

**KAUA‘I ISLAND UTILITY COOPERATIVE (KIUC)
SHORT-TERM HABITAT CONSERVATION PLAN/
INCIDENTAL TAKE PERMIT
RENEWAL APPLICATION**

Prepared For:



The power of human connections®

**Prepared by:
Planning Solutions, Inc.
Rana Biological Consulting, Inc.
Ebbin Moser + Skaggs, LLP**

April 6, 2016

TABLE OF CONTENTS

1. INTRODUCTION	1-1
1.1 BACKGROUND	1-1
1.2 RENEWAL	1-2
2. UPDATED INFORMATION – OVERVIEW	2-1
2.1 NEW INFORMATION: GENERAL	2-1
2.2 KSHCP: MAJOR DELAYS/CHANGES RESULT IN KIUC DEVELOPING ITS OWN LONG-TERM HCP	2-1
2.3 NEW INFORMATION: COVERED ACTIVITIES	2-3
3. UPDATES: POTENTIAL BIOLOGICAL IMPACTS	3-1
3.1 UNDERLINE MONITORING PROGRAM – COLLISION ESTIMATES	3-1
3.2 DISTRIBUTION OF COLLISIONS BY SPECIES	3-2
3.3 MORTALITY ESTIMATES	3-2
3.3.1 UMP DATA AND ANALYSIS	3-2
3.3.2 USFWS LITERATURE REVIEW	3-3
3.3.3 MORTALITY AND SEABIRD POPULATION ESTIMATES	3-4
4. UPDATES: CONSERVATION PROGRAM	4-1
4.1 ALREADY IMPLEMENTED MINIMIZATION MEASURES	4-1
4.1.1 IMPLEMENTED MINIMIZATION MEASURES IDENTIFIED IN STHCP	4-1
4.1.2 IMPLEMENTED MINIMIZATION MEASURES NOT IDENTIFIED IN STHCP	4-1
4.2 FUTURE IMPLEMENTATION OF MINIMIZATION MEASURES	4-2
4.3 MITIGATION MEASURES	4-2
4.3.1 IMPLEMENTED MITIGATION MEASURES IDENTIFIED IN STHCP	4-2
4.3.2 NEW INFORMATION FROM SEABIRD COLONY MANAGEMENT, MONITORING, AND RELATED STUDIES	4-2
4.3.3 CONTINUATION OF SOS, PREDATOR CONTROL MEASURES, AND MONITORING	4-4
4.3.4 FUTURE IMPLEMENTATION OF MITIGATION MEASURES NOT IDENTIFIED IN THE STHCP	4-4
5. UPDATES: MITIGATION IMPLEMENTATION BUDGETS	5-1
5.1 SOS PROGRAM	5-1
5.2 SEABIRD COLONY MANAGEMENT AND PREDATOR CONTROL IN UPPER LIMAHULI VALLEY	5-1
5.3 SEABIRD COLONY MANAGEMENT & PREDATOR CONTROL AT HONO O NĀ PALI	5-4
5.4 CONTINUE TO FUND UNDERLINE MONITORING PROGRAM (UMP)	5-4
5.5 LAY GROUND WORK FOR CREATING PREDATOR-PROOF AREAS IN ULP & UMV	5-7

1. INTRODUCTION

1.1 BACKGROUND

The U.S. Fish and Wildlife Service (USFWS) approved the Kaua'i Island Utility Cooperative (KIUC) Short-Term Habitat Conservation Plan (STHCP), and issued the associated Incidental Take Permit (ITP No. TE234201-0), on May 13, 2011. At that time, relatively little was known about the distribution, population or behaviors of the Covered Species¹ on Kaua'i, or the extent of the effects of KIUC's facilities and activities thereon. Thus, the purpose of the short, five-year term of the STHCP was to have KIUC, in concert with multiple conservation partners,² implement a suite of specific agency-approved monitoring and research projects, and to then use the resulting new information to inform the development of a subsequent long-term HCP.

As the STHCP explains in detail, in 2011 the "subsequent long-term HCP" was anticipated to be the Kaua'i Seabird Habitat Conservation Program (KSHCP), an island-wide "regional" HCP that the Hawai'i Department of Land and Natural Resources/Division of Forestry and Wildlife (DLNR/DOFAW) and the USFWS have been working to develop since 2003. In early 2011, the agencies expected that their KSHCP would be completed and approved by early 2012. Take of seabirds on Kaua'i by scores of facilities due to light attraction and collisions with above-ground structures has been well known for decades. The KSHCP was to address this island-wide situation programmatically by creating a regional HCP that could provide take authorization to, and deploy mitigation funds received from, numerous entities across the island. Participating entities were expected to include KIUC, hotels and resorts, industrial facilities, and state and local government installations. As part of the STHCP, the USFWS required that KIUC participate in and obtain long-term take authorization through the KSHCP, and the STHCP text reflects that.

However, the task of developing the KSHCP proved to be very complicated and difficult. As a result, and after many years of delays, in late 2015 DLNR and USFWS decided unilaterally to "split" the KSHCP into two pieces – a light-attraction HCP that the agencies would prepare for potential use by multiple applicants, and a KIUC-only HCP which KIUC would prepare that would cover all of KIUC's facilities and operations. To assist KIUC in implementing this huge added responsibility, the agencies offered to pass through to KIUC a portion of the FY2015 federal grant funds the USFWS had awarded to DLNR for purposes of completing the original KSHCP.

As required by the agencies' decision to "split" the KSHCP, KIUC began developing its own Long-Term HCP (LTHCP) in early 2016. The LTHCP will address all of KIUC's take of the Covered Species (i.e., both utility line collisions and light attraction). Development of the LTHCP will be closely coordinated with KSHCP's development of its greatly reduced-in-scope light-attraction HCP (LAHCP). Consistent with the USFWS FY2015 grant fund award, KIUC intends to have its LTHCP completed and approved by early 2018.

KIUC has successfully implemented all of the minimization and mitigation measures stipulated in the STHCP (some at significantly greater expense than projected in the STHCP), as well as numerous additional voluntary measures. In so doing, KIUC and its partners have developed extensive new information that has radically improved the state of knowledge about the Covered Species, KIUC's impacts, and the effectiveness of different minimization and mitigation approaches. KIUC is now

¹ The term "Covered Species" refers to the Hawaiian Petrel (*Pterodroma sandwichensis*), Newell's Shearwater (*Puffinus newelli*), and the Federal proposed for listing Band-rumped Storm-Petrel (*Oceanodroma castro*).

² These include the Hawai'i Department of Land and Natural Resources (DLNR) Natural Area Reserves System, the Kaua'i Endangered Species Recovery Project, the National Tropical Botanical Garden, and the Kaua'i Humane Society.

utilizing that best available information to prepare its LTHCP, and DOFAW is using that new information to help craft its LAHCP.

1.2 RENEWAL

The five-year term of the STHCP and ITP are set to expire on May 13, 2016. KIUC's ITP (No. TE234201-0) is a renewable permit.³ Pursuant to 50 CFR §13.22, KIUC hereby applies to the USFWS for a renewal of the ITP until the LTHCP is completed and approved and a new ITP is issued.

USFWS regulations [50 CFR §13.22(a)] state that if information contained in the original application (i.e., the STHCP) is no longer current or correct, then the application for renewal must provide corrected information. For the reasons discussed above, some of the information in the STHCP has been superseded by new and different information developed through implementation of the STHCP's conservation measures. This application provides the required updated and corrected information.

³ See Page 1 of the ITP, Box 4.

2. UPDATED INFORMATION – OVERVIEW

2.1 NEW INFORMATION: GENERAL

When the USFWS approved KIUC's STHCP in 2011, there was limited information available on the frequency of seabird collisions with power lines. As a result, the STHCP relied largely on the following, which constituted the best available information at that time: (i) data on downed and retrieved seabirds collected through the Save Our Shearwaters (SOS) program; (ii) generalized data from periodic DOFAW radar surveys conducted once or twice a year at selected locations on Kaua'i; (iii) the results of surveys and related analyses carried out during 1992-1994 (Ainley et al. 1995; Cooper and Day 1995) (often referred to as the Electric Power Research Institute or "EPRI" studies); and (iv) population estimates of the Covered Species published in 1995 that were based largely on at-sea surveys conducted over the previous decade.

While the 2011 STHCP estimates of collisions with power lines and resulting mortality were based on the best information available at the time, the limitations of the data were well understood. That recognition, together with the USFWS' expectation that it would in 2012 issue to KIUC and other entities long-term take authorization for the Covered Species through the programmatic, island-wide KSHCP, were the principal reasons why the USFWS determined that KIUC's STHCP and ITP would be limited to just a five-year term. The STHCP also made two critically important assumptions (based on the best information available at that time) that have subsequently been proven to be incorrect: (i) a seabird's collision with a power line would always be fatal; (ii) a colliding seabird would almost always be a Newell's Shearwater (NESH) rather than a Hawaiian Petrel (HAPE) or Band-rumped Storm-Petrel (BRSP).

The 2011 STHCP established a comprehensive monitoring and research program. While still preliminary, the information the monitoring and research have produced has greatly increased biologists' understanding of many aspects of the Covered Species' behavior. It has also revealed several facts relevant to the ITP. The most important of these are that: (i) the extent of seabird collisions with power lines is significantly greater than had been thought at the time KIUC's STHCP was prepared and the ITP issued; (ii) the mortality rate for collisions is significantly less than was thought at that time; and (iii) the proportion of seabird collisions that involve HAPE is greater (and thus the proportion involving NESH is smaller) than previously believed.

Section 3.0, below discusses the results of studies and analyses of seabird collisions, mortality rates, distribution between species, and other topics.

2.2 KSHCP: MAJOR DELAYS/CHANGES RESULT IN KIUC DEVELOPING ITS OWN LONG-TERM HCP

When the USFWS approved KIUC's STHCP and issued the ITP on May 13, 2011, it did so with the expectation that the island-wide KSHCP would be completed by early 2012, and that the USFWS would issue long-term incidental take authorization through it to a wide range of applicants, including KIUC. Specifically, Section 1.1.3.4 of the STHCP states the following:

"First, KIUC would modify its [then proposed] October 2007 HCP to seek short-term (3 to 5 years) take authorization. This interim plan would commit to certain mitigation measures that would provide immediate conservation benefits to the species and generate new scientific information that would better-inform decision-making.

Second, for purposes of obtaining long-term take authorization, KIUC would do so not through its own HCP, but instead by obtaining coverage through the island-wide Kauai Seabird HCP (KSHCP), which DOFAW is currently developing using grant funding

provided by the USFWS. (DOFAW and the USFWS currently intend for the KSHCP to be completed and approved by late 2011 or early 2012.)

In this approach the take authorization provided by the ITP for KIUC's Short-Term HCP would be superseded by take authorization provided under the KSHCP as soon as that is available...."

Section 1.1.3.6 of the STHCP expressly states that both the USFWS and KIUC envisioned that KIUC would ultimately satisfy its long-term incidental take authorization needs by participating in the development and implementation of the island-wide KSHCP:

"DOFAW plans to have the KSHCP completed and the associated state and federal incidental take authorizations issued by late 2011 or early 2012. The agencies intend that the KSHCP will include provisions for determining take levels for participant entities (such as KIUC), as well as developing long-term mitigation actions aimed at recovery of the species. It is the agencies' belief that the island-wide KSHCP will minimize the costs to permittees/licensees such as KIUC, while doing more to help the species recover. As KIUC desires to secure the long-term take authorization through the KSHCP, it has been and will continue to fully support the KSHCP development process. Once KIUC obtains incidental take authorization through the KSHCP, the KSHCP and associated incidental take authorizations will supersede this Short-Term HCP and associated incidental take authorizations."

Section 1.2.1 of the STHCP further states:

"This Short-Term HCP and the associated take authorizations would be valid until such time as the KSHCP is approved, or up to 5 years from the time of issuance, whichever is shorter. KIUC, DOFAW, and the USFWS all anticipate that the Short-Term HCP and associated take authorizations will in fact be in place for a far shorter amount of time, as this Revised Short-Term HCP now clarifies that it will be superseded by the KSHCP and associated take authorizations once those are approved and issued, currently anticipated to occur as early as late 2011 or early 2012. The potential 5-year term of this Short-Term HCP ensures that KIUC will continue implementing conservation measures in the event the KSHCP is delayed."

"In the unlikely event that long-term take authorizations under the KSHCP are not available to KIUC at the end of the 5-year term of this Short-Term HCP, this Short-Term HCP and its associated incidental take authorizations may be extended with the agreement of KIUC, DOFAW and the USFWS, to the extent allowed by law."

The KSHCP was not completed by early 2012. Plagued by continual delays, it was also not completed over the subsequent several years. As a result, in mid-2015 the USFWS and DLNR reassessed the fundamental direction of the KSHCP. Without consulting or seeking input from KIUC or other potential KSHCP applicants, the USFWS and DLNR then decided unilaterally to "split" the island-wide/all-applicants/all-causes-of-take KSHCP into two separate plans: (1) a light-attraction HCP which the agencies would prepare for potential use by multiple applicants, and (2) a KIUC-only HCP which KIUC would prepare that would cover all of KIUC's facilities and operations. The USFWS and DLNR informed KIUC and all KSHCP potential applicants of this new approach in a joint letter on November 4, 2015. As a result, KIUC now cannot obtain long-term take authorization through the island-wide KSHCP. Instead, because of the wildlife agencies' decision to "split" the KSHCP, KIUC must now prepare its own long-term HCP.

Consistent with their decision to "split" the KSHCP, the agencies proposed to also split the ESA Section 6 FY2015 grant funds awarded by USFWS to DLNR for the purpose of completing the comprehensive island-wide plan. The agencies proposed giving the newly constituted LAHCP a portion of the awarded funds necessary to complete the light-attraction plan, and giving the balance to

KIUC to help fund the significantly larger line collision plan necessitated by the split. In so doing, both agencies recognized that KIUC's share of the FY2015 grant funds was insufficient to prepare and process its LTHCP and associated environmental review documents, and thus both agreed to support an application to the USFWS for additional HCP planning funds in the FY2016 Section 6 funding process. DLNR submitted an application to the USFWS for FY 2016 Section 6 planning grant funds on March 18, 2016.

2.3 NEW INFORMATION: COVERED ACTIVITIES

The 2011 STHCP and ITP cover the continued existence, operation and maintenance of all KIUC facilities that existed at the time of ITP issuance, and the installation, operation and maintenance of certain future KIUC facilities as described in the STHCP. Hence this Application does not contain any updated or corrected information about the Covered Activities.

THIS PAGE WAS INTENTIONALLY LEFT BLANK

3. UPDATES: POTENTIAL BIOLOGICAL IMPACTS

Chapter 4 of the STHCP addressed the potential biological impacts of KIUC's facilities and operations on the Covered Species. As described above, the STHCP was based on the best available information that existed at that time. KIUC has since developed significant new information through implementation of the STHCP conservation measures. The new information related to potential biological impacts is presented below.

3.1 UNDERLINE MONITORING PROGRAM – COLLISION ESTIMATES

Prior to the STHCP, little actual monitoring of seabird collisions with power lines had been conducted on Kaua'i. As part of the STHCP mitigation program, Section 5.6.6 required KIUC to fund the development and implementation by DOFAW of a comprehensive Underline Monitoring Program (UMP). The STHCP describes the UMP in part as follows:

"The monitoring will consist of ground surveys and/or alternative methods (e.g., bird-strike indicators), possibly carried out in conjunction with concurrent radar observations conducted in the vicinity of an agreed-upon subset of KIUC's power lines. The purpose of the surveys is to help quantify the likelihood of seabird collisions with such power lines, and to develop methods that can be used for long-term monitoring."

The UMP, which is implemented by DOFAW's Kaua'i Endangered Seabird Recovery Project (KESRP), has been very successful at both developing new monitoring methodologies and generating critical new information. After initially implementing a traditional transect monitoring approach (i.e., walking transects beneath power lines, looking for downed birds), KESRP concluded that such an approach was both impractical and unlikely to produce reliable data. Consequently, KESRP began experimenting in 2012 with a new, previously untried monitoring methodology that employed Song Meters and sophisticated signal processing software to record sounds produced by power lines, and then identify the subset of recorded sounds that represent collisions by seabirds.

After concluding that this new monitoring technique was potentially promising (albeit still very much a work in progress), in 2013 KESRP staff: (i) deployed Song Meters on select power lines deemed likely to pose the greatest risk of seabird collisions; (ii) performed concurrent human observations on a subset of those lines; (iii) developed a methodology for computer analysis of resulting sound files and for validating the results; (iv) investigated anomalous results; and (v) identified issues that needed further study in 2014.

These initial and limited 2013 UMP results suggested that the frequency of seabird collisions with power lines could be significantly higher than estimated in the STHCP. At the same time, the results also suggested that the level of mortality resulting from these collisions was significantly lower than previously thought. When the STHCP was prepared and approved, the consensus assumption was that all seabird collisions with a power line were fatal. However, KESRP observations of multiple collision incidents showed that assumption was wrong. A large majority of observed collision birds continued to fly on after colliding with a line, while only a very small percentage appeared to fall to the ground near the collision point. In fact, in the one observation area that is most readily surveyed (the agricultural Coffee Fields near 'Ele'ele), KESRP biologists were unable to locate any downed birds after observing collisions despite the fact that rigorous search efficiency tests in the area had shown that ground searches there were highly reliable.

Based on the 2013 UMP effort and results, KESRP, USFWS and KIUC collaborated to develop a more comprehensive work plan for 2014, the goal of which was to enable a comprehensive, island-wide assessment of seabird collisions with power lines. This involved deploying more Song Meters, on a larger subset of total power line segments, at a wider array of location types, along with more extensive efforts to validate the methodology and results.

KESRP issued a final, yet only partial, 2014 UMP Annual Report on June 29, 2015; that report did not contain an island-wide assessment of power line collisions. KESRP later issued a follow-up "Briefing Report" in October 2015 to provide an update on its modeling efforts, which are intended to ultimately yield an island-wide assessment. The Briefing Report emphasized four "major limitations" to producing results that could be considered final island-wide results: (1) two different microphones have been used to date (due to problems with microphone performance), and the relative performance of each has not yet been determined; (2) many 2014 collision strike sounds were recorded at sites which have no visual observations to validate that seabirds are flying low over such lines; (3) not all regions were monitored, and extrapolation of data to unmonitored lines in the central or coastal mountain regions of the island is deemed inappropriate due to drastically different topography, vegetative structure and elevation; and (4) there is considerable variation in the number and timing of collisions in the off-peak period (middle of the night) and the limited amount of off-peak data. With these major limitations in mind, the Briefing Report preliminary modeling results based on two different models estimated 3,517 and 4,219 line strikes, respectively.

Given the novel monitoring methodology which has been employed in earnest only in 2014 and 2015⁴, the need to resolve a series of data aberrations, KESRP's need to further refine and validate their sound recording methods and sound data analyses, and significant questions concerning data extrapolation and appropriate correction factors, KESRP has repeatedly cautioned against using the preliminary results to date for decision-making purposes. Instead, KESRP is using additional funds provided by KIUC to utilize additional 2015 Song Meter and human observer data, along with habitat variable data collected in late 2015, to advance its comprehensive modeling and island-wide assessment to the level necessary for decision-making. That analysis is expected sometime in 2016, and KIUC expects to then utilize the results in the LTHCP.

3.2 DISTRIBUTION OF COLLISIONS BY SPECIES

At the time the ITP was issued it was thought that the vast majority of take by KIUC facilities was of Newell's Shearwaters. This was based on the fact that few Hawaiian Petrels were turned into the SOS Program, and because Hawaiian Petrels were believed to fly during times of the day with greater ambient light thus making power lines more visible and hence more avoidable.

New information gained through STHCP implementation and related analyses by others suggests that while the majority of the collisions do, in fact, involve Newell's Shearwaters, many more involve Hawaiian Petrels than the approximately 1% previously thought. Based on the best available information, the USFWS has recently estimated that 76.9% of collisions involve NESH, 23% involve HAPE, and 0.1% involve BRSP.⁵

3.3 MORTALITY ESTIMATES

3.3.1 UMP DATA AND ANALYSIS

The 2013 UMP Annual Report analyzed the relationship between the number of line strikes recorded acoustically and the number of bird carcasses found on the ground. The report described the searcher efficiency and carcass removal trials, and the searches then conducted in the 'Ele'ele Coffee Fields under the steel pole lines during time periods in which acoustic strike monitoring was ongoing. The Annual Report concluded that the ground search data was highly reliable, because: (i) staff searcher-efficiency had a greater than 95% discovery rate; (ii) no carcasses were removed by scavengers over a

⁴ KESRP has not yet analyzed data from the 2015 monitoring.

⁵ Framework for Mitigating the Impacts of Utility Power Operations Affecting Listed Seabird Populations on Kaua'i (USFWS, November 30, 2015).

two-month period; and (iii) despite rapid decay the researchers could readily re-find the carcasses for two months. Surprisingly, given past assumptions about collisions and mortality, these highly reliable ground searches discovered zero seabird carcasses even though the Song Meters recorded 51 strike sounds.⁶ The report concluded that the vast majority of seabirds that hit lines do not immediately fall to the ground but continue flying with their ultimate fate being unknown.

The *2014 UMP Annual Report* noted that KESRP staff directly observed only five power line collisions by target seabirds during extensive monitoring of portions of its 69 kV cross-island transmission circuit passing through the 'Ele'ele Coffee Fields and parallel to the Power Line Trail. When added to 2012 and 2013 observations, the result is a three-year total of 19 observed seabird power line collisions. The *2014 UMP Annual Report* further noted that:

- Of the 19 observed strikes, only 1 (5.3%) definitively resulted in a grounded bird within the observer's field of view, and that grounded bird was retrieved and determined to be healthy enough to be released the following day after being examined by staff of the Save Our Shearwaters program.
- The flight of 8 birds (42.1% of total) appeared unaffected by the observed collision.
- Ten (10) birds (52.6% of total) were seen to descend immediately after the strike. Three (3) of those were observed recovering powered flight, although one of these collisions was particularly hard and this bird was observed slowly losing altitude as it left the observer's field of view. The remaining 7 collisions resulted in birds descending out of field of view immediately due to obstructions between the observer and the area under wires or the narrow field of view on the thermal camera.⁷

During 2014 KESRP staff also continued their carcass searches in the Coffee Fields under wires being acoustically monitored. Combining both the 2013 and 2014 seasons, 104 strike sounds were recorded there (not accounting for missed strikes or fully accounting for middle of the night strikes), but no associated seabird carcasses were located despite intensive survey efforts.

3.3.2 USFWS LITERATURE REVIEW

As part of its technical assistance to KIUC related to the development of a future HCP, the USFWS estimated the effects of seabird injuries sustained from power line collisions, using both the UMP data described above and the results of a literature review.⁸ The USFWS determined that the UMP data provides the best available information for evaluating the fate of seabirds colliding with power lines. The USFWS concluded based on the UMP data to date that 5% of collisions result in immediate or direct mortality, and 53% result in some form of injury as exhibited by a change in flight path and marked drop in elevation immediately after a collision. Based on a literature review, the USFWS concluded it is appropriate to apply a "crippling rate" (i.e., the percentage of injured birds that subsequently die outside of the search area after a collision) of 20%. In summary, the USFWS estimates that 5% of collisions will result in immediate mortality, and an additional 10.6% (0.2 x 53%) will result in later, collision-caused mortality, for a combined mortality rate of 15.6%.

⁶ UMP staff did find one NESH under these power lines. However, it was found in the month of May, prior to deployment of roving Song Meter units in this area. Hence, the presence of the bird could not be correlated with a strike sound.

⁷ Two of these collisions occurred in the Coffee Fields where staff immediately initiated searches after the collision but did not find a trace of a downed bird, thus indicating that the birds either recovered flight out of view or they crash landed but were able to crawl/scuttle out of the search area within seconds of hitting the ground.

⁸ Framework for Mitigating the Impacts of Utility Power Operations Affecting Listed Seabird Populations on Kaua'i (USFWS, November 30, 2015).

3.3.3 MORTALITY AND SEABIRD POPULATION ESTIMATES

The power lines believed to account for the highest number of collisions have been in place in their present form for more than 20 years. The USFWS and other researchers have estimated that the populations of the Covered Species have declined substantially during that time. For example, the USFWS reports that the NESII range-wide population declined over 75% decline from 1993-2009, to a present population of 16,200 to 24,300. However, if the seabird collision rate is as high as the preliminary acoustic monitoring effort shows, and the mortality rate is as high as 15.6%, the NESII population would have declined more rapidly, and would be far smaller today. The KESRP agrees that the numbers don't add up – either the current population size is actually larger than what the USFWS believes it to be, or the collision rate is lower than what the UMP acoustic monitoring methodology indicates, or the mortality rate for collision birds is significantly lower than 15.6%. What is clear is that the mortality rate, previously assumed to be close to 100%, is most likely close to an order of magnitude lower. Whether it is significantly lower than the 15.6% that the USFWS has estimated, or whether the population and/or collision numbers are significantly different than what is currently assumed, is currently unknown. KIUC-funded research to be conducted during the term of the requested permit renewal is seeking answers to these questions, which answers can be used in the preparation of the LTHCP.

4. UPDATES: CONSERVATION PROGRAM

Chapter 5 of the STHCP addressed the overall conservation program, consisting of a suite of conservation measures to avoid and minimize impacts of KIUC's existing and future facilities, and to mitigate KIUC's unavoidable impacts. KIUC has successfully implemented all required conservation measures, and has voluntarily implemented significant additional conservation measures in consultation with the USFWS and its conservation partners. These efforts have produced significant new information and initiatives, which are discussed below.

4.1 ALREADY IMPLEMENTED MINIMIZATION MEASURES

4.1.1 IMPLEMENTED MINIMIZATION MEASURES IDENTIFIED IN STHCP

KIUC has implemented all of the minimization measures identified in the 2011 STHCP (except those for which the USFWS concluded, based on subsequent analyses, would not produce the intended benefits). The most significant of these was the reconfiguration of its overhead power lines at Keālia.

4.1.2 IMPLEMENTED MINIMIZATION MEASURES NOT IDENTIFIED IN STHCP

Based on the analysis of monitoring data collected during implementation of its STHCP, KIUC and the USFWS identified several minimization measures not identified in the 2011 STHCP that they agreed would provide substantial benefits to the Covered Species, and KIUC has implemented (or is in the process of implementing) all of these. With USFWS approval, KIUC has implemented the following:

- *Mt. Kāhili Undergrounding.* In March 2013, KESRP informed KIUC that a segment of a 12.46 kV power line serving communications facilities atop Mt. Kāhili appeared to be experiencing frequent seabird collisions, particularly by NESH transiting to and from two nearby breeding colonies. This problem had not previously been identified. KIUC worked with the USFWS to allocate "project not yet determined" funds from Year 4 of the STHCP, and to reallocate funds from STHCP-specified projects that were no longer deemed to be a priority based on monitoring data, to assist in the costs to underground the Mt. Kāhili line. KIUC then secured necessary governmental and private landowner approvals, and implemented the complex road repair and line undergrounding work in early 2015. This minimization project significantly reduced seabird collisions in this area.
- *Lāwa'i and Coffee Fields.* Based on UMP monitoring, the upper-most line in these two locations (which is the static line) poses a substantial risk of seabird collisions. KIUC conducted an engineering evaluation of potential remedies, and then committed to removing the static line and replacing its critical lightning protection function at both locations by installing lightning arrestors directly on the conductors. KESRP anticipates that removal of the static line will significantly reduce collisions in these areas. KIUC anticipates completing implementation in April 2016.
- *Port Allen Lighting.* In consultation with USFWS, KIUC has implemented measures to reduce exterior lighting at its Port Allen Generating Station. Specifically, KIUC painted the translucent yellow fiberglass siding on its SWD building which significantly reduced light emission. It also modified all external lights (including streetlights on the property) to colors (i.e., wavelengths) that reduce the light-attraction risk to seabirds.
- *LASERS.* In connection with the UMP, KIUC has funded extensive studies by KESRP in 2014 and 2015 to evaluate the use of LASERS mounted on power line poles to create a "light-fence" to divert seabirds away from power lines. KESRP reported in early 2016 that the initial results indicate there is a highly significant increase in avoidance behavior by seabirds when LASERS are utilized, and expressed their belief that LASERS should effectively reduce collisions. KESRP is scheduled to issue an updated report on the LASER evaluation work by mid-2016, and will continue its

evaluation and testing of LASERs during the 2016 seabird season. KIUC intends to utilize the results in finalizing the minimization program that it includes in the LTHCP.

4.2 FUTURE IMPLEMENTATION OF MINIMIZATION MEASURES

As noted above, one key finding of the Underling Monitoring Program (UMP) to date is that seabird collisions with power lines are largely concentrated in a few areas. As a corollary to that, the risk of seabird collisions with most line segments is non-existent to low. Another finding is that the highest-risk line segments are not those identified in the STHCP (in fact, the line segments identified for minimization measures in the STHCP are now known to largely pose a low risk to seabirds).

In response to the new information generated by STHCP implementation, in 2015 KIUC began working with consulting engineers and KESRP staff to identify, evaluate, and select a comprehensive set of minimization measures that would drastically reduce Covered Species collisions with its power lines. The minimization program is intended to target the line segments posing the highest collision risk as identified through the UMP, particularly certain line segments along the Power Line Trail.

KIUC has already conducted an engineering feasibility and cost evaluation of the line segments initially judged to be the highest priority for minimization efforts. KIUC has also given engineers the go-ahead to develop conceptual plans for selected improvements to the Power Line Trail, consulted extensively with KESRP (including funding additional field observations by KESRP to visually monitor seabird flight paths in the vicinity of some line segments targeted for minimization), and begun evaluating permitting issues associated with these. KIUC intends to continue implementing these additional minimization measures, along with all of the ongoing minimization measures specified in the STHCP, while the LTHCP preparation and agency evaluation process is underway.

4.3 MITIGATION MEASURES

4.3.1 IMPLEMENTED MITIGATION MEASURES IDENTIFIED IN STHCP

KIUC has successfully implemented all mitigation measures identified in the STHCP, as well as additional voluntary measures. These have included predator control in seabird breeding colonies, and extensive monitoring using cameras and auditory surveys.

4.3.2 NEW INFORMATION FROM SEABIRD COLONY MANAGEMENT, MONITORING, AND RELATED STUDIES

The new information that researchers have garnered through the aforementioned monitoring effort has greatly increased biologists' understanding of the breeding, chick-rearing, and other behavior of the Covered Species. It has also improved their ability to identify management measures likely to enhance breeding success. For example, scores of cameras have been installed at seabird burrows, and the resulting photos document extensive seabird predation by rats, cats and pigs. The photos have also assisted efforts to trap and remove cats and pigs. New methods of rat trapping have been developed and deployed, using self-resetting Goodnature traps. KIUC also funded an assessment of other seabird breeding colonies where predator-proof fence installation and post-fencing predator removal would be feasible. KIUC also joined an *ad hoc* Working Group formed by the private owner of the Upper Mānoa Valley, and through those efforts KIUC is pursuing a new major mitigation project to fence and implement predator control to protect and expand the Covered Species breeding colonies located there. If that effort is successful, it may lead to enhanced predator control and removal actions in NTBGS's (National Tropical Botanical Garden) adjacent Upper Limahuli Preserve as well.

Several of the specific STHCP mitigation measures, and the new information they have generated, are summarized below.

- *Updated At-Sea Covered Species Population Estimates.* KIUC funded an analysis of National Oceanic and Atmospheric Administration (NOAA) research vessel data for the purpose of updating the Spear et al. (1995) population estimates for Newell's Shearwater and Hawaiian Petrel for the eastern and central tropical Pacific waters of the Hawaiian Archipelago and to relate population density to environmental parameters. The work analyzed approximately 15 years of previously unanalyzed data, and provided an updated measure of absolute population numbers that allows natural resource managers to make better management decisions about the Covered Species. This analysis was completed in 2013 (Joyce, April 2013) and has since been used by USFWS in population modeling efforts.
- *Upper Limahuli Preserve Habitat Management and Monitoring.* DOFAW, USFWS and KIUC have been working together since 2002 to identify seabird breeding colonies where habitat management work which is likely to improve seabird reproductive success could be conducted.⁹ In late 2006, USFWS and DLNR identified NTBG's Upper Limahuli Preserve (ULP) as a specific location where Covered Species breeding colony management work might be feasible. Soon thereafter, the USFWS approved a \$340,000 grant to help fund construction of an ungulate-proof fence around approximately 400-acres of the ULP. However, NTBG did not possess the resources needed to fully implement all of the ongoing management measures needed to derive the full biological benefit of the fence. Accordingly, KIUC committed through the STHCP to implement several mitigation measures in the ULP. These included the development and implementation of a feral cat removal and management plan and implementation of rodent control measures. In order to evaluate the effectiveness of these mitigation measures, KIUC also committed in the STHCP to fund KESRP's monitoring of seabird abundance and behavior in the area where these measures were deployed.

At that time the USFWS acknowledged that these efforts would result in significant beneficial effects for at least two (and possibly all three) of the Covered Species, and would also benefit numerous listed and/or rare native plant species and the ecosystem as a whole. Because all of the parties anticipated that the STHCP would quickly be superseded by the KSHCP, the original contracts between KIUC and NTBG covered only the first two years of the STHCP. Because the KSHCP never progressed, KIUC has renewed and supplemented its contracts with NTBG and DOFAW on an annual basis in order to ensure the continued implementation of seabird colony management and monitoring.

KIUC-funded work by NTBG and KESRP in the ULP has generated new information on the best means of controlling seabird predators in their breeding colonies. KIUC has worked with NTBG to modify and expand the predator control efforts, and the suite of conservation measures now being implemented is substantially more effective than those that were conducted in Year 1 of the program. Consequently, the conservation measures being implemented during 2016 provide substantially greater benefits to the Covered Species than did those implemented through the STHCP beginning in 2011. Equally important, the experience gained under the STHCP has helped forge a close working partnership among KIUC and its conservation partners whose internal communications and idea-sharing have allowed all parties to deploy their resources more effectively than had previously been the case.

- *Hono o Nā Pali Natural Area Reserve.* The STHCP also committed KIUC to supporting extensive seabird colony predator control and monitoring within the Hono o Nā Pali Natural Area Reserve (HNP). DOFAW researchers had determined that: (i) the area is an important breeding site for both the NESH and the HAPE; (ii) that predation of the Covered Species by cats, rats, pigs, and Barn Owls is an important limiting factor to Covered Species breeding success in this area; and (iii) that several predator control measures likely to improve Covered Species breeding success could

⁹ It has long been widely recognized that invasive mammalian predators pose the greatest risk to the Covered Species.

be implemented immediately using funds made available by KIUC. These included: cat and pig-trapping at specific high-traffic sites located near known breeding colonies; rat-baiting near known breeding colonies; owl removal; and breeding success monitoring to determine the efficacy of, and identify potential improvements in, these management actions. As with the ULP, KIUC has continued funding this work every year that its STHCP has been in effect, and indeed has committed vastly more funds to this effort than is required by the terms of the STHCP.

This work in the HNP has produced new information on the best means of controlling predators harmful to the Covered Species. KIUC has worked with DOFAW to modify and expand the predator control efforts, and the revised and updated measures that are now being implemented provide greater benefits than those mandated by the STHCP. Equally important, the experience gained under the STHCP has helped forge a close working partnership among KIUC and its conservation partners whose internal communications and idea-sharing have allowed all parties to deploy their resources more effectively than had previously been the case.

- *Auditory Surveys to Locate Additional Colonies.* When the STHCP was prepared, the ULP and HNP were the only seabird breeding colony locations known to be suitable for predator control and monitoring. The STHCP committed KIUC to provide funding of two years of auditory studies intended to locate additional seabird colonies that might be suitable for management. KIUC funded those studies in accordance with the STHCP, and has also voluntarily provided additional funds for additional auditory surveys in subsequent years. The results of those studies have substantially improved biologists understanding of where seabird colonies are located and that information is informing KIUC's development of its LTHCP (as well as DLNR's development of the new light-attraction KSHCP).

4.3.3 CONTINUATION OF SOS, PREDATOR CONTROL MEASURES, AND MONITORING

During the time it is preparing the LTHCP and associated environmental review documents, and going through the USFWS and DLNR review and approval process, KIUC intends to continue funding the full implementation of the Save Our Shearwaters (SOS) program, and the colony management, predator control, and seabird monitoring work in the ULP and HNP. It also intends to include these measures as part of its LTHCP mitigation program. Similarly, KIUC will continue to work with the owner of Upper Mānoa Valley to characterize the seabird presence there, and to implement the preparatory steps necessary to ultimately construct a predator-proof fence there.

4.3.4 FUTURE IMPLEMENTATION OF MITIGATION MEASURES NOT IDENTIFIED IN THE STHCP

As explained above, though not required by the STHCP, KIUC has funded substantial additional auditory and other surveys intended to identify additional Covered Species breeding colonies that may be suitable for predator control and other management actions to improve breeding success.

- *Upper Mānoa Valley.* One such identified site is the Upper Mānoa Valley (UMV), located adjacent to the ULP. KESRP had previously identified the UMV as likely having Covered Species breeding colonies. In turn, KIUC approached the private landowner, and in early 2015 began participating in the landowner's *ad hoc* Working Group of stakeholders (which includes USFWS, DOFAW, KESRP, KSHCP, NTBG, and The Nature Conservancy of Hawai'i) that was evaluating natural resource management approaches for the valley. Among other things, KIUC has voluntarily funded (i) a helicopter and ground-truthing site reconnaissance to evaluate the potential feasibility of installing a predator-proof fence around the perimeter of the approximately 200-acre valley; (ii) multiple KESRP site visits to conduct auditory surveys, search for seabird burrows, conduct habitat evaluations, and install cameras to monitor predation; and (iii) evaluation of state permitting requirements, given that the site is located within a Conservation District.

KIUC continues to work closely with the landowner and the other members of the UMV Working Group, and has developed a detailed Scope of Work that includes ultimately constructing a predator-proof fence and conducting post-fencing predator removal. KIUC intends to include this fencing and predator removal project in its LTHCP. Moreover, during the time that the LTHCP is in preparation and then undergoing agency review, KIUC intends to continue implementing the many preparatory steps necessary to construct the fence (e.g., fence construction evaluation, biological surveys of the proposed fence line, biological and other surveys of the UMV generally, preparation of necessary permitting documents, etc.).

- *Upper Limahuli Preserve.* In conjunction with the UMV project described above, KIUC intends through the LTHCP to replace the existing ULP ungulate-proof fence with a predator-proof (i.e., rat-proof) fence. Depending upon the post-fencing rat removal approaches taken in the UMV, KIUC may then work with NTBG to implement an expanded post-fencing rat control program in the ULP. KIUC intends to continue implementing the many preparatory steps necessary for this ULP project while the LTHCP preparation and agency evaluation are underway.

THIS PAGE WAS INTENTIONALLY LEFT BLANK

5. UPDATES: MITIGATION IMPLEMENTATION BUDGETS

As described above in Sections 4.3.3 and 4.3.4, KIUC intends during the term of the requested Renewal to continue implementing the mitigation measures specified in the STHCP as well as additional mitigation in the Upper Mānoa Valley. Updated annual budget estimates for these measures are set forth below.

5.1 SOS PROGRAM

The SOS Program, as described in the updated *SOS Manual*, provides a substantial conservation benefit to the Covered Species. It serves to: (i) minimize the number of the Covered Species that die as a result of collisions with KIUC facilities (to the extent the program retrieves and successfully releases birds downed as a result of KIUC facilities) and (ii) mitigate the unavoidable impacts of KIUC's facilities (to the extent that it retrieves and successfully releases birds downed for reasons unrelated to KIUC facilities). Consequently, KIUC intends to continue ensuring that the Kaua'i Humane Society (KHS) or another suitable entity approved by DLNR and USFWS fully implements the SOS Program. KIUC will itself continue to implement the community outreach component in conjunction with KHS or another suitable entity, and will continue to provide technical support as needed.

The specific obligations for this undertaking, and the associated measures of success are as follows:

- On the basis of past agreements with KHS, KIUC anticipates that the cost will be \$225,000 per year (in 2016 dollars).
- KIUC will implement the community outreach, education, and related aspects of the SOS Program as described in the *SOS Manual*, as it has done in previous years, at an estimated annual cost of \$25,000.
- KIUC will, through the use of expert consultants, provide KHS or other operator of the SOS Program with technical support on an as-needed basis, at an annual cost of up to \$25,000.

In summary, KIUC anticipates expending a total of \$275,000 annually to continue to fully fund the SOS program.

5.2 SEABIRD COLONY MANAGEMENT AND PREDATOR CONTROL IN UPPER LIMAHULI VALLEY

KIUC will continue to fund implementation of ongoing seabird colony management and predator control work within the Upper Limahuli Valley (ULP). It will do this by continuing its ongoing agreements with NTBG and KESRP. Under those agreements, KIUC is funding the following measures:

- Maintenance of an ungulate-proof fence around the 400-acre ULP and continued implementation of the comprehensive ungulate exclusion management program.
- Continued implementation of a feral cat, pig, and Barn Owl removal program.
- Continued implementation of selective rodent control measures in accordance with the procedures developed and implemented as part of KIUC's 2011 STHCP.
- Continued implementation of an active alien plant control and monitoring program.
- Continued implementation of the Covered Species monitoring program developed by KESRP in accordance with the 2011 STHCP.
- These types of activities will also require the maintenance of existing helicopter landing zones and weatherports to support field crew activities.

These efforts will result in significant beneficial effects for at least two (and possibly all three) of the Covered Species. They will also benefit numerous listed and/or rare native plant species and the ecosystem as a whole.

Specific tasks and implementation budgets prepared by NTBG and KESRP for these ongoing mitigation measures in the ULP are expected to be similar to the annual costs that KIUC incurred in implementing these measures during 2016, and those are summarized below in Table 5.1 (for NTBG) and in Table 5.2 (for KESRP). In total they amount to nearly \$380,000 per year for NTBG and \$100,000 per year for KESRP. For each year that the renewed ITP is in effect, KIUC is committed to funding the specific tasks used to calculate the implementation budgets, even if the actual costs of the specific tasks turn out to be different.

Table 5.1 Total NTBG ULP Preserve Predator Control Budget: 2016

<i>Category</i>	<i>Item</i>	<i>Annual Cost</i>
Salaries and Fringe	Project Management	\$35,000
	1 x 100% FTE NTBG Predator Control Coordinator	\$60,000
	Partial support for 3 critical support positions (predator and invasive plant control)	\$90,000
Helicopter	Helicopter rental	\$45,000
Fence Line Maintenance	Contractor to annually clear/weed-whack fence line (helicopter rental included)	\$29,000
Equipment & supplies	Communications and monitoring equipment	\$10,000
	Fence and shelter maintenance	\$2,500
	Field equipment (traps, firearms, camping gear, safety equipment)	\$15,000
	Food and other expendables	\$14,000
	Sub total	\$300,500
Administrative Fee	NTBG Administrative fee of 20%	\$60,100
	Base Contract Total	\$360,600
	<i>Contingency funds for Helicopter, Field Equipment, & fence/shelter maintenance</i>	<i>\$17,500</i>

Table 5.2 Total ULP KESRP Monitoring Budget: 2016

ITEM	Amount
SEABIRD MONITORING STAFF	
1 x coordinator (0.5 month)	\$3,547
1 x coordinator (0.5 month)	\$3,759
1 x field crew leader (0.5 month)	\$2,015
1 x field crew leader (0.5 month)	\$2,136
2 x Field technicians (2 weeks training per tech)	\$3,042
2 x Field technicians (10 weeks monitoring/tech, 6 weeks digitizing and analyzing/tech)	\$24,336
Per diem (10 trips, 2 staff, 4 days @ \$20/day pp)	\$1,600
SEABIRD MONITORING EQUIPMENT	
Song Meters	
Song meters - SM2 (10) [<i>already purchased</i>] ¹	\$0
Microphone for SM2 (2 per unit, replacements)	\$1,600
32GB SD cards for SM2 (replacements) - <i>allocated to contingency (10 units)</i>	\$0
Song Meter - D batteries (10units*4*3)	\$131
Analysis of song meter data by Conservation Metrics	\$13,965
Reconyx Cameras	
Reconyx PC900 Hyperfire [<i>already purchased</i>]	\$0
Thunderbolt mounting block [<i>already purchased</i>]	\$0
Lithium AA batteries (3 sets per camera) 12/pack x 90=1080 batteries	\$1,548
SanDisk 8GB SDHC Memory Card (replacements) - <i>allocated to contingency (20 units)</i>	\$0
LaCie d2 Quadra v3 4TB External Hard Drive	\$595
TRANSPORT	
Helicopter (\$1200*10)	\$12,000
Vehicle Maintenance	\$2,000
Vehicle Fuel	\$500
OTHER	
Office Rent	\$4,800
Microsoft Office 365	\$119
Satellite telephone time for monitoring team	\$800
Field Equipment (replacement gear)	\$3,000
SUBTOTAL	\$81,494
PCSU/RCUH direct & indirect costs	\$7,297
DOFAW Direct Administrative Cost (5%)	\$2,792
Contingency (10%) + <i>additional (one time) \$160 for SD Cards for Song Meters and Reconyx</i>	\$8,309
GRAND TOTAL	\$99,893
Note 1: Established Song Meters in the ULP may need to be replaced should the units fail or the models become obsolete.	

5.3 SEABIRD COLONY MANAGEMENT & PREDATOR CONTROL AT HONO O NĀ PALI

KIUC will continue to fund implementation of ongoing seabird colony management and predator control work within the Hono o Nā Pali Natural Area Reserve (HNP). It will do this by continuing its ongoing agreements with DOFAW Natural Area Reserves System (NARS) and KESRP reached for its 2011 HCP and ITP. Under those agreements, KIUC is funding a variety of measures that include: (1) cat and pig-trapping at specific high-traffic sites located near known breeding colonies; (2) rat-baiting near known breeding colonies; (3) Barn Owl removal; and (4) breeding success monitoring to determine the efficacy of, and identify potential improvements in, these management actions. The specific tasks and implementation budgets prepared and proposed by DOFAW NARS and KESRP are summarized below. KIUC anticipates that the work will be performed by DOFAW NARS and KESRP staff utilizing funds provided by KIUC as detailed in Table 5.3 and Table 5.4. KIUC is committed to funding the specific tasks used to calculate the implementation budgets, even if the actual costs of the specific tasks turn out to be different.

5.4 CONTINUE TO FUND UNDERLINE MONITORING PROGRAM (UMP)

KIUC will continue to fund relevant UMP work during the term of the ITP renewal. Because the nature of the work that is conducted each year is determined by the results of previous year's work, it is not possible to predict either the exact tasks or the expenditures that will be required during each year of the Renewal. However, based on the information that is presently available KIUC has committed to fund the 2016 UMP research listed in Table 5.5. It anticipates that similar research will continue to be appropriate during the subsequent years of the renewed ITP and will fund such work that KESRP and the USFWS agree is needed up to the level that it is committing to in 2016.

The aforementioned UMP monitoring and research will increase the amount and quality of data that are available concerning seabirds that may be affected by KIUC facilities. It will allow biologists to further develop field and analytical methods that the USFWS and DOFAW need for the purpose of issuing long-term take authorization.

Table 5.3 Total HNP Seabird Predator Control Budget: 2016

ITEM	TOTAL
PERSONNEL	
Salaries	
Predator control Coordinator	\$59,280
Predator control specialist	\$49,920
Predator control technicians	\$195,000
Travel	
Field Per Diem - Field Personnel	\$19,200
Training	
First Aid and Firearms Training	\$3,500
Off-island travel, Conference registration, travel, lodging	\$6,700
MATERIALS, SUPPLIES, AND EQUIPMENT	
Trapping Supplies and Bait	\$9,100
Ammunition and Firearms Maintenance	\$1,100
Computer Software (including licenses)	\$520
First-aid kit restocking	\$1,500.00
Miscellaneous (includes propane refills, printer supplies, and batteries)	\$1,560
Goodnature Bait and CO2 Cartridges	\$2,245
Equipment	
Firearms (new, parts, and accessories)	\$4,000
Computer monitors	\$750
Smart Phones and Cases	\$1,950
Remote Cameras	\$8,985
Traps and Snares (Tomahawk and Conibear traps & Pig Snares)	\$2,640
Solar Kit	\$3,000
Miscellaneous (e.g., solar batteries, propane, SD cards, stoves)	\$4,380
Direct Procurement, Communications, Services, etc.	
Rent	\$21,996
Office Electric, Internet, cell phone, & Miscellaneous	\$6,520
Vehicle Repair & Maintenance	\$6,000
Helicopter Services	\$70,000
COMPREHENSIVE SUBTOTAL	\$479,786
PCSU Indirect	\$38,499
RCUH Direct	\$20,161
DOFAW Overhead (5% of PCSU/RCUH/DOFAW subtotal)	\$22,274
KIUC Contingency Fund (10% of Comprehensive Subtotal)	\$47,979
GRAND TOTAL	\$608,699

Table 5.4 Total HNP Seabird Monitoring Budget: 2016

ITEM	Cost
STAFF WAGES	
1 x coordinator (0.5 month)	\$3,547
1 x coordinator (0.5 month)	\$3,759
1 x field crew leader (0.5 month)	\$2,015
1 x field crew leader (0.5 month)	\$2,136
2 x Field technicians (2 weeks training per tech)	\$3,042
2 x Field technicians (N Bog) - 10 weeks monitoring per tech	\$15,210
2 x Field technicians (Pöhākea) - 10 weeks monitoring per tech	\$15,210
2 x Field technicians (Pihea) - 10 weeks monitoring per tech	\$15,210
2 x Field technicians (digitizing & analyzing, 2 months)	\$12,168
Per diem - per site, 3 sites (10 trips, 2 staff, 4 days @ \$20/day pp)	\$4,800
SEABIRD MONITORING EQUIPMENT	
Song meters	
Song meters - SM2 (30) - <i>already purchased</i>	\$0
Microphone for SM2 (2 per unit) - <i>replace any non-functional mics</i>	\$4,800
32GB SD cards for SM2 (replacements) - <i>allocated to contingency (60 units)</i>	\$0
Song Meter - D batteries (30units*4*3)	\$392
Analysis of song meter data by Conservation Metrics (<i>see Nov. 12, 2015 Attachment B</i>)	\$33,795
Reconyx Cameras	
Reconyx PC900 Hyperfire (30 per site) - <i>already purchased</i>	\$0
Reconyx Repair (including shipping)	\$1,000
Thunderbolt mounting block - <i>already purchased</i>	\$0
Lithium AA batteries (3 sets per camera) 3,240 batteries (270 units for 12/pack)	\$4,669
SanDisk 8GB SDHC Memory Card (replacements) - <i>allocated to contingency (60 units)</i>	\$0
LaCie d2 Quadra v3 4TB External Hard Drive (do keep old data; need new for new data)	\$1,190
TRANSPORT	
Helicopter - N Bog	\$12,000
Helicopter - Pöhākea	\$12,000
Vehicle Maintenance	\$4,000
Vehicle fuel	\$500
EQUIPMENT/SUPPLIES	
Microsoft Office 365	119.88
Field Equipment	3000
Satellite telephone time for monitoring team	800
PCSU/RCUH direct & indirect costs	\$13,248
DOFAW Direct Administrative Cost (5%)	\$4,782
Contingency (10%) + \$800 for SD Cards for Song Meters and Reconyx	\$16,336
GRAND TOTAL	\$189,731

Table 5.5. Underline Monitoring Program Budget: 2016

<i>Work Item</i>	<i>Cost</i>
Base UMP Monitoring	210,028
Wildlife Technologist 2016 (#2)	\$116,000
GIS Analyst & Data Tech 2016) (#3)	\$52,608
PIT Tags-Study Daily Pattern of Burrow Attendance (#7)	\$40,176
Additional UMP Seabird Studies (#10)	\$179,718
UMP Acoustic Monitoring 2016 (#11)	\$155,829
2016 Data Logger (#12)	\$47,718
2016 Power Line Trail LIDAR Mapping*	~\$35,000
2016 Bird Diverter Efficacy Study*	~\$15,000
NESH Eyes Study*	~\$150,000
Southern Power Line Trail Acoustical Data Analysis*	~\$3,000
TOTAL	\$802,077
Note: Expenditure estimates that are marked with an asterisk are approximate as formal scopes of work and contracts have not yet been finalized.	
Source: Planning Solutions, Inc. based on KIUC Budget Records as of March 15, 2016	

5.5 LAY GROUND WORK FOR CREATING PREDATOR-PROOF AREAS IN ULP & UMV

On its own initiative, KIUC had begun work intended to make areas available for the creation of protected nesting colonies of the Covered Species (i.e., areas surrounded by predator-proof fences and within which the principal seabird predators had been removed or reduced in numbers). KIUC is committed to continuing these measures during the term this Renewal.

The specific measures that KIUC is committed to continuing or initiating during this interim period are listed in Table 5.6.

Table 5.6. Work to be Conducted in Preparation for Protected Colonies in the ULP and UMV

<i>Work Item</i>	<i>Cost¹</i>
Secure Initial Landowner Approval	\$25,000
Conduct Biological Surveys in the UMV	\$15,000
Conduct Cultural Surveys in the UMV	\$30,000
Conduct Archaeological Surveys in the UMV	\$19,000
Conduct Rat Home Range Study	\$11,000
Develop Predator Eradication/Reduction Plan	\$10,000
Conduct Additional UMV Seabird Monitoring	\$50,000
Conduct Additional ULP Seabird Monitoring	\$25,000
Obtain Conservation District Use Approval for Work in ULP and UMV	\$10,000
Prepare Detailed Design for Predator Proof Fences	\$15,000
Phase 1 Project Management for Predator Proof Fences	\$150,000
Construct Weatherports and Landing Zones in the UMV	\$120,000
Purchase Materials for Predator Proof Fences in the UMV	\$1,200,000
Purchase Materials for Predator Proof Fences in the ULP	\$1,300,000
Phase 1 Fence Construction in the ULP/UMV ²	\$1,450,000
Phase 2 Project Management for Predator Proof Fences	\$150,000
Phase 2 Fence Construction in the ULP/UMV	\$1,450,000
Phase 3 Project Management for Predator Proof Fences	\$150,000
Phase 3 Fence Construction in the ULP/UMV	\$1,450,000
TOTAL	\$7,630,000
Note 1: Expenditure estimates are approximate as formal scopes of work and contracts have not yet been finalized.	
Note 2: Fence construction cost includes labor, helicopter materials and crew time, and infrastructure as estimated in the Pacific Conservation Rim's September 2014 feasibility assessment report.	
Source: Planning Solutions, Inc. based on KIUC Budget Records as of March 15, 2016	