumstances/Adaptive Management
In addition to the annual payments, Participants will make payments to the KSHCP Reserve Account to provide Financial Assurances (three years of annual payments) and provide a fund for Changed Circumstances and Adaptive Management (the cost of one complete fence and social attraction equipment replacement).

First, to provide financial assurances, Participants will collectively pay three times the anticipated annual payments after Year One. As shown in Table 7-2, the collective anticipated annual payment after Year One is approximately $200,000. Therefore, the Financial Assurances payment will be $600,000. This financial assurances reserve fund is available to be drawn upon by the other Participants if a Participant does not make its annual payment or elects to withdraw from the KSHCP. This will allow the remaining Participants to cover the mitigation costs that the delinquent or withdrawing participant would have paid. The collective financial assurances payment will be made to the KSHCP Reserve Fund with half ($300,000) to be paid in Year 1 and the other half ($300,000) to be paid in Year 2.

Second, the Participants will fund a reserve to provide for Changed Circumstances and Adaptive Management measures that exceed the annual payments. As provided in Section 6.11, up to 2 events requiring complete replacement of the fence and social attraction equipment is considered a Changed Circumstance. The Reserve Fund shall be funded initially in the amount of one complete fence and social attraction equipment replacement. This collective payment will be $225,000. These funds may be used if there are Changed Circumstances or Adaptive Management measures that require the expenditure of funds beyond those available from the annual payments. This collective payment will be made in year 2 (as the first year cost includes a cushion for increased costs in year 1). The Reserve Fund shall be replenished following withdrawals so that there are sufficient funds to pay for one complete replacement of the fence and social attraction equipment, provided however that the Changed Circumstances reserve, as replenished, shall not exceed the cost of up to 2 events requiring complete replacement of the fence and social attraction equipment, as provided in Section 6.11. Not withstanding any limits on replenishment of the Changed Circumstances/Adaptive Management Reserve Fund, the Participants remain responsible for meeting the biological goals of the KSHCP (see Adaptive Management Process in Chapter 6).

No later than Year 28 of the KSHCP, the Participants will determine whether they wish to seek an amendment to extend the term of the KSHCP. If the Participants conclude they will seek an amendment to extend, the annual payments shall be made and the Reserve Fund maintained pending consideration of the amendment. If the Participants conclude they will not seek an amendment to extend, they will advise the USFWS and DLNR. At the end of Year 28, one year of the three years of Financial Assurance funds in the KSHCP Reserve Account ($200,000) shall be transferred to the KSHCP Conservation Measures Implementing Fund and shall offset the annual payment for Year 29 to the extent of the funds transferred. At the end of Year 29 of the KSHCP, one year of the three years of Financial Assurance funds in the KSHCP Reserve Account ($200,000) shall be transferred to the KSHCP Conservation Measures Implementing Fund and shall offset the annual payment for year 30 to the extent of the funds transferred. At the end

of the original term of the HCP, or any sooner termination, any interest accrued and remaining monies in both the KSHCP Reserve Account and the KSHCP Conservation Measures Implementing Fund will be paid to the Participants remaining in the HCP based on their proportionate share of the authorized take.

Inflation – Participants will work with the Prime Contractor to manage costs of implementation of the KSHCP. The budget includes inflation at three percent (3%) per annum for the annual payments. Both the KSHCP Conservation Measures Implementation Funding Account and the KSHCP Reserve Account will be invested by NFWF in one or more investment portfolios or an interest-bearing account maintained by NFWF. The Changed Circumstances/Adaptive Management funds will be replenished following withdrawals so that there are sufficient funds in then-current dollars to pay for one complete replacement of the fence and social attraction equipment, provided however that the Changed Circumstances reserve, as replenished, shall not exceed the cost of up to 2 such events, as provided in Section 6.11.

For the Financial Assurances portion of the Reserve Account, the Participants will have funded an initial three years of payments into a NFWF investment account. In the event of an early withdrawal of a Participant, the remaining Participants will replenish their individual pre-withdrawal shares for inflation, taking into account investment income, so that their three years of Financial Assurance payments are in then-current dollars.

Table 7-2: Schematic of types of payments needed for KSHCP funding, and which payments will be required in specific years.

	Year 1	Year 2	Year 3	Year 4	Year 5
Annual Payment	$600,000	$181,094	$192,772	$197,995	$203,293
Changed Circumstances	0	$225,000			
Financial Assurances	$300,000	$300,000			

The Prime Contractor shall have the right, but not the obligation, to accept payment in kind for materials or labor needed to implement the KSHCP from a Participant in satisfaction of its annual payment(s). The Participants shall have the right, but not the obligation, to provide a letter of credit in lieu of the Financial Assurances payment, provided that the Letter of Credit shall be made payable to NFWF or the KSHCP accounts, as directed by NFWF.

7.2 NON-SHARED COST COMPONENTS

The minimization measures described in individual PIPs will be performed by each individual Participant. The measures consist of lighting minimization; recovery of downed seabirds and their transportation to SOS or another appropriate facility; predator control at facilities; outreach and worker training; and honu actions (see Chapter 9). These measures will be implemented by the Participants within one year of Implementing Agreements (IA) and the issuance of the ITP and ITL.

Each Non-Governmental Participant will:

- Provide the estimated cost of its non-shared minimization and other measures in its PIP, along with an explanation as to how the Participant plans to fund these costs. Unless the Participant is going to provide a funding guarantee such as an irrevocable letter of credit, the Participant should provide sufficient information to show that it has the financial ability to fund these costs, i.e., that it is financially solvent and capable of providing the necessary funding.
- Warrant that it has, and will expend, the operating funds necessary to continue its minimization obligations.
- Agree to promptly notify the Prime Contractor and regulatory wildlife agencies (USFWS and DLNR) of any material change in its financial ability to fulfill its ongoing minimization obligations.
- Certify in its Annual Report to the Prime Contractor that it has, and will continue to expend, the operating funds necessary to continue its minimization obligations throughout the term of the ITP and ITL.

Each Governmental Participant will:

- Provide the estimated cost of its non-shared minimization and other measures in its PIP, along with an explanation as to how the Governmental Participant plans to fund those costs. If the Governmental Participant relies on annual appropriations for its funding assurances, the effective date of its incidental take authorization and the incidental take authorization for each year thereafter will be contingent on the Governmental Participant certifying to the agencies that funds have been appropriated for that year and will be expended. For this reason, the agencies recommend that Governmental Participants request appropriations for any non-shared measures not included in the normal operating budget in their next respective biennium budgets and as a recurring annual expense thereafter.
- Agree to promptly notify the Prime Contractor and regulatory agencies (USFWS and DLNR) if the funds requested to carry out its obligation under the KSHCP are not authorized.
- Certify in its Annual Report to the Prime Contractor that it will request in its annual budget and if approved expend, the operating funds necessary to continue its minimization obligations throughout the term of the ITP and ITL.

7.3 READJUSTING COST PER TAKE

7.3.1 LATE ENTRY TO THE KSHCP

The KSHCP is designed to accommodate new Applicants, or Participant requests for additional incidental take amounts annually up to the maximum level authorized by the wildlife agencies in the form of new or amended permits (see Section 6.3). This may result in a reduction to cost per take estimates. The cost readjustments described below will occur if the additional

incidental take request does not exceed the maximum amount analyzed in the KSHCP and is authorized by the wildlife agencies. (Note: If the maximum amount of take authorized in the KSHCP is exceeded, this will trigger a Major Amendment so is not discussed further here, see Section 6.13.2).

The fundamental issue for any late entries to the KSHCP, in terms of funding, is distributing costs equitably while accounting for the higher "set up" costs paid by the initial Participants. Additional incidental take requests will generally fall into three categories:

1. Results of Take Monitoring demonstrate the need for existing Participants to request additional incidental take;
2. Additional new Applicants who have been incurring ongoing take since the KSHCP initiation and are approved to join the KSHCP; or
3. Additional Applicants who have not incurred take in the past (e.g. opening a new facility) are approved to join the KSHCP.

In the case of category 1, the Participant will have already contributed towards the initial set up costs. The overall cost per take will reduce for all Participants to reflect the increase in overall take authorization within the planned-for mitigation

In the case of Category 2, the new Applicant will be required to pay for a portion of the set up costs (relative to the additional incidental take request) plus a portion of the annual implementation costs since the first year of the KSHCP, based on its proportional amount of incidental take. This is because the new Participant has been incurring take during this time period and because it is not equitable for a new entrant to pay only for the maintenance of infrastructure built and paid for by others. The set up costs include but are not limited to the cost of fence construction, predator control and social attraction site equipment that the initial Participants funded in the first years of the KSHCP. The annual fee for the Participants will be reduced as a result of the allocation of a portion of the set up costs as well as a reduced annual payment given the increase in authorized take.

In the case of Category 3, the new Participant will be required to pay a portion of the set up costs, but will begin paying their share of annual implementation costs at the time of joining, and for the remainder of the permit term. It is not equitable for a new entrant to pay only for the maintenance of infrastructure built and paid for by others. The set up costs include but are not limited to the cost of fence construction, predator control and social attraction site equipment that the initial Participants funded in the first years of the KSHCP. The annual fee for the Participants will be reduced as a result of the allocation of a portion of the set up costs as well as reduced annual costs given the increase in authorized take.

Late Participants (categories 2 & 3) will be required to make an initial payment consisting of: (1) a proportional contribution towards Year 1 set up costs ($600,000) and (if applicable) proportional contribution towards annual implementation costs for missed years, both adjusted for inflation;

(2) a proportional contribution toward the $600,000 Financial Assurances Payment, as adjusted for inflation to reflect three years of annual payments in then-current dollars; and
(3) a proportional contribution towards the $225,000 Changed Circumstance/Adaptive Management payment, as adjusted for inflation to reflect to the cost of one complete fence and social attraction equipment replacement. See Section 7.1 for details on these payments and their function in the KSHCP funding scheme.

The term of the KSHCP shall not be extended by the addition of Participants.

In all cases, the overall costs per take should be reduced for the initial group of Participants, and their 30 year costs will be adjusted to reflect this. The resulting reduction in annual costs and set-up costs for the initial Participants will be re-calculated to reflect a new annual cost per take, and applied retroactively to credit initial Participants for payments at the higher rate. Participants will subsequently pay a lower annual rate.

7.3.2 Early Withdrawal from the KSHCP.

A Participant may withdraw from the KSHCP before the conclusion of its permit term if it discontinues its Covered Activities or otherwise surrenders its permit in accordance with applicable law. Upon withdrawal from the KSHCP, the Participant shall forfeit the Financial Assurances Payment and the Changed Circumstances payment, except as provided below. Participants that withdraw early will have paid annual fees for an annual incidental take estimate averaged over the 30 year term, and will not be credited if their incidental take did not reach the annual take estimates.

For example, if a Participant withdraws at Year 10, and the initial take request was 2 birds/year, even if the Participant facility's monitoring has not documented incidental take of 20 birds, the fees paid in years 1-10 will be retained to pay for sufficient mitigation offset. However, if incidental take exceeded annualized take estimates, the withdrawing Participant will be required to pay additional fees as determined by DLNR and USFWS, with assistance from the Prime Contractor.

Where there is a new Participant with take to replace the take of the withdrawing Participant in whole or in part, the new Participant will pay into the KSHCP Reserve Account its share of the Financial Assurances and Changed Circumstances/Adaptive Management payments, and the withdrawing Participant will receive its pre-payments or a portion thereof.

In the case of withdrawal of a Participant or Participants or Participant reductions in take request, the wildlife agencies will work with the Participants to enroll additional Participants or provide mitigation for other programs or entities that require mitigation for seabird take. The Prime Contractor will work with the wildlife agencies to determine whether mitigation can be scaled to reflect the reduced take. If these strategies do not work, all shared costs must be collected from remaining Participants, provided however that the Participants may elect to initiate a Major Amendment if there is a reduction of greater than 10% of the initial authorized take (see Section 6.13.2).

A change in ownership shall not constitute an Early Withdrawal if the permit is transferred to the new owner (see Section 6.16). The Federal permit may be transferred in accordance with regulations in existence at that time (currently codified at 50 C.F.R. 13.25). In the event of a change of ownership of the Facility, the Implementing Agreement, the ITP and the ITL shall be transferred to the new owner. There shall be no change to the annual payment in the event of a change of ownership. The amounts paid to the KSHCP accounts, including the Financial Assurances and Changed Circumstances/Adaptive Management payments, shall be transferred and credited to the new owner.

7.4 PERMIT SUSPENSION OR REVOCATION

In the case of Participant's permit suspension or revocation, the costs and obligations of the other Participants in the KSHCP will be adjusted in the same manner as Early Withdrawal.

7.5 MITIGATION CREDIT

The KSHCP is a comprehensive plan that includes measures to avoid, minimize and mitigate for incidental take of Covered Seabirds caused by light attraction. The plan is structured to achieve the Goals and Objectives outlined in **Table 5-1**. The following section describes how mitigation credit is allocated based on successful completion of these objectives. The chronological sequence of plan objectives with substantive mitigation targets provides a phased approach towards accruing mitigation credit. This approach will enable the wildlife agencies and the Prime Contractor to determine the degree to which the KSHCP goals and objectives are achieved by the Participants over time.

The relationship of KSHCP objectives achieved and mitigation credit allotted is set by completion of biological performance targets, which in turn is tied to providing required annual funds. Year one has higher costs as the project is set up (8% of total 30-year project cost). As the project then moves into long-term maintenance, biosecurity and monitoring, the annual cost stabilizes, and each year 3% of the total project budget is spent.

Table 7-3. Proportion of total proposed KSHCP costs to be spent by project year.

Project Year	Percentage of Total Project Cost*
1	7.7%
2	3.3%
3-30	3.3%

*Total project cost includes funding of infrastructure, predator removal and biosecurity, biological and compliance monitoring and the KSHCP Prime Contractor and is presented in *Appendix G: KSHCP Budget Details*. Total project cost does not include funds collected for Changed Circumstances/Adaptive Management or Financial Assurances.

For each of the objectives associated with the mitigation project, the cumulative financial investment is reflected in the mitigation credit (**Table 7-3**). For example, if Objective 2.C is achieved by the end of Year 4, 17% of the total take of each Participant has now been successfully mitigated (8% in Year 1, 3% in each of Years 2, 3, & 4). If Objective 2.D is achieved by Year 7, 26% of the total take for each Participant has been mitigated. These numbers are derived from cumulative years of contributing 3% per year towards total project costs. Under this approach, a total mitigation credit equaling 100% can be achieved by the end of the 30-year permit term if all KSHCP goals and objectives are met in a timely manner.

Calculating the accrued mitigation credit at annual intervals is important for multiple reasons. Firstly, this helps determine the level of progress towards KSHCP goals and objectives. Secondly, if through the Adaptive Management process that decision on whether the mitigation project must be abandoned and funding shifted to an alternate mitigation project. This also provides a defined metric, based on which biological objectives were successfully met, for determining how much take has already been successfully mitigated (see **Table 7-4**). Criteria for project abandonment include inability to meet multiple project objectives on the scheduled timeline, even with the implementation of Adaptive Management measures.

Successful completion is a **requirement** for all KSHCP Participants (see Section 5.2) for all of the objectives associated with Biological Goal 1. Thus there is no specific mitigation credit associated with achieving these objectives, as it is necessary for permit compliance.

The level of mitigation credit allotted for achieving specific objectives is detailed in **Table 7-4** for the objectives associated with Goal 2**.**

Table 7-4. Mitigation credit standards under the KSHCP by Biological Objective.

Biological Goals	Biological Objectives	Mitigation Credit Standard
Goal 2: Mitigate authorized take impacts of Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua'i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of take caused by Covered Activities on the production of fledglings in the wild.	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.	Achieving objectives 2.A, 2.B, 2.G & 2.H results in **7.7%** of mitigation credit.
	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.	
	2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation.	Achieving this objective results in **17.5%** of mitigation credit.
	2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation.	Achieving this objective results in **20.8-27.4%** of mitigation credit.
	2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 of KSHCP implementation.	Achieving this objective results in **37.2%** of mitigation credit.
	2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP implementation.	Achieving this objective results in **70%** of mitigation credit.
	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.	Achieving Objectives 2.A, 2.B, 2.G & 2.H results in **7.7%** of mitigation credit
	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.	Achieving Objectives 2.A, 2.B,2.G, 2.H results in **7.7%** of mitigation credit
	2.I. Annual protection of any honu nests adjacent to facilities via shielding or other measures to avoid light attraction take.	Successful completion of this objective is a **requirement** for all KSHCP Participants where this applies.

The goal of using project tasks (Objectives 2.A-2.B) and biological targets (Objectives 2.C-2.G) in concert with the level of financial investment to inform the assessment of accrued mitigation credit is intended to provide a transparent and flexible process for evaluating the success of the KSHCP minimization and mitigation program.

7.6 BUDGET SUMMARY TABLE

Table 7-5: Summary of KSHCP costs throughout the 30-year term as estimated by Pacific Rim Conservation. Costs do not include Changed Circumstance/Adaptive Management or Financial Assurances Costs. The Participants anticipate that the initial Prime Contractor will be Pacific Rim Conservation for the initial five years, with options to extend.

Yr	Total	Total plus 3% inflation annually	State HCP Compli-ance	NFWF cost	Grand Total
1	$578,768	$578,768	$10,000	$11,575	$600,343
2	$162,854	$167,739	$10,000	$3,355	$177,739
3	$167,739	$172,772	$10,000	$3,455	$182,772
4	$172,772	$177,955	$10,000	$3,559	$187,955
5	$177,955	$183,293	$10,000	$3,666	$193,293
6	$183,293	$188,792	$10,000	$3,776	$198,792
7	$188,792	$194,456	$10,000	$3,889	$204,456
8	$194,456	$200,290	$10,000	$4,006	$210,290
9	$200,290	$206,298	$10,000	$4,126	$216,298
10	$206,298	$212,487	$10,000	$4,250	$222,487
11	$212,487	$218,862	$10,000	$4,377	$228,862
12	$218,862	$225,428	$10,000	$4,509	$235,428
13	$225,428	$232,191	$10,000	$4,644	$242,191
14	$232,191	$239,156	$10,000	$4,783	$249,156
15	$239,156	$246,331	$10,000	$4,927	$256,331
16	$246,331	$253,721	$10,000	$5,074	$263,721
17	$253,721	$261,333	$10,000	$5,227	$271,333
18	$261,333	$269,173	$10,000	$5,383	$279,173
19	$269,173	$277,248	$10,000	$5,545	$287,248
20	$277,248	$285,565	$10,000	$5,711	$295,565
21	$285,565	$294,132	$10,000	$5,883	$304,132
22	$294,132	$302,956	$10,000	$6,059	$312,956
23	$302,956	$312,045	$10,000	$6,241	$322,045
24	$312,045	$321,406	$10,000	$6,428	$331,406
25	$321,406	$331,048	$10,000	$6,621	$341,048
26	$331,048	$340,980	$10,000	$6,820	$350,980
27	$340,980	$351,209	$10,000	$7,024	$361,209
28	$351,209	$361,745	$10,000	$7,235	$371,745
29	$361,745	$372,598	$10,000	$7,452	$382,598
30	$372,598	$383,776	$10,000	$7,676	$393,776
	$7,942,829	$8,163,751	$300,000	$163,275	$8,475,326

8. ALTERNATIVES TO THE TAKING

Section 10(a)(2)(A)(iii) of the Endangered Species Act of 1973, as amended, and 50 CFR 17.22(b)(1)(iii) and 17.32(b)(1)(iii)] requires that alternatives to the taking of species be considered and reasons why such alternatives are not implemented be discussed. This chapter addresses this requirement.

8.1 NO ACTION ALTERNATIVE

The No Action Alternative means that an HCP would not be finalized and an ITP/ITL would not be potentially issued. This also means current conditions and activities that cause take of Federally listed species would continue absent take authorization in violation of Federal and State law.

Many HCPs commonly include a "no-action" alternative in a context where the action at issue is not already ongoing. Under those circumstances, the no-action alternative would obviate the need for an ITP/ITL because the action likely to cause take would not occur.

However, in the case of the KSHCP, the actions causing take have been ongoing (in some cases for decades) and is compounded by the effects of multiple existing facilities. Therefore under the "no action" alternative, entities on Kaua'i causing incidental take would continue operations with or without light minimization measures in place, without incidental take permit authorization from the DLNR or the USFWS under the KSHCP.

This alternative was not selected for several reasons, including the fact that in most cases the effects of light attraction can be reduced but not eliminated, leaving entities out of compliance with Federal and State law. In addition, failure to mitigate for the take that cannot be eliminated will continue to imperil these very vulnerable native species. However, it is likely that when considered island-wide, unavoidable take of the listed seabird species would inevitably continue and would be unmitigated and unauthorized. In addition, the entities with continuing take would remain exposed to enforcement actions either via one or both of the wildlife agencies as well as third parties under the Federal ESA.

8.2 THE "NO INCIDENTAL TAKE" ALTERNATIVE

As noted above, the effects of light attraction causing take of listed seabirds can be minimized but not entirely eliminated. Thus, a "no incidental take" alternative necessitates that all businesses and agencies on Kaua'i would need to modify existing and future use of artificial light to completely avoid incidental take of the Covered Seabirds. This would mean eliminating most, if not all, sources of artificial lighting during the fallout season. This alternative is not feasible for several reasons. Artificial lights in publicly used facilities such as parking lots, recreational centers, hotels, harbors, and airports are necessary for public safety and security. There are too many existing facilities using lighting for it to be practical to eliminate all sources of lighting. It is not reasonable or feasible to extinguish all nighttime lights on Kaua'i during fallout season. This alternative therefore has little chance of succeeding and does not meet

socioeconomic and regulatory needs for lights and utilities to support the human population on Kaua‘i and was not selected.

8.3 RESTRICTED USAGE OF LIGHTING ALTERNATIVE

As noted above, the effects of light attraction can be minimized but not entirely eliminated. A “restricted usage of lighting” alternative would require that all businesses and agencies on Kaua‘i modify existing and future use of artificial light to avoid incidental take of the Covered Seabirds by restricting light use during certain hours of the night during months when the Covered Seabirds are present on Kaua‘i (April-December). If current data on seabird nighttime movement patterns were used to set the timing restrictions, this would result in 4-8 hours each night when night-time lighting would be restricted (Raine et al. 2017d).

This would mean restricting all sources of artificial lighting during the fallout season. This alternative is not feasible for several reasons. Artificial lights in publicly used facilities such as parking lots, recreational centers, hotels, harbors, and airports are necessary for public safety and security. These facilities require lighting during all night time hours, but especially 2-4 hours after sunset, which coincides with a high movement time and high risk of fallout for Covered Seabirds. It is not reasonable or feasible to restrict use of all nighttime lights on Kaua‘i during fallout season. This alternative therefore has little chance of succeeding and does not meet socioeconomic and regulatory needs for lights and utilities to support the human population on Kaua‘i and was not selected.

9. HONU (GREEN SEA TURTLE) IN THE KSHCP

According to Federal Endangered Species Act, incidental take permits may not be issued to cover take of a listed threatened or endangered species if the Covered Activity also impacts additional listed threatened or endangered species. Thus, since the Covered Activity of artificial lighting has the potential to impact honu hatchlings, they are included in the KSHCP. However, as described in the following sections, no incidental take request for honu is anticipated in the KSHCP. Therefore details related to honu have been summarized in this chapter, separate from other chapters that focus on Covered Seabirds.

9.1 EFFECTS OF ARTIFICIAL LIGHTS ON HONU

Hawaiʻi is home to several sea turtle species, including the honu, Hawksbill Turtle - honuʻea (*Eretmochelys imbricata*), Olive Ridley Turtle (*Lepidochelys olivacea*) and the Leatherback Turtle (*Dermochelys coriacea*). Of these species, only the honu is known to nest regularly on Kauaʻi. Thus, it is the only turtle species with the potential to be affected by Covered Activities of the KSHCP.

Sea turtles nest most successfully on dark, quiet beaches. Lights can cause turtles to abandon nesting efforts, resulting in a false crawl, or a nesting attempt during which the female fails to deposit eggs (Witherington 1992). There is also the potential that gravid female turtles, deterred from nesting due to lights, may shed their eggs at sea (Witherington and Martin 2000). In addition, light pollution may cause some turtles to use sub-optimal nesting habitat due to a lack of better locations. In sub-optimal habitats, the number of hatchlings produced and hatchling survivorship may be compromised, and hatchling sex ratios may be altered.

Once hatchlings emerge from the nest cavity, they are highly sensitive to disorientation by lights, an outcome which causes mortality from dehydration, exhaustion, and/or predation particularly when they are attracted towards lights of developed areas and away from the sea, counter to their natural behavior (Witherington and Martin 2000, Salmon 2003).

Some studies have measured an indirect relationship between the amount of lighted beach development and sea turtle nest densities (Mattison et al. 1993). Adult females seem to use a "straight ahead" method to select a nest site. They do not appear to be affected as much by lights up and down the beach as they are by bright lights in front of them upon emerging (Witherington 1992, Salmon 2003). In addition, distant point sources and urban glow are more likely to affect hatchlings than adult females (Salmon et al. 1992).

Hatchling sea turtles exhibit a robust sea-finding behavior. Although the cues involved in sea finding are complex, hatchlings rely primarily on vision for proper orientation (Salmon et al. 1992, Lohmann et al. 1997, Witherington and Martin 2000). Hatchlings have a tendency to orient toward the brightest direction, but a combination of light and shapes is thought to be responsible for orientation of the clutch once they have left the nest. On natural undeveloped beaches, the brightest direction is almost always away from elevated shapes (e.g., dune, vegetation, etc.) and toward the broad open horizon of the sea (Salmon et al. 1992,

Witherington and Martin 2000). In contrast, on developed beaches, the brightest direction is often away from the ocean and toward lighted structures.

Artificial lighting cues cause either type of disorientation (Witherington 1990, 1997), however, the two behaviors described above are typically lumped under the term "disorientation." Hatchlings that are disoriented may either travel along a consistent course away from the ocean and toward a light source, or they are unable to establish a particular course and wander aimlessly (**Figure 9-1**).

Figure 9-1: Tracks of disoriented loggerhead (*Caretta caretta*) hatchlings, Melbourne Beach, Florida. Photograph by Blair E. Witherington.

Hatchlings unable to find the ocean, or delayed in reaching it, are likely to incur high mortality from dehydration, exhaustion or predation (Witherington and Martin 2000). If the hatchlings are drawn landward from the beach, they may enter roadways and be run over or become irretrievably lost. Weakened hatchlings that eventually reach the water may still die as they are more vulnerable to marine predators, which are abundant in nearshore waters (Gyuris 1994, Stewart and Wyneken 2004).

9.2 HONU TAKE RISK ASSESSMENT

Unlike seabird light attraction data, for which we rely on the SOS program (as described above), honu light disorientation events are rarely witnessed or documented. Sea turtles prefer to nest on beaches with minimal light and human disturbance. Discerning hatchling disorientation relies primarily on following and counting hatchling tracks and is unlikely to be documented unless the nest is being purposefully monitored. There are no systematic surveys for sea turtle nests on Kaua'i and thus the number and location of all nests is not known. Further, nests are not systematically monitored for the effects of light disorientation. Also, evidence of disorientation is easily and rapidly obliterated by natural and anthropogenic factors. Until more data are available on the distribution and success of honu nests, an island-wide quantification of honu take from light disorientation is not possible.

A study by Parker and Balazs (2015) reported 20 honu nesting sites that span the island, some with regular, annual nesting and others documented intermittently. Nesting density at these sites is low (1-2 nests annually). The majority of the known nesting locations are isolated beaches, away from lights and high human traffic, such as Allerton Beach at NTBG.

The process for determining whether an Applicant has a risk of honu take is based on 1) whether there is beachfront property at Applicant facilities with suitable habitat, and 2) whether there is light from the facility that will be visible from this beach habitat (**Figure 9-2**). Suitable habitat is very general for honu, and is defined as a beach with sufficient sand for digging (T. Jones, 2017, pers. comm.). Presence of native vegetation is also an indicator of suitable habitat.

If there is suitable beachfront habitat at the facility, the next step is to determine if there is light from the facility that is visible from this habitat. If there is no beachfront property, no suitable habitat and/or no light visible from this habitat, then there is no potential for take via the KSHCP Covered Activities.

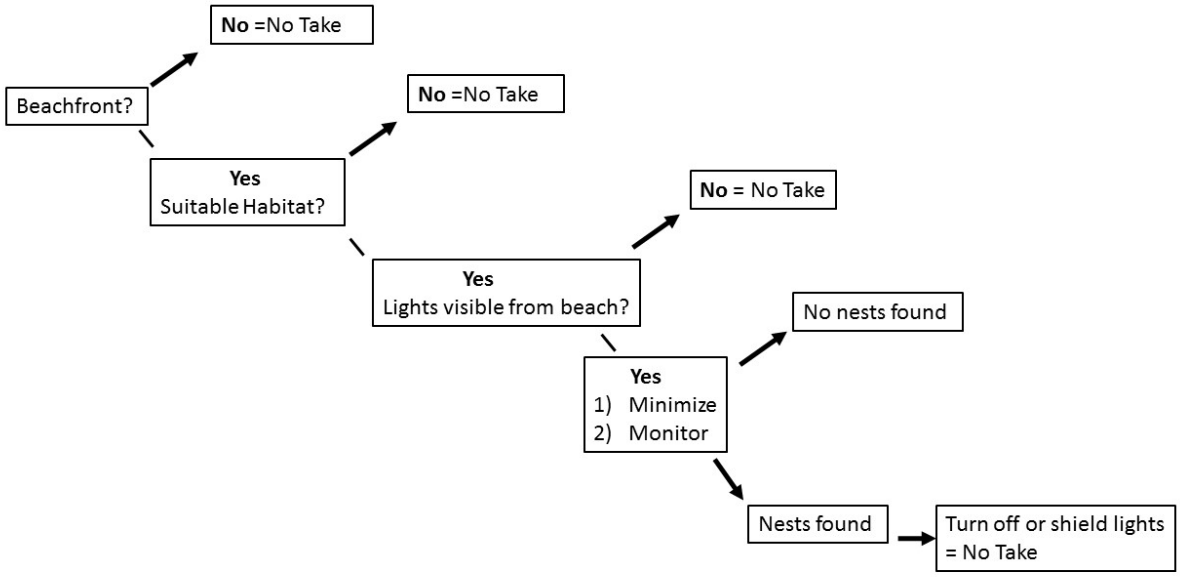

Figure 9-2: Flow chart of Applicant process for determining risk of honu take via light disorientation.

If there is light visible from suitable habitat on a facility's property, the Applicant must determine the level of risk for take of honu hatchlings via light disorientation. The following questions may guide this risk assessment:

- Can the visible lights be turned off or minimized during turtle nesting season (May to November)?
- Can sufficient monitoring be done to ensure that any nests are found and properly shielded (as described in Section 9.5)?
- Have there been documented honu nests on this beach before? Lack of documented nests is not an indication that there will not be future nests, but history of nesting could indicate a higher risk for light disorientation take.
- If there have been nests recorded on this beach, have there been documented light disorientation events?

Participants are responsible for minimizing light visible from beach habitat and monitoring for nests (see Section 9.5 below). If nests are found, actions to shield and protect the hatchlings from the effects of light disorientation must be implemented, as described in Section 9.5.

Each Applicant will do their own risk assessment. It is anticipated that Participants with beach front properties can completely avoid future incidental take of honu. Currently there is no provision for requested incidental take of honu in proposed Participant PIPs, and the minimization and mitigation measures outlined in Section 9.4 will be implemented as described to ensure that there is zero take of the species. If incidental take of honu is requested by a Participant during the 30-year term of the KSHCP permit term, commensurate honu mitigation will be developed. The regulatory agencies would submit any such proposed mitigation for public review either as an amendment to the KSHCP or as part of processing a permit application.

9.3 NET EFFECT OF THE KSHCP ON THE HONU

The honu population on Kaua'i is increasing, as is the State wide population. The effects of light disorientation do not seem to be causing significant negative effects on the overall honu population (Parker and Balazs 2015). To better support this conclusion, more long-term monitoring of honu nests and nest success on Kaua'i is warranted. Measures undertaken by Participants in the KSHCP to avoid hatchling sea turtle light disorientation and to respond to any disorientated hatchlings on their facility, will further increase the likelihood of the honu population on Kaua'i continuing to increase. The effects of light disorientation can be mitigated so that this effect does not negatively impact honu populations.

9.4 MEASURES TO AVOID AND MINIMIZE TAKE OF HONU

Measures to avoid and minimize take to achieve Goal 1 of the KSHCP are described in Section 5.3. All actions that are implemented to avoid and minimize take for Covered Seabirds will also benefit honu. Lighting guidelines fit the recommendations by Salmon (2003) to limit the impact of coastal light pollution on turtles.

Reducing predators at facilities will also benefit any honu that chose to nest on facility beaches. Adult turtles may be scared off by dogs, and hatchlings may be subject to predation by dogs or cats.

Outreach materials to inform staff and guests about the potential for nesting honu is also required. As many people as possible should be trained to recognize sea turtle tracks, and the signs of nesting. Materials should also discuss timing of nesting and hatching, other honu behaviors that might be observed (i.e. basking), and laws protecting sea turtles while they are on land. An example handout is provided in *Appendix F: Training and Outreach Materials.*

9.5 PROTECTION OF HONU NESTS FROM LIGHT ATTRACTION (OBJECTIVE 1.F)

All KSHCP Participants must monitor for nests if they have beachfront property with suitable habitat and visible lights (see Section 9.2 for process to evaluate take risk). Beach monitoring surveys will aid in determining sea turtle presence, active nests, potential threats (e.g., lights, excessive beach debris, deep tire tracks, etc.), and hatch date of nests. Standard monitoring techniques follow suggested protocols in Eckert et al. (1999) and Hillis-Star and Phillips (2012).

Methods & Protocols for Nest Finding and Monitoring:

- Surveys will be conducted between May 15th and December 15th each year.
- Surveys should include sandy areas of all suitable beachfront property and consist of walking the area in the morning to look for evidence of nesting (turtle tracks, digging, presence of turtles etc.).
- Surveys should be completed by staff or volunteers that have completed annual training provided by USFWS or DLNR.
- Surveys should be completed at least once per week during peak nesting season (May-July) bi-weekly for the remainder of the nesting season (August-December).
- All sea turtle activity should be reported immediately to USFWS and DLNR and all potential nest sites shall be protected immediately using measures specified below;
    - Active nests (those at which eggs have been deposited or thought to have been deposited) must be monitored every 1-2 days.
    - Once the nest has been incubating for 45 days, monitors will begin checking the nest daily for signs of hatching to ensure that no obstacles inhibit hatchling movement from the nest to the ocean;
    - Evidence of hatching shall be reported to USFWS and DLNR within 24 hours. USFWS, DLNR, or their designee, will then be responsible for final nest excavation to determine species, proportion of eggs that hatched and to send remaining eggs to NOAA for DNA analysis.
- During nest surveys and nest monitoring the following minimum data shall be collected:
    - Maps of surveyed beaches which indicate:
        - The property and facilities of the Participant conducting the monitoring, and proximity to the beach that will be monitored;
        - Lights visible from the beach;
        - The general survey route along the beach;

        - Length of the beach monitored;
    - Date, personnel surveying, time spent on the survey;
    - Outcome of the survey – the number of nests found;
    - Nests should be mapped with a GPS unit;
    - Assessment of potential threats at the nest;
    - Status of protective measures installed (e.g. light fences) at all nests found;
    - Hatching success and emergence success as determined by final nest excavation.
    - Nest excavations shall only be completed by the DLNR or USFWS, or their designee.

(Methods and Protocols adapted from Eckert et al. (1999) and Hillis-Star and Phillips (2012))

The following actions to avoid take are based on the recommendations published in Witherington et al. (2014), Lake (2008), Salmon (2006) and Witherington and Martin (2003)

- If an active honu nest is found at a Participant facility, the most effective way to prevent hatchling disorientation is to turn off any lights that are visible from the nest site.
- If this is not possible,
    - lights must be shielded so that they do not shine on the nests;
    - a temporary light-proof silt fence must be erected that will not further endanger the nest and hatchlings. "Light-proof fencing" is a temporary fence built from wooden stakes and opaque black silt fence fabric.
- If the nest is located on a public beach, installation of a fence may draw attention to the nest and increase the risk of vandalism – in this case, the shielding and / or removal of lights is even more important.
- Participants should contact the NOAA Stranding Hotline and KSHCP Prime Contractor to assist with installing fence adjacent to nests.
- Materials and any installation costs will be the responsibility of the Participant.

The following fencing technique is recommended wherever light visibility from the nests, as visible from the sand surface, cannot be eliminated or shielded at the light source.

a. The fence must be tall enough to shield the visibility of lights at Participant facilities and placement must be approved by a qualified biologist (e.g. DAR, NOAA, DOFAW, USFWS, biological consultant, or non-profit organization may be specified in the PIP);
b. Photographs and GPS coordinates of the honu nest(s) shall be documented and the fence shall be placed 7 days prior to the expected hatch date, or when a sandy depression develops within the defined nest area, to indicate hatchlings are in the process of emerging. Photographs of lights at night from the nest before and after the fence installation shall be taken;
c. The fence will be in place and maintained daily prior to hatchling emergence to be effective. Adjustments to the fence may be made with approval of a qualified biologist;

d. After the honu hatchlings have emerged and entered the ocean, the fence shall be removed;

Areas seaward of the nest shall be maintained free of ocean debris and garbage on a daily basis. Feral and loose animals such as dogs, cats and rats shall be controlled per requirements of Section 5.3.2**.**

Vehicles can crush hatchlings and deep tire ruts can trap hatchlings inside. Therefore, a ban on beach driving at Participant properties during the expected hatching period must be enforced and vehicle entry routes (even informal ones) must be effectively blocked off. "Enforcement" activities could include monitoring for beach driving and calling the police, DOCARE and / or the county if beach driving occurs. Daily raking or smoothing deep sand tracks adjacent to the nest is also required one week prior to and after the expected hatch date.

There is not anticipated to be any incidental take of honu requested in the KSHCP, as monitoring and nest protection measures described in Section 9.5 will be implemented by all Participants with visible lights on beachfront property. However, if honu hatchling disorientation does occur, the following protocols should be followed:

- The Department of Aquatic Resources (DAR) should be contacted immediately so the hatchling turtles are only handled by staff or volunteers permitted to handle endangered species.
- Disoriented hatchlings should be protected from foot or vehicle traffic, predation, and handling.

All Participant staff should be trained on Standard Operating Procedures (SOPs) with regard to hatchling disorientation, to minimize take impacts.

9.6 ADAPTIVE MANAGEMENT FOR HONU

The KSHCP was drafted assuming that all take of honu can be avoided through actions to identify honu nests prior to hatching and to implement temporary conservation measures to prevent hatchling disorientation from artificial light as outlined above. If honu nests cannot be effectively identified in advance or if temporary measures are insufficient to prevent hatchling disorientation, and incidental take occurs, the Prime Contractor affected Participant will meet with USFWS and DLNR to discuss the probable reasons for the situation and possible changes or alternatives. This might include an evaluation of monitoring protocols and the process for installing light shielding around the nests. Minor changes to protocols compatible with existing funding can be made as soon as practicably possible. If take cannot be avoided, the affected Participant will work with the wildlife agencies to amend the Plan to provide honu mitigation. If not considered feasible to provide mitigation through the KSHCP, the Participant will need to develop its own HCP for honu take. Under either scenario, the Participant should apply for an incidental take permit/license.

10. GLOSSARY FOR KSHCP AND ALL ASSOCIATED APPENDICES

Active Burrow: Determined when an adult bird is either observed or when signs of bird presence are documented during the breeding season (e.g., feathers, guano, digging, etc.).

Adaptive Management: A systematic science based approach for managing complex ecosystems that face a high degree of uncertainty. This approach aims to reduce uncertainty by incorporating what is learned from management, monitoring, and intensive research into future management actions.

Adult: Life stage in which a species has reached sexual maturity.

Applicant: A non-Federal entity seeking an Incidental Take License and an Incidental Take Permit under the Kaua‘i Seabird Habitat Conservation Plan, once accepted, the “Applicant” becomes a “Participant”.

Avoidance Measures: Actions that aim to eliminate all potential take of a Covered Species.

Biological Goals (specific to the KSHCP): To implement a statewide conservation strategy, for the duration of the Incidental Take Licenses and Permits, that supports the conservation goals of the State and Federal management and recovery plans.
(Goal 1) is “Under the KSHCP, avoid and minimize take impacts to the Covered Seabirds caused by nighttime lighting on Kaua‘i to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Seabirds represent a major threat to their survival and recovery.”
(Goal 2) is “Under the KSHCP, mitigate authorized take impacts of the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua‘i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of take caused by Covered Activities on the production of fledglings in the wild.”

Biological Objectives (specific to the KSHCP): As an extension of the Conservation goals, the objectives were developed from the USFWS and DLNR recovery and management planning documents and are intended to satisfy the Federal and State regulatory requirements for issuance of Incidental Take Licenses and Permits. An example would be to avoid take of Covered Seabirds due to light attraction by removing or turning off lighting as specified in the Participant Inclusion Plan.

Biological Opinion: A document prepared by the Fish and Wildlife Service (USFWS) for all Participant Inclusion Plans (PIP) submitted by Applicants. As required by the Endangered Species Act (ESA), the document addresses whether the proposed activities will jeopardize the continued existence of the listed species or result in the destruction or negative alterations of the listed species’ critical habitat.

Biosecurity: Systematic measures intended to protect against the introduction or spread of harmful organisms to other plant and animal life (e.g. monitoring a predator exclusion fence line for any openings that might allow predators into a seabird nesting colony).

Breeding Pairs: Two animals that copulate and work cooperatively to produce offspring.

Breeding Probability: The likelihood that any one animal will breed in a given year.

Breeding Success: Number of chicks fledged from number of burrows active

Carapace: Bony or chitinous case or shield covering the back or part of the back of an animal (as a turtle or crab).

Changed Circumstances: As defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by the Applicant or wildlife agency and to which the parties can plan a response. Adaptive Management is one type of Changed Circumstances.

Colony: Area where birds nest and breed in close proximity as a group, often sharing communal behaviors for the benefit of the entire group. The size of the colony can vary from just a few breeding pairs to hundreds or thousands of birds depending on the species and availability of resources, including suitable nest sites and takeoff/landing zones.

Colony-based Mitigation: Efforts made to reduce primary threats (e.g., predation, burrow destruction by ungulates) at Covered Seabird breeding colonies.

Colony Creation: Small, existing colonies can be augmented and new colonies can be created, in a predator-free fenced enclosure, by increasing the colonization rate of an area using techniques such as social attraction and/or translocation.

Covered Activities: Activities that cause the incidental take of a Covered Species. Under the KSHCP this includes the placement, operation, and maintenance of light structures that can cause disorientation of fledgling seabirds and hatchlings of the honu.

Covered Seabirds: The ʻaʻo or Newell's shearwater (*Puffinus auricularis newelli,* threatened); the Hawaiian petrel or ʻuaʻu (*Pterodroma sandwichensis,* endangered); the band-rumped storm-petrel or ʻakēʻakē (*Oceanodroma castro,* endangered).

Critical Habitat: As a species is proposed for listing, USFWS is required to consider if the species survival is dependent upon vital geographical areas. The Endangered Species Act regulations specify the criteria for designating Critical Habitat as "those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection" (50 CFR 424.12).

Cut-off Lighting: Lighting with flat glass lenses that eliminate or minimize glare and produce no upward visible light.

Downed Seabirds: Seabirds on the ground in locations where they normally should not be found, usually as a result of attraction and disorientation by artificial lights or structure collisions. These birds are unable to get off the ground again naturally.

Enclosure: An area that has been encompassed by a fence (i.e., ungulate, feral cat, or predator proof fencing) or by a combination of fencing along with a natural barrier such as a cliff.

Endangered Species Act (ESA): A key legislation for both domestic and international conservation. The act aims to provide a framework to conserve and protect endangered and threatened species and their habitats. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service (NMFS).

Endemic (endemism): A species that is exclusively found in a specific area or region and is not found to naturally occur anywhere else. For example, The ʻaʻo and the ʻuaʻu can only be found in the central Pacific ocean and Hawaiian Islands.

Enrollment Package: This includes a written request (e.g. cover letter) from the landowner, facility operator, or other responsible party; State and Federal application forms (with Federal application fee); a completed Participant Inclusion Plan; an Implementing Agreement; and the final approved Habitat Conservation Plan Document.

Essential Lighting: A category of Participant facility lighting that cannot be turned off due to the necessity of the illumination for operation and/or safety at the facility.

Facility: Structure built, installed, or established to serve a particular purpose.

Fallout: When a seabird lands at a location that it normally would not have landed as a result from attraction and disorientation to artificial lights. These birds cannot get airborne again naturally.

Fallout Season: September 15th to December 15th, when the majority of ʻaʻo and ʻuaʻu are fledging from their burrows.

Fledging: The act of leaving the nest/burrow for the first time and migrating to the ocean to begin foraging. After fledging, seabirds will not return to their natal burrow until they are 2-5 years old (sub-adults).

Fledgling: A young bird, typically with fully developed wing muscles and feathers, that leaves the nest for good and is able to survive away from the nest.

Fledging Success: Number of chicks fledged from all successfully hatched chicks.

Flight Corridor: Heavily used flight path; defined airspace through which individuals of a particular species will travel regularly in transit between foraging areas and nest site. Areas in which regular bird traffic is reasonably predictable.

Flyways: Common flight paths that utilize natural topographic features leading inward or out from the mountainous interior where nest sites are located, typically flying seabirds are more concentrated here than elsewhere.

Ground Calling: Seabirds heard calling from the ground that suggests possible breeding activity in the vicinity of the calls, whereas, seabirds heard calling in flight may be the result of birds transiting over the island while traveling to or from the breeding colony.

HAPE: ʻuaʻu or Hawaiian Petrel (*Pterodroma sandwichensis*). This is based on an ornithological naming convention that creates standardized 4 –letter code from the first two letters of the common names.

Hatchling: A young animal that has recently come out of its egg. All of the Covered Species emerge from eggs and may be referred to as a "hatchling", but in the KSHCP this is used in particular with reference to sea turtles.

Habitat Conservation Plan (HCP): An incidental take permit is required when non-Federal activities will result in "take" of threatened or endangered wildlife. A habitat conservation plan (HCP) must accompany an application for an incidental take permit. The purpose of the habitat conservation planning process associated with the permit is to ensure there is adequate minimizing and mitigating of the effects of the authorized incidental take.

Impacts to Covered Species: The effects that Covered Activities have on the Covered Species (e.g., death of Covered Seabirds due to light attraction, death of honu hatchlings due to light disorientation, etc.).

Implementing Agreement: A planning document that is part of the required Applicant enrollment package needed in order to receive an Incidental Take Permit.

Incidental Take: The taking of a species that is listed as endangered or threatened under the Endangered Species Act that is "incidental to, and not the purpose of, carrying out of an otherwise lawful activity" (50 CFR 17.3).

Incidental Take License ITL: All qualifying private, non-Federal entities, can request an incidental take license (ITL) under §195D-4(g) of the Hawaiʻi Revised Statutes (HRS). The Incidental Take License provides a way for the State to authorize take that occurs as a result of otherwise legal activities. This licensing document must be accompanied with an approved Habitat Conservation Plan.

Incidental Take Permit ITP: Pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, a permit can be issued by USFWS to non-Federal entities, allowing incidental take of an endangered or threatened species when the take results from otherwise lawful activities. This permitting document must be accompanied with an approved Habitat Conservation Plan.

Invasive Species: A non-native or non-indigenous organism that negatively affect the habitat that it has invaded. Environmental, ecological, and/or economic impacts may result from the invasion.

IUCN Red List: International Union for Conservation of Nature maintains a list of the conservation status of all plant and animal species, updated with scientific information and based on a globally recognized system for identifying risk of extinction. For more information see: www.iucnredlist.org.

Kaua'i Seabird Habitat Conservation Plan (KSHCP): This project is undertaken by the State Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW)). The goal is to provide a streamlined, cost-effective way to attain legal authorization and coverage for unavoidable incidental take of Kaua'i's endangered and threatened seabirds and sea turtles due to light attraction and to achieve net conservation benefits for the Covered Species.

KSHCP Stakeholders: Team comprised of representatives from the KSHCP Implementing Entity (IE), Participants, USFWS, DOFAW and KESRP and other entities that will meet annually (at a minimum) to review KSHCP Annual Report, make management recommendations and support implementation of the KSHCP.

Life History Parameters: Factors that affect the likelihood of an individual from surviving one year to the next. The matrix modeling was based on the parameters of survival and fecundity (age of first breeding, breeding probability, reproductive success and sub-adult and adult survivorship).

Light Attraction: Disorientation in nocturnal seabirds or sea turtle hatchlings caused by artificial lighting.

Light Disorientation: Altered behavior in hatchling sea turtles that are attracted to an artificial light source and do not migrate directly to the ocean after emerging from their nest.

Light(ing) Intensity: Measure of the wavelength-weighted power emitted by a light source in a particular direction per unit solid angle, based on the lumosity function, a standardized model of the sensitivity of the human eye. The Standard International unit of luminous intensity is the candela (cd).

Listed Species: Any species designated as threatened or endangered under the Endangered Species Act.

Lumens: SI unit of luminous flux, equal to the amount of light emitted per second in a unit solid angle of one steradian from a uniform source of one candela.

Maximum Extent Practicable: Fully consistent with the enforceable policies of the management program unless full consistency is prohibited by existing laws or regulations. Involves applying best management practices (BMPs) that are effective in reducing take.

Minimization Effort: Action taken by Participant or permittee to reduce activities causing take.

Mitigation: [Environmental, compensatory] describes projects or programs intended to offset known impacts to an existing historic or natural resource such as a stream, wetland, endangered species, archaeological site, or historic structure.

Mitigation Action: Measure that reduces or addresses potential adverse effects of a proposed activity on species covered by a HCP. Should address specific needs of the species involved and be manageable and enforceable. Actions may take many forms, such as preservation (via acquisition or conservation easement) of existing habitat, enhancement or restoration of degraded or a former habitat, creation of new habitats, establishment of buffer areas around existing habitats, modifications of land use practices, and restrictions on access.

Mitigation Production: The number of birds that were produced, or able to successfully fledge at a mitigation site. Most often used in reference to biological production at a mitigation site in comparison to an unmanaged breeding site.

Mitigation Sites: Project area receiving mitigation action.

Monitoring: The systematic surveillance or sampling of air, water, soil, and biota in order to observe and study the environment, and to derive knowledge from this process. The processes and activities that need to take place to characterize and monitor the quality of the environment or effectiveness of a project.

Moon Phase: Shape of the illuminated (sunlit) portion of the moon as seen by an observer on Earth. Changes cyclically as the moon orbits the earth, and can be useful in predicting fallout of covered seabird fledglings during the fledging season.

NESH: ‘a‘o or Newell’s Shearwater (*Puffinus auricularis newelli*). This is based on an ornithological naming convention that creates standardized 4 –letter code from the first two letters of the common names.

Net Benefit: Abbreviated reference to “net conservation benefit”, a requirement under Hawai‘i State law for HCPs to mitigate commensurate for the requested take plus additional mitigation to ensure the likelihood of the survival and recovery of the species in the wild.

Non-Federal Entities: Any entity without Federal status, as this is a requirement for eligibility.

Participant Inclusion Plan (PIP): A plan delineated by the Applicant describing Covered Activities at facilities, efforts to avoid and minimize take, and requested take for each Covered Species.

Participant: A non-Federal entity holding an Incidental Take License and an Incidental Take Permit under the Kaua'i Seabird Habitat Conservation Plan. Prior to being accepted, the "Participant" is referred to as an "Applicant".

Pelagic: Related to, or living in, the sea, far from shore.

Permittees/Permit Holders: Each Participant in the KSHCP will be a permittee with their own individual ITL and ITL.

Polygon: Area of calling activity recorded during an auditory survey, classified as either 'heavy' or 'light', the boundaries of which are defined subsequently on a map by the surveyor. May also include visual flight observations and/or breeding evidence on the ground such as burrows, scrapings, and guano.

Predator Control: The act of controlling animals defined as predators via a variety of techniques. In the KSHCP the primary predator for which predator control techniques are applied consist of non-native rats, feral pigs, feral cats, and barn owls.

Predator Eradication: Complete removal of predators from within a predator-proof enclosure or reserve featuring natural barriers.

Predator-proof Fence: A fence specially designed to exclude predators from entry to an enclosure. Can be created to exclude a variety of predators, from a 2 day old baby mouse (small mesh) to just ungulates.

Prime Contractor: The entity responsible for administering and coordinating all facets of the Seabird Mitigation under the KSHCP. This includes compiling, preparing, and submitting necessary information to the regulatory wildlife agencies, DLNR and USFWS, to enable the agencies to determine compliance with the terms and conditions of each ITP/ITL issued.

Productivity: Number of fledged young per nesting pair of seabirds.

Recovery Plan: A document which specifies what research and management actions are necessary to support recovery of a listed species, but does not itself commit manpower or funds. Recovery plans are used in setting funding priorities and providing direction to local, regional, State, and Federal planning efforts.

Seabird: A bird that frequents coastal waters and the open ocean.

Seabird Fallout Period: The time period each year (September 15-December 15) when listed seabirds on Kaua‘i are fledging from their nests and may become subject to light attraction.

Site: Location that has been identified by HCP planning as a project area slated to receive monitoring in any capacity, ranging from the passive, such as the seasonal installation of an acoustic monitoring unit (song meter), to the highly active, such as the installation of a predator-free refugium for translocation and social attraction.

Social Attraction: A colony creation technique whereby seabirds are attracted to an area to initiate breeding by playing recordings of other seabirds of the same species. This is an effective technique due to the colonial nature of seabirds.

Stakeholders: Individuals or entities with an investment in the outcome of a planning process.

Sub-adult: For Covered seabirds in the KSHCP, this term refers to birds 2-5 years old who have not reached sexual maturity.

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct.

Triggers: Established milestones or circumstances that if not met will initiate the need for Adaptive Management.

Upper Limahuli Preserve (ULP): An upland area on the northern coast of Kaua‘i that is owned and managed by the National Tropical Botanical Garden. An ungulate fence was installed to protect rare plants and seabird nesting habitat, and active predator control in the preserve is ongoing.

Unforeseen circumstances: As defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that cannot be reasonably anticipated by the Applicant or wildlife agency.

Ungulates: A hoofed mammal. On Kaua‘i, existing ungulates that may trample burrows and seabird habitat, or predate on nesting seabirds include feral pigs and goats and deer.

Wildlife Agencies: Public agencies involved in permitting and regulation of wildlife. These include the Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) at the State level, and the US Fish and Wildlife Service (USFWS) at the Federal level.

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