PUBLIC REVIEW DRAFT

SHORT-TERM SEABIRD HABITAT CONSERVATION PLAN
KAUA'I ISLAND UTILITY COOPERATIVE (KIUC)

PREPARED FOR:

Kaua'i Island
Utility Cooperative
4463 Pāhe'e Street
Līhu'e, HI 96766-2000

PREPARED BY:

PLANNING SOLUTIONS, INC.
210 Ward Avenue, Suite 330
Honolulu, HI 96814

RANA BIOLOGICAL CONSULTING, INC.

EBBIN MOSER + SKAGGS LLP

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EXECUTIVE SUMMARY

The Kaua‘i Island Utility Cooperative (“KIUC”) is seeking incidental take authorization from the U.S. Fish and Wildlife Service (USFWS) and the Hawai‘i Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) for the continued operation and maintenance of all existing KIUC facilities, and the installation, operation and maintenance of certain future KIUC facilities. Its applications request coverage for a period of 5 years. The authorization is needed because some of these have the potential to result in the incidental take of three federally- and state-listed threatened and endangered species: the Hawaiian Petrel (*Pterodroma sandwichensis*), Newell’s Shearwater (*Puffinus auricularis newelli*), and the Federal candidate for listing Band-rumped Storm-Petrel (*Oceanodroma castro*). No other listed, proposed, or candidate species have been found or are known or expected to be affected by KIUC facilities or activities.

KIUC is seeking an Incidental Take Permit (ITP) from the USFWS under section 10(a)(1)(B) of the Federal Endangered Species Act, and an Incidental Take License (ITL) from DLNR under sections 195D-4 and 195D-21 of the Hawai‘i Revised Statutes. This HCP supports the issuance of these permits, and describes how KIUC will avoid, minimize, mitigate, and monitor the incidental take of threatened and endangered species that may occur as a result of existing or future facilities and activities. KIUC has already made many efforts to minimize and avoid the potential impacts. These include shielding all KIUC owned street lights to eliminate upward-projecting light that could disorient seabirds; pursuing opportunities to underground existing and proposed power lines; supporting and funding the Save-Our-Shearwaters (SOS) program; experimenting with methods to increase the visibility of power lines; supporting seabird predator control on Lehua Island; and carrying out extensive research designed to identify colonies, where measures can be taken to enhance the successful reproduction of the species.

The general and species-specific mitigation measures KIUC is proposing include:

- Fully funding implementation of the SOS Program for the term of the ITP/ITL.
- Funding seabird colony management and predator control in Limahuli Valley for the term of the ITP/ITL.
- Funding a two-year at-sea capture study aimed at assessing the survival of SOS-released birds.
- Updating Spear et al.’s (1995) estimates of at-sea seabird populations.
- Funding a two-year auditory survey to locate additional seabird breeding colonies.
- Funding development and implementation of an underline monitoring program aimed at better-understanding take by overhead utility structures.
- Funding additional work to be stipulated by the agencies during the fourth and fifth year of the permit.

The work that KIUC proposes to carry out will enhance knowledge of the species’ biology and distribution and improve their chances of reproductive success. This HCP incorporates adaptive management provisions to allow for modifications to the mitigation and monitoring measures as knowledge is gained during implementation.

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CHAPTER 1 – INTRODUCTION & BACKGROUND

1.1 OVERVIEW & BACKGROUND

1.1.1 APPLICANT: THE KAUA'I ISLAND UTILITY COOPERATIVE

The Kaua'i Island Utility Cooperative (KIUC) is a not-for-profit, tax-exempt cooperative association governed by an elected nine-member Board of Directors.[1] KIUC is entirely ratepayer-owned and is responsible for the production, purchase, transmission, distribution, and sale of electricity on the Island of Kaua'i, Hawai'i. KIUC was formed to purchase and operate the assets of the previous owner, Kauai Electric (KE) (a division of Citizens Utilities Corporation). KIUC completed the purchase of KE assets in November 2002. KIUC is a public utility regulated by the Hawai'i Public Utilities Commission, and is required by law to provide and ensure the availability of reliable electrical service.

In order to carry out its responsibilities of ensuring reliable electrical service to Kaua'i, KIUC owns and operates a variety of electric utility installations on the Island. These include fossil-fuel-fired generating stations at Port Allen and Līhu'e, the upper and lower Waiaihi hydroelectric stations within the Wailua watershed, 7 electrical substations and 5 switchyards located throughout the island, approximately 160 miles of electrical transmission lines, approximately 560 miles of 12.5 kV electrical distribution lines, and approximately 425 miles of secondary lines (120/240 volts) that carry power from step-down transformers that are part of the distribution network to individual homes and businesses.[2] KIUC also purchases power from several independent power producers (IPPs) and transmits the power that is obtained from these sources through its electrical transmission system. Figure 1.1 contains a satellite photo of the Island of Kaua'i. Figure 1.2 shows the location of major KIUC facilities.

1.1.2 NEED FOR THE HCP

KIUC's electrical transmission and distribution system is largely above ground and consists of poles and wires that extend from 25 to more than 100 feet above ground. The overhead wires and poles occupy airspace through which birds fly, and collisions between birds and these facilities have been documented. Its other facilities, including generating stations, substations, equipment baseyards, offices, and other facilities are of less concern, but some take has been attributed to them. While the collision rate is not unusually high, KIUC's existing facilities are known to have affected three species of seabirds that are protected by the Federal Endangered Species Act, the Hawai'i Endangered Species Act, and other Federal and State laws and regulations. The species are the Federally listed endangered Hawaiian Petrel (*Pterodroma sandwichensis*), the Federally listed threatened Newell's Shearwater (*Puffinus auricularis newelli*), and the Federal candidate for listing Band-rumped Storm-Petrel (*Oceanodroma castro*). All three species, hereafter referred to as the "Covered Species," are also listed by the State of Hawai'i as threatened or endangered species. These species nest and breed in certain inland locations on the island but spend most of their lives at sea. They generally travel between land and sea during hours of darkness or near-darkness.

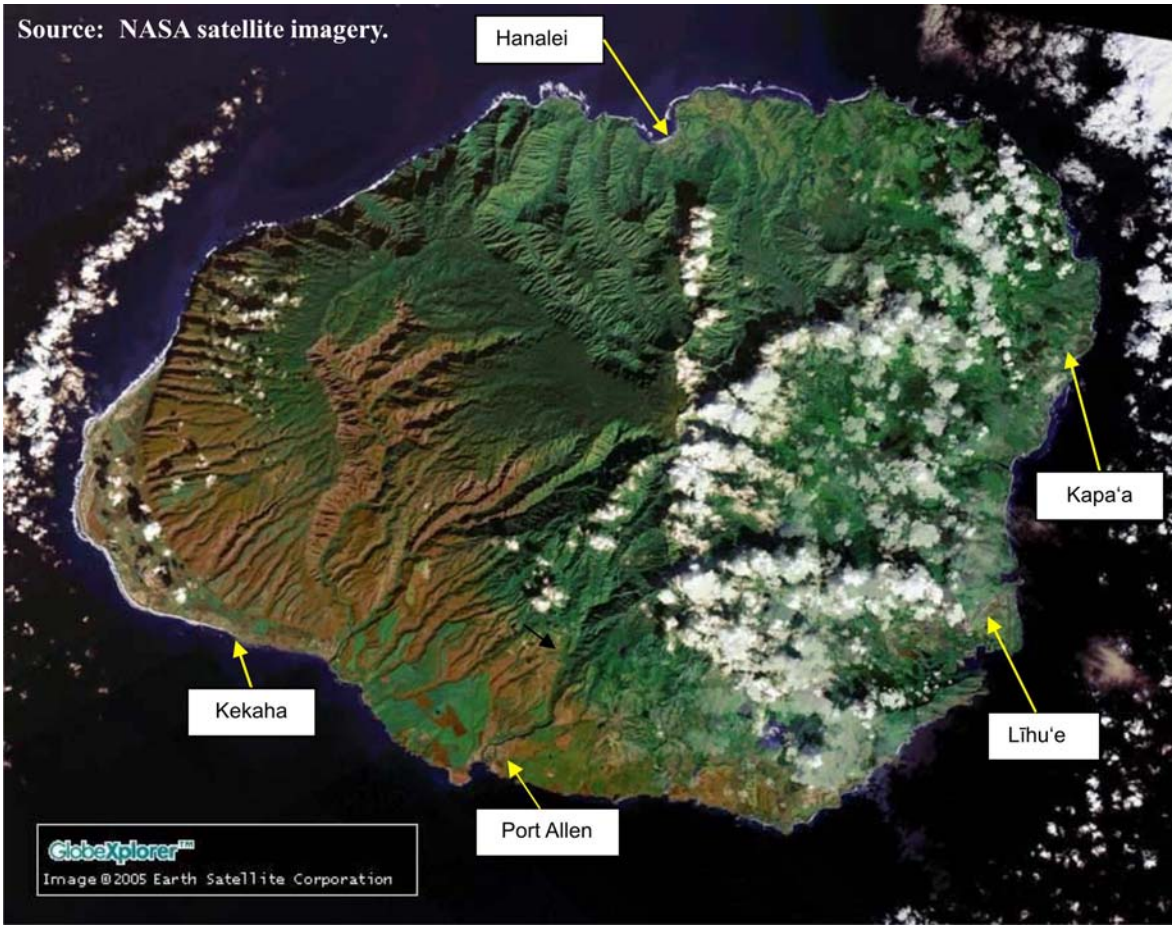
In addition to collisions, urban lights, including streetlights KIUC owns and operates on behalf of the County of Kaua'i, can attract and/or disorient fledglings of these species making their first flights to sea. Birds that become disoriented by these lights can exhaust themselves by flying around the lighted areas before eventually landing, and can also collide with obstacles such as power lines, utility poles, buildings, and other tall structures. The Covered Species have very limited ability to resume flight from flat surfaces, therefore once on the ground they are highly subject to predation by dogs,

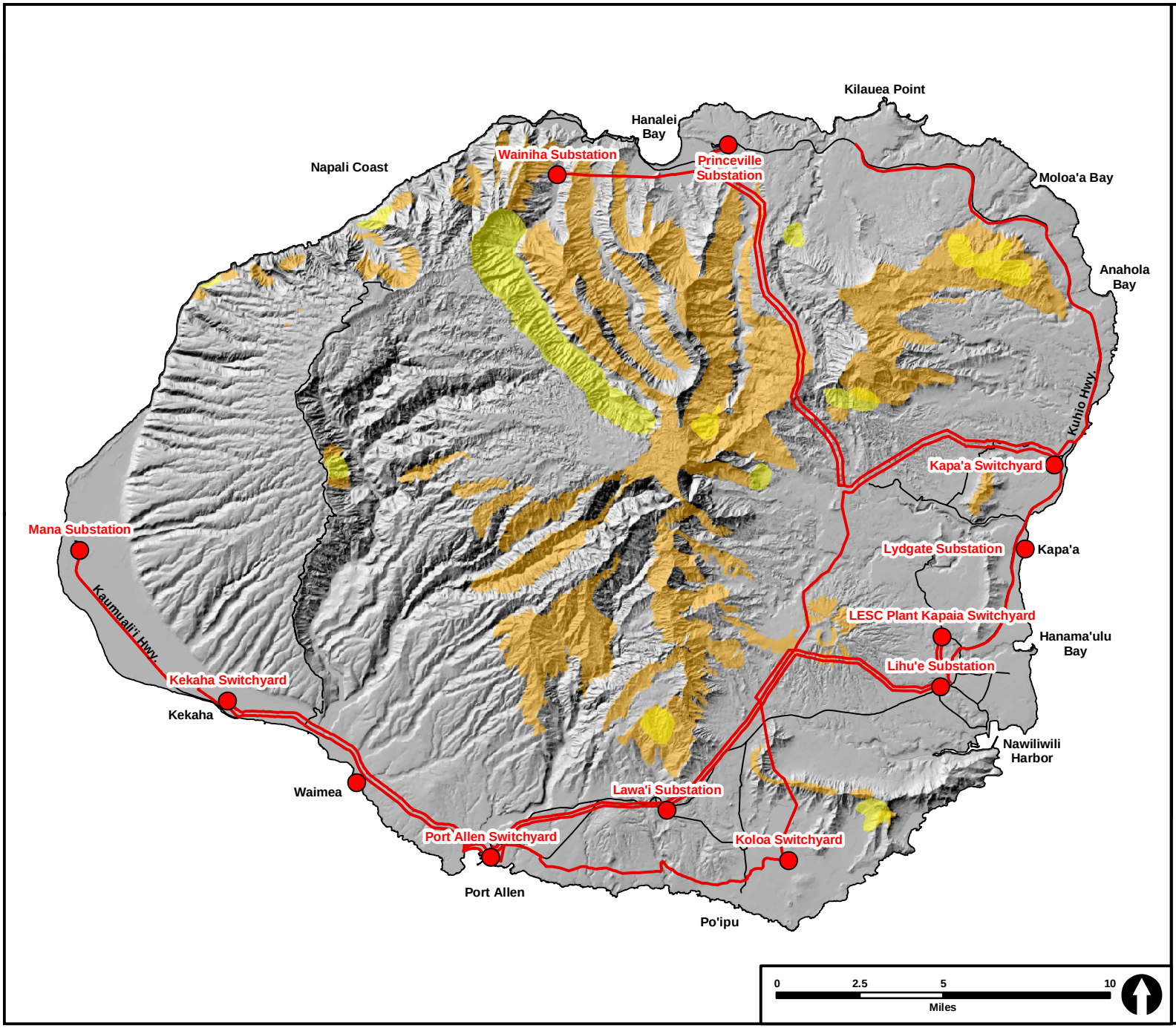
[1] KIUC was formed as a cooperative pursuant to the provisions of Chapter 421C of the Hawai'i Revised Statutes.

[2] Approximately 162 miles (22 percent) of the transmission and distribution lines are underground.

cats, and other mammals, and to injury and death by vehicles, other human activity, or due to dehydration or starvation.

Figure 1.1 Satellite Photo of Island of Kaua'i





Legend:

- KIUC 69 kV Transmission Lines
- KIUC Switchyards & Substations
- Major Roadways
- Known Newell's Shearwater Nesting Colonies
- Potential Newell's Shearwater Nesting Habitat

Prepared For:

Kaua`i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

--Kaua`i Island Utility Cooperative
--State of Hawai`i GIS
--Rana Productions

Figure 1.2:

Major KIUC Facilities

KIUC Habitat Conservation Plan

Figure 1.2 Major KIUC Facilities 2008-04-26.mxd

As discussed elsewhere in this document (see, for example, Sections 1.2 and 1.3 below, the harm that is caused by the collisions and light-related downings is prohibited under both Federal and State laws unless permits are obtained. This HCP provides the factual basis for the determinations that must be made for the permits to be issued.

1.1.3 HISTORY OF THIS HCP

1.1.3.1 Initial Agency Discussions with Kaua'i Electric & Interim Conservation Measures

In 2001, KE engaged in discussions with the U.S. Fish and Wildlife Service (USFWS) and the Hawai'i Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) regarding the potential effects on threatened and endangered seabirds of a new electrical transmission line needed to connect a new electrical generation facility (constructed by another company) to the KE system. In consultation with the agencies, KE conducted radar surveys to identify seabird flight paths and altitudes in the vicinity of the proposed line, then altered the initial location, design, and height of the line in order to avoid impacts to seabirds.

Following these project-specific efforts, KE and the agencies then began discussing the development of a Habitat Conservation Plan (HCP) for the entire KE system. Such an HCP would identify and implement measures to minimize impacts of KE's existing and future facilities (e.g., power lines, lights) and operations on these seabird species, and measures to mitigate for unavoidable impacts. In recognition of the ongoing effects of KE's existing facilities on seabirds, and the fact that development and approval of a system-wide HCP was likely to take several years, KE and the agencies quickly agreed to a more proactive approach. Rather than await the conclusion of the multi-year HCP development and approval process to institute minimization and mitigation measures, KE immediately began developing and implementing a series of "Interim Conservation Measures" (ICMs) designed to immediately reduce and mitigate impacts to seabirds. These ICMs, and KE's commitment to develop an HCP, were memorialized in a Memorandum of Agreement (MOA) signed by KE and the USFWS on November 7, 2002.[3]

1.1.3.2 KIUC Assumes Responsibility for HCP, Develops Draft HCPs for Agency Review

KIUC continued working towards an HCP immediately after it assumed control of KE's assets, and has continued to do so ever since, entering into a second MOA containing additional ICMs in December 2004. Both MOAs provided that the utility would receive full credit for all ICMs implemented prior to approval of the HCP and issuance of the incidental take permits.

KIUC met regularly with USFWS and DLNR representatives as it completed the ICMs and sought agency agreement on a satisfactory avoidance, minimization, and mitigation program for the HCP. It submitted a complete draft HCP to both agencies in early 2006, then a complete revised draft in November 2006. In late 2006 the agencies notified it of a potential mitigation opportunity in Limahuli Valley. KIUC immediately joined in discussions with the landowner and involved parties and incorporated Limahuli into its proposed HCP.

1.1.3.3 KIUC Submits HCP and Application for Incidental Take Authorization (October 2007)

In October of 2007, the utility submitted its proposed HCP and associated applications for long-term incidental take authorization to DOFAW pursuant to Hawai'i Revised Statutes (HRS) Chapter 195D, and to the USFWS pursuant to the Endangered Species Act. The USFWS provided comments on the HCP to KIUC in March 2008, and KIUC responded to most of the comments by May. Because of a staffing shortage, DOFAW's review of the Draft HCP was delayed for over a year.

In December 2008 DOFAW and USFWS presented to KIUC a joint written response to the October 2007 HCP. In their response the agencies noted the following:

[3] This MOA was also binding on KIUC, which completed the purchase of KE's assets later that month.

- KIUC has made concerted efforts in the areas of avoidance and minimization of impacts to listed seabird species.
- The utility has documented significant contributions to the Save-Our-Shearwaters (SOS) program.[4]
- KIUC's support of the SOS program has contributed substantial education and community outreach on behalf of these species.
- The Draft HCP itself represents a substantial effort toward meeting Federal and State requirements.

The agencies also concluded that additional information was needed before determining the effect of a long-term take authorization, and that a short-term HCP would allow the opportunity to provide benefit to the species through implementation of mitigation and recovery actions that would not otherwise occur, and gather the additional information needed for long term management. As a result, the agencies recommended a new, two-stage approach for obtaining incidental take permit coverage, as described below.

1.1.3.4 Agencies' Shift to Two-Stage Approach for Obtaining Take Coverage (December 2008)

The agencies recognized KIUC's need for incidental take authorization. However, in December 2008 they concluded that the information which exists about the species is insufficient to grant long-term take authorization. The agencies therefore proposed a new two-stage approach:

- First, KIUC would modify its October 2007 HCP to seek short-term (3 to 5 years) take authorization. This modified, short-term HCP 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 and the USFWS are currently developing and plan to have completed and approved by 2011. Should other factors create a situation where it is not feasible to obtain coverage through the *KSHCP*, KIUC would resume its efforts to obtain long-term authorization through its own HCP.

1.1.3.5 Agencies' Recommended Process for Obtaining Short-Term Incidental Take Coverage

DOFAW and USFWS recommended that KIUC modify its October 2007 Draft HCP to seek short-term take authorization and incorporate certain specific mitigation and monitoring actions. This approach would provide the take authorization KIUC had applied for (though for a shorter time period), satisfy associated mitigation and monitoring needs, and allow for the collection of additional scientific information needed to support a longer-term conservation program through the KSHCP. The agencies described the recommended components of this new short-term HCP as follows:

(1) Covered Activities: A description of all facilities and activities (e.g., power lines, existing and planned facilities, lighting, etc.) anticipated over the term of the short-term HCP.

(2) Avoidance and Minimization Efforts: A description of the avoidance and minimization measures that KIUC will continue to implement over the term of the short-term HCP.

(3) Authorized Take Limits: A single proposed take limit for each species representing anticipated potential take based on the best available information and estimation modeling.

(4) Proposed Mitigation: Description of the mitigation measures that would be implemented under the short-term HCP. The agencies recommended the following:

[4] SOS is a program begun by DOFAW in the 1970s in response to the observed grounding of fledgling seabirds each fall. Island residents are requested to retrieve seabirds observed on the ground and take them to designated aid stations. The vast majority of grounded seabirds are uninjured but typically have great difficulty resuming flight without human intervention. With the help of the SOS Program, most are released back into the wild following evaluation, rest and/or hydration.

- Continued funding of the Save-Our-Shearwaters program at the current level.
- Funding of half of the National Tropical Botanical Garden's (NTBG or other appropriate entity) infrastructure, helicopter, and project management costs or similar activities which provide benefit to the species and environment, and contribute to the recovery of the species, per agreement with the Parties, and 100% of the predator control and bird monitoring costs for the Upper Limahuli project, for the duration of the short-term HCP.
- Funding an at-sea capture study to determine the proportion of birds which survive following release through the SOS program.
- Funding a one-time analysis of most-recent National Oceanic and Atmospheric Administration (NOAA) research vessel data to update Spear et al.'s (1995) population estimates for the covered species.

(5) Monitoring: Developing (in collaboration with the agencies) and implementing (with the possible participation of the agencies or a third-party contractor) a monitoring protocol leading to a statistically valid estimate of take, which could then be used to later seek long-term take authorizations.

1.1.3.6 Agencies' Recommended Process for Obtaining Long-Term Incidental Take Coverage

The agencies and the Cooperative envision that KIUC will ultimately satisfy its long-term incidental take needs by participating in DOFAW's development and implementation of the island-wide *KSHCP*. DOFAW plans to have a draft of the *KSHCP* available for agency review by Summer 2009, and to complete the *KSHCP* and have incidental take permits in place by Summer 2011. 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 will fully support the *KSHCP* development process.

1.1.3.7 KIUC Agrees to Agencies' Recommended Approach, Prepares Short-term HCP

KIUC met with both DOFAW and the USFWS several times from December 2008 to March 2009 to work out the details of the agencies' recommended new approach. KIUC then agreed to this new approach, and prepared this short-term HCP.

1.2 OVERVIEW OF THE HCP

1.2.1 TERM OF THE HCP AND TAKE AUTHORIZATIONS

This HCP describes measures that KIUC will implement over the terms of the incidental take permit (ITP) and incidental take license (ITL) to minimize and mitigate the impacts of its facilities and operations on the Covered Species. The HCP provides the basis for the issuance of the following Federal permit and State license (hereafter referred to as the "permits") that would authorize the take of the Covered Species incidental to the continued operation and maintenance of existing KIUC facilities, and the construction, operation and maintenance of certain future facilities:

- An incidental take permit from the USFWS under section 10(a)(1)(B) of the Federal Endangered Species Act, and
- An incidental take license from DLNR under sections 195D-4 and 195D-21 of the Hawai'i Revised Statutes.

This short-term HCP and the associated take authorizations would be valid for up to 5 years from the time of permit issuance. Within 3 years of permit issuance, (a) the Parties will jointly assess newly developed information and the status of DOFAW's proposed island-wide Kaua'i Seabird Habitat Conservation Plan (KSHCP) and (b) based upon the outcome of that assessment, KIUC will promptly

determine and notify the Agencies whether it will seek to obtain long-term federal and state take authorizations through the KSHCP (if it has been or soon will be completed and approved) or through its own long-term HCP. KIUC and the agencies desire and anticipate that KIUC will in fact obtain long-term take authorizations through participation in the KSHCP. Only in the unlikely event that this is not available or if satisfactory terms of participation cannot be obtained would KIUC independently seek long-term take authorizations through the preparation of its own long-term HCP. Regardless of the manner in which they are obtained, any such long-term take authorizations would supersede the short-term take authorizations issued pursuant to this short-term HCP. If long-term take authorizations are not obtained by the end of the 5-year term, the 5-year term may be extended with the agreement of all three Parties and to the extent allowed by law.

1.2.2 SPECIES TO BE COVERED

As described in Section 1.1.2 above, this HCP covers the Federally listed endangered Hawaiian Petrel (*Pterodroma sandwichensis*), the Federally listed threatened Newell's Shearwater (*Puffinus auricularis newelli*), and the Federal candidate for listing Band-rumped Storm-Petrel (*Oceanodroma castro*). All three species are also listed by the State of Hawai‘i as threatened or endangered species. The reasons why coverage for other endangered bird species known to be present on the island, e.g., the Hawaiian goose (Nēnē, *Branta sandvicensis*); Hawaiian hoary bat (‘Ōpe‘ape‘a or *Lasiurus cinereus semotus*); Hawaiian stilt (Ae‘o or *Himantopus mexicanus knudseni*; Hawaiian coot (‘alae ke‘oke‘o or *Fulica alai*); and Hawaiian duck (koloa maoli or *Anas wyvilliana*) is not being sought are discussed in Section 3.4.4.

1.2.3 ACTIVITIES TO BE COVERED

All existing KIUC facilities and activities, and those limited future facilities which KIUC anticipates needing within the term of the ITP/ITL. These are described in Chapter 2 of this report.

1.2.4 PERMIT BOUNDARY/COVERED LANDS

This HCP and associated permits cover all of KIUC's facilities and activities on the Island of Kaua‘i. Because the Cooperative operates an island-wide system, this means that it covers the full geographic extent of the island (see and Figure 1.2).

1.2.5 TAKE AUTHORIZATION BEING SOUGHT

The amount of take sought under this HCP was developed in coordination with the Agencies, and consists of 125 Newell's shearwaters (lethal take), 55 Newell's shearwaters (non-lethal take), 2 Hawaiian petrels, and 2 Band-rumped Storm Petrels per year. On the basis of the information that is available to it and as discussed later in this report (see Chapter 4), KIUC expects that actual take will be far below these amounts.

1.2.6 CONTINUANCE OF EXISTING AVOIDANCE AND MINIMIZATION EFFORTS

As discussed in more detail in Section 5.4.2 of this report, KIUC will continue existing efforts and pursue any new opportunities to avoid and minimize adverse effects of its facilities.

1.2.7 IMPLEMENTATION OF MITIGATION MEASURES

This HCP provides for the implementation of mitigation measures that fully offset unavoidable take during the term of the permits and provide a net benefit to the species. The measures, which are described in detail in Section 5.6 of this report, include the following:[5]

[5] Dollar costs noted below are as of 2009 and will be adjusted for inflation.

- KIUC will continue to fund the Save Our Shearwaters program at the current real level (i.e., accounting for inflation) for each year that this HCP and associated incidental take authorizations are in effect.
- For each year that this HCP and associated incidental take authorizations are in effect, KIUC will fund mitigation work conducted as part of the seabird breeding colony habitat management project currently under way at the National Tropical Botanical Garden (NTBG) in the upper Limahuli Valley as follows: (i) the actual cost of 50% of infrastructure, helicopter and project management costs or similar activities which provide benefit to the species and environment, and contribute to the recovery of the species, per agreement with the Parties and (ii) 100% of predator control and bird monitoring costs as stated in Section 5.6.2.2 (see Table 5.2), a combined annual total of up to $271,330. If the NTBG or other appropriate entity does not require some or all of these funds, KIUC will apply the unused funds (subject to a 10% contingency to cover any potentially higher costs) to another habitat management project which KIUC and the Agencies determine will provide an equivalent conservation benefit to the Covered Species.
- KIUC will provide up to $40,000 per year for each of two years to offset the cost of a two-year at-sea capture study to be conducted by DOFAW as described in Section 5.6.2.3.
- KIUC will contribute up to $100,000 toward the cost of a one-time analysis of the most recent National Oceanic and Atmospheric Administration (NOAA) research vessel data to update the Spear et al.'s (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. This analysis will be conducted under the direction of NOAA and will be completed within one year.
- KIUC will provide up to $98,000 per year to DOFAW to fund a two-year seabird auditory survey to that will locate additional seabird breeding colonies where DOFAW believes habitat management work could be performed in the future.
- KIUC and the participating agencies will complete monitoring of an agreed-upon subset of KIUC's power lines to quantify seabird collisions with such power lines following an agency-approved protocol. KIUC will fund such monitoring for a period of two years, at a cost not to exceed $180,000 per year, and KIUC will also fund or conduct additional follow-up monitoring in the remaining years of this HCP as later determined by the Parties to be appropriate based on the results of the first two years of monitoring.

The SOS program, at-sea capture study, analysis of NOAA data, and auditory surveys described above, constitute satisfaction of the requirement in HRS 195D-4(g)(3) of providing means to ensure monitoring of the Covered Species by the State. The HCP minimization, mitigation and monitoring measures described above may be modified by agreement of all three parties at any time, based on the evaluation of new information regarding the population of the Covered Species, the effects of KIUC operations and facilities on the Covered Species, or other relevant matters.

1.3 REGULATORY CONTEXT

1.3.1 FEDERAL ENDANGERED SPECIES ACT (ESA)

1.3.1.1 General Provisions of the ESA

The ESA provides a process for identifying species needing protection, a framework for determining the type of protective measures needed, and enforcement measures. Two sections of the ESA are most relevant to KIUC's facilities and operations.

- Section 9 (16 USC 1538) prohibits the taking of a listed wildlife species; and
- Section 10 (16 USC 1539) provides for issuance of incidental take permits for listed species to non-Federal entities.

Section 9 of the ESA prohibits the "take" of wildlife species listed as endangered, and it prohibits the take of species listed as threatened unless otherwise specifically authorized by regulation. Under the ESA, the term "take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct." [16 USC 1532(19)]. The term "harm" in the definition of take means "an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." The term "harass" in the definition of take means "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3.]

The USFWS may permit, under certain terms and conditions, any taking otherwise prohibited by Section 9 if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. To apply for an incidental take permit, an applicant must develop, fund, and implement a USFWS-approved Habitat Conservation Plan (HCP) to minimize and mitigate the effects of the incidental take. Under Section 10, the HCP must satisfy the following criteria to be approved:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such takings;
- The applicant will ensure that adequate funding for the plan and procedures to deal with unforeseen circumstances will be provided;
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- Such other measures that the Secretary of the Interior requires as being necessary or appropriate for purposes of the plan.

1.3.1.2 Section 10(a)(1)(B) Process - Habitat Conservation Plan Requirements & Guidelines

1.3.1.2.1 HCP Development Phase

To obtain an incidental take permit, an applicant must develop a Habitat Conservation Plan that provides the following information (see ESA Section 10(a)(2)(A), and 50 CFR 17.22(b)(1) and 17.32(b)(1)):

- The impact that will likely result from such taking;
- The measures the applicant will undertake to monitor, minimize and mitigate such impacts, the funding that will be available to implement such measures, and the procedures to be used to deal with unforeseen circumstances;
- The alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and
- Such other measures that the Director of the USFWS may require as necessary or appropriate for purposes of the plan.
- The *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, published by the USFWS and the National Marine Fisheries Service (NMFS) in November 1996, provides additional policy guidance concerning the preparation and content of HCPs. The USFWS and NMFS published an addendum to the *HCP Handbook* on June 1, 2000 (65 FR 35242) (USFWS and NOAA 2000). This addendum, also known as the Five-Point Policy guidance, provides clarifying guidance for the two agencies in conducting the incidental take permit program and for those applying for an incidental take permit under Section 10. The five components addressed in the policy are: (1) biological goals, (2) adaptive management, (3) monitoring, (4) permit duration, and (5) public participation. Each of these is discussed briefly below:

Biological Goals and Objectives: HCPs must include biological goals (broad guiding principles for the conservation program – the rationale behind the minimization and mitigation strategies), and biological objectives (the measurable targets for achieving the biological goals). These goals and objectives must be based on the best scientific information available and are used to guide conservation strategies for species covered by the plan.

Adaptive Management: The Five-Point Policy encourages the development of adaptive management plans as part of the HCP process under certain circumstances. Adaptive management is an integrated method for addressing biological uncertainty and devising alternative strategies for meeting biological goals and objectives. An adaptive management strategy is essential for HCPs that would otherwise pose a significant risk to the Covered Species due to significant information gaps.

Monitoring: Monitoring is a mandatory element of all HCPs under the Five-Point Policy. As such, an HCP must provide for monitoring programs to gauge the effectiveness of the plan in meeting the biological goals and objectives, and to verify that the terms and conditions of the plan are being properly implemented.

Permit Duration: Under existing regulations, several factors are used to determine the duration of an incidental take permit, including the duration of the applicant's proposed activities and the expected positive and negative effects on covered species associated with the proposed duration. Under the Five-Point Policy, the USFWS will also consider the level of scientific and commercial data underlying the proposed operating conservation program, the length of time necessary to implement and achieve the benefits of the operating conservation program, and the extent to which the program incorporates adaptive management strategies.

Public Participation: Under the Five-Point Policy guidance, the USFWS announced its intent to expand public participation in the HCP process to provide greater opportunity for the public to assess, review, and analyze HCPs and associated documentation (e.g., National Environmental Policy Act review). As part of this effort, the USFWS has expanded the public review process for most HCPs from a 30-day comment period to a 60-day period.

1.3.1.2.2 Permit-Processing Phase

The HCP development phase concludes and the permit processing phase begins when a complete application package is submitted to the appropriate permit-issuing office. A complete application package consists of 1) an HCP, 2) an Implementing Agreement (IA) if applicable, 3) a permit application, and 4) a $100 fee from the applicant.

The USFWS must publish a Notice of Availability of the HCP package in the *Federal Register* to allow for public comment. It also prepares an Intra-Service Section 7 Biological Opinion, and a set of Findings which evaluate the permit application against the Section 10(a)(1)(B) permit issuance criteria (see below). An Environmental Action Statement, Environmental Assessment, or Environmental Impact Statement serves as the Service's record of compliance with the National Environmental Policy Act (NEPA), which has gone out for a 30-day, 60-day, or 90-day public comment period. An implementing agreement is required for the HCP as well.

A Section 10(a)(1)(B) incidental take permit is granted upon a determination by the Service that all requirements for permit issuance have been met. Statutory criteria for issuance of the permit specify that:

- the taking will be incidental;
- the impacts of incidental take will be minimized and mitigated to the maximum extent practicable;
- adequate funding for the HCP and procedures to handle unforeseen circumstances will be provided;
- the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild;

- the applicant will provide additional measures that the Service requires as being necessary or appropriate; and
- the Service has received assurances, as may be required, that the HCP will be implemented.

1.3.1.2.3 Post-Issuance Phase

During the post-issuance phase, the Permittee and other responsible entities implement the HCP, and the Service and DOFAW monitor the Permittee's compliance with the HCP as well as the long-term progress and success of the HCP.

1.3.2 HAWAI'I REVISED STATUTES: CHAPTER 195D

Chapter 195D, Hawai'i Revised Statutes (HRS) is the Hawai'i equivalent of the ESA. Chapter 195D formally declares it the State's policy to insure proactively that the survival of indigenous aquatic life, wildlife, and land plants and their habitat is perpetuated. 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 Department of Land and Natural Resources (DLNR) has determined to be in need of conservation. (See also §195D-4(e)).

Under §195D-4, any species listed as endangered or threatened pursuant to the ESA is automatically deemed to be an endangered or threatened species under Chapter 195D. Section 195D-4 also authorizes DLNR to declare any other indigenous species of aquatic life, wildlife, or land plant to be an endangered species or a threatened species pursuant to §195D. The State has determined that all three seabird species covered by this HCP are endangered (Hawaiian Petrel) or threatened (Newell's Shearwater and Band-rumped Storm-Petrel).

Under §195D-4(g), the Board of Land and Natural Resources (BLNR), after consultation with the State's Endangered Species Recovery Committee (ESRC), may issue a temporary license (subsequently referred to as a "§195D incidental take license") as part of a habitat conservation plan to allow a take otherwise prohibited if the take is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. In order to qualify for the license, the following must occur:

- The applicant minimizes and mitigates the impacts of the take to the maximum extent practicable;
- The applicant guarantees that adequate funding for the plan will be provided;
- The applicant posts a bond, provides an irrevocable letter of credit, insurance, or surety bond, or provides other similar financial tools, including depositing a sum of money in the endangered species trust fund created by §195D-31, or provides other means approved by BLNR, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take;
- The plan increases the likelihood that the species will survive and recover;
- The plan takes into consideration the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed;
- The activity permitted and facilitated by the license to take a species does not involve the use of submerged lands, mining, or blasting;
- The cumulative impact of the activity, which is permitted and facilitated by the license, provides net environmental benefits; and
- The take is not likely to cause the loss of genetic representation of an affected population of any endangered, threatened, proposed, or candidate plant species.

§195D-4(i) directs DLNR to work cooperatively with Federal agencies in concurrently processing habitat conservation plans and incidental take licenses pursuant to the Endangered Species Act. §195D-21 deals specifically with habitat conservation plans. The provisions are similar to those in Federal regulations. HCPs submitted in support of an incidental take license application must:

- Identify the geographic area encompassed by the plan; the ecosystems, natural communities, or habitat types within the plan area that are the focus of the plan; and the endangered, threatened, proposed, and candidate species known or reasonably expected to be present in those ecosystems, natural communities, or habitat types in the plan area;
- Describe the activities contemplated to be undertaken within the plan area with sufficient detail to allow DLNR to evaluate the impact of the activities on the particular ecosystems, natural communities, or habitat types within the plan area that are the focus of the plan;
- Identify the steps that will be taken to minimize and mitigate all negative impacts, including without limitation the impact of any authorized incidental take, with consideration of the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed; and the funding that will be available to implement those steps;
- Identify the measures or actions to be undertaken; a schedule for implementation of the measures or actions; and an adequate funding source to ensure that the actions or measures are undertaken in accordance with the schedule;
- Be consistent with the goals and objectives of any approved recovery plan for any endangered species or threatened species known or reasonably expected to occur in the ecosystems, natural communities, or habitat types in the plan area;
- Provide reasonable certainty that the ecosystems, natural communities, or habitat types will be maintained in the plan area, throughout the life of the plan;
- Contain objective, measurable goals; time frames within which the goals are to be achieved; provisions for monitoring; and provisions for evaluating progress in achieving the goals quantitatively and qualitatively; and
- Provide for an adaptive management strategy that specifies the actions to be taken periodically if the plan is not achieving its goals.

§195D-25 provides for the creation of an Endangered Species Recovery Committee (ESRC) composed of biological experts, representatives of relevant Federal and State agencies (i.e., USFWS, USGS, DLNR), and appropriate governmental and non-governmental members to serve as a consultant to the Department of Land and Natural Resources and the Board of Land and Natural Resources on matters relating to endangered, threatened, proposed, and candidate species. The ESRC's duties include reviewing all applications for Habitat Conservation Plans, safe harbor agreements, and incidental take licenses, and making recommendations to the Department and the Board on whether they should be approved, amended or rejected; reviewing all existing HCPs, safe harbor agreements and incidental take licenses annually to ensure compliance, and making recommendations for any necessary changes; and considering and recommending appropriate incentives to encourage landowners to voluntarily engage in efforts that restore and conserve endangered, threatened, proposed, and candidate species. Hence, the ESRC plays a significant role in the HCP planning process. KIUC has met with the ESRC several times during the preparation of this HCP.

1.3.3 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

Congress enacted the National Environmental Policy Act (NEPA) in 1969 to ensure that Federal agencies consider the environmental impacts of their actions and decisions (in this case deciding whether to issue an incidental take permit). NEPA requires the Federal government to use all practicable means and measures to protect environmental values and makes environmental protection a part of the mandate of every Federal agency and department. NEPA requires analysis of the potential environmental impacts of any proposed Federal action that significantly affects the quality of the human environment, and public disclosure of that analysis. The results of the NEPA analysis help the Service understand the direct, indirect, and cumulative impacts of the alternatives and decide whether to issue an incidental take permit (ITP or section 10(a)(1)(B) permit).

Issuance of an incidental take permit by the USFWS is a Federal action subject to NEPA compliance. Hence, the Service must prepare a NEPA analysis for each HCP as part of the incidental take permit application process. Before deciding whether to approve KIUC's proposed HCP and issue an incidental take permit to the Cooperative, the USFWS will prepare and distribute an Environmental Assessment that addresses the direct, indirect, and cumulative effects of the incidental take authorized by permit issuance, and the direct, indirect, and cumulative effects associated with the implementation of mitigation and minimization measures described in the HCP.

1.3.4 HAWAI'I STATE ENVIRONMENTAL REVIEW LAW

The Hawai'i State Environmental Impact Statement Law (Hawai'i Revised Statutes Chapter 343) and its implementing regulations (Hawai'i Administrative Rules §11-200) establishes a system of environmental review to ensure that environmental concerns are given appropriate consideration in decision-making along with economic and technical considerations. The Hawai'i Office of Environmental Quality Control (OEQC) is responsible for environmental oversight and review under Chapter 343. §343-5 mandates the preparation of an Environmental Assessment for activities by agencies [§343-5(a)] or applicants [§343-5(b)] meeting certain conditions.[6] Chapter 343, HRS, specifically exempts the preparation of "feasibility or planning studies" (such as the HCP) from the Chapter 343 environmental assessment requirement. Consequently, the State of Hawai'i Department of Land and Natural Resources has determined that a Chapter 343 environmental assessment or environmental impact statement is not needed for this HCP.

1.3.5 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. A list of birds protected under MBTA implementing regulations is provided at 50 CFR 10.13. Unless permitted by regulations, the MBTA 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. In addition, USFWS regulations[7] require a permit for the banding or marking of migratory birds protected under the MBTA.

All three Covered Species addressed in this HCP are protected under the MBTA. If the HCP is approved and USFWS issues an ESA incidental take permit to KIUC, the terms and conditions of that incidental take permit will also constitute a Special Purpose Permit under 50 CFR 21.27 for the take of the Hawaiian Petrel, Newell's Shearwater, and Band-rumped Storm-Petrel under the MBTA. Therefore, subject to the terms and conditions to be specified in the ESA incidental take permit, any authorized take of the three Covered Species will not be in violation of the MBTA.

1.3.6 NATIONAL HISTORIC PRESERVATION ACT

USFWS issuance of a Section 10 incidental take permit is considered an "undertaking" under Section 106 of the National Historic Preservation Act (NHPA) (16 USC 470). The undertaking is defined as the land-use activity that may proceed once incidental take authorization is obtained by the applicant. Section 106 requires the USFWS to assess and determine whether the undertaking has the potential to affect "designated historic properties." If so, the USFWS must consult with the Advisory Council on Historic Preservation, the State Historic Preservation Officer (SHPO), affected Tribes, the applicant, and other interested parties, and make a good-faith effort to consider and incorporate their comments into project planning. To carry out this obligation, the USFWS must identify the "area of potential effects" associated with the proposed undertaking, which is usually defined as the geographic area

[6] Because it is a private entity, KIUC is governed by the provisions of §343-5(b). However, if HCP-related activities require the use of State or county lands or funds, the agency approving the use of these resources would have to fulfill the requirements of §343-5(a).

[7] 50 CFR Part 13

where the undertaking may directly or indirectly change the character or use of designated historic properties. The USFWS generally interprets the area of potential effects as the specific location where incidental take will occur and where ground-disturbing activities may affect historic properties. The USFWS in consultation with the SHPO must make a reasonable and good-faith effort to identify undiscovered historic properties, and determine the extent of any archeological investigations that may be required. The cost of NHPA compliance, however, rests with the applicant.

The majority of the actions that would be covered by the Section 10 permit that KIUC has requested are existing facilities. With the exception of certain hydroelectric facilities, none of these qualify for designation as historic properties. Continued maintenance of the facilities that would be covered by the permit does not involve activities with the potential to affect known historic properties.

1.4 ORGANIZATION OF THE HABITAT CONSERVATION PLAN

This Habitat Conservation Plan (HCP) consists of a Plan Summary table and the following sections.

- Chapter 1 – Introduction and Background provides an overview of the KIUC System, the purpose and need for the HCP, and the regulatory framework within which it is being prepared.
- Chapter 2 – Covered Activities describes KIUC's existing and future activities, and existing and future facilities, that are covered by the HCP.
- Chapter 3 – Environmental Setting contains an overview of the existing environment in the area covered by the HCP. This includes physical features (geography/geology/ topography, climate, hydrology, etc.), biological characteristics (e.g., vegetation and wildlife), characteristics of the species to be covered by the HCP, and land use.
- Chapter 4 – Potential Biological Impacts provides an estimate of the take which KIUC's facilities may cause. It assesses the direct, indirect, and cumulative impacts on each species.
- Chapter 5 – Conservation Program describes the biological goals and objectives, the kinds of measures that were considered for avoiding and minimizing existing and future impacts, and the measures that will be taken to mitigate unavoidable impacts. It also describes the monitoring and reporting measures that are incorporated into the plan and the adaptive management provisions that are included to allow management practices to keep pace with increasing knowledge and/or changing conditions.
- Chapter 6 – Alternatives Considered briefly describes alternatives not discussed in detail in the previous Chapter, including the no-action alternative and other alternatives that would not result in take.
- Chapter 7 – Plan Implementation discusses how the plan is to be implemented over time, including timeframes and success criteria.
- Chapter 8 – References lists the documents and sources cited and used in preparing this HCP.
- Chapter 9 – Glossary contains a glossary of the terms used in the report.

Appendices grouped at the end of this document contain reports and other supplemental information.

CHAPTER 2 – COVERED ACTIVITIES

This HCP and the associated Federal and State incidental take permits to be issued by the USFWS and DLNR will cover and provide incidental take authorization for the continued existence, operation and maintenance of all existing KIUC facilities, and the installation, operation and maintenance of certain future KIUC facilities. The relatively short term (up to 5 years) for which coverage is being sought stems from the expectation that KIUC will seek and obtain long-term coverage through participation in the Kaua‘i Seabird Habitat Conservation Plan being prepared by the State of Hawai‘i DLNR under grants from the USFWS. Existing facilities and activities are described in Section 2.1 below, and future additional facilities and activities are described in Section 2.2.

2.1 EXISTING FACILITIES & ACTIVITIES

2.1.1 OVERVIEW

KIUC owns and operates a variety of electric utility installations on the Island. The locations of major KIUC facilities are depicted in Figure 1.2. These include fossil-fuel-fired generating stations at Port Allen and Līhu‘e, the upper and lower Waiahi hydroelectric stations in the Wailua watershed, seven electrical substations and five switchyards located throughout the island, over 160 miles of electrical transmission lines, approximately 560 miles of 12.5 kV electrical distribution lines, and approximately 425 miles of secondary lines (120/240 volts) that carry power from step-down transformers that are part of the distribution network to individual homes and businesses.

KIUC also owns and operates approximately 3,100 streetlights on behalf of the County of Kaua‘i, the State of Hawai‘i, and private entities.[8] While these represent most of the streetlights on the island, a number of public facilities and private developments also own and operate streetlights that are not under KIUC’s control.

2.1.2 KIUC GENERATING STATIONS

<u>Port Allen Generating Station</u>. The two largest facilities in the system are KIUC’s two fossil fuel-fired generating stations. The Port Allen Generating Station is located on the southern side of the island near the town of ‘Ele‘ele (see Figure 2.1). It is the older of the two and, as shown in Table 2.1, has the most installed generating capacity (approximately 96 MW). In addition to the generating units, the facility includes a switchyard, offices, and warehouse space. The total area of the site is approximately 9 acres. The gas turbines, diesels, and steam plant at the Port Allen Generating Station are all fired on No. 2 diesel oil. The gas turbines are connected to a heat recovery steam generator and can be operated in both a simple-cycle and combined-cycle mode. Except for small on-site day tanks, fuel storage is provided through a contract with Chevron, which maintains a Tank Farm immediately *makai* (seaward) of the Port Allen Generating Station.

<u>Kapaia Power Station</u>. The Kapaia Power Station (KPS) is located in Kapaia on the outskirts of Līhu‘e (see Figure 2.2). At present, the 14-acre KPS site contains a 27.5 MW advanced steam-injected combined cycle power plant and support facilities, including fuel storage tanks, water treatment facilities, a control and maintenance building, warehouse and office space, and various mechanical and electrical equipment. The generating facility delivers electrical power to a switchyard at the southwestern corner of the KPS. A 1.1-mile-long transmission line that runs along an old cane haul road connects the switchyard to the remainder of KIUC’s transmission system. In addition to these fossil-fuel fired generating facilities, KIUC also owns and operates two small hydroelectric units near Līhu‘e that it purchased from the Līhu‘e Plantation Company.

[8] June 12, 2003, Press release by KIUC announced: “*All 3,049 [KIUC-owned] street lights on Kauai are now equipped with special shields designed to keep light from shooting skyward and distracting endangered, low-flying seabirds.*” The number has increased slightly since that time as KIUC has installed streetlights in newly developed areas.

Figure 2.1:

Port Allen Generating Station

Prepared For:
Kaua'i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Source:
State of Hawai'i GIS

Project:
KIUC System Habitat Conservation Plan

Landscape Corner Pane.cdr

Figure 2.2:

Kapaia Generating Station

Prepared For:
Kaua'i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Source:
KIUC

Project:
KIUC System Habitat Conservation Plan

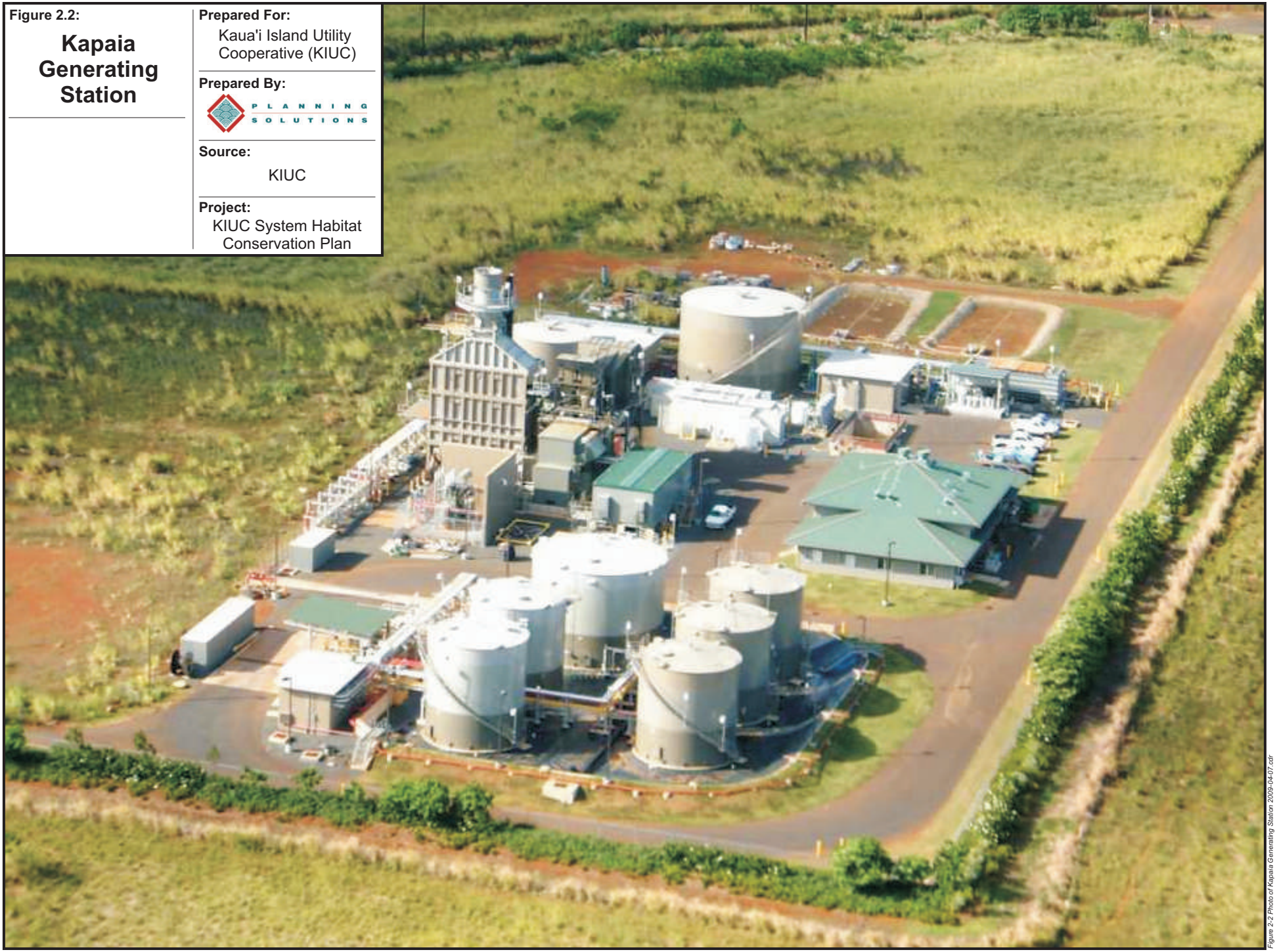


Figure 2-2 Photo of Kapaia Generating Station 2009-04-07.cdr

Table 2.1 Capacity and Location of Existing KIUC System Generating Units

Location	*Unit Name*	*Year Installed*	*Capacity (MW)*
Port Allen Generating Station	Gas Turbine No. 1	1973	17.5
Port Allen Generating Station	Gas Turbine No. 2	1977	22.6
Port Allen Generating Station	Steam Plant	1968	10.00
Port Allen Generating Station	EMD Diesel 1	1964	1.8
Port Allen Generating Station	EMD Diesel 2	1964	1.8
Port Allen Generating Station	EMD Diesel 3	1968	2.7
Port Allen Generating Station	EMD Diesel 4	1968	2.7
Port Allen Generating Station	EMD Diesel 5	1968	2.7
Port Allen Generating Station	SWD 6	1990	7.85
Port Allen Generating Station	SWD 7	1990	7.85
Port Allen Generating Station	SWD 8	1991	7.85
Port Allen Generating Station	SWD 9	1991	7.85
Kapaia Power Station	CT1	2002	27.5
Source: Kaua‘i Island Utility Cooperative, October 13, 2007.			

2.1.3 ELECTRICAL SWITCHYARDS, SUBSTATIONS, AND POWER LINES AND POLES

2.1.3.1 Electrical Switchyards and Substations

KIUC’s generating units produce energy at various lower voltages; this is then “stepped up” by power station transformers to a common higher voltage for transmission over long distances to grid exit points (substations). On Kaua‘i the transmission is typically done at 57 kV.[9] Switchyards also serve as interconnecting and switching points for transmission lines and distribution circuits. Substations are used to reduce the voltage from transmission lines through “step-down” transformers and to route it to the areas where it is needed through distribution circuits. While they all perform similar functions, the electrical substations and switchyards in KIUC’s system vary in age, size, and location with respect to existing urban development. Most are between one and two acres in size. They are all surrounded by 7-foot or higher chain link fences and all contain a variety of electrical transformers and switchgear that allow KIUC to step-up or step-down the voltage. The largest of the transformers are a little more than ten feet high. The tallest structures in most of the substations and switchyards are the structures that support wires coming into and out of the facilities; these are typically about 25 feet high.

The names and principal functions of equipment typically located at electrical switchyards and substations are as follows:

[9] The 57 kV voltage is a non-standard level that the utility inherited from the plantation systems which it acquired when it was first created. That voltage is no longer in wide use, and so all of the equipment that has been installed for many years is designed to handle 69 kV. Once all of the old, lower-rated equipment has been replaced, KIUC will be able to energize its system at 69 kV. While the need to continue to supply customers while making the switch-over will make this a challenging task from an operational viewpoint, it will not require substantial construction or other activities relevant to this HCP. Hereafter in this document, all references to transmission facilities will be referred to as 69 kV.

- *Power Transformers*. Electrical power transformers are used to raise or lower the voltage in electric power systems. The transformers found in electrical switchyards at KIUC's generating stations are "step-up" transformers that increase the voltage of the electricity to 69 kV. The transformers located in substations are generally "step-down" transformers that reduce the voltage to 12 kV. Finally, pole-mounted transformers reduce the voltage further to the 120/240 volts that is used by the ultimate customers. The system has a large number of these final low-voltage step-down transformers located closer to customers' as a way to minimize energy losses from the system.
- *Circuit Breakers*. These are mechanical switches capable of carrying electrical currents and of breaking the electrical connection when there is an electrical overload or other problem. In concept, these are like the circuit breakers that people have in their homes. However, because they must handle much greater loads, they are designed quite differently. The kinds of circuit breakers used on Kaua'i are generally less than 10 feet tall.
- *Electrical Busses*. Busses transfer power between two or more electrical circuits within a switchyard. They can be in the form of solid metal bars. Busses are chosen instead of conductors since they can carry high amounts of energy in a confined space.
- *Control Structures*. Some switchyards and substations have small (usually less than 10 feet by 20 feet) one-story structures that house control equipment. This room is air conditioned and has no windows. The control room is used to house equipment that monitors, controls, and communicates with the equipment (e.g., breakers, transformers, and switches) within the substation and also communicates outside of the substation. The equipment within the control structure usually consists of sensitive electronics such as panel meters, protective relays, control switches, remote terminal units (for remote communications), air-conditioner, and a battery bank for backup control power.
- *Communication Equipment*. Good communication is essential for the reliable operation of the system; fault-sensing protective relays must communicate to monitor the flow of power. Protection of the transmission line from short circuits and other faults is usually so critical that KIUC uses its own communications links for some applications, and the equipment for this is typically located in the substations.

Photographs of typical switchyard and substation equipment, as well as various transmission and distribution line configurations are presented in Figure 2.3 below.

2.1.3.2 Utility Pole Heights and Cable Arrangements

The wire sizes and pole heights vary widely for each type of line according to the particular physical circumstances of their installation. Moreover, the configuration switches from one type to another (and often back again) within distances of as little as a few hundred feet. The changeability makes it impossible to map the differences on a system-wide scale.

- 69 kV transmission lines are typically carried on poles that are 70 to 85 feet tall.[10] A wide variety of line arrangements are used. These include vertical arrays, where the wires are immediately above one another on the pole; diamond arrays, where cables are mounted on the top and on either side of the pole; and horizontal arrays, where the lines are mounted on horizontal crossarms or post type insulators. Sometimes lower-voltage distribution lines are mounted lower on the same poles.

[10] Note that the height of powerlines when measured as "above ground level" can be greater than the height of the pole where the powerline crosses a drainage. Similarly, the height of powerlines when measured as "above vegetation level" is less than the height of the pole where the powerline crosses tall, dense vegetation. In many cases it is actually lower than surrounding vegetation.

Figure 2.3 Photographs of Substation & Switchyard Equipment

PHOTO	*PHOTO DESCRIPTION*
	Typical steel transmission poles supporting twin, vertically stacked 69 kV circuits. Orange marker balls are visible on the lightning arrestor wire that extends from the top of one pole to the next. This segment is located near Hanahanapuni. Note large sag in wires associated with large pole-to-pole separation typically used in rough terrain.
	Typical wood pole, double-circuit 69 kV transmission line with single 12 kV distribution line under-build. The three wires in each of the transmission circuits are arrayed vertically (i.e., one above another). The distribution circuit uses three wires on a wooden crossarm. The thick cables low on the poles are telecommunication cables owned by others. This picture was taken west of Waimea town.

Figure 2.3 Photographs of Substation & Switchyard Equipment

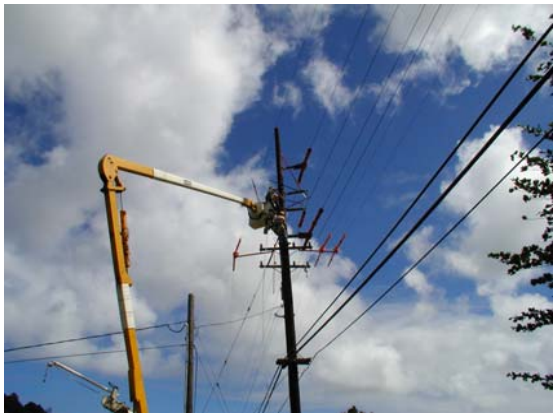
PHOTO	*PHOTO DESCRIPTION*
	Typical wood pole, single-circuit 69 kV transmission line with twin 12 kV distribution line under-build. The line crew is performing maintenance on the lines using a bucket-truck. The three wires in the transmission circuit are arrayed vertically (i.e., one above another). Each of the two distribution circuits has three wires on two separate horizontal wooden crossarms. The thick cables low on the poles are telecommunication cables owned by others. This picture was taken at ‘Ele‘ele.
	Close-up of typical wood pole, single-circuit 69 kV transmission line with twin 12 kV distribution line under-build shown above.

Figure 2.3 Photographs of Substation & Switchyard Equipment

PHOTO	*PHOTO DESCRIPTION*
	The green box in the foreground is a step-down transformer that reduces the 69 kV voltage used for transmission to the 12 kV voltage used in the electrical distribution system. It is approximately 11 feet high to the top of the bushings. This example is located in Kapa‘a and is typical of the many others are located in switchyards and substations around the island.
	This is a 69 kV transmission circuit breaker. This one, which is located in the Kapa‘a substation, is approximately 9 feet tall.

Figure 2.3 Photographs of Substation & Switchyard Equipment

PHOTO	*PHOTO DESCRIPTION*
	This is the T-11 Distribution Bus at the Kapa‘a Substation. The maximum height of the structure is approximately 20 feet.
	On the left are typical steel pole transmission poles supporting twin, vertically stacked 69 kV circuits. These have a 3-wire 12 kV under-build arranged in a triangular configuration (one wire on one side of the pole and two on the other). Orange marker balls are visible on the lightning arrestor wire (static wire) that extends from the top of one pole to the next. This segment is located at Kapa‘a. Note that there is much less sag in these wires than in wires in remote areas that have longer runs (i.e., distance between poles). These poles are approximately 85 feet tall, with the transmission lines separated from one another vertically by approximately 6 feet. The wood pole line on the right carries a three-wire 69 kV circuit in a triangular arrangement at the top with a 12 kV under-build, also in a triangular arrangement. The wood poles are approximately 75 feet tall. There are no telecommunications lines on any of these poles.

Figure 2.3 Photographs of Substation & Switchyard Equipment

PHOTO	*PHOTO DESCRIPTION*
	This is a small transformer substation located at Mānā. The pole on the left carries a 12 kV distribution circuit arranged horizontally. The light green structure in the left-hand corner of the substation contains control and protection equipment. The A-frame structure immediately to its right supports the wires as they enter and leave the substation.
	Typical wood pole transmission line supporting twin, vertically stacked 69 kV circuits. These have a 3-wire 12 kV under-build arranged in a horizontal configuration (one wire on one side of the pole and two on the other). Thick telecommunications cables are supported on a horizontal crossarm on the lowest position on the poles. A single lightning arrestor wire extends from the top of one pole to the next, and the pole in the foreground has three small cylindrical transformers typical of those used to reduce the 12 kV distribution voltage down to the 120 volts used in homes and businesses; the service line from the transformer to the customer extends to the left off of the picture at a height of about 20 feet on the pole. This segment is located between Waimea and Kekaha. These poles are approximately 75 feet tall, with the transmission lines separated from one another vertically by approximately 6 feet.

Figure 2.3 Photographs of Substation & Switchyard Equipment

PHOTO	*PHOTO DESCRIPTION*
	This is a close-up of one of the wooden poles shown on the previous picture.
	This is a "Power-Mini-Sub." It exhibits a dual pole structure which supports an elevated cross-member. The three barrel-shaped objects supported on the cross-member are voltage regulators. The overall height of the structure is approximately 40 feet; note that it is well below the top of the nearby vegetation. This facility is located in Wainiha.

- 12 kV distribution lines are typically on poles that are 40 to 60 feet tall. As with the poles carrying transmission lines, the electrical cables carrying the power are arranged in a variety of ways depending upon each pole's specific circumstances. Moreover, circuits frequently change from one configuration to another over a short distance. Small, pole-mounted step-down transformers make the final voltage reduction (to 120/240 volts) at which power is delivered to individual homes.

KIUC has a joint pole agreement with the telephone company providing for joint ownership of many of the poles in the KIUC system. The poles subject to this agreement carry KIUC lines and Hawaiian Telcom lines. The agreement also allows for leasing space on the poles to third parties so that many poles also carry cable television lines. The agreement establishes a "Joint Pole Committee" which has jurisdiction over all matters relating to the replacement, remediation, use and maintenance of the poles (subject to applicable Public Utilities Commission, State, and County regulations). KIUC's ability to dictate the design and use of the poles is severely limited by the fact that Hawaiian Telcom shares ownership in the poles. This means that even if KIUC were to withdraw from the agreement and remove its wires from the utility poles, the poles and the other wires (e.g., telephone and cable television) would remain. Moreover, the agreement does not prohibit the parties from erecting and maintaining poles outside of the joint use agreement, and it does not prohibit third parties (such as cable companies) from also using the poles subject to the agreement of the original parties. This HCP does not address telephone, cable, and other lines affixed to KIUC's poles because KIUC has no ownership or control over such lines.

2.1.4 MISCELLANEOUS OTHER FACILITIES

Streetlights. In addition to this joint pole agreement, KIUC also maintains and operates the majority of the streetlights (more than 3,000 of them) that illuminate the island's roadways under agreements with State and County governments. KIUC bills the County and State monthly for their operation. The majority of these lights are on poles that also carry electric lines, but some of the lights are stand-alone fixtures on their own stanchions. Nearly all of the lights are switched on and off automatically by photo-sensitive switches installed in the individual lights.

KIUC Headquarters/Offices. KIUC's main offices are located in offices that it leases from the owner of the two story building located at 4463 Pahe‘e Street in Līhu‘e. It is not responsible for maintenance of the exterior of the building or of any of the exterior lighting.

Radio Transmitters. KIUC owns and operates several small radio transmitters that it uses to coordinate and control the generating units and transmission and distribution facilities in its islandwide system. These consist of the following:

- A single-story shack located at the top of Mount Kahili houses radio transmitters, batteries, and ancillary equipment. A standard height (40-50-foot-high) guyed utility pole (see the left-most pole in the photo at left below) supports the antenna that serves these (the transmitter's antenna is about half-way up the pole, and UHF antennas are located at top of pole, pointing to Kapa‘a and Kōke‘e). KIUC shares the location with other companies, which own and operate the antennae that are on the two other poles visible in the picture.
- A 12-foot by 15-foot single-story control building made of fiberglass is located just above horse shoe bend at the old Pu‘u ka Pele Station at the Koke‘e- National Air Guard facility. The antenna serving this equipment is attached to the Air Guard tower.
- KIUC also owns and operates a 12-foot by 15-foot single-story fiberglass control building located in Kīlauea. The 50-foot-high utility pole that is the second from the left in the right-hand photo below) supports the antennae that serves this facility. The facility's VHF whip antenna is on top. The UHF antenna is below that (and well below the top of the utility pole).

Mount Kahili	Kīlauea

KIUC purchases power from several independent power producers (IPPs) and transmits the power through its electrical transmission system. IPP facilities and activities are not covered by this HCP.

2.1.5 ONGOING OPERATION & MAINTENANCE ACTIVITIES

Existing KIUC facilities require ongoing maintenance to ensure safe and efficient operation. Most of the activities associated with maintaining KIUC facilities do not significantly affect the configuration of existing facilities and electrical power lines. Examples of such maintenance include responding to mechanical failures of equipment within substations or on electrical power lines due to corrosion and wear, replacing damaged and rotting poles, trimming tree branches near lines, and restoring and testing wood poles.

Some regular maintenance activities necessarily result in raising pole heights, relocating poles, and/or increasing the number of poles in the system. One example is "reconductoring", or the replacement of a smaller conductor with a heavier one. This must be done occasionally to accommodate increasing electrical loads on the electrical power lines. In order to maintain a proper offset distance between the lines strung on the poles, the line height must be increased and/or the distance between poles reduced, which may entail replacing poles, adding more poles, and replacing insulators. KIUC is also required to move their facilities from time to time to accommodate road widening or other County and State projects.

2.1.6 IMPLEMENTATION OF THE HCP'S CONSERVATION PROGRAM

Chapter 5 of this HCP describes a conservation program which, among other things, involves handling of and other activities involving the Covered Species. Implementation of all aspects of the conservation program is covered under the incidental take permits.

2.2 FUTURE KIUC ACTIVITIES AND FACILITIES

KIUC is required by the State Public Utilities Commission (PUC) to provide and ensure the availability of reliable electrical service. As Kauai's population and demand for electricity continues to grow, new facilities will be needed to improve the transmission and distribution of electricity. Some specific additional facilities are already slated for development, while others are in the early planning stages.

This HCP divides future additional facilities into two categories for purposes of incidental take authorization:

- Future additional facilities that are relatively minor in terms of size and extent, are constructed routinely, but are unlikely to have any observable or measurable effect on the Covered Species (e.g., a new, low-elevation distribution line to provide service to a new home). These facilities are to be covered under the incidental take permits.
- Specific reasonably foreseeable future additional facilities that are larger in size and extent, already planned, and which KIUC expects it must begin to make substantial financial commitments within the term of this HCP. These facilities are to be covered under the requested incidental take permits.

If, during the term of this HCP and related permits, the need arises to construct facilities that are not known at this time and are not, therefore, discussed in this document, KIUC will review the concept plans for such facilities to determine potential impacts to Covered Species. Only those presently unidentified projects which it is clear (either from analysis or from discussion with the regulatory agencies) will not cause harm will be pursued without seeking additional permit coverage. Implementation of any projects which KIUC determines will require incidental take authorization for the Covered Species will be delayed until that coverage is available, either through participation in the *KSHCP* or through a separate permit process.

Facilities and activities in each of the two categories are discussed in detail below.

2.2.1 FUTURE ADDITIONAL FACILITIES: CATEGORIES OF COVERED MINOR FACILITIES

The following categories of routine KIUC facilities and activities necessary to serve the utility's customers are minor in size and extent and, due to their physical attributes, have extremely limited, if any, potential to affect the Covered Species. The construction and operation of these facilities are to be Covered Activities under the incidental take permits for the term of the HCP. These activities will also be covered under the longer-term permit coverage KIUC plans to seek under the *KSHCP*.

2.2.1.1 New Connections within Existing Service Areas (< 1,320 feet)

New residential and commercial customers regularly request new connections to the existing electrical distribution network. When this occurs, KIUC is obligated by the Public Utilities Commission tariff under which it operates to provide the requested service from the nearest distribution line to the customer. Approximately 75% of these requests can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer's meter. The remaining requests typically require installation of one to three poles (and often a transformer), but they are occasionally longer. The top of the poles used for this purpose typically extend no more than 35 to 45 feet above ground level, and the service lines from poles to homes typically start from the pole at a takeoff height of approximately 30 feet above the ground and descend to attachment points on the eaves of homes at about 8 feet above the ground. Hence, their average height above the ground is a little under 20 feet.[11] This is below the height at which most individuals of the Covered Species typically fly. If any such new connections require the installation of new poles that extend higher than 45 feet above ground level, KIUC will submit the proposed exception to the agencies for review and approval. If an agency objects to the proposed exception, it must notify KIUC of its objections within 30 calendar days of receipt of the request. The agencies may request up to ten (10) additional business days of review time so long as they submit their request for an extension no later than 25 calendar days after their receipt of KIUC's request. If the agencies do not respond within the allotted time, their lack of response shall be deemed approval of KIUC's request.

2.2.1.2 Electrical Equipment Additions to Existing Substations and Switchyards

Periodically, KIUC must install additional electrical equipment in its existing substations and switchyards. In some cases the need stems from KIUC's ongoing conversion from 57 kV to the 69 kV transmission system that is more compatible with standard equipment now being produced by

[11] 30 feet above ground level at pole less 8 feet above ground level at roof/2) = 19 feet.

electrical equipment manufacturers.[12] In other cases the equipment additions are related to the need to expand the substation capacity to meet growing electrical demand.[13] The tallest additional equipment that might be installed at a substation is less than 20 feet high, well below the elevation at which the Covered Species would normally fly.

2.2.1.3 Minor Generating Station Equipment and Structure Additions

Mechanical and electrical equipment must periodically be added to generating stations to accommodate changes in operating procedures, improved technology, or governmental permitting requirements. This equipment is typically less than 25 feet high (i.e., well below the height of existing structures on the generating station sites). Low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities may also be added from time to time to allow the facilities to carry out their functions. Some of these may involve a few, low-intensity outdoor lights. Any new lights will be shielded and used only when needed. In the context of the already-developed industrial nature of the generating stations, such additions are unlikely to affect the Covered Species.

2.2.1.4 Voltage Upgrade on Existing Poles

As discussed above, while the island's electrical transmission system was initially designed to operate at 57 kV, all of the new facilities installed over the past several decades have been designed to 69 kV standards to facilitate eventual conversion to this industry-standard voltage. Hence, it will not be necessary to modify transmission lines if and when a complete voltage conversion to 69 kV is made. Instead, relatively straightforward changes in connections at substations will suffice. The steel transmission poles along KIUC's main transmission corridor across the center of the island have been designed so that they could accommodate 138 kV should the utility reach the point where this is needed to reduce line-losses and increase long-distance transmission capacity. Such voltage upgrades are unlikely to affect the Covered Species.

2.2.1.5 Installation of Shielded Street Lights at Government or Private Request

KIUC periodically receives requests from the County and State agencies to install and operate additional streetlights to serve new subdivisions or existing thoroughfares. In some cases the streetlights that are installed in new developments to comply with County code requirements are on their own poles, with electrical and telecommunications cables being placed underground.[14] In other cases the lights are placed on poles that also carry overhead electrical and telecommunication cables. KIUC will continue obliging those requests and responding to them in a timely manner. As with all the existing KIUC-owned streetlights on Kaua'i, any new streetlights would be equipped with full-cutoff lights to eliminate upward-projecting light that could disorient seabirds.

2.2.1.6 Fiberoptic Cable Installation

KIUC is continuing to install fiberoptic cables that link major facilities in its system. These will complement fiberoptic cables it has already installed linking the Port Allen Generating Station, Kōloa Switchyard, Līhu'e Switchyard, Hana Kukui Main Office, Kapaia Power Station, Lydgate Substation and Kapa'a Switchyard. The additional communication ability will increase the stability of its transmission and distribution system and have the added benefit of improving other types of communication between its major facilities.

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[12] KIUC has nearly completed the equipment changes needed to convert its transmission voltage from 57 kV to 69 kV. Once the remaining transformers, switches, and other remaining 57kV-rated equipment have been replaced, the cooperative will increase the line voltage of its transmission system. This will not require modifications to equipment that have the potential to affect the covered species.

[13] Some of the growth in demand is due to additional development, but much is due to the increased per-capita use of electrical power.

[14] As provided for under existing PUC guidance, KIUC installs new transmission and distribution lines overhead unless the landowner or developer requests that they be placed underground. Where such requests are made, the developer pays the cost differential between underground and overhead installation.

These fiberoptic cables come in two forms: ADSS (All Dielectric Self Supporting) and Optical Ground Wire (OPGW). ADSS fiber cable has its strength built in and requires no externally lashed messenger; it is installed on existing utility poles, either in the space allocated for communication lines (approximately 21 feet above the ground) or at the lowest position in the electrical space (approximately 27 feet above the ground). OPGW (which looks like a normal aluminum stranded cable) is usually strung at the top of the pole, in place of the static wire. It provides both lightning protection and fiber communications. KIUC will continue to install OPGW fiber conductors in place of, and at no greater height than, the existing static wire.[15]

2.2.1.7 In-situ Replacement of Existing Lines or Other Facilities

KIUC is periodically required to replace existing lines or other facilities in their current location for maintenance, service reliability or other such reasons. For example, KIUC on occasion must replace an existing segment of power line because of line age or damage. So long as the line is replaced in its current location, and the new line is installed at a height which is equal to or lower than that of the line being replaced, then the installation and operation of that new line segment is covered by the incidental take permits. Another effort that is ongoing within the KIUC system is the preparation to energize the transmission lines at 69 kV rather than the 57 kV at which they now operate. All of the transmission lines themselves now meet 69 kV standards, but they will continue to be energized at 57 kV until the last substation and other control equipment has been upgraded to the higher 69 kV standard, at which point the switch-over will be made. The eventual switchover does not involve physical or other changes that have the potential to affect the Covered Species.

KIUC normally performs *in-situ* replacement work during daylight hours. It will only conduct such work during nighttime hours in emergency situations or when system conditions require nighttime work. Lighting of the work area will be required in such situations. Such lights will be shielded and directed downward to the maximum extent practicable, and KIUC workers will be trained in how to handle any downed birds and will have appropriate equipment onsite to hold and transport any retrieved downed birds to an SOS facility.

2.2.2 FUTURE ADDITIONAL FACILITIES: LARGER, PLANNED, SHORT-TERM PROJECTS

KIUC has, or may need to, commit to a few new facilities within the term of the permits that are larger in size and extent than the categories of facilities described above, but are sufficiently well defined such that the construction and operation of these facilities are Covered Activities under the incidental take permits.

2.2.2.1 Kumanu Substation

The South Shore of Kaua‘i is presently served by KIUC’s electrical substations in Kōloa and Lāwa‘i, both of which are already operating near their full capacities.[16] Construction has begun on the first phase of the Kukui‘ula project, a 1,000-acre master planned resort/residential community, and other development is ongoing in the region as well. Additional substation capacity is being installed to accommodate the increased load resulting from this development. In addition to supporting anticipated area loads, the new substation will also provide redundancy for the Kōloa, Lāwa‘i, and Port Allen Substations during the next decade or more.

The new electrical substation will be located on a portion of TMK: 2-6-003:001 adjacent to an existing field road and next to a 69kV overhead transmission line (see Figure 2.4). It is

[15] For those locations where existing static wires are not already installed, KIUC will pursue the procedures outlined in 2.2.3 for future additional facilities.

[16] The original Kōloa Substation was expanded in 1982 to meet increased load demands in the Kōloa and Po‘ipū areas. The expanded Kōloa Substation contains two 7.5/10.5 MVA power transformers and four 12.5kV distribution circuits. The station is presently loaded to over 80 percent of its base rating, which exceeds the load the substation can reliably support during peak-load periods. The Lāwa‘i Substation provides limited redundancy for Kōloa Substation; however, during peak periods Lāwa‘i Substation also operates near maximum capacity.

approximately six miles from the switchyard at the Port Allen Power Plant and three miles from the Kōloa Substation. The electrical substation site is in the State Agricultural District; it is designated as Agricultural by the Kaua‘i County General Plan and by County Zoning. The new substation will require one acre of land and is planned as an outdoor station with two 69kV circuit breaker line terminals, one for each 69kV line exiting the station. Full build-out of the substation is designed with three power transformers and six 12.5kV distribution circuits. Initial construction will only employ one transformer and two distribution circuits.

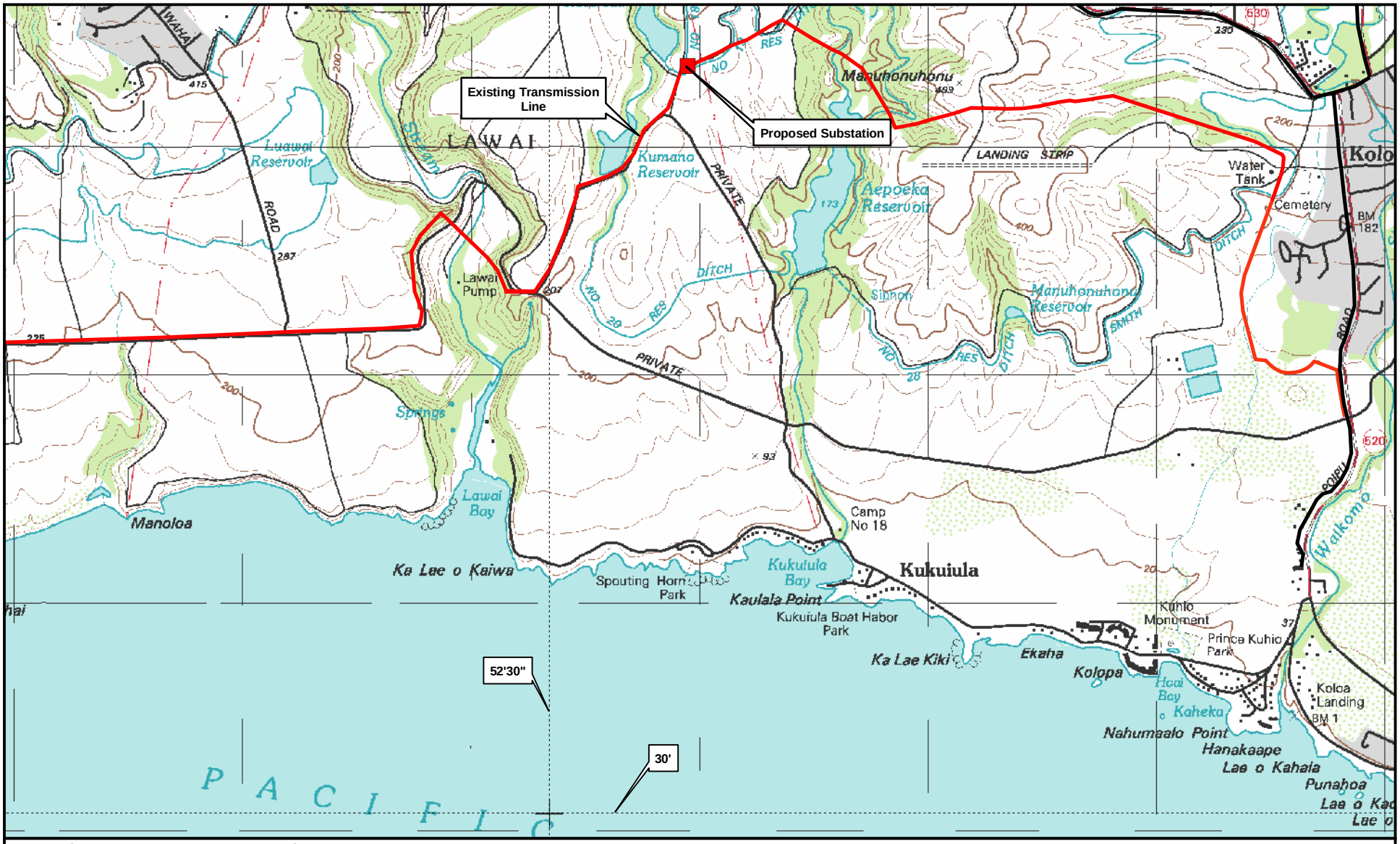
Most of the equipment in the proposed substation is quite low, with all of the transformers and switches being less than 20 feet in height. The tallest structures, the two A-frames that hold the incoming and outgoing electrical lines, are less than 40 feet tall. The only outdoor lighting at the site would be for emergency use only and would be provided using shielded fixtures. Hence, it is unlikely that this project would adversely affect the Covered Species.

2.2.2.2 Lydgate Substation Upgrade

KIUC’s existing Lydgate substation is on the eastern side of Kaua‘i approximately one mile south of the Wailua River and approximately a quarter of a mile inland from the ocean. The substation serves portions of the County’s Kawaihau and Līhu‘e Planning Districts, including Waipouli, Hanamā‘ulu, Wailua Houselots, and Wailua Homesteads. The old substation had exposed transformers, wires, and support structures. The equipment was outdated and heavily corroded from salt spray, and at the time this was written (Spring 2009), KIUC was reconstructing the substation. Most of the equipment is being placed in a new indoor enclosure; only the transformers will remain outside (two initially with space for a third if needed). It expects the work will be completed during the third quarter of 2009. The modernized transformer station will reduce the maintenance costs and visual impacts associated with the facility and will reduce the potential for equipment failures, thereby enabling KIUC to continue providing reliable electrical service to the Wailua area of Kaua‘i. KIUC plans on maintaining the landscaping buffers that surround the site, and make only minor alterations to the overhead wire connection between the substation and the adjacent 69 kV electrical transmission line.

The replacement facility has fewer and lower overhead wires and other structures than the existing outdoor facility. It does not require physical changes to the overhead electrical transmission and distribution system aside from replacement of the existing wires. No change in street lighting is needed. The only outdoor lighting at the site would be for emergency use only and would be provided using shielded fixtures. Hence, it is unlikely that this project would adversely affect the Covered Species.

As mentioned in Section 5.4.2.2, KIUC is participating with the State of Hawai‘i, Department of Transportation to underground its existing overhead electrical lines within the Kūhiō Highway right-of-way between the Lydgate Substation and the Kapa‘a Bypass Road. In order to protect the new underground cable from the effect of lightning strikes, KIUC must install a static wire (running pole-top to pole-top) for one half mile from the Lydgate Substation towards Līhu‘e. A half-mile of static wire will also be added to the top of the transmission poles northward from the Kāpa‘a Bypass Road. The existing transmission lines will be lowered to accommodate installation of the additional static wire conductor. Hence, the static line located at the top of the poles will be at about the same height as the highest existing transmission cable.



Prepared For:
Kaua`i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Sources:
-KIUC
-USGS 7.5' Quad Map

Legend:
69 kV Transmission Line

0 0.25 0.5 1
Miles

Figure 2.4:

Proposed Kumanu Substation

KIUC Habitat Conservation Plan

2.2.2.3 North Shore Reliability Enhancement Project

The first power line on the North Shore of Kaua‘i was a 35-mile line connecting Wainiha Hydro with McBryde Sugar Company’s irrigation system pumps located on the Hanapēpē River. The line was completed in 1906 and remained in service for over thirty years. In 1938, the original line was replaced with a steel lattice tower line, a part of which is still in service between Wainiha and Hanalei. The lattice tower line operation was changed from 33 kV to 57 kV in 1938.

Growth on the North Shore and a deteriorating lattice tower line prompted KIUC’s predecessor, Kaua’i Electric (KE) to undertake two large transmission line projects in the early 1990s. One of these is a 69 kV steel-pole line that runs from the Hanahanapuni Tap to the Princeville Substation that was reconstructed in 1992-1993 following hurricane Iniki. In 1991 KE began construction of a 69 kV wood pole line to connect the Kapa‘a Substation to the Princeville Substation. The twenty-mile line was designed to run alongside Kūhiō Highway and Kalihiwai Road. Approximately 16 miles of the line had been built when local opposition caused KE to suspend construction, thus creating a gap of approximately 4.5 miles.

The Princeville Substation, which serves the area from Hanalei to Moloa‘a, is fed by just one 69kV transmission circuit. A second 69 kV circuit is required to enable KIUC to provide reliable service to Princeville, Hanalei, Kilauea, and other communities within this service area. The need for the additional transmission circuit will increase as development of the area between Kapa‘a and Princeville consumes more and more of the power that can be supplied by the existing Kapa‘a 12 kV distribution system, and thereby reduces the amount of power that the existing Kapa‘a 12 kV system can transmit to Kilauea, Princeville, and beyond on those occasions when power from the 69 kV circuit is not available.

In 2005, KIUC identified and evaluated options it could pursue to improve service to its customers in this area in a manner that is cost-effective, environmentally sound, and responsive to community concerns. After identifying the operational objectives for the second 69 kV circuit and identifying factors that shape the project environment and influence the appropriateness of alternative solutions, the study team explored ways to meet the operational objectives in light of the many economic, community, and ecological constraints that exist. KIUC evaluated the dozen alternatives it identified from four perspectives: engineering and operations, cost, community compatibility, and ecological compatibility (specifically including minimization of impacts to threatened and endangered birds that may collide with power lines). Its ensuing analysis of the twelve identified four alternatives as best with respect to their ability to meet KIUC’s objectives.[17] After consulting with the 28 different community members and further investigating the top-ranked alternatives, KIUC refined its design concept to arrive at the plan shown in Figure 2.5.

[17] During this process, KIUC considered complete and partial undergrounding alternatives. It rejected complete undergrounding because of its extremely high cost (see Section 6.2 for cost estimates).

Legend:

Existing 69 kV Transmission Line

Proposed 69 kV Transmission Line

Prepared For:

Kaua'i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Sources:

--Kaua'i Island Utility Cooperative
--State of Hawai'i GIS
--IKONOS 2 Satelite Photography

Figure 2.5

Conceptual Design of North Shore Transmission Line

KIUC Habitat Conservation Plan

Figure 2-5 Conceptual Design of North Shore Transmission Line 2009-06-14.mxd

The proposed plan places a high priority on minimizing the potential effect on the Covered Species. In all of the areas where the plan calls for wires where none presently exist the additions are either shielded by existing vegetation and/or topography or are attached to the side of the Kūhiō Highway bridge across the Kalihiwai River. This design choice completely eliminates the potential adverse effect on the species in this route segment.[18] Most of the portion of the line that is on the Princeville side of the intersection of Kūhiō Highway and ‘Anini Road would be above ground and would use the same poles that carry the existing 12 kV line. In all cases where additional above-ground transmission wires are proposed KIUC would offset the effect of the additional circuit by changing the existing 12 kV distribution wires to a horizontal (i.e., one-level) arrangement (in lieu of their present vertical configuration). Because the four wires in the proposed 69 kV circuit would be limited to two levels (instead of the traditional four), the total number of levels at which wires would be present would be lower with the project (3 levels) than it is at present (4 levels), thereby reducing the potential for bird/line collisions relative to the present.

At present, the 69kV-capable poles end at the golf course approximately 1,500 feet east of the main entrance to the Princeville development. Beyond that point all of the electrical service is underground. In order to avoid increasing the possibility of bird strikes in this area, KIUC is planning on the use of an underground cable, completely eliminating the potential for adverse effect.

2.2.2.4 Kapaia Power Station Generation Addition

KIUC’s present integrated resource plan calls for it to install its next firm-capacity generating unit at the Kapaia Power Station. The plant additions will consist of a single combustion turbine (CT), a heat-recovery unit, a steam turbine, and electrical equipment.[19] The CT and steam turbine will be housed in separate structures. The heat recovery unit will be either a once-through steam generator (OTSG) or a heat-recovery steam generating unit (HRSG). The structure housing the OTSG or the HRSG (whichever is selected) will be the tallest of the proposed buildings; at ~70-feet, it will be about the same height as the existing OTSG for Combustion Turbine Unit 1 (CT-1), which stands at 71’6”. The exact height of the exhaust stack that will be used will be determined when the air quality analyses that KIUC is presently conducting have been completed. However, KIUC expects that it will be approximately the same height as the existing stack on the site. The stack may require FAA compliant lighting. Any additional lighting, if required, will follow current bird-friendly design and operating criteria. The switchyard will require an additional breaker that will be mounted on an existing structure.

The Kapaia Power Station is not located in an area that is known to have a high passage rate by the Covered Species, and KIUC’s monitoring of the grounds of the Kapaia Power Station have not revealed any downed birds at the facility since it was constructed. As the proposed addition does not involve structures or lighting that are significantly different from those that already exist, KIUC does not anticipate that the proposed addition represents a significant new source of potential take. Nevertheless, it is KIUC’s intention that the proposed addition be covered by the requested ITP/ITL.

2.2.2.5 Green Energy Switchyard/Substation

KIUC has entered into a Purchase Power Agreement with Green Energy Hawaii LLC, which proposes to construct and operate a biomass electric generating facility which will burn woodchips from locally grown albizia trees and other agricultural waste products to generate electricity that will be sold to KIUC. Occupying a portion of TMK 2-7-001-001, the Green Energy site is located between Kuia Stream and Weoweopilau Streams approximately one-quarter mile *mauka* of Kaumuali‘i Highway and just west of Half-Way Bridge (see Figure 2.6). If the biomass project

[18] It is worth noting that the proposed design would have less effect on the Covered Species than the line proposed in the early 1990s. For example, the Kalihiwai River crossing is in a conduit attached to the side of the highway bridge rather than overhead near the mouth of the stream. Similarly, the transmission cables are arranged on two levels, rather than four, and the existing 12 kV cables are being reconfigured from four levels to one. A portion will be underground.

[19] The unit will be a renewable multi-fuel unit with an approximate output of 18MW.

receives all required approvals and is constructed, Green Energy Hawaii LLC will also construct a substation on its site that will allow it to connect to KIUC's existing Koloa-Fujita transmission line (which passes over the western portion of the Green Energy site).[20] The existing steel poles supporting the Koloa-Fujita lines are typically 70 feet high; the additional takeoff structure required for the interconnection would be at or below that height. The only outdoor lightning at the site would be for emergency use only and would be provided using shielded fixtures. Although Green Energy Hawaii LLC will construct the substation and interconnection, upon commissioning and approval by KIUC it will then convey those facilities to KIUC which will thereafter operate and maintain them. Because the proposed new generating facility is located adjacent to an existing transmission line, it will not require new transmission line construction.

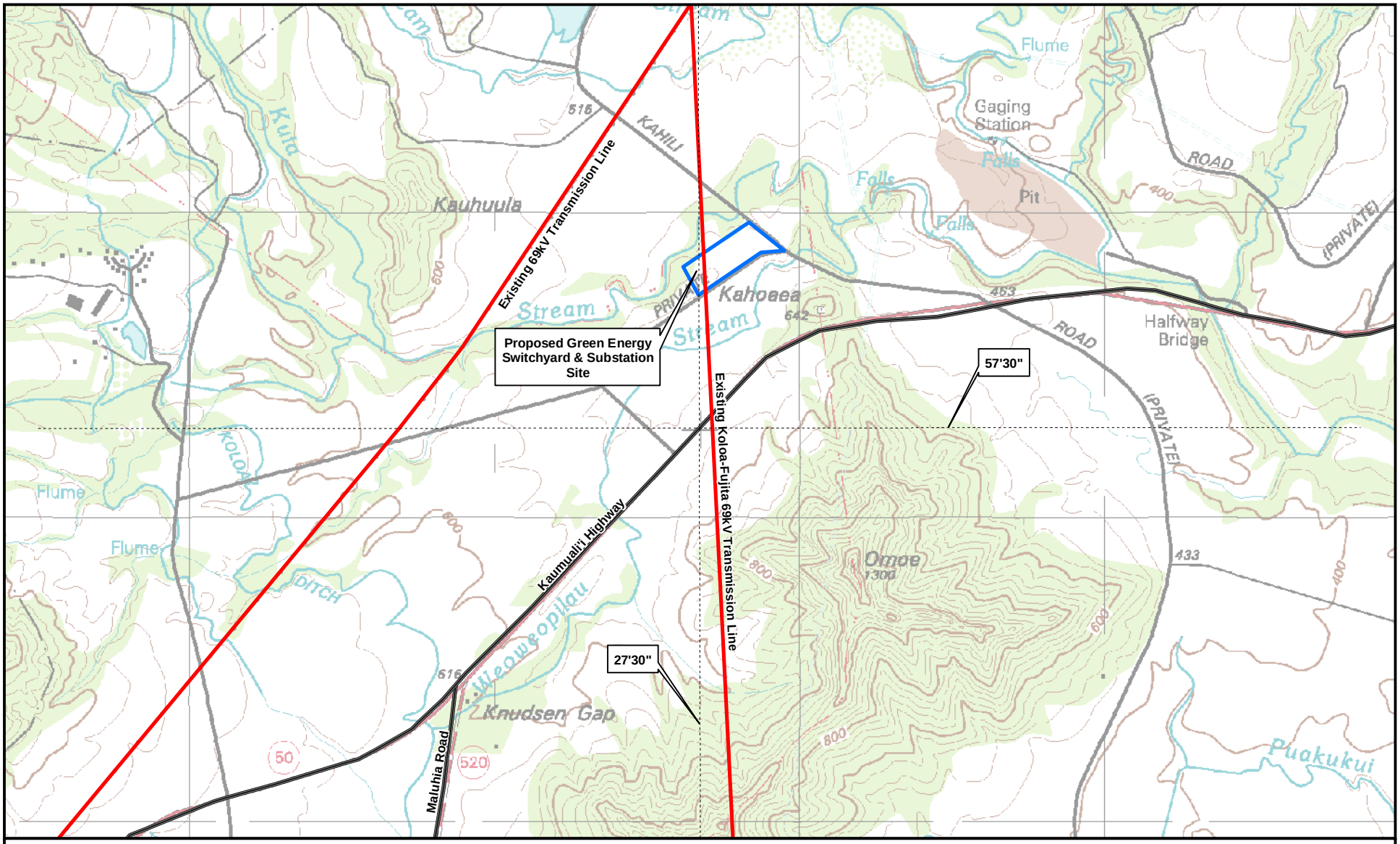
Because the substation structure will be small, will require no regular outdoor lighting, and the interconnection will require only a relatively short takeoff structure, these facilities are unlikely to have any significant adverse effects on the Covered Species.

2.2.3 SCREENING, ANALYSIS AND POTENTIAL HCP AMENDMENT PROCESS FOR OTHER FUTURE ADDITIONAL FACILITIES

For future additional facilities which do not fall into one of the two categories described above, KIUC will prepare an internal analysis of whether the construction and operation of the facility will cause take of the Covered Species.

- If KIUC concludes that no take will occur, then no incidental take authorization is required and KIUC may construct the facility without seeking an amendment to this HCP or the incidental take permits. In that case, the construction and operation of this new facility will not be covered under the incidental take permits. At its discretion, KIUC may seek USFWS and DLNR concurrence with its conclusion that no take will occur. KIUC may also elect to seek an amendment to the HCP and the incidental take permits to cover the new facility notwithstanding its conclusion that no take will occur.
- If KIUC concludes that take of the Covered Species may or is likely to occur, it will employ its best efforts to design the new facility so as to minimize the potential impact on the Covered Species to the maximum extent practicable, utilizing the design standards described in Chapter 6. For a new power line, for example, this could involve adjusting the line route, height, or configuration, and incorporating bird collision avoidance features such as line markers or tall vegetation. KIUC will then present to the USFWS and DLNR a detailed written description of the new facility and such minimization measures, and an assessment of the likely impact of the new facility on the Covered Species. The USFWS and DLNR will then review this submittal, and within 60 days shall inform KIUC in writing that either KIUC has in fact minimized the impact to the maximum extent practicable, or identify for KIUC in writing specific ways in which the impacts can practicably be minimized further. Within an additional 30 days, the USFWS and DLNR shall then determine in writing whether the project (either as originally proposed by KIUC, or as modified with additional impact minimization measures agreed to by KIUC, USFWS and DLNR) is likely to result in take of protected species.

[20]The substation would have three transmission breakers, a spare bay for a future distribution bus and transformers, and a control room.



Prepared For:

Kaua`i Island Utility Cooperative (KIUC)

Prepared By:

PLANNING SOLUTIONS

Sources:

--Kaua'i Island Utility Cooperative
--USGS 7.5' Quad Map

Legend:

0 0.125 0.25 0.5
Miles

Figure 2.6:

Green Energy Switchyard & Substation

KIUC Habitat Conservation Plan

Figure 2-6 Green Energy Switchyard & Substation 2020-Oct-28.mxd

Incidental take coverage for facilities determined to have a minor impact can be provided through a Minor Amendment to the HCP and incidental take permits, as described in Chapter 8. Incidental take coverage for facilities determined to have a significant or potentially significant impact on the Covered Species can be provided through a Major Amendment to the HCP and incidental take permits as described in Chapter 8**.** Either form of amendment may require additional mitigation for unavoidable impacts, which mitigation shall be commensurate with the degree of additional impact.[21]

[21] Given the short-term duration of this HCP, it is unlikely that the need will arise to amend the HCP to cover future additional facilities.

CHAPTER 3 – ENVIRONMENTAL SETTING

3.1 INTRODUCTION

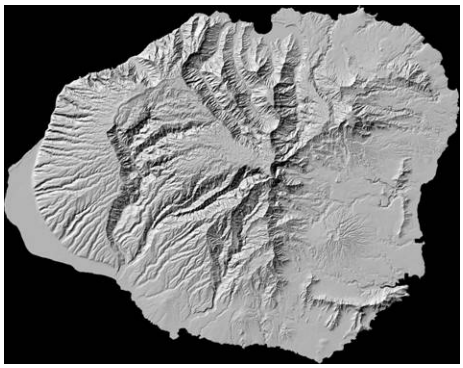
This chapter provides an overview of the existing environment on Kaua‘i. While the breadth of KIUC’s system means that the discussion is necessarily islandwide, the discussion below pays special attention to the relationship between KIUC’s facilities, known seabird colonies, and the routes that the Covered Species are believed to fly while traveling between nesting areas and the ocean. It is divided into four main parts:

- Section 3.2 discusses the physical environment, including physiography, geology, soils, hydrology, climate, and air quality.
- Section 3.3 covers the overall biological environment.
- Section 3.5 provides an overview of the socio-economic environment on Kaua‘i.
- Section 3.5 summarizes the existing land use patterns on the island.

3.2 AFFECTED PHYSICAL ENVIRONMENT

3.2.1 PHYSIOGRAPHY, GEOLOGY AND SOILS

3.2.1.1 Physiography

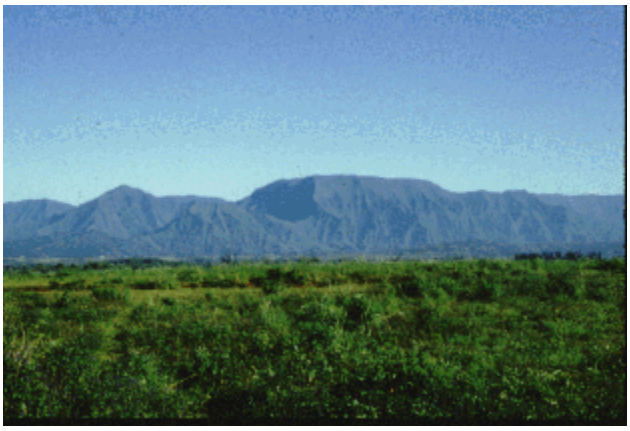


Kaua‘i has a land area of slightly more than 550 square miles. Roughly circular in shape, its most striking physiographic features are a high central plateau topping out at over 5,000 feet at the summits of Wai‘ale‘ale (5,148 feet) and Kawaikini (5,243 feet), steep cliffs and deeply incised valleys along the northern Nāpali coast, the 3,600-foot deep Waimea Canyon, the broad Līhu‘e Basin on the southeastern quadrant of the island, and extensive coastal plains. These can be seen on the shaded relief map to the left.

As evidenced by these pictures of Honopū and Ho‘olulu Valleys, the Nāpali coast, on the northwest coast of Kaua‘i, consists of huge cliffs, knife-edge ridges, and deep canyons.

The Waimea Canyon, was formed as the Waimea River cut deeply into lavas of the Waimea Canyon Basalt. As can be seen in the photo to the left, it is a wilderness of deep gorges and labyrinthine canyons. The Waimea River and its tributaries are fed by vast swamps in the very wet plateau of the central highlands. The picture to the left is a view looking up the canyon (i.e., northward), from its western rim.

The west side of Kaua‘i, south of the Nāpali coast has a shape that is typical of shield volcanoes. It consists of a gently sloping surface, cut by a series of deep canyons. The land meets the ocean with either abrupt steep shoreline cliffs or, as in the Polihale area, miles of sandy beaches. The broad, flat Māna Plain is located on the southwest corner of the Island. It is just above (and in a few areas slightly below) sea level. Another feature of the west side is a 15 to 80-foot high cliff at the interface between the lava that forms the mountains and the Māna Plain.



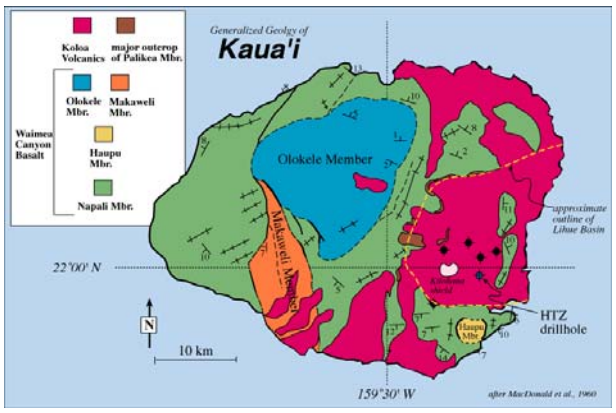
The North Coast of Kaua‘i consists of two distinct parts. The portion from Kalihiwai to Wailua consists of a reasonably broad, gently sloping *makai* (seaward) portion backed by the steeper slopes of the Wai‘ale‘ale massif. These can be seen in this view of the central highlands of Kaua‘i and Wai‘ale‘ale from a point near the shoreline. The portion from Kalihiwai to Hā‘ena, where the Nāpali coast begins, is composed of three deeply incised valleys (Hanalei, Lumaha‘i, and Wainiha).

The character of the shoreline varies greatly along this side of the island. It ranges from sandy beaches (as at Hanalei) to rocky sea cliffs. The view of the shoreline adjacent to the historic lighthouse at Lae O Kīlauea near the Kīlauea Point National Wildlife Refuge (shown in the photo to the left) is a good example of the latter.

3.2.1.2 Geology

Kaua‘i, like the other Hawaiian Islands, was formed by magma that emerged from a hotspot on the earth’s crust. As this magma moved towards the surface, it erupted as lava, pouring out over the ocean floor. Over time, the eruptions formed a typical Hawaiian shield volcano. It was long thought that the island was formed by a single shield volcano, but more recent investigations suggest that it almost certainly represents two or more.

Figure 3.1 Generalized Geology of Kaua‘i



The main mass of Kaua‘i is believed to be about 3 to 5 million years old, although there were a few very small eruptions on the island as late as about 400,000 years ago. As shown in Figure 3.1, two basic rock units are found in the stratigraphy. The oldest is the Makaweli member of the Waimea Series lavas and is shown in green (Clague & Dalrymple, 1988). The Olokele Member of the Waimea Series (shown in blue) occupies a large area in the center of the island. The Waimea Canyon scarp probably represents a major collapse at the beginning of the post-shield (or declining) stage. Post-shield-building volcanic soils of the Olokele Member of the Waimea Canyon Basalt may have in filled a major caldera-like collapse structure to form the present day broad summit area of Mt. Wai‘ale‘ale and the Alaka‘i Swamp. The Makaweli series volcanics fill a graben-like feature in the southern part of the island.[22] The major east-west trending Haupu Mountain ridge, between Po‘ipū and Līhu‘e, is composed of the Haupu Member of the Waimea Canyon Basalt. This is thought to be a structural remnant of the original shield-building and/or post-shield volcanic stage of the island.

After a long period (probably about 0.5 to 1.5 million years) of no eruptions and great erosion of the Waimea Series lavas, eruptions began again. Lavas from this second period of great eruptive activity formed the Kōloa series volcanics. These are shown in red on the map. This post-erosional stage of volcanism on Kaua‘i is particularly well-developed, especially on the eastern side of the island. Very late stage explosive volcanic vents and cones of the Kōloa Volcanics such as Kilohana Crater, Kīlauea Crater, and 35 to 40 other smaller but similar features are present throughout the eastern portion of the island. The very steep eastern facing scarp of Wai‘ale‘ale was formed in part by the collapse of the Līhu‘e Basin.

3.2.1.3 Soils

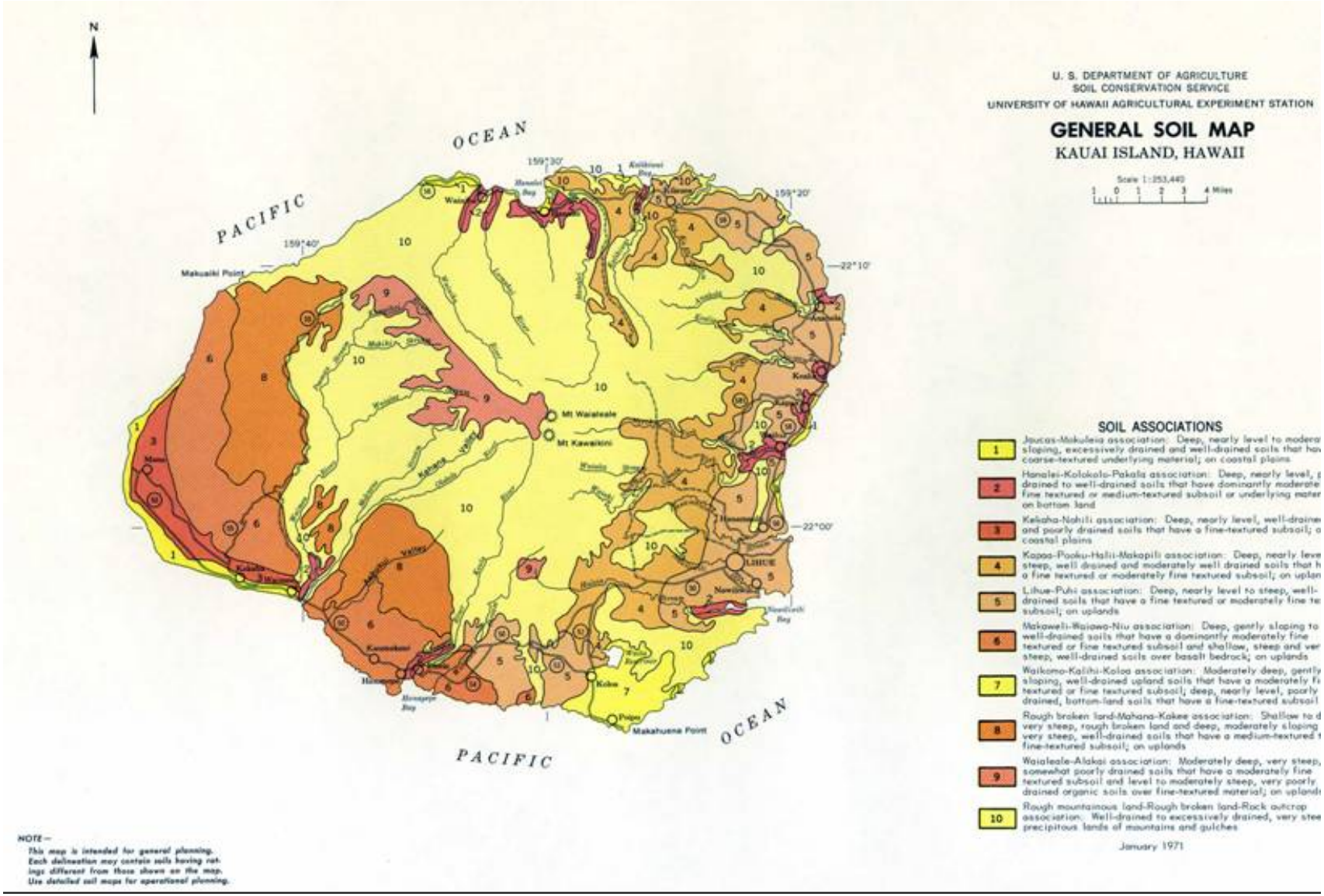
A generalized map showing the main soil associations on the Island of Kaua‘i is reproduced in Figure 3.2. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. Table 3.1 contains brief descriptions of the soil associations on Kaua‘i.

[22] A graben is an elongate block of the earth’s crust that is relatively depressed (i.e., that has dropped down) between two fault systems.

Table 3.1 Soil Associations on the Island of Kauaʻi

Association	*Characteristics*
Jaucas-Mokulēʻia	Deep, nearly level to moderately sloping, excessively drained and well-drained soils that have coarse-textured underlying material; on coastal plains.
Hanalei-Kolokolo-Pākalā	Deep, nearly level, poorly drained to well-drained soils that have dominantly moderately fine textured or medium-textured subsoil or underlying material; on bottom land.
Kekaha-Nohili	Deep, nearly level, weld-drained and poorly drained soils that have a fine-textured subsoil; on coastal plains.
Kapaʻa-Poʻokū-Hāliʻi-Makapili	Deep, nearly level to steep, well drained and moderately well drained soils that have a fine textured or moderately fine textured subsoil; on upland.
Līhuʻe-Puhi	Deep, nearly level to steep, well-drained soils that have a fine textured or moderately fine textured subsoil; on uplands.
Makaweli-Waiawa-Niu	Deep, gently sloping to steep, well-drained soils that have a dominantly moderately fine textured or fine textured subsoil and shallow, steep and very steep, well-drained soils over basalt bedrock; on uplands
Waikomo-Kalihi-Kōloa	Moderately deep, gently sloping, well-drained upland soils that have a moderately fine textured or fine textured subsoil; deep, nearly level, poorly drained, bottom-land soils that have a fine-textured subsoil.
Rough broken land-Mahana-Kōkeʻe	Shallow to deep, very steep, rough broken land and deep, moderately sloping to very steep, well-drained soils that have a medium-textured to fine-textured subsoil.
Waiʻaleʻale-Alakaʻi	Moderately deep, very steep, somewhat poorly drained soils that have a moderately fine textured subsoil and level to moderately steep, very poorly drained organic soils over fine-textured material; on uplands.
Rough mountainous land-Rough broken land-Rock outcrop	Well-drained to excessively drained, very steep to precipitous lands of mountains and gulches.
Source: Sato *et al*., 1972.	

Figure 3.2 Soil Associations on the Island of Kaua'i



3.2.2 HYDROLOGY

Kaua‘i’s hydrology differs somewhat from that of the other main Hawaiian Islands. As can be seen in Figure 3.4, most of the streams radiate out from the Wai‘ale‘ale-Kawaikini massif in all directions, cutting through intrusive dikes that retard the groundwater movement toward the ocean from high rainfall areas in the interior. In the process they tend to receive large influxes of groundwater throughout their length. Thus, unlike most Hawaiian streams, many of those on Kaua‘i actually gain flow as they descend (i.e., they are “gaining” streams). As a result of this, in some parts of Kaua‘i more than 65 percent of the water falling on the ground appears as streamflow. This proportion is far higher than the 30 percent of mean annual rainfall that the U.S. Geological Survey estimates runs off as streamflow statewide.

Even on Kaua‘i, the percentage of rainfall that directly runs off varies spatially among basins and temporally within a basin. Within a basin, the percentage of rainfall that runs off varies temporally among individual storms, and may range from less than 5 to greater than 90 percent. The percentage of rainfall that runs off is generally highest in areas which have relatively high average rainfall, experience high-intensity rainfall, have low-permeability soils, have steep slopes, possess a water table at or near the land surface, or where the antecedent soil moisture is high.

As illustrated by the examples shown on the figure at right, there are substantial differences between different drainages with respect to the seasonality of streamflow, the percentage of the flow that represents base flow, total discharge, and other factors.

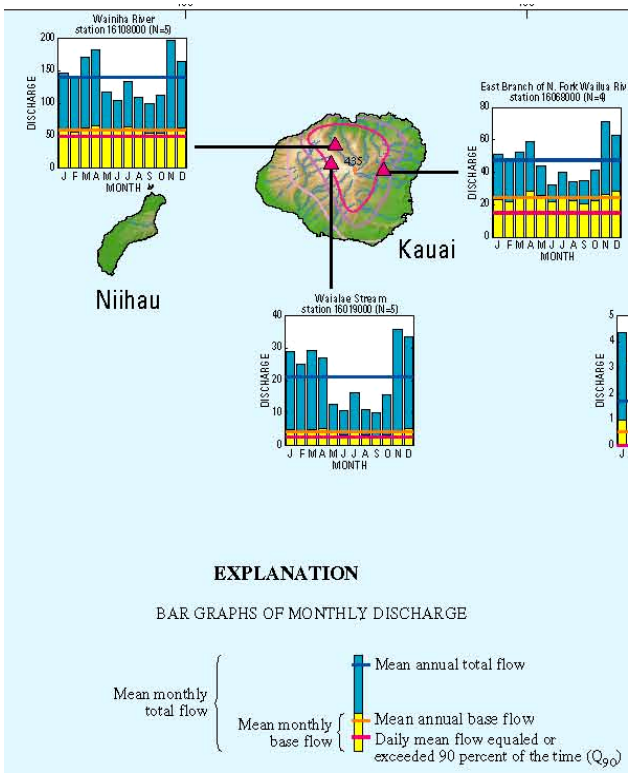
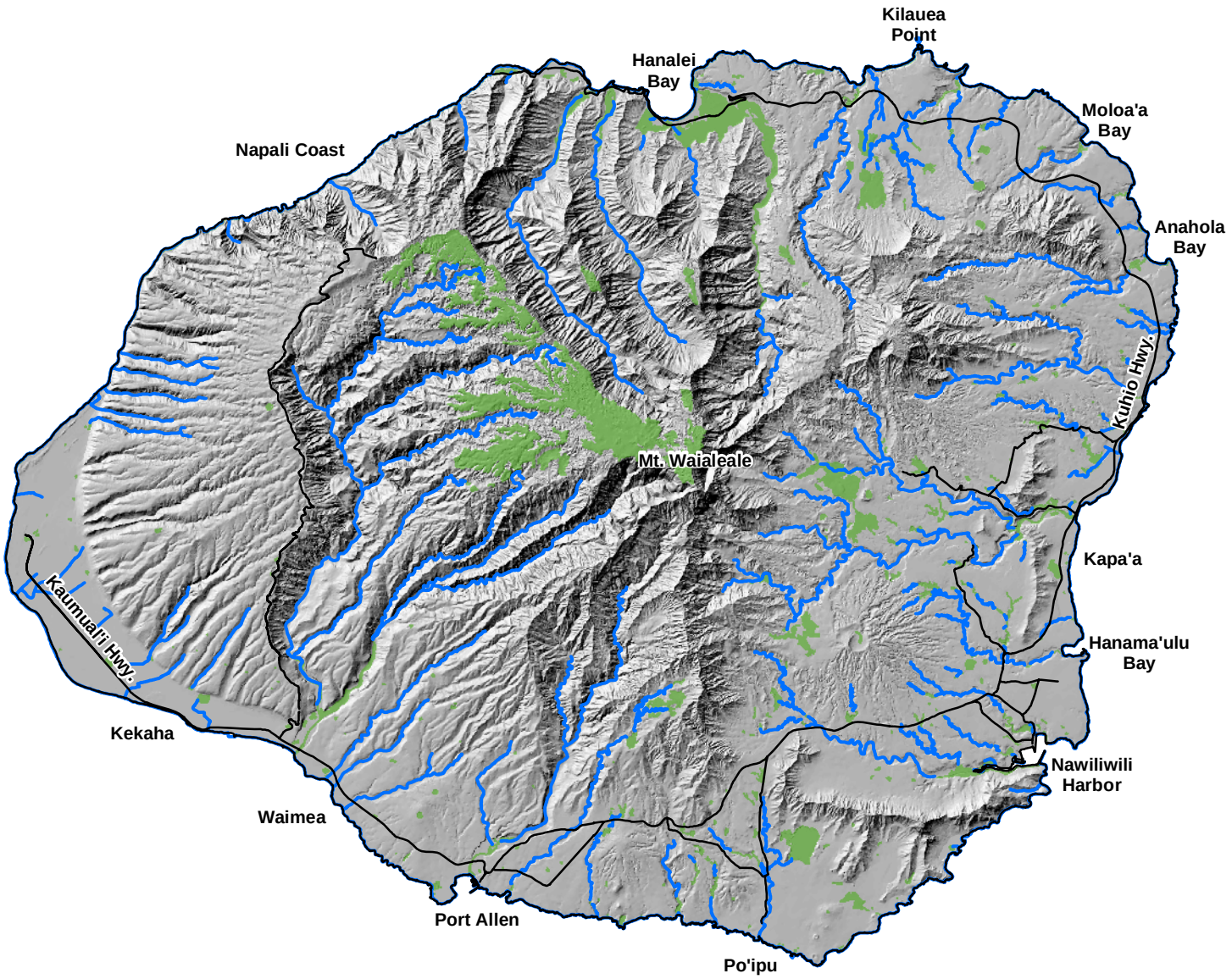


Figure 3.3 Streamflow at Selected Locations.

At 19.5 miles, the Waimea River-Po‘omau Stream is the longest stream on Kaua‘i. Other long rivers on the island include the Makaweli River (15.1 miles), the Wainiha River (13.8 miles), the Hanapēpē River (13.3 miles), and the Wailua River (11.8 miles). At 140 million gallons per day, the Hanalei River has the highest average discharge. Occupying 424 acres, the Waita Reservoir, which is located on the southern side of the island near Kōloa, is the largest surface water body.



Legend:

Perennial Streams

Wetlands

Major Roadways

Prepared For:

Kaua`i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

Kaua`i Island Utility Cooperative
State of Hawaii GIS

Figure 3.4:

Perennial Streams on Kaua'i

KIUC Habitat Conservation Project

Figure 3-4 Perennial Streams on Kaua'i 2008-04-28.mxd

3.2.3 CLIMATE AND WEATHER

3.2.3.1 Wind

The northeast trade winds are the most important determinant of Kaua‘i’s climate. They represent the outflow of air from the high pressure region known as the Pacific Anticyclone, whose typical location is well north and east of Hawai‘i. The trade wind zone moves north and south seasonally with the sun, so that it reaches its northernmost position in the summer half-year. Consequently, the trade winds are strongest and most persistent from May through September, when the trades are prevalent 80 to 95 percent of the time. From October through April, Hawai‘i is located to the north of the heart of the trade winds, and their frequency decreases to about 50 percent (as a monthly average). On a few exposed headlands and in mountains that catch and concentrate the full force of the trades, winds above 40 miles per hour may occur several days each month of the year. In nearly all other locations, however, such winds occur only occasionally, and then only as the result of a major storm, the passage of a cold front, or an unusual local situation.

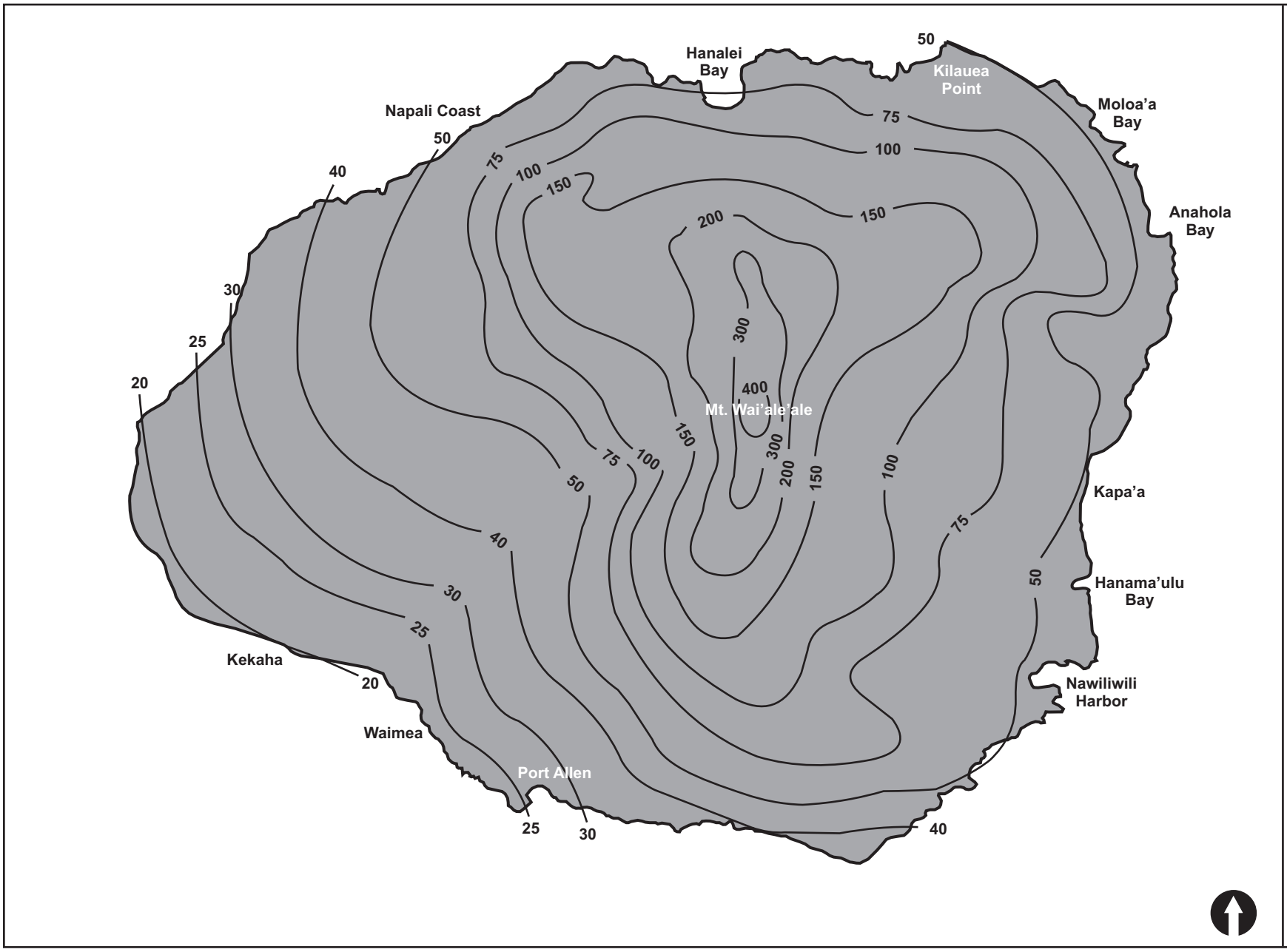
The land and sea circulations are on a far smaller scale than the circulations of the major storm systems, with the exchange of air often being confined to a few square miles. Circulations of this kind are most common on the southern and western coast, in locations that are to the leeward with reference to the trade winds and topographically sheltered from them, e.g., the Barking Sands area. Land and sea air circulation exhibit a diurnal rhythm. From the late morning until the early evening air moves inland on a sea breeze; sometimes these sea breezes are fairly brisk. During the night and until shortly after sunrise, the air drifts back from land to sea; this movement is usually quite gentle.

Kaua‘i’s topography interacts with the winds to produce large variations in conditions from one locality to another. Air blowing inland as part of the trade wind flow is redirected horizontally and vertically by the mountains and valleys. This complex three-dimensional flow of air results in marked differences from place to place in wind speed, cloudiness, and rainfall. Together with variations in the elevation of the land, it results in differences in air temperature.

3.2.3.2 Rainfall

Rainfall on Kaua‘i varies greatly from place-to-place. Average annual rainfall at Waimea on the island’s southwestern shore is less than 30 inches. Twenty miles away at the summit of Wai‘ale‘ale, it is more than 450 inches. The majority of inland areas that represent potential nesting habitat for Hawaiian Petrels and Newell’s Shearwaters exhibit average annual rainfall of 100 inches or more. Extreme rainfall intensities are high. To take the most extreme instance on record, during the storm of January 24-25, 1956, over 38 inches of rain fell at the Kīlauea Sugar Plantation Office within a 24-hour period, out of a storm total of 43.5 inches. During the same storm six inches of rain fell during a single 30-minute period and about 12 inches fell in a single hour.

While rainfall can be extremely heavy, very light showers are extremely frequent in most localities. On windward coasts, for example, it is common to have up to ten brief showers in a single day, none of them producing more than 0.01 inch of rain. This seeming contradiction is explained by the fact that the usual run of trade-wind weather yields many light showers in the lowlands. Mountain slopes and crests within the cloud belt receive water in the form of fog drip or cloud mists as well as outright rainfall. This “fog drip” may contribute two-thirds as much water to vegetation and soil in that area as does rainfall itself – and proportionately more when rainfall is light.



Note: Rainfall amounts in inches.

Prepared For:

Kaua'i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

State of Hawai'i DLNR Div. of Water & Land Development; Report R42 *Climatologic Stations In Hawai'i*

Figure 3.5:

Average Annual Rainfall

KIUC Habitat Conservation Plan

Figure 3-5 Average Rainfall 2008-04-28.cdr

3.2.3.3 Temperature

The temperature regime is not as variable from place to place as is rainfall but there are substantial geographic differences, chiefly as the result of variations in elevation. Diurnal temperature ranges are smallest in the lowlands, with daytime temperatures commonly in the 70's to 80's and nighttime temperatures in the 60's to 70's. Mean annual temperatures, which range between about 72° and 75° F. near sea level, decrease by about 2.5° to 3° F. for each 1,000 feet of elevation.

Outside the dry, leeward areas, temperatures of 90° F and above are quite uncommon. In the leeward areas, temperatures in the low 90's may be reached on several days during the year, but temperatures higher than these are uncommon. The warmest days are usually during Kona weather, when the trade winds, which come from cooler latitudes, fail and air stagnates over the heated islands. At elevations below 1,000 feet, the lowest nighttime temperatures on record have been in the 50's, except in relatively cloudless areas such as the leeward coasts where temperatures in the high 40's have been known to occur. These are extreme values, and it is possible for several years to pass without temperatures near 50° F being experienced near sea level. August is the warmest month of the year on Kaua'i, and February is the coolest. The average difference between the highest and lowest temperature experienced on any one day is typically between 10° and 20° F; the higher readings occur in areas that are lower, drier, and less exposed to the wind.

3.2.3.4 Hurricanes, Tropical Storms, and Waterspouts

In addition to the trade winds, major storm systems affect the Hawaiian Islands. These occur most frequently from October through March, when there may be two, three, or even as many as six or seven major storm events in any particular year. Such storms typically bring heavy rains and are sometimes accompanied by strong winds. The storms may be associated with the passage of a cold front – the leading edge of a mass of relatively cool air that is moving from west to east or from northwest to southeast. The storms may also be associated with a large eddy, or Low, that draws in moist, warm air, producing tremendous clouds and torrential rains.

Hurricanes and tropical storms[23] have directly affected Kaua'i on a number of occasions over the past 50 years. Figure 3.6 shows the tracks of hurricanes that have affected the Hawaiian Islands since 1950 and Table 3.2 summarizes their most important characteristics. Hurricanes are infrequent, but they have had a great effect on Kaua'i. The two most recent hurricanes to hit Kaua'i (Iwa, which struck the Island on Nov. 23, 1982, and 'Iniki, which hit on Sept. 11, 1992) have been the most devastating with respect to KIUC's facilities and operations.

The County estimates that Hurricane 'Iniki caused more than $1.8 billion damage to the island, not including the impact on employment and the quality of life for Kauai citizens. In addition to damaging or destroying over 14,000 homes, the storm decimated the island's electrical infrastructure. While the power plants suffered relatively little damage, the transmission and distribution lines that deliver the power to customers was largely destroyed and had to be largely rebuilt (see Table 3.3). Kauai Electric, KIUC's predecessor, estimates that Hurricane Iniki caused $62,298,000 in damages. Since it recovered only $3,308,000 from insurance, the net cost of the storm was nearly 59 million.

[23] A "Hurricane" is an intense tropical weather systems with well defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. A "Tropical Storm" is an organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph.

Figure 3.6 Tracks of Major Storms: 1950 to 2000

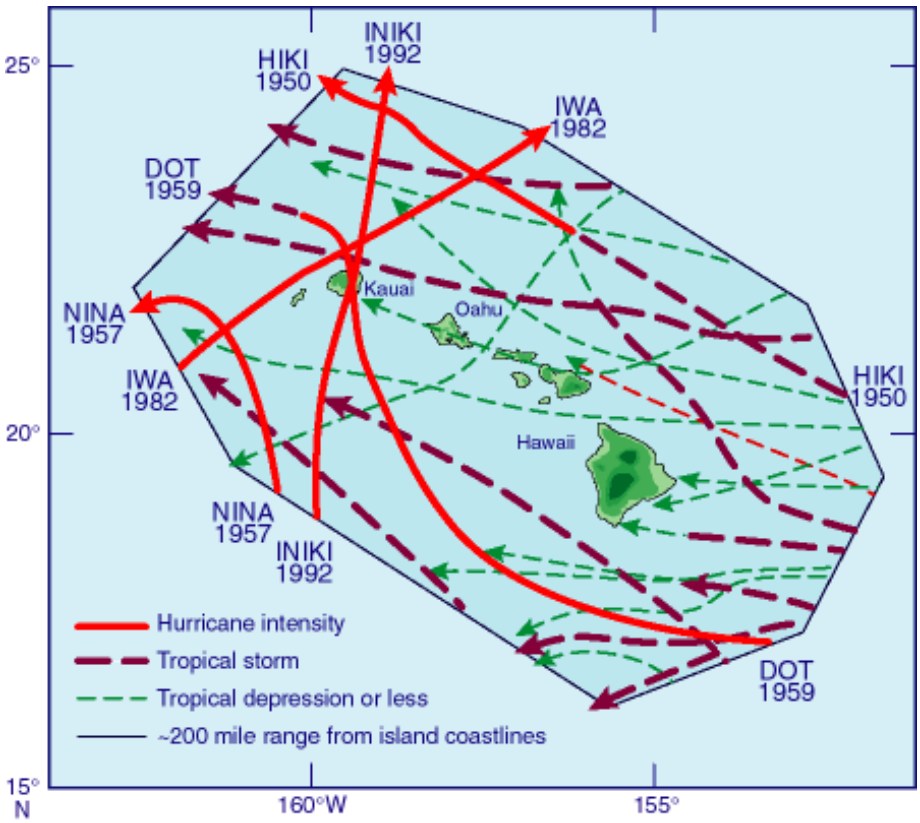


Table 3.2 Major Hurricanes Affecting Kaua'i: 1950 to 2002

Name	Date	Maximum recorded winds ashore (m.p.h.)		Category*	Deaths	Property damage (mil. $)
		Sustained	Peak gusts			
Hiki	Aug. 15-17, 1950	68	(NA)	1	1	0.2
Nina	Dec. 1-2, 1957	(NA)	92	1	1	0.1
Dot	Aug. 6, 1959	81	103	2	-	5.5+
Iwa	Nov. 23, 1982	65	117	3	1	234.0
'Iniki	Sept. 11, 1992	92	143	4	8	1,900

*Note: Category is based on the Saffir-Simpson Hurricane Scale:
- Category 1, wind speed of 74-95 mph, minimal damage.
- Category 2, wind speed of 96-110 mph, Moderate damage.
- Category 3 wind speed of 111-130 mph, Extensive damage.
- Category 4 wind speed of 131-155 mph, Extreme damage.
- Category 5 wind speed of >155 mph, Catastrophic damage.

Source: *State of Hawai'i Data Book: 2002*.

Table 3.3 Damage to KIUC Facilities by Hurricane Iniki

Transmission and Distribution	***Poles and Lines***		***Downed Poles as % of Total***
	Total No.	***No. Downed***	
Transmission Poles	1,700	450	26%
Distribution Poles	15,300	4,545	30%
Total	17,000	4,995	29%
Source: Oahu Civil Defense Agency, City And County Of Honolulu, Hawai‘i, http://www.mothernature-hawaii.com/files/honolulu_planning-09.pdf			

Both hurricanes ‘Iwa and ‘Iniki had direct and indirect impacts on the three Covered Species. Hurricane ‘Iwa likely resulted in few direct deaths, since it hit the Island very late in the nesting season. ‘Iniki on the other hand, likely did directly kill a number of birds, since it’s landfall coincided with the height of the nesting season. However, it is not possible to quantify the direct effect that either storm had on populations of these species.

Both hurricanes resulted in significant changes in vegetation on the Island, especially that found within the more remote areas of the interior. Hurricane force winds denuded large areas of densely forested valley walls. At one known Newell’s Shearwater colony at Kaluahonu, located on the south facing flank of Hā‘upu Ridge, between Kawaimanu and Kāmaulele peaks, north of the abandoned Kōloa Mill, most of the ‘Ōhi‘a lehua (*Metrosideros polymorpha*)/ uluhe (*Dicranopteris linearis*) forest was destroyed. This damage allowed more aggressive alien plant species, including, rose myrtle (*Rhodomyrtus tomentosa*), strawberry guava (*Psidium cattleianum*), common guava (*Psidium guajav*a), Moluccan albizia, (*Paraserianthes falcataria*), Java plum (*Syzygium cumini*), silk oak (*Grevillea robusta*), and kiawe (*Prosopis pallida*), to almost completely overrun the colony site, resulting in it’s abandonment (David 2003). Whether this phenomenon was repeated at other colonies is unknown, however, the habitat conversion resulting from wind damage was extensive in many area on the island.

3.2.3.5 Tsunami

As is true throughout Hawai‘i, low-lying shoreline areas are susceptible to periodic inundation by tsunami. The greatest wave heights usually occur near where the offshore bathymetry is steepest, and a tsunami’s size and run-up can vary considerably within very short distances. For example, during the 1965 tsunami on the north shore of Kaua‘i, a run-up of 35 feet was recorded at Haena, while only a few miles away in Hanalei Bay, the run-up was only three feet. While tsunami can have substantial effects on low-lying coastal areas, their effects do not extend inland to the habitat used by the Covered Species.

3.2.3.6 El Niño/Southern Oscillation

Fishermen along the Pacific coast of South America coined the term El Niño to refer to a seasonal invasion of warm southward ocean current that displaces the more typical north-flowing cold current in which they normally fished. Today, the term no longer refers to the local seasonal current shift but to part of a phenomenon known as El Niño-Southern Oscillation (ENSO), a continual but irregular cycle of shifts in ocean and atmospheric conditions that affect the globe. El Niño has come to refer to the more pronounced weather effects associated with anomalously warm sea surface temperatures interacting with the air above it in the eastern and central Pacific Ocean. Its counterpart – effects associated with colder-than-usual sea surface temperatures in the region – is known as “La Niña”.

Pelagic seabirds are generally thought to depend on often distant, limited, or ephemeral food supplies of small fish and squid. Seabird population are restricted by the availability of these prey items in their pelagic feeding grounds (Diamond 1978, Schreiber and Schreiber 1984). ESNO events temporarily change climatic conditions, ocean currents and the productivity and abundance of seabird prey. The impact of ESNO events on seabirds has been well documented along the coasts of Ecuador and Peru (Cushing 1982). In the Central Pacific, ESNO events have been shown to have resulted in almost total reproductive failure and the deaths of tens of thousands of birds in large seabird colonies on Christmas Island (Schreiber and Schreiber 1984). These anomalous abiotic events serve as a natural evolutionary forcing mechanism, controlling populations of seabirds in the tropical Pacific Ocean.

3.2.4 AIR QUALITY

Air quality on the island is generally good. This is a function of the island's mid-ocean location, the persistent regional winds, and the absence of substantial industry. In 2006, 24-hour PM_{10} (10-micron size particulate matter) concentrations at the single State of Hawai'i Department of Health monitoring station in Līhu'e ranged from a low of 0 microgram per cubic meter to a high of 34 microgram per cubic meter. The average for the entire year was 11 microgram per cubic meter. At no time did the concentration exceed 25 percent of the 150 microgram per cubic meter State Standard for PM_{10} (DOH 2007).

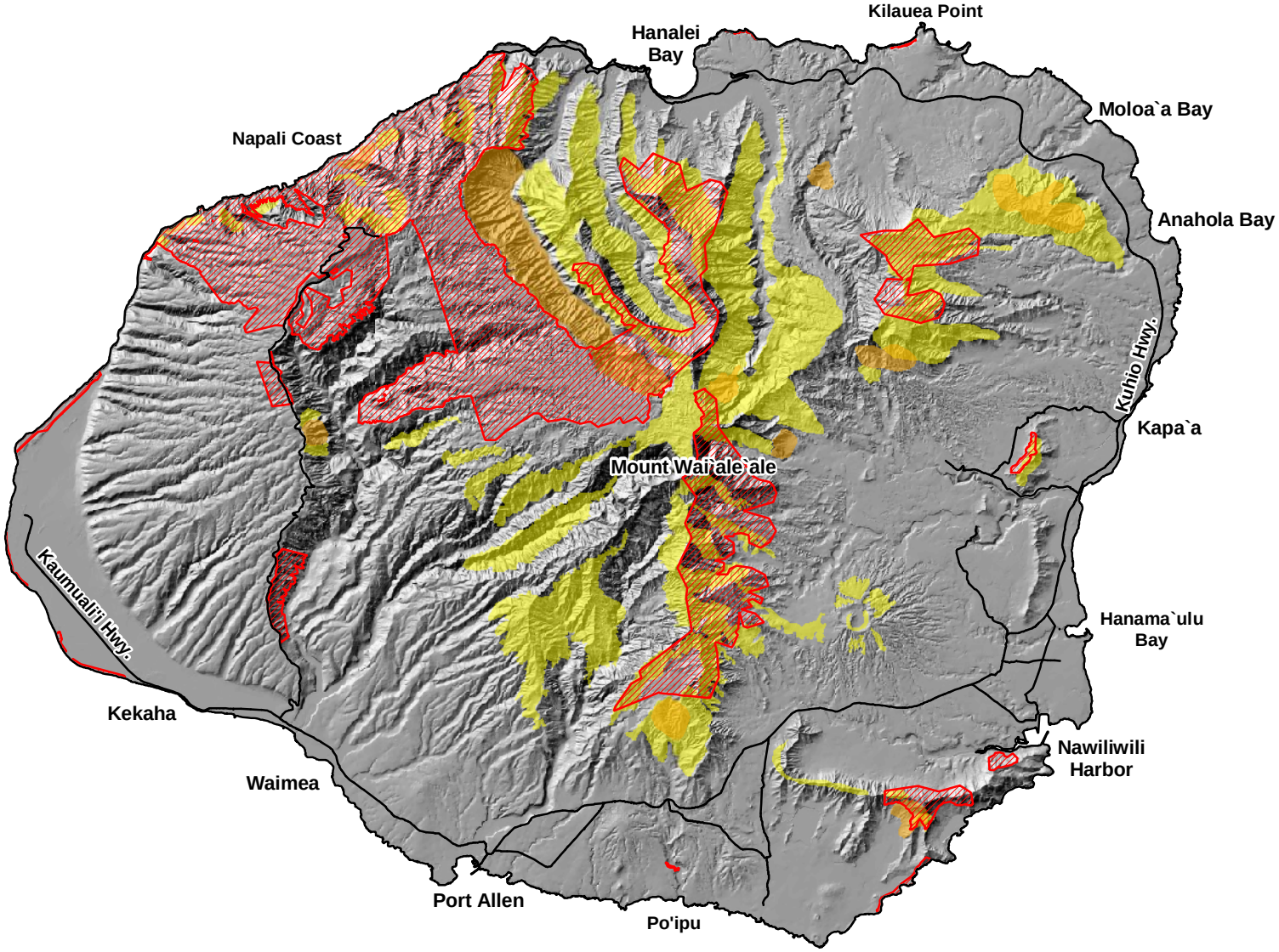
3.3 EXISTING BIOLOGICAL ENVIRONMENT

3.3.1 FLORA

Because of the age of the island and its relative isolation, the island of Kaua'i has the highest levels of floristic diversity and endemism in Hawai'i. However, the native vegetation has undergone extreme alterations because of (1) past and present land use (primarily agriculture) and (2) the intentional and inadvertent introduction of non-native plants and animals. Browsing, digging and trampling by ungulates (pigs, goats, cattle, sheep and deer) have resulted in increased numbers of non-native plants because many of the non-native plants can colonize newly disturbed areas more quickly and effectively than can Hawai'i's native plants. Introduced rodents (rats and mice) feed on the fruits, seeds and new growth of many endemic plant species. In many instances rats have completely halted the recruitment of native palms and other species. Many of these endemic plants are now extinct, forced out by "alien", or introduced, plants, of which there are now more than 4,600 species. Many of the remaining endemic species are now listed as threatened or endangered. As a result, native forests are now limited to Kaua'i's upper-elevation, moist and wet regions.

The USFWS has recently designated approximately 99,200 acres of the island in 15 units as Critical Habitat for 83 threatened and endangered plant species on Kaua'i (USFWS 2003a). Each of these Critical Habitat units provides one or more of the primary constituent elements essential for the conservation of the plant species.[24] Nearly all of the acreage is in uninhabited, remote areas (see Figure 3.7).

[24] Because existing man-made features and structures within the mapped Critical Habitat units do not contain and are unlikely to develop primary constituent elements of Critical Habitat, they are excluded from designated Critical Habitat areas. Excluded man-made features and structures include: aqueducts and other water system features; arboreta and gardens; buildings, electrical power transmission lines and associated rights-of-way; heiau (indigenous places of worship or shrines); hydroelectric power plants; missile launch sites; radars; residences—single-family homes and condominiums; roads; shoreline navigational aids; State parks; telecommunications towers and associated structures and equipment; telemetry antennas; and trails. (Federal Register 2003a)



Legend:

- Fish & Wildlife Service Designated Critical Plant Habitat
- Known Newell's Shearwater Nesting Colonies
- Potential Newell's Shearwater Nesting Habitat
- Major Roadways

Prepared For:

Kaua`i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

--Rana Productions, Inc.
--U.S. Fish & Wildlife Service
--State of Hawaii GIS

Figure 3.7:

Critical Habitat Areas on Kaua'i

0 2.5 5 10
Miles

KIUC Habitat Conservation Plan

Figure 3-7 Critical Plant Habitat Areas on Kaua'i 2008-04-28.mxd

3.3.2 FAUNA

3.3.2.1 Mammals

The only native terrestrial mammalian species known from the Islands are the Hawaiian monk seal (*Monachus schauinslandi*) and the Hawaiian hoary bat (*Lasiurus cinereus semotus*). All other mammalian species on Kaua‘i are alien species. Both the Hawaiian monk seal and the Hawaiian hoary bat are Federally listed endangered species. The endemic Hawaiian monk seal, though an ocean dwelling mammal, does spend part of its life on land. The monk seal is occasionally seen hauled out, either sleeping or sunning on beaches and within intertidal zones around the island. It does not occupy areas where KIUC facilities are, or are likely to be, located.

Hawaiian hoary bats have an island-wide distribution, occurring seasonally from sea level to the summit of Mount Wai‘ale‘ale. Thus, individuals of this species do occupy inland areas where the potential for interaction with KIUC facilities is present. The Hawaiian hoary bat is a typical lasurine bat, and as such, they primarily lead a solitary existence, described as “over-dispersed”. They generally roost cryptically in foliage, which makes them difficult to study (Findley and Tomich 1983, Jacobs 1994, Carter *et al*. 2000). Very little research into the life cycle, distribution, or population estimates of this species has been conducted; and much of what has been studied, were small, disconnected, or anecdotal studies as opposed to coherent controlled experiments. Fundamental research into this species distribution and life cycle has just begun (Bonaccorso *et al*. 2005). The Hawaiian hoary bat is primarily a nocturnal species, foraging on flying insects, which it tracks and captures using ultrasonic echo location.

Unlike nocturnally flying seabirds, which regularly collide with man-made structures, bats are uniquely adapted to avoid collision with most obstacles, man-made or natural. They navigate and locate their prey primarily by using ultrasonic echolocation, which is sensitive enough to allow them to locate and capture small flying insects at night. No bat/power line impacts have been documented on Kaua‘i.

The other 13 mammalian species occurring on Kaua‘i are all alien species that were introduced to the Hawaiian Islands by humans at different times since the Islands were first colonized by aboriginal settlers.[25] Rats, cats, dogs and pigs are known to directly predate adult seabirds, their eggs and chicks. The six ungulates present on the Island (pigs, goats, sheep, cows, black tailed deer and horses) also impact seabirds by converting native species-dominated vegetation habitats into alien-dominated ones. This habitat modification often eliminates key components necessary for the continued survival of native wildlife species.

3.3.2.2 Birds

There are currently 59 breeding avian species known from the Island of Kaua‘i. Fourteen of these are endemic (i.e., native and unique to the Hawaiian Islands) species or sub-species, and 12 of these are listed as either threatened or endangered under the ESA. There are no documented effects of KIUC facilities or activities on nēnē, stilt, koloa, moorhen, or other listed bird species (other than the Covered Species). An additional 8 species are indigenous (i.e., native to the Hawaiian Islands, but also found elsewhere naturally). In addition to the breeding species, about 100 additional species have been recorded as non-breeding migratory or extra-limital species over the past 50 years (Pyle 2002, Engilis *et al*., 2004, R. David unpublished field notes 1973-2007). A detailed discussion of the three avian species covered under the HCP is presented in Section 3.4.

[25] Because numerous island bird populations evolved in the absence of mammalian predators, they often are naïve to the threat that rats, cats, dogs and other continental predators pose to them. The scientific literature is replete with case studies documenting the wholesale destruction that mammalian predators have wreaked on island bird populations. In New Zealand, for example, cats are considered the primary cause of the extinction of 8 island endemic bird species, including the Stephens Island Wren, Chatham Island Fernbird, and the Auckland Island Merganser, while at the same time eradicating another 41 indigenous species from New Zealand islands. It has been estimated that cats were killing 450,000 seabirds on an annual basis on one small island in New Zealand alone, prior to their eradication (Veitch, C. R. 1985).

3.3.2.3 Herpetofauna

The herpetofauna of the Hawaiian Islands currently consists of 28 species of reptiles and eight species of amphibians (McKeown 1996, Kraus et al. 1999, R. David unpublished field notes 1973-2007). Kaua‘i currently hosts 18 species of terrestrial and semi-aquatic reptiles and amphibians and two ocean dwelling reptiles. All of these with the exception of the two sea turtles are likely alien species, though as further genetic research is undertaken, it is possible that one or two of the small geckos will turn out to be indigenous (McKeown 1996). The two listed marine reptiles, Pacific green sea turtle (*Chelonia mydas agassizii*), and the Pacific hawksbill turtle (*Eretmochelys imbricata bissa*) are limited to the immediate shoreline where they are occasionally seen sleeping or sunning on beaches and within intertidal zones around the Island. Both species nest on sandy beaches, laying their eggs in a nest excavated in the sand by the laying turtle. The terrestrial areas used by these turtles are in areas where no KIUC facilities exist or are likely to be located in the future.

3.3.2.4 Insects and Mollusks

Insects are the dominant animals in most terrestrial ecosystems, especially on isolated oceanic islands such as Kaua‘i where many larger animals are absent. In Hawai‘i, the original colonizing species evolved into perhaps 10,000 or more new species and adapted to live in the diverse island habitats.[26] These insects are important as pollinators of native plants, recyclers of nutrients in ecosystems, and food for native birds and other animals. Hawai‘i is home to close to 8,000 species of insects; some 5,300 of those are endemic, 84 are indigenous and over 2,600 are alien. There are occurrence records of over 4,000 alien insects in the Islands, though only about two-thirds of these have become established. Of the approximately 5,400 native insects currently known in Hawai‘i, roughly 98 percent are endemic. Moreover, it is likely that as additional entomological studies are conducted this number will double. Today, many native species are declining from the combined effects of invasive non-native organisms and human alteration of habitats.

Only 16 out of 30 insect orders recognized worldwide are represented in the native fauna. Another 11 orders have become established through human activities. The beetles (*Coleoptera*), flies (*Diptera*), bees and wasps (*Hymenoptera*), and moths (*Lepidoptera*) are the largest groups in the Hawaiian Islands. About 63 percent of the identified species occur on only one island, and many have extremely restricted ranges within their island. Gagné and Howarth (1985) and Howarth (1991) have argued that alien parasitoids are the major factor contributing to the decline and extinction of many native insect species. Lepidopteran caterpillars were an important food source for native forest birds and other native organisms. Consequently, their observed decline may be affecting other parts of the forest community.

It is likely that Hawai‘i has already lost a significant proportion of its terrestrial arthropod fauna. While 36 arthropod species are recognized as extinct by the USFWS, populations of 2 species, a damselfly (*Megalagrion nesiotes*) and a sphinx moth (*Manduca blackburni*), have recently been rediscovered. Many Hawaiian insect groups are extremely host-specific; for example, some genera of long-horned beetles (*Plagithmysus*), with 139 known species, and leaf bugs (*Nesiomiris*), with over 50 species, occur on rare native plant hosts. As their hosts are replaced by alien plant species, they will inevitably disappear.

Kaua‘i is home to two endangered arthropod species, the Kaua‘i cave wolf spider (*Adelecosa anops*) and the Kaua‘i cave amphipod (*Spelaeorchestia koloana*) which dwell in mesocaverns and caves. Currently both species are known only from the Po‘ipu and Kukui‘ula areas of the Island. It is conceivable that either or both species could be affected by undergrounding utility lines in that area if care is not taken to avoid the known populations and designated Critical Habitat for the two species (Federal Register 2003b).

[26] Information on the status of Hawaiian insects came from a data base compiled at the Bishop Museum of all published records on the taxonomy, biology, and distribution of Hawaiian arthropods (Nishida 1992).

The only mollusk species currently listed under the ESA on Kaua‘i is the threatened Newcomb’s snail (*Erinna newcombi*). The current known range of Newcomb’s snail is limited to very small sites located within six stream systems in north- and east-facing drainages on Kaua‘i. They are: Kalalau Stream, Lumaha‘i River, Hanalei River, Waipahe‘e Stream (a tributary to Keālia Stream), Makaleha Stream (a tributary to Kapa‘a Stream), and the North Fork Wailua River. Critical habitat has been designated for Newcomb’s Snail along eight stream segments and associated tributaries, springs and seeps on Kaua‘i, totaling 19.76 kilometers (12.28 miles) of stream channel (USFWS 2002a). There are no documented effects of KIUC facilities or activities on these species.

3.4 COVERED SPECIES

This section contains relevant biological information concerning the three species of seabirds covered by this Habitat Conservation Plan.[27] Section 3.4.1 covers the Hawaiian Petrel, Section 3.4.2 discusses the Newell’s Shearwater, and Section 3.4.3 provides information on the Band-rumped Storm Petrel. The discussions for each species include: (i) a description of their ecology and population biology; (ii) their distribution, range, and abundance; and (iii) known current threats to their survival.

3.4.1 HAWAIIAN PETREL

3.4.1.1 Ecology and Population Biology

The Hawaiian Petrel or ‘Ua‘u (*Pterodroma sandwichensis*) is a pelagic seabird of the Order Procellariiformes, Family Procellaridae. It was formerly considered to be a Hawaiian endemic subspecies of the nominate race of the Dark-rumped Petrel (*Pterodroma. p. phaeophygia*). The Hawaiian sub-species has recently been elevated to a full species, based on work conducted by Tomkins and Milne (1991), and Browne *et al*. (1997), that differentiated the vocalizations and morphology between it and the nominate species (Banks *et al*. 2002). The nominate race has been renamed the Galapagos Petrel (*Pterodroma phaeophygia*). Both species are typical long-winged gadfly petrels, easily confused in flight with several other like species.

Within and close to the breeding colonies Hawaiian Petrels are quite vocal, and their vocalizations are distinctive. Hawaiian Petrels are nocturnal feeders, subsisting primarily on squid, fish, and crustaceans caught near the sea surface (Simons 1985). Unlike shearwaters, Hawaiian Petrels are not known to dive or swim below the surface (Pitman 1986). Hawaiian Petrels forage widely across the central, northern and eastern Pacific Ocean, even during the breeding season (Pittman 1986, Warham 1990, Spear et al 1995, Simons et al. 1998, Adam 2007). Satellite tagged birds have been tracked traveling more than 10,000 kilometers on a single foraging trip to–and-from their breeding colony on the island of Maui (Adams 2007).

Hawaiian Petrels produce and store a high-calorie oil in their foregut, which most scientists presume functions to ensure nourishment for chicks despite the Petrels’ often unpredictable and widely dispersed food supply (Warham et al. 1976, Warham 1996, 1997, Jacob 1982). This oil production is unique to birds in the order Procellariiformes (Warham et al. 1976). Hawaiian Petrels feed during both daylight hours as well as at night where they search for squid, flying fish, goatfish, lantern fish, skipjack tuna, hatchetfish, and similar species, which they find near the surface of the water (Wheeler 1975, Nelson 1976 Pittmen et al. 1997, Simons 1985). Hawaiian Petrels capture prey items primarily by scavenging on the surface of the ocean, though they have been recorded feeding by aerial dipping, pattering, scavenging and surface-seizing (Ashmole 1971, Pittman 1986).

Known Hawaiian Petrel breeding areas on Kaua‘i are within interior valleys. Petrels on Kaua‘i excavate burrows beneath dense vegetation along valley headwalls, particularly favoring steep slopes covered with ‘uluhe fern (*Dicranopteris spp.*), though in at least one valley, petrel burrows are

[27] As discussed below in Section 3.4.4, since KIUC’s facilities and the Covered Activities described in this HCP do not affect other threatened or endangered species which occur on Kaua‘i (e.g., nēnē, kōloa, Hawaiian stilt, moorhen and Newcomb’s snail), no other such species are included as Covered Species in this HCP.

concentrated on the valley floor in dense native forest (R. David, personal observation). On Maui and Hawai‘i, relictual colonies[28] are mainly found in sparsely vegetated sub-humid and sub-alpine areas on Haleakalā and Mauna Loa, respectively. Hawaiian Petrel nests in colonies on Maui and Hawai‘i are typically widely dispersed, however densities in at least one colony matrix in Lumaha‘i Valley on Kaua‘i are apparently quite dense. Hawaiian Petrels, like most other Procellariiformes, appear to exhibit high degrees of nest-site and mate fidelity year after year. Hawaiian Petrels, along with the other Covered Species and other forest nesting seabirds, are an integral part of the forest nutrient cycle. The birds deposit a large quantity of nitrogen-rich fertilizer in the form of excrement in and around their burrows. In very wet forests such as those found on many Pacific Islands, soils are often relatively infertile and thus the added seabird generated nitrogen is significant.

The Hawaiian Petrel breeding cycle is quite synchronous and follows a timing pattern characteristic of Procellariiformes in general. First, breeding occurs at approximately five to six years of age, with an estimated 89 percent of the adult population breeding each year. Birds begin arriving on breeding grounds and pairing in mid-February. A distinct pre-laying exodus occurs in late March. Egg-laying typically transpires between late April and mid-May, with chicks hatching in July and August after an average incubation period of 55 days (Simons 1985). Each pair produces only one egg per year. Hatching success at Haleakalā has been estimated at approximately 70% (Hodges 1994), but no comparable data are available from Kaua‘i, where the nests have never been studied (principally because of their very remote location, on very steep and inaccessible terrain). At the time of hatching failed breeders and non-breeding adults depart the colony.

Although there have been no studies of the breeding biology of this species on Kaua‘i it is probable that their breeding biology is similar to that of birds studied on Maui, and likely similar to that of other similar petrels such as the Galapagos Petrel, which has been studied extensively. If so, then it can be stated that chicks are born with a soft, powdery down, which is replaced after a fortnight by a slightly heavier down. The chicks spend most of their time sleeping, although they can move around the nest burrow. Both adults spend their time flying to sea to feed and bring food home for the chicks; this occurs at diminishing intervals over the span of the nestling period, which averages about 110 days total. Growth rate of the chicks is extremely fast. The size of a meal can vary from 10 to 110 grams, the latter figure represents more than one quarter of a parent’s weight. This amount of food is likely the most an adult can carry.

Fledging begins in late September, during which time breeding adults begin to leave the nest. By the end of November most adult and successful fledgling birds (estimated at about 85% of nestlings) have departed the islands (Simons 1985). It is probable that parental feeding visits drop to just one or two in the final month, causing the weight of the chicks to drop precipitously. Some individuals are deserted by their parents up to six weeks before they fledge, while others are fed right up to the day of departure. Once the chicks leave they will not return to land again for several years, when they will return to nest. Hawaiian Petrels are long-lived, with birds banded on Maui commonly reaching 35 years of age (Simons and Hodges 1998).

3.4.1.2 Distribution, Range, and Abundance

Historical information on the distribution of this species in the Hawaiian Islands is very spotty. Following the initial description of this species in the 1880’s there were few records of the species between the early 1900’s and the 1930’s, followed by a steady accumulation of reports and information between the 1940’s and the present day (Banko 1980). Whether Hawaiian Petrels were truly extremely rare in those years, possibly due to human and introduced mammalian predation, or rather people simply were unaware of these nocturnal seabirds is unclear.

[28] The term “relictual colony” refers to a colony of a species which is extinct over much of its former range but which persists in a few areas.

Figure 3.8 Photographs of the Covered Species

a) Hawaiian Petrel (*Pterodroma sandwichensis*)

b) Newell's Shearwater (*Puffinus auricularis newelli*)

Source: Jack Jeffrey Photography©

c) Band-rumped Storm-Petrel (*Oceanodroma castro*)

Source: Alabama Ornithological Society (Steve McConnell)

Within recent historic times, Hawaiian Petrels have bred on Maui, Kaua‘i, Lāna‘i and Hawai‘i (Richardson and Woodside 1954, Simons and Hodges 1998, Pyle 1987, Telfer *et al*. 1987, DOFAW unpublished data 2006, 2007). The species is thought to be extinct on O‘ahu (Harrison 1990).

All attempts to estimate either world or individual island populations have been fraught with major problems. Spear *et al*. (1995) estimated from at-sea densities that the world population of Dark-rumped Petrels was 19,000, with at least 5,000 pairs nesting on Kaua‘i and 1,600 pairs on Maui (Ainley et al. 1997). A few thousand birds are now believed to attend the recently re-discovered Hawaiian Petrel Lana‘ihale colony on Lana‘i (Jay Penniman, DOFAW, pers. comm. with R. David June 22, 2009).

The breeding population on Maui is relatively stable, due in large part to predator control efforts and protection by the National Park Service (Simons 1985, Hodges 1994). The population nesting within Haleakala National Park is increasing (Cathleen Bailey, pers. comm. April 11, 2008). DOFAW also reports that the species has been observed breeding in west Maui (Paula Hartzell, pers. comm. June 16, 2009). The status of the Hawaiian Petrel population on the Island of Hawai‘i is unknown, although it is believed to be declining due to continued predation by introduced mammals. The breeding populations on Kaua‘i are similarly under-researched, although the number of fledglings grounded each year and retrieved by the Save Our Shearwater (SOS) program has remained steady, averaging 10 individuals per year from 1979 to 2006 (SOS Program Data).

3.4.1.3 Current Threats

Most Procellariiformes, including Hawaiian Petrels, have evolved in ecosystems free of terrestrial mammalian predators, and they are for the most part naïve of the threats that these predators pose to them. The only known native predator of Hawaiian Petrels is the Short-eared Owl or Pueo (*Asio flammeus sandwichensis*), which causes some mortality at breeding colonies. The Common Barn Owl (*Tyto alba*) is also believed to be a threat. Many biologists believe that predation of nesting Hawaiian Petrels by introduced mammals such as the roof rat (*Rattus r. rattus*), Norway rat (*Rattus n. norvegicus*) Polynesian rat (*Rattus exulans hawaiiensis*), domestic cat (*Felis catus*), domestic dogs (*Canis f. familiaris*) and the small Indian mongoose (*Herpestes a. auropunctatus*) is the most serious cause of mortality and breeding failure. Furthermore, they believe it has contributed significantly to the decline of the species. Small Indian Mongooses (*Herpestes a. auropunctatus*) have been thought to be absent from Kaua‘i, but there have been a few recent reported sightings.[29] Habitat destruction and alteration from pigs (*Sus s. scrofa*) uprooting burrows and facilitating the introduction of non-native plant species poses another serious threat to Hawaiian Petrels (Ainley *et al*. 1997, Cooper and Day 2003).

Artificial light sources and associated structures (e.g., fences, buildings, power lines, and telephone poles) constitute another anthropogenic threat to Hawaiian Petrels. Particularly in urbanized areas of Maui and Kaua‘i, Petrels have fallen to the ground after colliding with structures or becoming disoriented by artificial lights. While the numbers of downed Petrels documented on Kaua‘i per year have remained relatively small (averaging 10 birds annually), the threat posed by artificial lighting and structures will likely increase over time unless more bird-friendly designs are incorporated into new lights, power lines, etc.

Hawaiian Petrels once grounded become extremely vulnerable to alien mammalian predators and other hazards, as it is very difficult for them to take flight from flat ground (Ainley et al. 1997). The SOS program on Kaua‘i has retrieved 286 Hawaiian Petrels since 1979, an average of 9.40 birds per year (SOS Database 1979-2006, Rana Productions, Ltd, and Planning Solutions, Inc. 2008, Kaua‘i

[29] In late February 2004, State wildlife officials and environmentalists on the Kauai Invasive Species Committee set traps in East Kauai after a reported mongoose sighting. There have been previous reported sightings, but trapping efforts in the locales where the sightings took place failed to catch any of the animals. Wildlife Services / USDA has taken over the duties of looking into reported mongoose sightings on Kauai, but has not documented mongoose on the island either. Hence, at least at present this predator is presumed absent from Kaua‘i.

Humane Society 2009). In 2008, the SOS program handled four Hawaiian Petrels, all of which survived and were released back to the wild (Kaua‘i Humane Society 2009).

3.4.2 NEWELL'S SHEARWATER

3.4.2.1 Ecology and Population Biology

The Newell's Shearwater or ‘A‘o (*Puffinus auricularis newelli*), is an endemic Hawaiian sub-species of the nominate species, the Townsend's Shearwater (*Puffinus a. auricularis*) of the eastern Pacific.[30] Its size and black and white coloring make it superficially similar in appearance to several other shearwater species that occur in the central and northern Pacific which are sometimes referred to as Manx-type shearwaters (see Figure 3-8b).

Currently most Newell's Shearwater colonies are found at high elevations (160 to 1,200 meters), often in isolated locations and/or on slopes greater than 65 degrees (Ainley *et al*. 1997). Typical vegetation around colonies consists of open native forest dominated by ‘ōhia (*Metrosideros polymorpha*) with a dense understory of ‘uluhe fern (*Dicranopteris linearis*). The birds nest in short burrows excavated into the crumbly volcanic rock and ground, usually under dense vegetation, and under the base of trees. Burrows on Kaua‘i ranged in depth from 46-175 cm with an average of 87.78cm ± 22.2 SD (Telfer 1986). A single egg is laid in the burrow and one adult bird remains on the egg while the second adult goes to sea to feed. Newell's Shearwaters will not usually lay their eggs straight onto the ground if a nesting burrow is not available. Some colonies on Kaua‘i are located in vertical cliff faces, where birds presumably are nesting in rock crevices rather than creating burrows (Wood *et al*. 2001). Once the chick has hatched and is large enough to withstand the cool temperatures of the mountains, both parents will go to sea to provide the growing chick with a daily supply of food. Newell's Shearwaters arrive and leave their burrows in the mountains during darkness and birds are seldom seen near land during daylight hours.

The Newell's Shearwater is a pelagic bird which forages over deep water east and south of Hawai‘i, concentrating feeding in areas where tuna (*Thunnus* spp.) and other large, predatory fish have chased squid and other prey near to the ocean surface (Ainley *et al*. 1997). The birds feed by pursuit-plunging, diving 10 meters or more below the ocean surface to retrieve prey (Ashmole 1971).

First breeding occurs at approximately 6 years of age, after which breeding pairs produce up to one egg per year. The high rate of non-breeding, among experienced adults occupying the colony during the summer breeding season, is comparable to that of similar species (Ainley *et al*. 2001). No specific data exist on longevity for this species, but other shearwaters may reach 30 years of age or more (see for example Bradley *et al*., 1989, del Hoyo *et al*. 1992). The Newell's Shearwater breeding season begins in April, when birds return to prospect for nest sites. A pre-laying exodus follows in late April and possibly May, and egg-laying begins in the first two weeks of June and likely continues through the early part of July. Pairs produce one egg, and the average incubation period is thought to be approximately 51 days (Telfer 1986). The fledging period is approximately 90 days, and most fledging takes place in October and November, with a few birds still fledging into December (SOS Data).

Biologists have long believed that adult Newell's Shearwaters leave the nesting colony before or during fledging. However, very recent radar and at-nest electronic monitoring indicate that at least some adults continue to feed their young through fledging, and in fact some adults remain in the colonies after the fledglings have left (R. David, B. Zaun personal communication 2004).

3.4.2.2 Distribution, Range, and Abundance

The Newell's Shearwater is known to nest on Kaua‘i, Moloka‘i, and Hawai‘i (Ainley *et al*. 1997, Day *et al*., 2003, Day and Cooper 2002, Day *et al*. 2003). Newell's Shearwaters may also nest on Maui

[30] While the U.S. Fish and Wildlife Service recognizes the Newell's Shearwater as a subspecies, it should be noted that the International Union for Conservation of Nature redlist and modern taxonomists recognize it as a full species.

(Cooper and Day 2003), and possibly in very small numbers on O‘ahu and Lāna‘i. Numbers of colonies and individuals are greatest on Kaua‘i (Ainley *et al*. 1997).

The marine range of Newell’s Shearwater closely overlaps that of the Hawaiian Petrel, extending east as far as 120ºW, north up to 22ºN, and south to the equator near Hawai‘i (Ainley *et al*. 1997). Isolated records exist as far west as the Mariana Islands and Johnston Atoll and as far south as the Marquesas Islands and Samoa, with at least one record from California (Pratt *et al*. 1987; Maryl Faulkner, email of 8/3/07).

Spear *et al.* (August 1995: 624) estimated the total year-round at-sea population of Newell’s Shearwaters in the Hawaiian Islands during the early 1990s at roughly 84,000 individuals (95% confidence interval of 57,000 to 115,000 for spring and 58,000 to 113,000 for autumn). Using Spear et al.’s total population estimate and allowing for an estimated 7,600 one-year-old birds that do not visit Kaua‘i, Ainley *et al.* (1995a) estimated that the Kaua‘i Island population in the mid-1990s was approximately 65,000 birds, with a breeding population of about 14,600 pairs (Ainley *et al.* 1995a:42).[31]

Using population models incorporating best estimates of breeding effort and success, Ainley *et al*. (2001) projected an annual population decrease of 3.2 percent. When anthropogenic variables influencing Newell’s Shearwater mortality (e.g., predation, light attraction, and power line collision) were included, their models predicted an annual population decline of 6.1%, or approximately 60 percent every 10 years. If this projection is accurate, then the current population ought to be around 50,000 birds. There is little empirical data to confirm whether this estimate is in fact valid. However, the available scientific data (particularly radar studies conducted over the past decade and SOS data (Day *et al*., 2003; Planning Solutions Inc., 2003a, 2003b, 2004)) strongly suggest that the population of Newell’s Shearwater on Kaua‘i has declined sharply over the past 10 years.

The number of fledglings retrieved by the SOS program on Kaua‘i has steadily declined since 1979, from an average of about 1,500 per year between 1979 and 1990 to an average of less than 500 collected between 1999 and 2006 (SOS Database). While sharply higher than the number retrieved by the SOS Program in 2005, the number of fledglings retrieved in 2006 (467) was still slightly below the 1999-2005 average. Day *et al*. 2003 reported analysis of data trends from radar surveys showing an overall decline of roughly 50-70 percent in detection rates between 1993 and 2001, although detections for 1999, 2000, and 2001 were similar. Preliminary summaries of the results of radar studies conducted by the State indicate a decline of approximately 75 percent between 1993 and 2008 (Nick Holms personal comm., May 12, 2009).

Cooper and Day (1995:4) states that the leading cause of the decline in population is predation by introduced mammals, although it acknowledges that there are a number of other potential contributing causes. The *Newell’s Shearwater Five-year Workplan* drafted by the Newell’s Shearwater Working Group[32] (October 2005) summarizes the causes contributing to the species population decline as predation, habitat degradation and loss, light attraction, collision with manmade structures, and natural disturbance. All these threats are discussed in detail in the following section.

3.4.2.3 Current Threats

3.4.2.3.1 Terrestrial Threats

Loss of existing and potential nesting habitat due to clearing of forests for agriculture and urban development, mining of cinder cones, and recent volcanic eruptions on the Island of Hawai‘i are among the terrestrial factors believed to be contributing to the decline of Newell’s Shearwater. Newell’s Shearwater habitat has also been degraded by feral ungulates such as pigs (*Sus s. scrofa*)

[31] The breeding population of 14,600 pairs was estimated by multiplying the total population of 84,000 by 0.637 (proportion of total population of breeding age [6 years or older]), and then by 0.547 (the breeding probability). This estimate assumes that all Newell’s Shearwater breeding occurs on Kaua‘i.

[32] The Newell’s Shearwater Working Group, created by the USFWS, is an informal working group consisting of experienced seabird scientists from USFWS, DLNR and other entities.

and goats (*Capra h. hirca*), which now are managed as game species. Pigs and goats facilitate the invasion of nonnative plants and perhaps predators. These animals also crush burrows and compact the soil. Invasive nonnative plants, such as Moluccan albizia (*Albizia falcataria*), guava (*Psidium spp*.), and rose myrtle (*Rhodomyrtus tomentosa*), displace native vegetation and can completely alter vegetation structure and substrates typical of Shearwater nesting habitat. For example, the habitat at the Kāluahonu colony (southeastern Kaua‘i) has been almost completely and perhaps irreversibly transformed in just a few years and is now dominated by nearly pure and impenetrable stands of rose myrtle and guava. Intensive surveys in 2003 indicate that the colony has either dramatically declined or been abandoned entirely (David 2003).

Ground-nesting and fossorial (i.e., birds that are adapted for burrowing or digging) bird species, including shearwaters, petrels, and Storm-Petrels are especially vulnerable to predation by alien mammals (Hodges and Nagata 2001, Smith *et al*. 2002). Island nesting pelagic seabirds are particularly naïve to introduced predators, making predation a serious threat to adult seabirds as well as eggs and chicks. Predation by cats (*Felis catus*), and dogs (*Canis f. familiaris*) on adult and sub-adult Newell’s Shearwaters, and Hawaiian Petrels has been documented on Kaua‘i, and Hawai‘i, and rats are assumed to prey on the eggs and chicks of the Covered Species, although at present no data exist to document this. The nonnative Barn Owl (*Tyto alba*) also preys on adult Newell’s Shearwaters, to the point where Barn Owls respond to recorded Shearwater vocalizations (Ainley *et al*. 1997). Both Barn and Short-eared Owls (*Asio flammeus sandwichensis*) have been recorded during the course of ornithological radar studies at several colonies on Kaua‘i (David et al. 2002). Up to 9 Barn Owls were recorded in the air at one time above the Kaluahonu, and the Anahola Memorial Site during the course of radar surveys conducted in 2002 (David et al. 2002). Other researchers have also recorded similar owl concentrations over suspected Newell’s Shearwater colonies on Kaua‘i (Tom Savre, personal communication).

Urbanization on Kaua‘i, chiefly on the eastern and northern shores, has been positively correlated with increased groundings or “fallout” of fledgling Shearwaters on their first nocturnal flight from the burrow to the sea (Telfer *et al*. 1987, Ainley *et al*. 2001). The young birds are attracted to and disoriented by light sources, and they occasionally collide with buildings, cars, and other obstacles, including power lines. More frequently they simply fall to the ground, exhausted after fluttering around lights for long periods (Ainley *et al*. 1997, Podolsky *et al*. 1998). Risk of grounding for fledglings seems to increase on and around the new moon. Adult Shearwaters apparently are not attracted to lights to the same degree as fledglings, but adults do collide with power lines, particularly along flight paths used by the Covered Species to travel to and from inland nesting colonies (Cooper and Day 1998).

Once Shearwaters are grounded they become extremely vulnerable to alien mammalian predators and other hazards, as it is very difficult for them to take flight from flat ground (Ainley *et al*. 1997). The SOS program on Kaua‘i has retrieved and released over 30,000 downed Newell’s Shearwaters since 1979, giving them veterinary attention as needed, and then releasing them at elevated hack sites overlooking the ocean from which they can easily take flight. These efforts result in about 90 percent of retrieved birds being returned to the wild each year, most of whom would almost certainly have perished otherwise (SOS Database 1979-2006). In 2008, the SOS program handled 198 retrieved Shearwaters, of which 176 (89%) survived and were released back to the wild.

3.4.2.3.2 Non-Terrestrial Threats

While the terrestrial threats noted above have been the focus of much of the attention that researchers and resource managers have paid to the species, this does not mean that those factors are the most important with respect to the species’ long-term survival on the Island of Kaua‘i. On the contrary, the available data show far greater fluctuation (both apparent increases and seeming declines) in the species numbers on Kaua‘i than can be readily explained by changes believed to have occurred on the ground. Because this affects the extent to which on-ground management can ensure the survival of the species, consideration of these factors is warranted. Both federal and State wildlife agencies, as well as numerous NGO’s are working hard to gather at-sea information on the life histories, foraging

strategies, movement and a host of other critical issues related to identifying non-terrestrial threats and limiting factors that affect the long term viability of these species.

One possible explanation is that changes in the ocean have contributed substantially to the observed seabird population fluctuations. The exact nature of these oceanic changes and the way in which they actually affect the Covered Species are unknown. However, because scientists have documented decreased reproduction and increased mortality in seabirds coinciding with warmer water, one line of thinking is that it could be related to changes brought about by global warming.

Reductions in phytoplankton caused by warming sea temperatures can dramatically affect the food chain and, therefore, the health of seabirds near the top of the food chain, such as the Newell's Shearwater, Hawaiian Petrel and Band-rumped Storm-Petrel. For example, the U.S. Environmental Protection Agency (May 1999) reports that between 1987 and 1994 populations of Sooty shearwaters off the coast of California and Washington dropped to 10 percent of their former levels during a period when sea surface temperatures increased. Shaffer *et al*. (August 22, 2006) report a decline in Sooty shearwater populations in recent years both at breeding colonies in New Zealand and at wintering grounds in the eastern North Pacific that they associate with concomitant increases in oceanic temperatures that may have limited regional biological productivity. Bradley (Summer 2005) reported a mass abandonment of nests by Cassin's Auklets, a plankton-eater that dives for its krill prey. In 2005 Farallon auklets began breeding very late in April, and most abandoned their eggs during May. Noting that food web productivity and krill abundance depend on seasonal upwelling of cold, nutrient-rich water, which had been weak and intermittent that year, Bradley speculated that this could be evidence of a warming trend in the Earth's ocean-climate. Veit and Montevecchi (2006) correlate a 70% decrease in zooplankton abundance and a 0.75 °C surface temperatures increase in the California Current with a concomitant decline in upper trophic level predators such as salmonids and seabirds; they conclude that the decline in sooty shearwaters is due, at least in part, to a decline in their prey base in the California Current.

Poor reproductive success has been repeatedly documented in warmer years, including El Niño years (Cushing 1982, Schreiber and Schreiber 1984, Ainley *et al*. 1995). Seabirds in the Farallon Islands off California laid fewer eggs, and fewer chicks hatched during warmer years (Ainley *et al*. 1994, 1996b). Total reproductive failure and the deaths of tens of thousands of birds in large Sooty Terns (*Onychoprion*) colonies on Christmas Island have been documented following significant El Niño years (Schreiber and Schreiber 1984).

A final, indirect threat to Newell's Shearwaters relates to their dependence upon tuna to chase small prey items to the near-surface zone where they are within the birds' reach. Commercial tuna fishing has already placed several tuna species in jeopardy, and Ainley *et al*. (1997) speculate that this may have made it more difficult for Newell's Shearwaters to find food, thereby reducing the reproductive success of the species.

The abundance of prey is only one problem facing pelagic species such as the Covered Species as the climate changes – both the timing of peak prey abundances as well as the visibility of prey (due to ocean conditions) are also becoming issues for several seabirds in the northeastern Pacific and the eastern Atlantic. As regional sea surface temperatures increase off the Queen Charlotte Islands in British Columbia, Canada, populations of Common Murres, Tufted Puffins (*Fratercua cirrhata*), Rhinoceros Auklets (*Cerorhinca monocerata*), and Cassin's Auklets (*Ptychoramphus aleuticus*) have all begun breeding earlier. Puffins and auklets have been observed to start their breeding season two weeks earlier than normal, and the Common Murres have started breeding a full month earlier than the same populations did in the 1970s.

The earlier breeding season is not a problem in and of itself; however, it means that these birds may be out of synch with their primary prey. Cassin's Auklets eat zooplankton, and normally time their breeding cycle so their chicks hatch right after the zooplankton bloom. The zooplankton also respond to higher sea surface temperatures by blooming earlier than normal, but the zooplankton are blooming even earlier than the auklets are hatching, and thus the birds are unable to catch up.

Studies have shown that storms can significantly impact some bird populations, suggesting that increased storm activity expected from global warming may harm some species (Dunn 1975; Odsjo & Sondell 1976; Blake 1984; Poole 1989). Studies on Common Murre populations in the north Atlantic show that storms appear to impede fishing activities, so chicks are either fed less often (Birkhead 1976) or brought smaller fish by the adults (Finney *et al*. 1999). The foraging adults also had to work harder to find their prey, spending more time underwater, and were away from the nest for longer periods of time (Finney *et al*. 1999). If storms increase in either frequency or severity as predicted, reproductive success of these birds could diminish.

Seabird populations currently are threatened by a number of factors beyond climate change, including over-fishing, pollution, and by-catch (being caught incidentally through fishing practices). These impacts may compound effects of climate change, and it is often difficult or impossible to determine the relative importance of the different factors involved. This is particularly true in the case of seabirds such as the covered species that are relatively long-lived with low recruitment. Reduced reproduction will occur before the adult population decreases very much.

3.4.3 BAND-RUMPED STORM-PETREL

3.4.3.1 Ecology and Population Biology

The Band-rumped Storm-Petrel or ‘ake‘ake (*Oceanodroma castro*) is a small seabird about 20 centimeters (8 inches) long, weighing less than 40 grams (1.5 ounces). It is an overall blackish-brown bird with an evenly-cut white rump band and uppertail-coverts. Sexes are alike in size and appearance. There is little or no seasonal variation in plumage. Field identification can be difficult, because several other white-rumped species of Storm-Petrels are similar in size, color, and shape. However, vocalizations at breeding colonies are distinctive and can be used to identify the species (Allan 1962).

During the day, adults spend their time foraging on the ocean surface. Food consists mainly of small fish, squid, crustaceans, oily scraps of marine animal carcasses, and garbage remnants (King 1967; Harris 1969). Adults visit the nest site after dark, where they can be detected by their distinctive calls. Since no nests have ever been found in Hawai‘i, information on the breeding biology of this species can only be surmised based on the known breeding biology of this species in other locales, such as the Galapagos Islands. Nests are placed in crevices, holes, and protected ledges along cliff faces, where a single egg is laid (Allan 1962; Harris 1969).

The species is long-lived (15 to 20 years) and probably does not breed until its third year (Ainley 1984). The nesting season occurs during the summer months, with adults establishing nesting territories in April or May. The incubation period averages 42 days (Harris 1969) and the young reach fledging stage in 64 to 70 days (Allan 1962; Harris 1969).

3.4.3.2 Distribution, Range, and Abundance

The Band-rumped Storm-Petrel is a wide ranging species found in the subtropics of the Pacific and Atlantic Oceans (Harris 1969). Breeding populations in the Atlantic are restricted to the eastern portions of the ocean, primarily in the Azores island group off northwestern Africa (Cramp and Simmons 1977). Wintering populations may occur as far west as the mid-Atlantic, with small numbers regularly reaching the coasts of North and South America (Cramp and Simmons 1977). In the Pacific, there are three widely separated breeding populations--one in Japan, one in Hawai‘i, and one in the Galapagos (Harris 1969; Richardson 1957). Populations in Japan and the Galapagos are comparatively large and number in the thousands (Coulter 1984; Hasegawa 1984), while the Hawaiian birds represent a small, remnant population of possibly only a few hundred pairs (Harrison *et al*.1984; Harrison *et al*. 1990). Extensive at-sea surveys of the Pacific have revealed a broad gap in distribution of the Band-rumped Storm-Petrel to the east and west of Hawai‘i (Pitman 1986; Spear *et al*. 1994). The Hawaiian population of the Band-rumped Storm-Petrel is the only population within U.S. borders or under U.S. jurisdiction, and is thus a high priority for conservation efforts.

Evidence of existing nesting populations of Band-rumped Storm-Petrels in the Hawaiian Islands is based on detection of adult birds during breeding-season surveys and by retrieval of fledglings in the fall by persons involved in the SOS Program. Fledglings have been retrieved sporadically on the islands of Hawai‘i and Kaua‘i, providing additional evidence of nesting colonies within the Hawaiian archipelago (Harrison *et al*. 1990, Banko *et al*. 1991).

Recent work by Wood *et al*. (2002) provides good evidence that the species nests on Kaua‘i. Despite the suggestion by Harrison *et al*. (1990) that the island of Kaua‘i had the largest population in the islands, breeding bird surveys on Kaua‘i in 1992 by the USFWS (USFWS, unpublished data, 1992) detected only a few Band-rumped Storm-Petrels, and only along the north shore in Nu‘alolo Valley. Harrison *et al*. (1990) reported many Band-rumped Storm-Petrels over the last 12 years on the south and southwest side of Kaua‘i at the mouths of Waimea Canyon and Hanapēpē Valley, and concluded that Band-rumped Storm-Petrels probably nested along the cliffs of these two valleys and elsewhere on the island. A search of Hanapēpē Valley in 1980 by J. Sincock revealed what appeared to be burrows, feathers, and feces on a cliff face 50 to 70 meters (165 to 230 feet) from the top of the cliff (Harrison *et al*. 1990). In 1992, almost the same location was occupied by Common Mynas (*Acridotheres tristis*), and Band-rumped Storm-Petrels were not heard during nocturnal surveys (USFWS, unpublished data 1992). Crossin (1974) found Band-rumped Storm-Petrels off the southern coast of Kaua‘i but speculated that the population on the island “cannot be large”. In September 2001, Wood *et al*. (2001a, 2001b) heard Band-rumped Storm-Petrels in Pōhakuao Valley, an isolated hanging valley on the Nāpali coast, and estimated that 50 to 60 birds were nesting on cliffs 370 to 460 meters (1,200 to 1,500 feet) in elevation.

Between April and October of 2002, Wood *et al*. (2002) gathered data on the distribution and abundance of the Band-rumped Storm-Petrel at several locations on Kaua‘i. They concluded that there are nesting populations at several locations on the Island. These include Waimea Canyon (east of Waimea Canyon lookout); four sub-populations along the Nāpali Coast (Kalalau, Pōhakuao, Nu‘ololo Aina, Nu‘ololo Kai); one site in the Koke‘e region of Awa‘awapuhi; one site, called Awa‘awapuhi vista, at the eastern rim of Nu‘alolo and Awa‘awapuhi Valleys (accessed from the Awa‘awapuhi Trail, Koke‘e State Park); and Lehua Islet off the north coast of Ni‘ihau. Three other sites were monitored and appear to be general fly-by sites where the petrels are in transit to nearby nests, including upper Waimea Canyon; Honopu (Kōke‘e); and Kalalau Rim (Koke‘e). Five of the sites that this team investigated represent previously unpublished locations.

Worldwide population of the species is uncertain, but is most likely less than 25,000 breeding pairs. Based on their field investigations, Wood *et al*. (2001a, 2001b) estimated that there are approximately 200 nesting pairs on Kaua‘i.[33, 34] Despite the strong evidence of the species presence described above, Band-rumped Storm-Petrels remain the only seabird in the Hawaiian Islands for which the nest and eggs have not been found after western contact.

Wood *et al*. (2002) provide relatively detailed information on the vegetation characterizing the sea cliffs where the Band-rumped Storm-Petrel is nesting:

> *The Pōhakuao cliffs where storm-petrels nest are dominated by the shrub Chamaesyce celastroides var. hanapepensis (akoko), and two native grasses, Eragrostis variabilis (kawelu) and Panicum lineale (panic grass).*
>
> *Common herbs included Plectranthus parviflorus ('ala'ala-wai-nui), Dianella sandwicensis ('uki 'uki), Peperomia tetraphylla, P. blanda var. floribunda, & P. cookiana ('ala'ala wai*

[33] According to Wood et al., the range of nesting pairs stated for the Awa‘awapuhi and Waimea Canyon sites were general estimates. They expressed greater confidence in their estimates at the remaining sites as they were based on pin-pointing distinctive arriving calls, but not including calls that were repeated around general nesting locations. They recommended further research to better evaluate the number of nesting birds in each region.

[34] Despite the strong evidence of the species presence described above, Band-rumped Storm-Petrels remain the only seabird in the Hawaiian Islands for which the nests and eggs are unknown to science.

nui), Pilea peploides, and Peucedanum sandwicense (makou). Sedges included Carex meyenii and Cyperus phleoides. Vines included Alyxia oliviformis (maile), and Cocculus trilobus (huehue). Occasional ferns (and fern allies) were also a component of these cliff regions.

Tree species were distributed randomly around small ledges and terraces where soil pockets could accumulate and included Dodonaea viscosa ('a'ali'i), Psydrax odoratum (alahe'e), Metrosideros polymorpha var. glaberrima ('ohi'a), Hibiscus kokio subsp. saintjohnianus (koki'o 'ula 'ula), Diospyros spp. (lama), Acacia koaia (koai'e), Antidesma platyphyllum var. hillebrandii (hame), Bobea elatior ('ahakea), and Melicope pallida ('alani) (Wood and LeGrande 2001; Wood et al. 2001).

3.4.3.3 Current Threats

Sub-fossil remains of Band-rumped Storm-Petrels have been found on O‘ahu and Moloka‘i and Hawai‘i (Olson and James 1982, A. Ziegler personal communication), and their bones are abundant in some ancient Hawaiian midden (A. C. Ziegler personal communication as reported in Wood *et al*. (2002). Slotterback (2002) and Athens *et al*. (1991) found bones of this species in sea level midden. They speculate that Hawaiian populations once nested in coastal sites throughout Hawai‘i and loss of habitat and predation by introduced mammalian predators including humans has been an important factor in the decline of this species.

Introduced predators are believed to be the most serious terrestrial threats facing the Band-rumped Storm-Petrel in Hawai‘i. Rats, cats, dogs, mongoose and barn-owls are likely culprits. The Band-rumped Storm-Petrel, like the other seabirds covered by this HCP, lacks effective anti-predator behavior, and has a lengthy incubation and fledgling period, making adults, eggs, and young highly vulnerable to predation by introduced mammals.

Wood *et al*. (2002) observed owls flying along basalt cliff faces where the Band-rumped Storm-Petrels nest in Pōhakuao. These observations included consistent traffic of the Short-eared owl or pueo during the day and the screeching of barn owls in the evening. The topic of owl predation on Hawaiian seabirds was covered in an article in the *‘Elepaio* (Byrd and Telfer 1980) and evidence of it has also been reported in studies done as part of KIUC’s efforts to identify suitable locations for mitigation measures.

Another impact to the Band-rumped Storm-Petrel results from the effects of artificial lights on fledgling young and, to a lesser degree, adults. Artificial lighting of roadways, resorts, ballparks, residences, and other development in lower elevation areas both attracts and confuses night-flying Storm-Petrel fledglings, resulting in “fall-out” (Harrison *et al*. 1990) and collisions with buildings and other objects (Banko *et al*. 1991). Additional, unstudied factors that could affect the continued existence of the Band-rumped Storm-Petrel include commercial fisheries interactions or alteration of the prey base upon which the Storm-Petrel depends.

It is unclear how difficult it is for Band-rumped Storm-Petrels to take off once they have been grounded. Unlike the other Covered Species, it appears that the wing morphology of Band-rumped Storm-Petrels should enable them to regain flight after being grounded. Nevertheless, once on the ground, Band-rumped Storm-Petrels are extremely vulnerable to alien mammalian predators and other hazards. The SOS program on Kaua‘i has retrieved 24 Band-rumped Storm-Petrels since 1979, an average of less than one bird a year. (SOS Database 1979-2006, Rana Productions, Ltd, and Planning Solutions 2008, Kaua‘i Humane Society 2009). The SOS program handled two Band-rumped Storm-Petrels in 2008, and six birds in 2007 which were all retrieved from cruise ships. All of the Band-rumped Storm-Petrels handled by the SOS Program in 2007 and 2008 were released alive following veterinarian and rehabilitation care. Recent increases in the number of Band-rumped Storm-Petrels being recovered by the SOS Program is attributed to more birds downed on ships at sea being turned into the SOS Program at Nāwiliwili Harbor.

3.4.4 PROTECTED SPECIES NOT COVERED BY THE HCP

As previously noted, other endangered species are present on Kaua‘i in areas where KIUC has on-ground infrastructure. Those species are nēnē (Hawaiian goose, *Brandt sandvicensis*); kōloa maoli (Hawaiian duck, *Anas wyvilliana*); *‘alae‘ula* (Common Moorhen *Gallinula chloropus sanvicensis*); ‘alae ke‘oke‘o (Hawaiian coot, *Fulica alai*), ae‘o (Hawaiian stilt, *Himantopus mexicanus knudseni*), and ‘Ōpe‘ape‘a (Hawaiian hoary bat, *Lasiurus cinereus semotus*).

KIUC is not requesting coverage for take of any of these species for the following reasons. Unlike the three seabird species for which coverage is being sought (which fly to and from their nesting colonies under the cover of darkness), all five of these bird species typically fly during daylight. This, together with their acute vision, mean that it is unlikely that KIUC’s on-ground infrastructure poses a direct threat to any of these species, as they readily can and do avoid utility lines.[35]

The Hawaiian hoary bat is widely distributed on Kaua‘i, especially in the lowland areas. However, there is no current empirical data suggesting that bats have collided or will likely collide with utility structures on Kaua‘i. This species, which is well-sighted, feeds during both crepuscular periods and to a lesser degree after dark. They are drawn to outdoor lighting, as these tend to attract and concentrate flying insects that the bats forage on. However, their excellent visual and echolocation abilities together with their relatively low flying speed mean that they are not at significant risk from harm as a result of collisions with KIUC facilities.[36]

3.5 EXISTING SOCIO-ECONOMIC ENVIRONMENT

3.5.1 HUMAN POPULATION

According to the 2000 U.S. Census, Kaua‘i’s Year 2000 resident population was 58,500, about 14 percent higher than in 1990. The total island population amounted to 4.8 percent of the Hawai‘i’s population, making it the least populated of the State’s four major counties (Honolulu, Maui, Kaua‘i, and Hawai‘i, excluding Kalawao County). A 2008 U.S. Census estimate suggested the population of Kaua‘i County reached 62,828, a 7% increase since 2000 and still the least populated of the State’s four major counties (U.S. Census Bureau 2008).

Most of the residents live in towns scattered around the perimeter of the island, primarily along the eastern and southern shores. A few smaller communities are found on the north shore of the island. There are no towns on the northwest side of the island (the Nāpali coast) or in the mountainous interior. Consequently, the primary interaction between birds and human activity occurs as the birds fly between their nests in the mountains and the ocean. The principal economic driving forces for the economy of Kaua'i County are tourism, agriculture, and defense expenditures.

Over the next 10 years, most of the population and urban growth on the island is expected to be in Kukui‘ula and Pō‘ipu along the south shore; Līhu‘e, Wailua, and Kapa‘a on the windward side; the Princeville area on the north shore; other existing urban centers; and some agricultural subdivisions. Little or no growth is anticipated in the mountainous interior of the island. Slow to moderate economic and population growth is anticipated over the next decade.

[35] It is worth noting that unlike their continental cousins none of these species are migratory. This is important because when migrating in continental land areas, birds tend to congregate in large numbers and fly through relatively narrow corridors en masse, and often at night). Those behavioral characteristics, absent in the species in Hawai‘i, create a risk of collision with tall man-made structures, such as large guyed television towers, that does not exist for the five species for which coverage is not being requested.

[36] The only currently available data documenting Hawaiian hoary bats having been harmed by man-made structures are of bats having been caught on barbed wire fencing, and collision with wind turbines.

3.5.2 TOURISM

Over 1.25 million people visited Kaua‘i in 2006. The average daily visitor census in that year was just under 21,000. This means that on average one visitor was present for approximately every three residents (DBEDT 2007). The visitor count rose to almost 1.3 million people in 2007, but declined sharply in 2008 as a result of the precipitous downturn in the world economy. DBEDT's provisional estimate of Kaua‘i visitor arrivals for all of 2008 is 1,033,449, down over 20 percent from the previous year. At this time, no one has accurate estimates of the speed at which the visitor arrivals are likely to recover, but DBEDT forecasts dated February 20, 2009, suggest that the number of statewide visitor arrivals in 2012 will still be over 6 percent below the number recorded in 2007.

3.5.3 DEFENSE

The Pacific Missile Range Facility (PMRF) at Barking Sands on the southwestern shore is the world's largest instrumented multi-environment range to support surface, subsurface, air and space missile operations. Operations vary from small, single-unit exercises to large, multiple-unit battle-group scenarios. These are expected to continue and expand in coming years. PMRF is a major contributor to Kaua‘i's economy (USFWS 2002b).

3.5.4 AGRICULTURE

Sugarcane cultivation was the economic mainstay of Kaua‘i for more than a century. Its importance has declined greatly over the past several decades, and it is now only a shadow of its former self. Today, only one plantation remains in business, and despite the efficiency of its operation, it remains on an economically shaky footing. Over 45,000 acres of former sugarcane land have been taken out of production as the industry has contracted. Some of the fields have been planted in diversified crops, including coffee, papaya and other fruits, seed corn, flowers and nursery products, vegetables and melons. A few areas have been converted to aquaculture, and some former sugarcane fields have been used for residential and other urban development. Despite this, most of the former sugarcane land is now used for grazing cattle which, in recent years, has allowed a growing cattle industry on Kaua‘i even though grazing is a comparatively low-value use of the land. Due to the contraction in the sugar industry, agriculture is now the smallest of the three major industries (USFWS 2002b). This is likely to remain true, though it is possible that some expansion may occur, especially if biofuels become a viable source of power.

3.6 EXISTING LAND USE PATTERNS

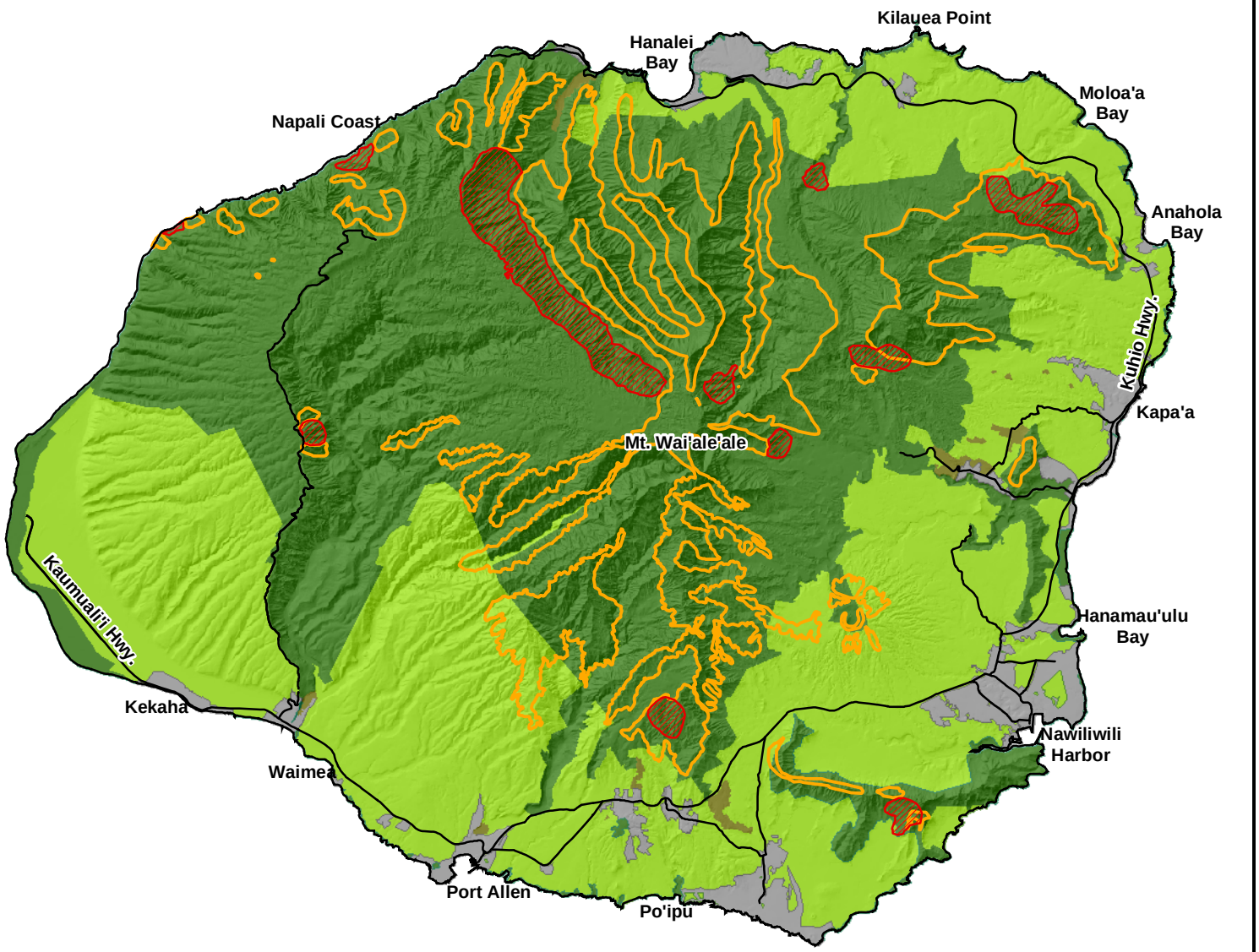
No island-wide land use maps are available for Kaua‘i. However, the breakdown of land use district acreages shown in Table 3.4 and depicted in Figure 3.9 illustrate two important points with respect to the island from the perspective of endangered seabirds. The first point is the generally rural nature of Kaua‘i. Despite the development that has occurred on the island over the past 50 years, it remains largely rural in character. Over 56 percent of the total acreage is classified as Conservation District and has virtually no development. Of the roughly 40 percent of the total land area that is in the Agricultural District, much is now fallow. Much of this land has been disturbed by intensive agricultural practices that were used in the cultivation of sugarcane, although a substantial portion of the agriculturally zoned land was not cultivated. The second point is that the Conservation land overlaps the areas that have been identified as existing or potential habitat for one or more of the Covered Species.

Table 3.4 Estimated Kaua‘i Acreage by State Land Use District Classification

Total area (acres)	*Classification by State Land Use District*							
	Urban		*Conservation*		*Agricultural*		*Rural*	
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
353,900	14,550	4.11%	198,769	56.17%	139,328	39.37%	1,253	0.35%

Note: Total acreage, including inland water, as classified by the Hawai‘i State Land Use Commission under the provisions of Chapter 205, Hawai‘i Revised Statutes, as amended.

Source: Hawai‘i State Department of Business, Economic Development & Tourism, Land Use Commission, records.



Legend:

- Major Roadways
- Known Newell's Shearwater Nesting Colonies
- Potential Newell's Shearwater Nesting Habitat

State Land Use Districts:

- Agricultural District
- Conservation District
- Rural District
- Urban District

Prepared For:

Kaua`i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

--Rana Productions, Inc.
--U.S. Fish & Wildlife Service
--State of Hawaii GIS

Figure 3.9:

State Land Use Districts

KIUC Habitat Conservation Plan

Figure 3-9 State Land Use Districts 2009-06-24.mxd

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CHAPTER 4 – POTENTIAL BIOLOGICAL IMPACTS

4.1 INTRODUCTION

Following KIUC's submittal of its proposed HCP and associated applications to DOFAW and the USFWS for incidental take authorization in October 2007, the agencies concluded that they lack sufficient data about the population of the Covered Species, the actual effects of KIUC's facilities and activities on the Covered Species, and the effectiveness of the mitigation proposed, to be able to issue long-term take authorization. This conclusion is partly due to the fact that few studies have ever sought to monitor and quantify actual bird-powerline collisions on Kaua'i. As discussed below, the best available information consists of population estimates and utility structure impact estimates based on limited radar studies and modeling efforts conducted in the mid-1990s and radar studies at selected locations commissioned by KIUC in 2007. As a result, as described in Chapter 1 the agencies recommended in December 2008 that KIUC seek short-term take authorization using take estimates based on these mid-1990s analyses, and develop and implement a powerline monitoring protocol to generate new data and analyses which can later be utilized to seek long-term take authorization.[37]

4.2 EPRI STUDY: OVERVIEW

In the mid-1990s, the Electric Power Research Institute (EPRI), with financial support from Kaua'i Electric, sponsored the Kaua'i Endangered Seabird Study (Cooper and Day 1995, Ainley et al. 1995). The study examined threats to the Dark-Rumped Petrel (later re-classified as the Hawaiian Petrel) and Newell's Shearwater on Kaua'i. Researchers tracked the flight patterns of the night-flying seabirds via a mobile unit equipped with modified marine radar. They also studied the natural history of the birds and identified possible causes of an apparent population decline. The research was guided and reviewed by a panel of technical experts from the U.S. Fish and Wildlife Service, the academic scientific community, utilities, and environmental groups. While subsequent work has provided additional insights into specific aspects of the species' behavior, the two-volume EPRI report constitutes the best available information about the species' behavior on Kaua'i.

The EPRI study also included an analysis of the impacts of utility structures on these seabirds. The EPRI estimate represents the best scientific and commercial data available. When adjusted to account for utility structures that have been installed since the EPRI study was completed, and for estimated changes in Covered Species population size, it remains the best basis for estimating take from KIUC structural facilities. Consequently, the Agencies and KIUC have used estimates from that study, together with the correction factors described below, to estimate take by KIUC's existing facilities for this short-term HCP. KIUC believes based on anecdotal information and its collective experience with these species that the take estimates included herein represent a likely "worst case" scenario, and that the actual take caused by KIUC facilities and activities is likely substantially less. Nevertheless, pending the implementation of additional research and the development of new data, the estimation approach described below is the best approach available.

[37] The research projects that would be covered under this permit (principally the at-sea capture study, but possibly other work as well, e.g., colony investigations) will involve the careful capture, handling and banding and release of birds. This will be done by trained qualified personnel approved by USFWS and DOFAW. No harm or mortality is expected as a result of these activities.

4.3 ESTIMATED ANNUAL TAKE: NEWELL'S SHEARWATERS

4.3.1 ESTIMATING POWERLINE MORTALITY OF NEWELL'S SHEARWATERS: 1993-1994

Ainley et al. (1995) modeled data collected by the Save Our Shearwater (SOS) Program between 1980 and 1993 and field data collected by its authors in 1993 and 1994, using corrective indices to account for various perceived shortcomings in the SOS Program data. Among other things, these indices compensate for incomplete on-ground survey coverage and for scavenger and observer bias; but they do not account for the impact of adult (i.e. parent) mortality on egg and chick survival (i.e., indirect take).

Based on their analyses, Ainley at al. (1995) concluded that during the 1980-1993 period, 'utility structures' (which included overhead electric powerlines as well as telephone lines and cable television lines strung on the same poles) were responsible for the deaths of between 122 and 350 birds per year, with the high figure being considered the "best estimate" (Ainley et al. 1995:44). The total pelagic population of the species at that time was estimated to be on the order of 84,000 birds (Spear et al. 1995:624) and the number on Kaua'i estimated to be 65,000 (Cooper and Day 1994:iv). Based on the age distribution of the birds collected, Ainley et al. (1995:44) estimated that of the 350 annual powerline mortalities they modeled, 70 were breeding adults and 280 were either non-breeding adults or subadults (i.e., 2 to 5 years old).

Because the EPRI estimate encompassed all utility structures, not just those owned by KIUC, the mortality estimates likely include harm caused by bird collisions with telephone and cable television lines as well as electrical power lines. KIUC electric power lines are located higher up on joint-use utility poles than are telephone and cable television lines. Based on that fact, on unpublished flight altitude data collected by ABR Inc., and on observations of flight behavior obtained during its own radar studies at locations previously identified as high bird activity areas (Denis and Verschuyl, 2008a, 2008b, 2008c, 2008d), KIUC concluded that KIUC facilities probably account for between 80 and 95 percent of all collisions between the Covered Species and utility structures. For the purposes of this short-term HCP, KIUC assumes that its power lines and associated structures are responsible for 90 percent of such collisions.

Although not accounted for in Ainley et al. (1995), Newell's Shearwater chicks require parental care from both adults until very near fledging, therefore, it is expected that one chick is indirectly taken for each breeding adult killed due to powerline collisions and this indirect take is included in the analysis of take authorized under this HCP.

4.3.2 ESTIMATING LIGHT-RELATED MORTALITY OF NEWELL'S SHEARWATER: 1993-1994

In an attempt to estimate the number of fledglings that die due to light-related impacts during the fall, Ainley et al. (1995: Table 17) assessed various assumptions regarding: (i) the discovery rate of bird downings associated with artificial lights (using rates ranging from 50 to 100 percent) and (ii) the morbidity rate of downed birds (using rates ranging from 7.7 to 43 percent). Ainley et al. (1995: Table 17) used the midpoint between 7.7 and 43 percent (25%), which they considered to be the best estimate of morbidity, along with the most conservative discovery rate of 50%, resulting in an estimate that 7.4 percent of all fledglings die due to light-related impacts. Ainley et al. (1995:43) estimated that during their study period, there were an average of 9,636 fledglings produced each year, making an estimate of the total mortality due to lights at 716 fledglings annually.

While the proximity to lights was identified as the most influential factor in the distribution of downed fledglings, Ainley et al. (1995:29) were not able to allocate any proportion of the mortalities to the owners of individual lights. Since that time, KIUC has completed its program of replacing all of its more than 3,000 unshielded street lights with shielded lights and also completed extensive modifications to its facility lighting at Port Allen and elsewhere. While these efforts clearly reduce light-related impacts on the Covered Species, some impact from these lights probably remains. Reed, Sincock, and Hailman (1985) conducted lighting experiments on Kaua'i during the early 1980's,

finding that shielding lights that illuminated the grounds of a resort reduced the average number of Newell's Shearwaters found by an average of 40 percent (the results were variable, ranging from 28.6 to 52.1 percent). There are some specific instances of lights or facilities under KIUC control identified as the location where downed birds were collected via the SOS program since the lights were shielded. Because of the non-systematic way in which birds are collected, however, those figures are not being used to allocate KIUC's proportion of the island-wide impacts. Absent additional information, KIUC is estimating that 10 percent of light-related impacts could be attributable to KIUC actions. This figure, as well as other assumptions that are incorporated in the Ainley et al. (1995) model, likely overestimate the actual effect of KIUC's facilities and will be re-assessed after new bird-powerline collision monitoring is conducted; revised estimates will then be used for any future long-term HCP.

4.3.3 ESTIMATING KIUC LIGHT-RELATED INJURY/HARASSMENT (NON-LETHAL TAKE) OF NEWELL'S SHEARWATER: 1993-1994

Using their assumed "conservative" discovery rate (i.e., the lowest numerical ratio of discovered downed birds to actual downed birds, with 1.0 being the highest possible) of 50 percent, Ainley et al. (1995:28) estimated 2,864 fledglings were downed associated with artificial lights each year during their study period.[38] They calculated that 2,148 of these downed fledglings (86.6 percent) did not die. As with light-related mortalities, specific information that could be used to estimate the proportion of this total island-wide take to KIUC actions with high statistical certainty is not available. Consequently, KIUC is estimating that 10 percent of light-related impacts could be attributable to KIUC actions, and should be included when consideration of authorized take and mitigation levels. Again, this figure likely overstates the actual affects of KIUC's facilities and will be re-assessed after additional monitoring is conducted and an updated estimate will be used for any future long-term HCP.

4.3.4 ADJUSTMENT FOR CURRENT (2008) SEABIRD POPULATION SIZE

Other things being equal, we assume that the number of Newell's Shearwaters colliding with power lines or attracted to lights is proportional to the size of their population on Kaua'i. The best available scientific information indicates that the population of Newell's Shearwaters on Kaua'i declined dramatically during the period 1993 to 2008.

Day, Cooper, and Telfer (2003) compared trends in the number of Hawaiian Petrels and Newell's Shearwaters observed on Kaua'i using ornithological radar surveys conducted in June 1993 and during 1999-2001, with trends in the number of young Newell's Shearwaters retrieved by the SOS Program over the same period. This comparison led them to estimate a decline in the number of Newell's Shearwaters visiting Kaua'i of more than 60% between 1993 and 1999-2001. The number of birds retrieved by the SOS program also declined over the same period at nearly the same rate (52 percent), from 1,111 birds in 1993 to an average of 533 birds a year during the 1999-2001 period.

The Hawai'i Division of Forestry and Wildlife have analyzed additional radar data from the years 1993 through 2008 to estimate that the population of Newell's shearwaters has declined 75 percent (Holmes, May 12, 2009). For the purposes of deriving take estimates for this short-term HCP, therefore, all take estimates calculated by Ainley et al. (1995) were reduced by 75 percent (see Table 4.1 for derivation).

[38] This number was calculated by dividing the 1,432 fledglings reported per year by the SOS Program by 0.5, the proportion of all downed fledglings that the investigators conservatively estimated were actually found.

Table 4.1 Annual Take Estimates for KIUC Lights and Facilities Using EPRI-Derived Figures Corrected for Changes in the Population between 1994 and 2008

Take Categories	*1993-1994* (Ainley et al. 1995)	*2008 Island-wide Take* (25% of Ainley et al. 1995)	*2008 KIUC Proportion* (90% of utility line take and 10% of light attraction)
POWER LINES			
Breeding Adult Mortalities	70	17.5	15.75
Non-breeding Adult/Subadult Mortalities	280	70.0	63.0
Chick Mortalities	70	17.5	15.75
LIGHT ATTRACTION			
Fledgling Mortalities	716	179	17.9
Fledgling Downings	2,148	537	53.7

4.3.5 CHANGES IN KIUC FACILITIES SINCE 1994

The current take assessment must consider changes in KIUC facilities that have occurred since the take estimates developed by Ainley et al. (1995). Overall, the number of miles of overhead wire in the KIUC system increased by 8.7 percent between 1994 and 2001; through 2006, the total increase has been about 10 percent. Nearly all of this increase has been in the form of lower voltage (12 kV or less)/lower height (<12.2 meter) distribution wire in already developed areas, however. It is unlikely these distribution lines have a significant adverse effect on the Covered Species. Consequently, no correction factor is applied to reflect the addition of these lower lines.

The electrical power lines along the Powerline Trail between Wailua Reservoir and Hanalei on the North shore of the island were upgraded, specifically replacing 20 kilometers of lower lines that run across the island from the Hanahanapuni Tap to and across Hanalei Valley with higher voltage lines. This area, particularly the Hanalei Valley, has been documented to have some of the highest seabird passage rates on the island. No underline monitoring has been conducted under these lines to determine how many collisions may be occurring. For the purposes of this short-term HCP, KIUC is assuming that an additional 10 percent to the adjusted take estimates, i.e., an additional 1.6 breeding adults, 6.3 non-breeding adults and subadults, and 1.6 chicks.

Table 4.2 Estimated Annual Take of Newell's Shearwaters by KIUC Lights and Facilities

Take Categories	*Estimated Annual Take*	
	Mortalities	*Non-Lethal Downings*
POWER LINES		
Breeding Adult Mortalities	17.3	
Non-breeding Adult/Subadult Mortalities	69.3	
Indirect Chick Mortalities	17.3	
LIGHT ATTRACTION	0	
Fledgling Mortalities	17.9	
Fledgling Downings	0	53.7
TOTAL	***121.8***	***53.7***

4.3.6 TOTAL ANNUAL ESTIMATED KIUC TAKE OF NEWELL'S SHEARWATERS

Table 4.2 combines all of the factors relevant to estimating take using the approach developed by Ainley et al. to arrive at an estimated annual take by KIUC power lines and lights. Based on these estimates, KIUC seeks incidental take authorization through this short-term HCP for 125 Newell's Shearwater mortalities and 55 Newell's Shearwaters non-lethal injuries annually.

As indicated at the beginning of this Chapter, these estimates, while the best possible at this time, are not completely supported by the empirical and anecdotal evidence, which suggests that the actual number of Newell's Shearwaters mortalities is likely to be substantially less than the estimates in the table. Three examples illustrate this point:

- If we assume that the SOS program picks up 50% of all the birds killed (the number Ainley et al. used in their estimate), then SOS should have reported something on the order of 44 adults/sub-adults in 2008 (50% of the 17.3+69.3=86.6 in the table). In fact, the number of Newell's Shearwaters retrieved by SOS in 2008 that were either dead or that died in captivity was only 18, 40 percent of that amount).
- In their 1995 report, Ainley et al. seem to equate "birds on the ground" with "fallout due to attraction by lights" (see the discussion supporting Table 17, for example). This is almost certainly erroneous. If it were true, one would likely not see so much fallout on the relatively unlit North Shore (where fallout has historically been very high relative to other parts of the island).
- In 2007 KIUC conducted the first-ever on Kaua'i vertical radar surveys for seabirds, at four locations. The results of those surveys show that the vast majority of seabirds flying to or from the ocean at those locations on those dates flew at a far higher altitude than the height of KIUC's powerlines.

In short, for now it seems safe to say that the estimated take in Table 4.2 is almost certainly conservative (i.e., higher than the actual amount) and that additional data collection and analyses is likely to lead to a reduction in the estimated level. Nevertheless, in the absence of better data, these are the take estimates that have been used in developing the measures contained in this short-term HCP.

4.4 ESTIMATED ANNUAL TAKE: HAWAIIAN PETREL

Ainley et al. (1995: 54) concluded: "To date impact and fallout and collisions with powerlines on Dark-Rumped Petrels has been minimal". Two major factors may account for the apparent difference in power line effect between the two species. One is the smaller population of Hawaiian Petrels estimated to be on Kaua'i. The other is that Hawaiian Petrels tend to do more of their over-land flying before full darkness than do Newell's Shearwaters, a pattern which probably makes it easier for them to see and avoid overhead wires. Whatever the cause, during the 30-year SOS program history 293 Hawaiian Petrels have been retrieved, or an average of 9.8 birds a year, over 80% of which were released alive. This is less than one percent of the number of Newell's Shearwaters retrieved during the same period. Assuming the 50 percent "conservative" discovery rate estimated by Ainley at al. (1995) for Newell's Shearwaters is similar for Hawaiian Petrels, it is possible that as many as 20 are downed annually.

Because the numbers of Hawaiian Petrels being downed is so much lower than the number of downings of Newell's Shearwaters, similar approaches to estimating the take occurring are not appropriate. For the purposes of this HCP, the proportion of the Hawaiian Petrel take due to KIUC lights or facilities is estimated to be 10 percent of the total, and the annual take authorized will be two birds due to any source.

4.5 ESTIMATED ANNUAL TAKE: BAND-RUMPED STORM-PETREL

As discussed in the preceding chapter, the number of Band-rumped Storm-Petrels on Kaua‘i is believed to be very small, with Wood et al. (2003) estimating the breeding population at 171 to 221 pairs. Not surprisingly then, very few Band-rumped Storm-Petrels have been retrieved by the SOS program – a total of 24 during its 30 year history. None of these retrieved birds has been clearly associated with utility structures, though the fallout of at least some of these individuals was probably influenced by outdoor lighting, including the streetlights that KIUC owns and operates on behalf of the County. With no evidence implicating KIUC utility structures with the downing of this species and such a small number of retrievals, statistically determining the annual KIUC-related take for this species is problematic. Because of the extremely low probability that KIUC lights or facilities cause take to Band-rumped Storm-Petrels in any year, the annual take authorized under this HCP will be two birds due to any source.

CHAPTER 5 – CONSERVATION PROGRAM

5.1 INTRODUCTION

This HCP is atypical in at least four important respects.

- First, KIUC agreed, through two Memorandums of Agreement with the USFWS, to implement many "interim conservation measures" concurrently with the development of an HCP, rather than waiting until the HCP was completed and approved and the incidental take permits issued. This action-oriented approach, which was possible because the agencies agreed to give KIUC full credit for all minimization and mitigation measures that it undertook prior to permit issuance, resulted in immediate conservation benefits to the Covered Species. As a consequence, conservation measures that have already been implemented are treated in the same fashion in this document as those which will be implemented in the future.
- Second, preparation of an HCP entailed more fundamental research into available mitigation options than is typical with most HCPs. This is because it was apparent to KIUC, USFWS, and DLNR from the outset that scientific information relevant to developing an effective conservation program for the Covered Species was lacking. In order to reduce the information gap and prepare the conservation plan that it submitted to the agencies in October 2007, KIUC performed substantial research (see for example Sections 5.4.1 and 5.6.1 for example), analyzed the results of that research, and then shared both the raw data and the tentative findings with the agencies. In some instances, measures which were initially anticipated as potential mitigation were determined to be ineffective or infeasible. Additional details about such measures, and the reasons why they were not selected, are described elsewhere in this report.
- Third, it is unusual for an HCP covering such a large area to have such a short term. Generally, it would cover a much longer period, such as the 50 years that KIUC proposed when it submitted its application in 2007.
- Finally, whereas most HCPs are prepared prior to facilities being put in place, this HCP covers a large existing utility system (as well as certain future additions to it.) The existence of extensive infrastructure limits the minimization options that are practicable.

The conservation program set forth below is based on extensive discussions and collaboration with the USFWS and DLNR; knowledge and experience gained through the process of developing the HCP including the results of extensive research activities and implementation of the interim conservation measures mentioned above; recommendations of experts in the field; consultations with the Newell's Shearwater Working Group (an inter-agency group of Hawaiian seabird experts from the USFWS and DLNR); and review of the Working Group's Draft 5-Year Workplan (October 2005), the USFWS Recovery Plan for the Covered Species, the USFWS' Seabird Conservation Plan – Pacific Region (January 2005), the USFWS' Avian Protection Plan (APP) Guidelines (APLIC, and USFWS, April 2005), and the Avian Power Line Interaction Committee's (APLIC 2005) course entitled "Avian Interactions with Power Lines: An Overview of Laws, Mitigation Strategies, and Techniques for the Protection of Avian Species."[39] Taken as a whole, this program will increase the likelihood that the Covered Species will survive and recover in the wild. Beyond that, it will provide a net environmental benefit, as required under Hawai'i law. Finally, it will help provide additional information that will guide the long-term conservation program that KIUC anticipates implementing under the auspices of the *KSHCP*.

[39] APLIC is an entity comprised of over twenty utilities, the National Rural Electric Cooperative Association, the Electric Power Research Institute, and the USFWS. Information about APLIC, and the APP Guidelines and APLIC course noted above, are available at www.aplic.org.

The remainder of this chapter is divided into the following main parts.

- Section 5.2 reviews the USFWS Recovery Plan objectives for the Covered Species, and the related Draft 5-Year Workplan, as these provide a scientific framework for crafting an effective conservation program for the species.
- Section 5.3 describes the biological goals and objectives of this HCP.
- Section 5.4 describes the conservation measures KIUC will implement to minimize the impacts of its facilities and activities on the Covered Species. (The heading for each conservation measure indicates which specific biological goal and objective it implements.)
- Section 5.5 describes the conservation measures KIUC will implement to minimize the impacts of future additional facilities and activities.
- Section 5.6 describes the conservation measures KIUC will implement to mitigate its unavoidable impacts on the Covered Species.
- Section 5.7 describes how the conservation measures result in a net environmental benefit to the Covered Species, in accordance with H.R.S. Chapter 195D.
- Section 5.8 describes the monitoring and reporting efforts which KIUC will implement.
- Section 5.9 describes the adaptive management efforts which KIUC will implement.

5.2 USFWS RECOVERY PLAN OBJECTIVES

Under Section 4 of the ESA, after listing a species as threatened or endangered the USFWS is required to develop and implement a plan (referred to as a "Recovery Plan") for the conservation and survival of the species. The Recovery Plan must describe site-specific management actions necessary to recover the species' population so that it can be de-listed. Although Recovery Plans do not have any regulatory effect, they are important guides in setting conservation priorities and providing blueprints for developing Habitat Conservation Plans.

5.2.1 HAWAIIAN PETREL AND NEWELL'S SHEARWATER RECOVERY PLAN

The USFWS issued the *Recovery Plan for the Hawaiian Petrel and Newell's Shearwater* in 1982. The *Recovery Plan* states that its primary goal is:

> *"…to secure currently known breeding populations of 'a'o and 'ua'u from unacceptable levels of predation and other losses, to determine minimum numbers for self-sustaining populations for each species, to establish new populations as necessary, and ultimately to de-list the species."*

The *Recovery Plan* goals and management objectives are as follows:

1) *Reducing the annual fallout of more than 1,000 Newell's Manx shearwaters to less than 100 (or near zero); reducing the annual fallout of dark-rumped petrels to near zero*[40]*;*
2) *Providing long-term protection for the eight known Newell's Manx shearwater nesting colonies on Kaua'i and the one known dark-rumped petrel nesting colony in Maui; and*
3) *Developing efficient predator control methods and techniques for use in and around isolated nesting sites.*

Implementation of the measures contained in KIUC's Habitat Conservation Plan will contribute to the targeted reduction in fallout, provide support for colony protection, and contribute information concerning the effectiveness of predator control measures.

[40] Since the publication of the Recovery Plan, the officially-recognized common names of these species changed, from "Newell's Manx shearwater" to "Newell's Shearwater" and from "Hawaiian dark-rumped petrel" to "Hawaiian Petrel."

5.2.2 NESH WORKING GROUP DRAFT 5-YEAR WORKPLAN (2005)

5.2.2.1 Overview of NESH Working Group 5-Year Workplan

The USFWS and DLNR have established an informal Working Group of Hawai‘i seabird experts from the USFWS, DLNR and the scientific community to focus on recovery of the Covered Species, with an emphasis on the Newell’s Shearwater. This group is known as the Newell’s Shearwater (NESH) Working Group. Rather than update the 1983 *Recovery Plan*, the Working Group instead developed a workplan consisting of specific recovery objectives for the Newell’s Shearwater that could be met within five years.

The NESH Working Group issued a draft Five-Year Workplan in October 2005 (NESH Working Group 2005). It states that although the nature of the threats to this species remains essentially the same since the *Recovery Plan* was issued in 1983, the severity of these threats (e.g., increased development) and thus the urgency of addressing them has increased. The Workplan also states that while the general long-term recovery strategy for the species has not changed, identification of interim recovery objectives and actions are needed to help ensure that initial conservation efforts by different agencies or groups are focused on the same ultimate goals, to see that limited recovery resources are used efficiently, and to provide milestones that can be used to track and evaluate progress toward recovery.

5.2.2.2 Workplan Goals

The draft Five-Year Workplan establishes five goals intended to reduce mortality, maintain or increase suitable nesting habitat, and to fill in gaps in scientific knowledge about the species:

1. Minimize adult/breeder mortality and maximize fledgling production by developing and implementing effective predator control methods in colonies;
2. Reduce the potential for collisions with power lines, towers, and other structures;
3. Protect existing colonies from degradation due to invasive plants and pigs;
4. Reduce fallout associated with lights; and
5. Improve monitoring methods, initiate studies to determine the effects of the tuna fishery on Newell’s Shearwater populations, and collect needed demographic data.

5.2.2.3 Workplan Objectives

The Workplan establishes the following specific objectives, designed to meet the long-term goals described above:

- Implement predator control in at least two colonies and install ungulate fencing around at least two colonies;
- Determine or estimate the number of adults that collide with power lines and structures;
- Collaborate with the Kaua‘i Invasive Species Committee to identify priority areas where invasive alien plants are a problem and help develop effective techniques for their control and interdiction;
- Encourage Kaua‘i County to adopt a light pollution ordinance and shield all remaining lights around hotels, playing fields, shopping centers, and other areas determined to be a hazard to shearwaters;
- Develop and implement effective monitoring techniques in at least two colonies that would facilitate the estimation of the effects of recovery actions;
- Continue broad-scale monitoring to assess population-wide trends throughout Hawai‘i to better understand threats and guide recovery efforts; and
- Develop studies to address fishery-related questions and collect demographic data.

5.2.2.4 Workplan Recovery Actions

The Workplan identifies specific actions needed to realize the interim recovery objectives described above. It emphasizes that logistical difficulties and uncertainties surrounding implementation of many recovery actions make it important to evaluate the efficacy of the measures annually, modifying them as needed to improve results. It also acknowledges that it will be quite difficult to quantify the relative impacts of the numerous threats to any given colony and the success of efforts to mitigate these threats.

The Workplan groups its specific recommended recovery actions into five broad categories: (1) predator control, (2) light attraction and collision; (3) invasive plants and pigs; (4) Save Our Shearwaters Program; and (5) monitoring. The specific actions are summarized briefly below.

Predator Control. The Workplan states that although cats, rats, owls, and to a lesser degree pigs all likely prey on adult and young Newell's Shearwaters, the feasibility of implementing predator control at breeding colonies is complicated by access to nesting areas, sensitivity to human disturbance, and inadvertent creation of access routes for predators. To date, only two sites have been identified as suitable to begin some predator control, Kalaheo (trapping of cats) and Moalepe (removal of barn owls and trapping of cats). The DLNR is implementing these efforts through the Kaua'i Endangered Bird Recovery Team (KEBRT) staff. The Workplan also notes that the expected future regulatory approval of aerial broadcasting of certain rodenticides in Hawai'i will likely benefit Newell's Shearwaters.[41]

Light Attraction and Collision. The Workplan states that light attraction and collisions are responsible for hundreds of strandings[42] annually and may be a major source of mortality. Greater public understanding of the causes of fallout is needed to increase support for, and voluntary participation in, avoiding, minimizing, and mitigating this threat. The Workplan identifies several measures intended to reduce light attraction and collisions, including outreach efforts with the local community to decrease lighting during the NESH fledging period, developing guidelines for minimizing light-related fallout, and identifying highest concentration fallout areas.

Invasive Plants and Pigs. The Workplan states that although the effect of invasive plants on NESH reproductive success has not been studied, some plant species alter the habitat to such a degree that there is little doubt that nesting would be affected. Pigs have also been documented destroying fossorial seabird nesting habitat often resulting in the abandonment of colonies. The Workplan recommends developing and coordinating monitoring and mitigation work with the Hawai'i Invasive Species Council (HISC).

Save Our Shearwaters (SOS) Program. The Workplan observes that the SOS program, historically funded and operated by DLNR, recently funded and operated by KIUC under DLNR oversight, and now funded by KIUC and operated by the Kaua'i Humane Society under DLNR oversight, has a long-standing history of successful community involvement to support recovery of downed birds. It identifies a number of additional needs, but concludes that neither DLNR nor KEBRT presently have staff or funds to implement these additional actions. The Workplan recommends that the SOS program continue, that modifications be made to improve the scope and effectiveness of the program (including the incorporation of bird rehabilitation procedures), that written protocols be developed, and that methods to evaluate survival rates of released birds be explored.

[41] Diphacinone is a rodenticide that is very effective at controlling rat populations. For widespread rat infestations in remote areas, diphacinone must be applied by aerial broadcasting in order to be effective. However, under the Federal Insecticide, Fungicide and Rodenticide Act, the aerial broadcast of diphacinone is currently prohibited. Efforts are underway at various State and Federal agencies to obtain regulatory approval for the aerial broadcast of diphacinone in Hawai'i. The consensus of Hawaiian seabird experts is that without such approval, the recovery of threatened and endangered seabird populations in Hawai'i is unlikely to be achieved (R. David, pers. comm.).

[42] A stranding represents a bird that lands and is unable to take off again without assistance.

Monitoring. The Workplan states that radar surveys and other forms of monitoring are needed to determine several factors pertaining to the species. These include: the species' distribution, abundance, and population trends; the geographic variability in threats; and the efficacy of various management actions. The Workplan then recommends implementing numerous projects, including radar surveys and the compilation of a database (including GIS) for all data from all sources.

5.3 BIOLOGICAL GOALS AND OBJECTIVES OF THE SHORT-TERM HCP

5.3.1 FRAMEWORK FOR ESTABLISHING GOALS AND OBJECTIVES

As noted previously, the USFWS' "Five Point Policy," published in 2000 as an addendum to the 1996 *HCP Handbook*, requires that HCPs "clearly and consistently define the expected outcome, i.e., biological goal(s)." To quote from the Five Points Policy:

> *Explicit biological goals and objectives clarify the purpose and direction of an HCP's operating conservation program. They create parameters and benchmarks for developing conservation measures, provide the rationale behind the HCP's terms and conditions, promote an effective monitoring program, and, where appropriate, help determine the focus of an adaptive management strategy.*
>
> *In the context of HCPs, biological goals are the broad, guiding principles for the operating conservation program of the HCP. They are the rationale behind the minimization and mitigation strategies.*

5.3.2 KIUC SHORT-TERM HCP BIOLOGICAL GOALS

KIUC drew on several resources when it established biological goals for its conservation measures. These include the USFWS *Recovery Plan*, the related Five-year Workplan, available scientific literature, State conservation strategies, and extensive consultations with USFWS, DLNR, and State Endangered Species Recovery Committee (ESRC) experts. These goals are listed in Table 5.1; the table also notes the types of measures that KIUC proposes to implement to achieve those goals. The sections of the report following the table provide the details of the conservation measures.

Before proceeding, it is worth noting that since beginning work on an HCP, KIUC has voluntarily implemented many "interim conservation measures" (ICMs) aimed at (and in some cases fully achieving) various Recovery Plan and Five-year Workplan objectives.[43] While they are not the subject of this HCP, an awareness of these past measures is essential to a complete understanding of the situation. Because of this, those measures that have been completed, or largely completed, are summarized in Appendix E. In many cases these ICMs resulted in standalone reports; copies of the appendix notes are available on the Department of Land and Natural Resources website.

[43] In many cases the interim conservation measures were implemented based in part on agency assurances that KIUC would receive credit for them in the incidental take permit processes.

Table 5.1 Biological Goals and Objectives of the Short-Term HCP

Biological Goals	*Conservation Measures*
Goal 1: Minimize the impact of existing and future KIUC facilities on the Covered Species so as to assist in their recovery.	1.A: Continue to minimize KIUC's contribution to light attraction by using only full-cutoff light fixtures on existing and future facilities.
	1.B: Minimize the impact of existing KIUC power lines by avoiding the construction of new lines that would increase take above present levels and continuing to look for opportunities to reconstruct existing lines such as to reduce the potential for take.
	1.C: Insure that minimization measures at power plants, substations and other facilities are institutionalized (i.e., made part of each facility/department's standard operating procedures).
	1.D: Provide downed seabird and monitoring training to KIUC personnel.
	1.E: Provide sufficient support for SOS to ensure its continued operation for the duration of the incidental take permits. (Also listed as 2.A.)
Goal 2: Mitigate for unavoidable adverse impacts of KIUC facilities on Covered Species so as to assist in their recovery.	2.A. Provide sufficient support for SOS to ensure its continued operation for the duration of the incidental take permits.
	2.B: Provide sufficient support for habitat restoration, predator control, and/or other appropriate conservation strategies contributing to the recovery of Covered Species as approved by the agencies, commensurate with the level of take to provide net benefit to the species and environment
	2.C. Seek NTBG Conservation Easement or equivalent in Upper Limahuli Valley.
Goal 3: Monitor impact to species, report, and provide for adaptive management so as to ensure that conservation resources provide the greatest possible contribution toward recovery.	3.A: Insure that monitoring measures at power plants, substations and other facilities are implemented per approved monitoring plan to track performance with respect to the Covered Species.
	3.B: Continue to explore and consider alternative avoidance, minimization, monitoring and mitigation options for improvement, and implement as agreed and appropriate.
	3.C. Fund two-year at-sea capture study to determine return rates for SOS birds, adult return and survival rates, also adding to population estimate information (Same as 2.C.)
	3.D: Provide sufficient support for compliance monitoring, including but not limited to underline take monitoring, and review of HCP activities
	3.E. Fund development and implementation of underline monitoring program
Goal 4: Assure funding for activities under the HCP so that conservation measures are certain to be implemented.	4.A: Provide funding assurances per HRS 195-D.
Goal 5: Provide information that will inform long-term take authorization following the end of the short-term permit.	5.A: Assist efforts to develop an island-wide HCP on Kaua'i.
	5.B. Fund two-year at-sea capture study to determine return rates for SOS birds, adult return and survival rates, also adding to population estimate information
	5.C. Fund update of Spear et al' (1995) at-sea seabird population estimates.
	5.D. Fund two-year auditory survey to locate additional seabird breeding colony/habitat opportunities for future mitigation
Source: Compiled by Planning Solutions, Inc.	

5.4 MEASURES TO AVOID & MINIMIZE IMPACTS OF EXISTING FACILITIES

5.4.1 COMPLETED EFFORTS TO AVOID & MINIMIZE IMPACTS OF EXISTING FACILITIES

Pursuant to two Memorandums of Agreement between KIUC and the USFWS (2002, 2004), concurrent with developing its HCP KIUC also implemented many steps to avoid or minimize the effect that its facilities and activities have on the Covered Species. These "interim conservation measures" were implemented based on agency assurances that KIUC would receive full credit for such measures in its HCP and the incidental take permit processes. Those measures that have been completed are noted briefly below in order to provide a context for the ongoing conservation measures described in Section 5.4.2. These completed measures are described in more detail in Appendix E:

- *Use Only Full-Cutoff (Shielded) Streetlights*. (All of the more than 3,000 KIUC streetlights are now fully shielded.)
- *Evaluated Power Lines and Installed Marker Balls to Deter Bird Collisions at Highest Collision-Risk Locations*.
- *Tested Durability of Commercially Available Bird-Diverter Devices (FireFly©)*.
- *Power Line Collision Risk Field Research (Radar Surveys) and Associated Measures*.
- *Installed and Maintain Shielded Lights at Port Allen Generating Station*.
- *Installed and Maintain Shielded Lights at Kāpaia Power Station*.
- *Implemented Seabird Training Program for KIUC Personnel*.

5.4.2 ONGOING EFFORTS TO AVOID & MINIMIZE IMPACTS OF EXISTING FACILITIES

In addition to the completed avoidance and minimization measures implemented concurrently with the development of this HCP, KIUC proposes to implement the following additional measures:

5.4.2.1 Participate with the State DOT to Underground Lines in the Wailua River Area

KIUC has been working with the State Department of Transportation (DOT) for several years in an effort to underground as many lines as possible as part of the State DOT's highway widening project in the Wailua River area. As a result of this effort and of the availability of special funding from the Federal government, it appears likely that KIUC will be able to underground the existing overhead lines between the Lydgate Substation and the Kapa'a bypass, a distance of approximately 1.7 miles.

5.4.2.2 Continue to Support Undergrounding Existing Electrical Lines

KIUC supports the undergrounding of existing power lines, but its ability to underground lines itself is severely constrained by its limited financial resources and the extraordinary cost of undergrounding on Kaua'i. Those constraints are discussed below.

Limited Financial Resources. KIUC's financial resources are very limited for several reasons. First, KIUC is a non-profit cooperative. As such, KIUC's customers are also its owners. This is in contrast to the more traditional "Investor Owned Utility" (IOU) model, in which the utility is a for-profit corporation owned and controlled by shareholding investors who in most cases are not customers of the utility. Second, KIUC serves a small island community and thus has a very small ratepayer base, consisting of only about 29,800 customers. Third, KIUC already has among the highest electricity rates in the nation. For example, its rate for residential customers in July 2009 was over 28 cents per kilowatt hour; in April 2009 the national average rate was approximately 11.5 cents per kilowatt hour.[44]

[44] See www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html Although it is working diligently to change the situation, KIUC currently relies on the combustion of highly refined fuel oils for over 90% of its energy supply. Because fuel oil prices have fluctuated dramatically over the last few years, this fuel price volatility has caused the rate which KIUC

In addition, as a young cooperative carrying a very large debt load, KIUC must meet certain mandatory loan obligations which further constrain its financial resources. KIUC was formed in November 2002 when it purchased the assets of the Kauai Electric division of Citizens Communications Company. KIUC used a loan from the Rural Utilities Service (RUS) of the U.S. Department of Agriculture to finance the $215 million purchase price. At the same time, KIUC also obtained a $25 million secured line of credit for working capital purposes, and a $60 million secured line of credit to be used in the event of a natural disaster, from the National Rural Utilities Cooperative Financing Corporation (CFC), a private, non-profit cooperative association. To finance its December 2003 purchase of a 26.4 MW combustion turbine electric generation facility from Kapaia Power Partners, KIUC obtained an additional $32.96 million loan from RUS and an $8.24 million loan from CFC. KIUC has been repaying the loans in accordance with its loan agreements. However, as of December 31, 2008, KIUC still had $218.8 million of RUS loans and $6.5 million of CFC debt outstanding.

The RUS loans require KIUC to maintain certain minimum coverage ratio levels.[45] This requires that KIUC's rates generate sufficient revenue to meet all of its expenses, and an additional "margin" (i.e., the equivalent of "net income" for an IOU). These margins enable KIUC to meet its required coverage ratios, as well as provide for future funding needs and build up equity over time. To date, KIUC's margins have been sufficient to consistently exceed its required ratios. However, KIUC's ratios have declined significantly over the last year due to a significant decline in electricity sales, and hence a significant decline in resulting revenues and margins. The decline in revenues is due primarily to the effects of the national economic recession, which has resulted in sharply reduced tourism levels, the closing of certain commercial establishments, and high unemployment on Kauai.[46] Dramatic fluctuations in fuel oil prices have also reduced KIUC margins. As a result of all these factors, KIUC projects a net margin for 2010 of only $300,588 (on projected revenue of $124,276,813). That net margin would not meet the required RUS ratios. Moreover, it would not enable KIUC to increase its equity from the 15.42% level that existed as of December 31, 2008 to the 30%-plus equity-to-assets ratio that it needs in order to qualify for greater financial flexibility under its RUS loan covenants.[47]

Given its small ratepayer base, already very high rates (which it is currently seeking to increase), declining revenues, and existing financial obligations to its public agency lender, its financial ability to underground existing lines is extremely limited.

High Cost of Undergrounding Existing Line. The cost of undergrounding existing above-ground power lines on Kaua'i is extremely high. KIUC's current (mid-2009) average estimates are $4,200,000 to $5,300,000 per mile for standard transmission lines, $6,900,000 to $7,900,000 per mile for standard transmission lines plus one circuit of distribution, and $7,700,000 to $8,700,000 per mile for standard transmission lines plus two circuits of distribution. The average estimates for undergrounding just distribution lines is $2,600,000 per mile for one circuit, and $3,400,000 per mile for two circuits. These general estimates are supported by location-specific and project-specific analyses. For example, the contract that was awarded in 2006 to the low-price bidder for construction of approximately 1.25 miles of new underground 69 kV line in the Kukui'ula development was for $3,300,000, or about $2,650,000 per mile. That price, now three years old, was for work on relatively

charges its customers to fluctuate accordingly. For example, over the past year KIUC's residential rate has ranged from a high of 49 cents in August 2008 to a low of 22 cents in February 2009.

[45] These ratios are: Times Interest Earned Ratio, Debt Service Coverage Ratio, Operating Times Interest Earned Ratio, and Operating Debt Service Coverage Ratio.

[46] For example, the Hawaii Department of Business and Economic Development and Tourism statistics for 2009 through April show that Kaua'i visitor arrivals are down 20.7%, visitor days are down 11.4%, and visitor expenditures are down 17.5%, compared to the same period in 2008. http://hawaii.gov/dbedt/info/visitor-stats/tourism/

[47] In June 2009, KIUC filed its first ever Application with the Hawaii Public Utilities Commission for approval of rate changes and increases, the purpose of which would be to generate additional revenues and margins in order to remain in compliance with its required ratios and continue to build equity.

level, undeveloped land with no special constraints. That project also did not entail the removal of existing overhead lines, or the consequent need to implement measures necessary to ensure uninterrupted electrical service while overhead lines are removed. A very recent analysis of a more complex project was recently completed for the Lydgate Substation to Kapa‘a Bypass Road undergrounding described in Section 5.4.2.1, above. The 2009 cost estimate for that project is $8,700,000 per mile.

In summary, given its very limited financial resources, and the extraordinary cost of undergrounding existing lines, it is not financially feasible for KIUC to underground any significant amount of its existing lines except in situations (such as that described in Section 5.4.2.1, above) where road realignments or other factors make sizeable cost-sharing possible. KIUC will continue to pursue and support such opportunities.

5.5 MEASURES TO MINIMIZE & AVOID IMPACTS OF FUTURE FACILITIES

Because of the relatively short term of this HCP and the permits that it supports, KIUC does not anticipate that future facilities other than those identified in Section 2.2 will need to be constructed while this HCP and the associated permits are in effect. Nevertheless, KIUC will support the following specific initiatives that are likely to promote impact avoidance and minimization in the future.[48]

5.5.1 CONTINUE TO USE BIRD-FRIENDLY OUTDOOR LIGHTING

The vast majority of lights owned and operated by KIUC are streetlights. In accordance with its existing practice, all new or replacement streetlights will utilize luminaires with cutoff optics, which do not emit light above an angle of 90 degrees. An example of such a light is the M-250A2 manufactured by GE Lighting Systems, Inc.; the specifications for this model are attached as Appendix B. For all other new or replacement lights, KIUC will only utilize shielded lights.[49] If new shielding or lighting options that provide greater protection for the Covered Species become available during the term of the HCP, KIUC will evaluate them.[50] If found to be feasible and effective, KIUC will incorporate fixtures using the new technologies into its system during the normal course of light replacements.

In addition, KIUC will make available to others, via its website (www.kiuc.coop) and other means, copies of outdoor lighting design guidelines and model lighting codes. This information is intended to make it easier for other organizations to install and/or switch to outdoor lighting that causes less stray light than would otherwise be the case. It would also facilitate the adoption of County-wide regulations designed to reduce stay light.

[48] KIUC has adopted a “Flat Design Standard for New 12 kV Electrical Distribution Lines” that it believes will help minimize the effect of any new facilities that the utility may construct and improve on situations where it is followed during retrofitting or relocation of existing facilities. Prior to the late 1980s, nearly all of the utility’s 12-kV distribution lines were constructed using what is referred to as “Flat” or “Cross-arm” design that places the three wires in a circuit at approximately the same height above the ground. However, in response to public concerns about the possible health effects of electro-magnetic fields (EMF) armless, or “Delta” construction began to gain favor. “Delta” power line configuration involves mounting two conductors on one side of a pole and attaching the third conductor in between them on the opposite side of the pole; this provides equal spacing between all three conductors. While the Delta and Vertical configurations reduce the levels of EMF, they present a greater obstacle to low-flying birds than does the flat design. Accordingly, on October 15, 2007 KIUC formally adopted guidelines that mandate use of flat designs for all newly constructed lines except in special circumstances.

[49] In the unlikely event that KIUC is forced during emergency repairs to use outdoor lights which do not meet these performance standards, KIUC will replace the sub-standard lights with lights that meet the performance standard as soon as possible, but in no event less than twelve months after the emergency repair is completed.

[50] For example, recent tests by Philips in the Netherlands suggest that greenish-tinged lights may produce less glare than orange/yellow or white lights and are well received by the public, boaters, ships in their use at docks. If proven successful from a performance standpoint, such technology could replace Metal halide and some wattages of high pressure sodium (HPS). See, for example *“NAM and Philips help birds migrate safely across North Sea”* (August 24, 2007), http://www.newscenter.philips.com/sites/philipsnews/about/news/news/20070824_Bird_Lighting.page.

5.5.2 PROMOTE BIRD-FRIENDLY PRACTICES BY ITS MEMBERS/CUSTOMERS

KIUC will continue its practice of promoting bird-friendly practices by its members. These efforts will include the following:

- KIUC will continue to encourage developers of new commercial and residential developments on Kaua‘i to underground power lines in the areas to be developed. This will reduce impacts on the Covered Species.[51]
- Second, KIUC will encourage the County of Kaua‘i to adopt a new zoning ordinance requiring that all new developments on the island locate all of their utility lines underground.
- Third, KIUC will support efforts to actively pursue alternative sources of funding to mitigate the high cost of undergrounding lines.

5.6 MEASURES TO MITIGATE UNAVOIDABLE IMPACTS

5.6.1 COMPLETED MITIGATION MEASURES

As noted in Section 5.4.1, concurrent with developing its HCP KIUC also implemented many "interim conservation measures." Those ICMs which mitigated unavoidable impacts, and have already been completed, are noted briefly below in order to provide a context for the ongoing mitigation measures described in Section 5.6.2. These completed measures are described in more detail in Appendix E:

- *Provided Support for Operation of Save Our Shearwaters Program During 2003 and 2004*.
- *Prepared Operations Manual in 2005 for Enhanced & Expanded SOS Program ("SOS+")*.
- *Implemented SOS+ in 2005-2009 under DLNR Oversight*.[52]
- *Conducted Field Evaluations of Five Potential Sites for Colony Enhancement*.
- *Evaluated and Drew Conclusions from the Colony Site Field Surveys*.
- *Analyzed Feasibility of Satellite & Radio Transmitter Technology For Tracking Seabirds Retrieved & Released by SOS+ Program*.
- *Consolidated, Standardized and Analyzed 25-Years of SOS Data on the Covered Species*.
- *Prepared & Distributed "Data Report and Analysis: Save Our Shearwaters Program 2003 Update"*.
- *Analyzed 25-Years of SOS Data, Then Prepared and Distributed "Data Report and Analysis: Save Our Shearwaters Program 2004 and 2005 Update*".
- *Monitored and Served as Clearinghouse for information on Latest Developments in Relevant Technologies*.
- *Assisted with Research On Retrieved Birds*.
- *Contributed Funds Towards Implementation of a Seabird Predator Control Project on Lehua Island*.

[51] An example of such undergrounding is described in more detail in Section 2.2.2.1. It involves the undergrounding of an existing overhead power line in the greater Po‘ipū area as well as the use of underground lines in residential areas that are part of the new Kukui‘ula development.

[52] During the years 2003 through 2008, when KIUC either provided necessary funding and technical support for SOS (2003-04), or KIUC itself implemented SOS (2005-07), or KIUC provided funds to the Kauai Humane Society to implement SOS (2008), the SOS program retrieved and released back to the wild approximately 2,000 individual members of the Covered Species. As noted previously, these downed birds would have died without the efforts of the SOS Program.

- *Conducted a Public Education and Awareness Campaign Each Summer Regarding Seabird Fallout, Methods of Reducing Seabird Impacts, and Public Participation in the SOS+ Program.*
- *Assured Scientific Oversight and Quality Control in Implementation of SOS+.*

5.6.2 ONGOING AND PROPOSED MITIGATION MEASURES

In addition to the completed mitigation measures implemented concurrently with the development of this HCP, KIUC proposes to implement the additional measures indicated below.

5.6.2.1 Fully Fund Implementation of the Current SOS+ Manual for the Term of the HCP

The SOS+ program as provided for in the updated *SOS Manual* provides a substantial conservation benefit to the Covered Species. It serves to both minimize the impacts of KIUC facilities (to the extent the program retrieves and successfully releases birds downed as a result of KIUC facilities), and 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).[53] As noted previously, downed seabirds will almost certainly die if not retrieved, treated, and released by the program. Consequently, SOS+ saves literally hundreds of individual Covered Species birds each year.[54]

Consequently, through and for the duration of this HCP, KIUC will annually provide sufficient funds to the Kaua'i Humane Society (KHS) or another suitable entity approved by DLNR and USFWS for it to fully implement SOS+ in accordance with the current SOS+ Manual.[55,56] KIUC will itself implement the community outreach component of the SOS+ program, and provide KHS with technical support as needed.

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

- Within 30 days of the date the Agencies approve the HCP and issue the ITP and ITL, KIUC will execute an Agreement or Contract with KHS, a copy of which will be provided to the Agencies, stipulating that KIUC will provide funding to KHS in the amount of $150,000 per year (in 2010 dollars), and that KHS will utilize that funding to fully implement the SOS+ program consistent with the current version of the SOS Manual.

[53] The vast majority of the SOS Program's effect is mitigation as the birds that it retrieves and releases back into the wild appear not to have been brought down by direct contact with KIUC facilities; for example, extremely few retrieved birds show an indication of having collided with a powerline or any other object. Instead, it appears that nearly all of the retrieved and released birds have become grounded as a result of other, non-KIUC, causes or of general area lighting. With respect to the latter, KIUC is responsible only for the limited amount of light that continues to escape from the fully shielded streetlights that it continues to operate on behalf of the County and from the few fully shielded lights that are necessary for safety and security at a few of its facilities, e.g., Port Allen Generating Station. To the extent that the SOS Program retrieves and ultimately releases back to the wild birds downed as a result of KIUC facilities or activities, that effort would constitute a minimization of KIUC impacts, rather than mitigation.

[54] As described previously, in 2005 KIUC assumed complete responsibility for staffing and implementing SOS+ under DLNR oversight. This undertaking, while very successful, also proved to be very challenging for KIUC, which is too small to support an in-house environmental regulatory department (unlike some other, larger utilities). Its experience led KIUC to conclude that it would be better if operational responsibility for SOS+ could and should be run by another entity whose core mission is more closely related to seabird conservation, using funds provided by KIUC. As noted above, in 2006 KIUC established a working partnership with the Kauai Humane Society (KHS) in implementing SOS+, and that partnership continued in 2007 and 2008, with the full support of DLNR and USFWS. In 2008 KHS took over SOS+ implementation, using funds provided by KIUC. KHS was eager to do so, and both DLNR and USFWS expressed full support for this approach. Going forward, KIUC anticipates that KHS will continue to implement the SOS+ program, using funds to be provided by KIUC pursuant to this HCP.

[55] For the 2009 SOS season, KIUC will also fully fund implementation of SOS+ by KHS, even though this HCP will not have been approved by the Agencies by the start of the season in mid-September.

[56] As noted in this HCP and in the Manual, the SOS+ program is to be evaluated each year, and appropriate modifications are to be considered that could improve the program. KIUC's expectation is that any such modifications would reflect adjustments to the current SOS+ program, rather than significant additions to the overall SOS+ effort and associated costs. However, KIUC also recognizes that the SOS+ program could expand if other sources of funds become available in the future (e.g., from grants, or from mitigation measures included in other HCPs addressing the Covered Species), in which case the Manual could be revised to reflect such program expansion. KIUC's funding obligation, however, will remain as specified in this section.

- 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 with technical support on an as-needed basis, at an annual cost of up to $25,000.[57]
- KHS will prepare the annual SOS Data Report and submit it to DLNR and to the USFWS.
- KHS will prepare and distribute an annual report on the SOS+ program as required by the SOS Manual. The annual report will include a description of the community outreach and education efforts implemented directly by KIUC.
- Should KIUC become aware of any problems associated with implementation of the SOS+ program, it will notify both USFWS and DOFAW within 30 days, and all Parties will then work cooperatively to achieve a solution to the identified problem within the following 30 days.
- KIUC is ultimately responsible for ensuring that the SOS+ program is fully implemented as described in the SOS Manual.

5.6.2.2 Fund Seabird Colony Management and Predator Control in Limahuli Valley

In late 2006, USFWS and DLNR identified a specific location where Covered Species breeding colony management work might be feasible. The site, located in the Upper Limahuli Preserve (owned by the private, non-profit National Tropical Botanical Garden (NTBG)) was identified by the Kaua‘i Endangered Seabird Recovery Project (KESRP)[58] survey team during a summer 2006 site visit. The purpose of the trip was to identify and document the pattern and distribution of Newell’s Shearwater, Hawaiian Petrel, and Band-rumped Storm-Petrel calling and flight activity as indicators of colony areas. The reconnaissance-level trip was intended to determine whether a significant colony of any of the Covered Species exists there, and to begin defining the kind of follow-up work that would be needed to obtain additional, more definitive information necessary for effective habitat management.

The survey identified concentrations of Hawaiian Petrel and Newell’s Shearwater calling activity, as well as active burrows and other evidence of breeding activity of both species, in both major valleys of the Upper Limahuli Preserve. The site is located amongst a mature mixed ohi‘a dominated forest along the Wainiha/Limahuli ridgeline. Night-vision surveys also documented large numbers of birds traveling south along the Wainiha/Upper Limahuli ridgeline suggesting many birds also travel through Limahuli to access other breeding areas further inland, possibly in Wainiha Valley, Hono o Nā Pali and elsewhere.

KIUC organized a meeting with the KESRP, NTBG, USFWS and DOFAW in late November 2006 to evaluate potential Covered Species conservation activities at this site collectively. Since that time KIUC has had several additional meetings and communications with the NTBG and KESRP over how KIUC might provide funding assistance for Covered Species management activities in Limahuli through this HCP. The NTBG has been extremely supportive of this effort, and since the November 2006 meeting KIUC has worked closely with KESRP and NTBG on their effort to develop an integrated on-ground natural resource management plan that would benefit the Covered Species.

NTBG has received a grant of approximately $340,000 from the USFWS to construct an ungulate proof fence around approximately 400-acres of the Upper Limahuli Preserve. Unfortunately, environmental disclosure and permitting processes have delayed the start of construction of the proposed fence, and construction costs have increased to the point that the grant funds are no longer

[57] These funding levels are based on the amounts that KIUC actually expended for the 2008 SOS season and expects to spend during 2009, which amounts reflect the experience gained by KIUC in implementing SOS in prior years, and which proved to be sufficient to successfully implement the *SOS Program Manual* in 2008.

[58] The Kaua‘i Endangered Seabird Recovery Project is a collaborative effort between the University of Hawaii, the USFWS and DOFAW.

sufficient. NTBG has also received an additional grant of approximately $180,000 to control alien invasive plant species within the preserve area. Based on the collective discussions to date, the agencies, NTBG and KIUC all agree that pooling all available financial resources to develop a broad, landscape-level conservation effort in the Upper Limahuli Preserve which encompasses multi-taxa and more than one order will produce greater benefits to the Covered Species and other resources than more narrowly focused efforts.

As currently envisioned, and with the understanding that it will take significantly more on-ground work than has currently been conducted to complete an integrated natural resource management plan for the proposed 400-acre management area and adjacent control (monitoring) sites, NTBG and KESRP have identified the following list of tasks and associated cost estimates, which would be implemented over a five year period:

- Construction of an ungulate-proof fence around an approximately 400-acre portion of the Upper Limahuli Valley.
- The development and implementation of a comprehensive ungulate removal and management program.
- The development and implementation of a feral cat removal and management plan.
- Implementation of selective rodent control where practicable, with the long-term hope of implementing an aerial rodenticide program.
- Development and implementation of an active alien plant control and monitoring program.
- Development and implementation of a bird monitoring program.

These types of activities will also require the development and maintenance of a number of on-ground structures and infrastructure to support field crew activities, including:

- Development and maintenance of helicopter landing zones.
- Siting and construction of a minimum of two weatherproof living structures.

These efforts will result in significant beneficial effects for at least two (and possibly all three) of the Covered Species addressed in this HCP; they will also benefit numerous listed and/or rare native plant species and the ecosystem as a whole. Specific tasks and proposed implementation budgets prepared by NTBG and KESRP to develop and implement an integrated natural resources management plan within the Limahuli Preserve are reproduced in Table 5.2 below.

For each year that this HCP and associated incidental take authorizations are in effect, KIUC will fund mitigation work conducted as part of the seabird breeding colony habitat management project currently under way at the National Tropical Botanical Garden (NTBG) in the upper Limahuli Valley (or, should this Limahuli Valley project become unavailable, then at an alternative site(s) that the Agencies and KIUC agree would provide comparable conservation benefits) as follows: (i) the actual cost of 50% of infrastructure, helicopter and project management costs or similar activities which provide benefit to the species and environment, and contribute to the recovery of the species, per agreement with the Parties and (ii) 100% of predator control and bird monitoring costs up to, but not exceeding the amounts shown in Table 5.2.

Table 5.2 Total Limahuli Preserve Budget

ITEM	2010	2011	2012	2013	2014	TOTAL
BASIC Helicopter requirements	$17,820	$41,820	$41,820	$41,820	$41,820	$185,100
PROJECT management labor costs	$12,000	$12,000	$12,000	$12,000	$12,000	$60,000
INFRASTRUCTURE						
Fence maintenance - ongoing	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Remote landing zone improve. & construction	$9,000	$5,500	$1,000	$1,000	$1,000	$17,500
Upper Limahuli Base camp improvement	$11,900	$1,100	$1,100	$1,100	$1,100	$16,300
Upper Limahuli Remote camp construction	$8,600	$1,100	$1,100	$1,100	$1,100	$13,000
VHF Radio Repeater station	$16,000	$0	$0	$0	$0	$16,000
Infrastructure Subtotal	**$65,500**	**$27,700**	**$23,200**	**$23,200**	**$23,200**	**$162,800**
ALIEN VERTEBRATE CONTROL						
Equipment	$17,450	$13,604	$13,825	$14,200	$13,825	$72,904
Labor	$2,000	$43,800	$51,000	$51,000	$51,000	$198,800
Alien Vertebrate Control Subtotal	**$19,450**	**$57,404**	**$64,825**	**$65,200**	**$64,825**	**$271,704**
ALIEN PLANT CONTROL						
Equipment	$1,282	$915	$1,082	$915	$1,032	$5,225
Labor	$11,000	$11,000	$11,000	$11,000	$11,000	$55,000
Helicopter over-flight surveys	$0	$2,240	$0	$2,240	$0	$4,480
Alien Plant Control Subtotal	$12,282	$14,155	$12,082	$14,155	$12,032	$64,705
BIRD MONITORING						
Labor	$19,800	$28,300	$29,800	$29,800	$29,800	$137,500
Bird monitoring equipment	$15,550	$5,650	$5,650	$8,050	$5,650	$40,550
Social attraction & chick translocation equip.	$4,500	$5,750	$4,250	$4,250	$250	$19,000
GIS mapping	$0	$3,620	$0	$3,620	$0	$7,240
Additional Helo reqmts. for slings or pax	$6,720	$6,720	$6,720	$6,720	$6,720	$33,600
Bird Monitoring Subtotal	$46,570	$50,040	$46,420	$52,440	$42,420	$237,890
NATURAL DISASTER RECOVERY RESERVE	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
INDIRECT COSTS (at 24% of direct costs)	$44,069	$51,148	$50,483	$52,515	$49,511	$247,728
GRAND TOTAL	**$227,691**	**$264,267**	**$260,830**	**$271,330**	**$255,808**	**$1,279,927**

Note: All amounts are in 2010 U.S. dollars; actual funding amounts for years 2011-2014 will be adjusted for inflation using agreed-upon indices.

Source: KESRP and NTBG – July 15, 2009 spreadsheet.

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

- KIUC, with the assistance of USFWS and DOFAW, will enter into an agreement with NTBG or other appropriate entity that stipulates as follows:
  - NTBG or other appropriate entity will prepare and submit to the Parties, by September 15, 2009, a detailed proposal/draft contract for carrying out the work that KIUC would fund in Limahuli Valley for the dollar amounts shown in Table 5.2.
  - The Parties will provide to NTBG or other appropriate entity any written comments on the draft scope of work within 30 days (i.e., by October 15, 2009).
  - NTBG or other appropriate entity will sign a formal letter of intent to execute a contract for the required work within 45 days of receipt of written comments (i.e., by December 1, 2009).
  - KIUC will convey to NTBG or other appropriate entity the funds budgeted in the final scope of work for Year 1 work within 30 days of permit issuance or at such earlier date as the parties may agree is appropriate;
  - In subsequent years KIUC will convey to NTBG or other appropriate entity the funds required for the next year's work by December 1 of the preceding year (e.g., funding for CY 2012 will be paid by December 1, 2011.
  - NTBG or other appropriate entity will prepare and circulate to the Parties by February 1 each year a draft report detailing the work implemented with KIUC funds during the prior calendar year.
  - The Parties will provide to NTBG or other appropriate entity any written comments on the draft report by March 1.
  - NTBG or other appropriate entity will prepare and distribute a final report by April 1.
  - NTBG or other appropriate entity will ensure that the work is implemented in accordance with this schedule, and in the event that the work is not completed, NTBG or other appropriate entity will return all funds for unmet deliverables to KIUC.
- If NTBG or other contracted party fails to complete some or all of the work, the Parties will pursue having similar work, with an equivalent conservation benefit, performed at an alternative site using the remaining funds returned to KIUC. If no alternative site is found and agreed upon within six months, then KIUC will deposit the remaining funds into the Endangered Species Trust Fund for use on activities approved by the Parties, to reach the stated objectives in the HCP.

5.6.2.3 Fund Two-Year At-Sea Capture Study to be Conducted by DOFAW

KIUC will fund the actual cost of a two-year at-sea capture study. DOFAW will be responsible for finalizing the specific methodology, and DOFAW or another qualified entity approved by the Parties will be responsible for conducting the surveys, and for preparing an interim (year 1) and end-of-study report. The overall study objective is to assess the feasibility of a Newell's Shearwater at-sea recapture program that would complement the existing banding effort undertaken for the Save Our Shearwater program. DOFAW believes that if the method proves feasible, it will produce empirical evidence concerning the survival rate of SOS-banded birds. These data may also provide ancillary information on how long these birds live. KIUC's contribution will not exceed $40,000 per year for each of the two years. This is more than sufficient to cover the budget reproduced in Table 5.3.

As DOFAW presently envisions it, the proposed study will entail:

- Locating and surveying (from tourist vessels and/or from fixed-wing aircraft) rafting groups of Newell's Shearwaters off the northwest coast of Kaua'i.
- Capturing Newell's Shearwaters at sea at located areas using common methods of scoop-netting and undertaking band recovery efforts.

- Analyzing the data collected during this effort and preparing a report describing the feasibility, cost, and usefulness of collecting and using data from periodic surveys of this sort to develop a database that has sufficient statistical power to extrapolate survival rates of Newell's Shearwaters and Hawaiian Petrels retrieved and released by the SOS Program.

Table 5.3 Budget for Two-Year At-Sea Capture Study

Item(s)	***Amount (US$/Year) (2010 dollars)***
16 fixed-wing aerial surveys ($200 per hour, 1 hour per survey) to locate rafting areas on NW coast of Kauai. 2 surveys per month from March - November	$7,650.00
16 boat-based surveys on regularly scheduled tourist trips (two technicians per trip, $120 per person per passage) to locate rafting areas on NW coast of Kauai. 2 surveys per month from March - November. (note that we have contacted boat operators to potentially donate these passages - this may reduce funds required if a positive response is received)	$7,960.00
8 boat charters (1 charter = 6 hours) to undertake directed surveys for at-sea captures. All 8 surveys to be undertaken in July when peak visitation rates are expected (nightly return to burrows plus presence of non-breeding birds)	$16,480.00
Salary for at-sea capture expert to attend 3 survey efforts (David Ainley)	$1,920.00
Equipment, including scoop nets, capture bags, personal protective equipment, misc.	$1,000.00
Training costs for staff to attend USCG skills and seamanship course	$240.00
Subtotal:	$35,250.00
Contingency @10%:	$3,525.00
Administrative Overhead @3%	$1,163.00
Grand Total	$39,938.00
Note A detailed write-up of this exists within a grant application.	
Source: Nick Holmes, Worksheet from "KIUC Mitigation Funds DRAFT 13DEC2008.	

DOFAW believes this information will be useful in its overall management of the species. If sufficient data are gathered it may also shed light on the longevity of these species, which will aid in population modeling.

The specific obligations for this undertaking, and the associated measures of success, are as follows (and are also identified in the attached Implementing Agreement which specifies DOFAW's obligations):

- DOFAW or another qualified entity approved by the Parties will prepare a draft study implementation plan, and scope of work, and circulate them by September 30, 2009 to KIUC and USFWS for review and comment; the scope of work will include a detailed budget, and the actual cost of the work will not exceed a total of $80,000 (2010 dollars).
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2009.

- DOFAW or another qualified entity approved by the Parties will finalize the study implementation plan, and scope of work, by November 30, 2009.
- KIUC will convey to the Endangered Species Trust Fund the funds budgeted in the final scope of work, within 30 days of the Agencies' approval of the HCP and issuance of the permits.
- DOFAW or another qualified entity approved by the Parties will ensure that all required permits and approvals needed to implement the study are in place by March 2010.
- DOFAW or another qualified entity approved by the Parties will implement the study during the peak season of offshore seabird congregation each year (approximately June and July).
- DOFAW or another qualified entity approved by the Parties will prepare a draft Year 1 report, and circulate it by September 30, 2010 to KIUC and USFWS for review and comment.
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2010.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the final Year 1 report by November 30, 2010.
- DOFAW or another qualified entity approved by the Parties will prepare a draft Final report covering the entire two year study, and circulate it by September 30, 2011 to KIUC and USFWS for review and comment.
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2011.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the Final report covering the entire two year study by November 30, 2011.
- If DOFAW or another qualified entity approved by the Parties fails to complete any of the above tasks, the Parties may find another entity to perform the remaining work with the remaining funds.

5.6.2.4 Fund Update of Spear et al.'s (1995) At-Sea Seabird Population Estimates

The USFWS has no updated estimates of at-sea seabird populations comparable to those prepared by Spear *et al*. in 1995. It has indicated that the absence of this information makes it difficult for it to estimate the current population of the Covered Species, and in turn the effects of KIUC facilities and operations on such populations. KIUC will fund the actual cost up to a maximum of $100,000 (which includes a contingency factor) of a one-time analysis of the most recent National Oceanic and Atmospheric Administration (NOAA) research vessel data to update 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. As DOFAW envisions it, the study would be an analysis of the already-collected NOAA at-sea data which would provide regulators with information about the birds' populations, as well as at-sea trends.

The specific obligations for this undertaking, and the associated measures of success, are as follows (and are also identified in the attached Implementing Agreement):

- KIUC, with the assistance of USFWS and DOFAW, will enter into a Memorandum of Agreement or other suitable instrument with NOAA (or another entity approved by the Parties and NOAA) within 30 days of the date the Agencies approve the HCP and issue the ITP and ITL that stipulates as follows:
  - NOAA (or other approved entity) will prepare and submit to the Parties, within three months of the Agencies' approvals of the HCP and issuance of the permits, a draft scope of work for analyzing the at-sea seabird data in order to update population estimates as originally developed

by Spear *et al*. (1995); the scope of work will include a detailed budget, and the actual cost of the work will not exceed $100,000.

- The Parties will provide to NOAA (or other approved entity) any written comments on the draft scope of work within 30 days.
- NOAA (or other approved entity) will issue the final scope of work within an additional sixty days (i.e., within 6 months of HCP approval and permit issuance).
- KIUC execute a contract with NOAA or another qualified entity approved by the Parties providing for the conduct of the work and will convey to NOAA (or other approved entity) the funds budgeted in the final scope of work within 30 days of the date the ITP/ITL have been issued.
- NOAA (or other approved entity) will prepare and circulate to the Parties a draft report within 18 months of HCP approval and permit issuance.
- The Parties will provide to NOAA (or other approved entity) any written comments on the draft report within 60 days of its receipt.
- NOAA (or other approved entity) will prepare and distribute a final report within 24 months of HCP approval and permit issuance.
- NOAA (or other approved entity) will ensure that the work is implemented in accordance with this schedule, and in the event that the work is not completed, NOAA (or other approved entity) will return all funds for unmet deliverables to KIUC.

- If NOAA (or other approved entity) fails to complete some or all of the work, the Parties may find another entity to perform the remaining work with the remaining funds returned to KIUC.

5.6.2.5 Fund Two-Year Auditory Survey to Locate Additional Seabird Breeding Colonies

KIUC will provide an amount not to exceed $98,000 per year (which includes a contingency factor of 10%) to support a two-year auditory survey to be implemented by DOFAW or another qualified entity approved by the Parties (see Table 5.4). The purpose of this study is to locate additional seabird breeding colonies where habitat management work could be performed in the future. As DOFAW presently envisions it, the surveys would be conducted in Nā Pali, Hono o Nā Pali, Mānoa Valley (adjacent to the Upper Limahuli Preserve), Lumahaʻi, Hanalei, Makaleha, Wainiha Pali, and Waiʻaleʻale.

The specific obligations for this undertaking, and the associated measures of success, are as follows (and are also identified in the attached Implementing Agreement which specifies DOFAW's obligations):

- DOFAW or another qualified entity approved by the Parties will prepare a draft study implementation plan, and scope of work, and circulate them by September 30, 2009 to KIUC and USFWS for review and comment; the scope of work will include a detailed budget, and the actual cost of the work will not exceed $98,000 (2010 dollars).
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2009.
- DOFAW or another qualified entity approved by the Parties will finalize the study implementation plan, and scope of work, by November 30, 2009.
- KIUC will convey to the Endangered Species Trust Fund the funds budgeted in the final scope of work within 30 days of the Agencies approval of the HCP and issuance of the permits.
- DOFAW or another qualified entity approved by the Parties will ensure that all required permits and approvals needed to implement the study are in place by March 2010.

- DOFAW or another qualified entity approved by the Parties will implement the study during the peak season each year (approximately June and July).
- DOFAW or another qualified entity approved by the Parties will prepare a draft Year 1 report, and circulate it by September 30, 2010 to KIUC and USFWS for review and comment.
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2010.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the final Year 1 report by November 30, 2010.
- DOFAW or another qualified entity approved by the Parties will prepare a draft Final report covering the entire two year study, and circulate it by September 30, 2011 to KIUC and USFWS for review and comment.
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by October 31, 2011.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the Final report covering the entire two year study by November 30, 2011.

Table 5.4 Estimated Annual Cost for Surveys for Additional Seabird Colonies

Budget Item	***Amount***
Helicopter Time, 15 hours	$15,000.00
Labor, 3 staff per trip, $5000 per trip, 9 trips total	$45,000.00
GIS etc	$10,000.00
Biological Principal Investigator Writing	$8,000.00
Biological Coordinator Coord & Writing	$8,700.00
Administrative Cost (@3%)	$2,601.00
Subtotal:	$89,301.00
Contingency (@10%)	$8,930.00
GRAND TOTAL	$98,231.00
Source: DOFAW, Mitigation Worksheet from "KIUC Mitigation Funds DRAFT 13DEC2008.	

If DOFAW or another qualified entity approved by the Parties fails to complete any of the above tasks, the Parties may find another entity to perform the remaining work with the remaining funds.

5.6.2.6 Fund Development and Implementation of Appropriate Underline Monitoring Program

In order to increase the amount and quality of data that are available concerning seabirds that may be affected by KIUC facilities, KIUC will cooperate with DOFAW in DOFAW's development, and DOFAW or another qualified entity approved by the Parties's implementation, of an underline monitoring program (field and analytical methods) that provides information that the USFWS and DOFAW need for purposes of issuing long-term take authorization. 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. KIUC will provide funds to DOFAW to offset the cost of such monitoring for a period of two years, at a cost not to exceed $180,000 per year. KIUC will also fund or conduct additional follow-up

monitoring in the remaining years of this HCP as later determined by the Parties to be appropriate based on the results of the first two years of monitoring.

The specific obligations for this undertaking, and the associated measures of success, are as follows (and are also identified in the attached Implementing Agreement which specifies DOFAW's obligations):

- DOFAW or another qualified entity approved by the Parties will prepare a draft study implementation plan and scope of work for the first year of work, and circulate them by October 15, 2009 to KIUC and USFWS for review and comment. The scope of work will address the goals of (1) developing and implementing field monitoring during the term of this HCP, and (2) developing an analytical method(s) to assess statistical power of different monitoring approaches (and respective costs) to estimate take levels (including what would need to be done to obtain acceptable confidence intervals). The scope of work will include a detailed budget, and the actual cost of the first year of work will not exceed $180,000 (2010 dollars).
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, by November 15, 2009.
- DOFAW or another qualified entity approved by the Parties will prepare and distribute a final study implementation plan, and scope of work, within 30 days of receipt of KIUC and USFWS comments.
- KIUC will convey to the Endangered Species Trust Fund the funds budgeted in the final scope of work, within 30 days of receipt of the final study implementation plan and scope of work.
- DOFAW or another qualified entity approved by the Parties will ensure that all required permits and approvals needed to implement the scope of work, including approvals for site access, are in place within three months of the Agencies' approval of the HCP and issuance of the permits.
- DOFAW or another qualified entity approved by the Parties will implement the study in accordance with the final study implementation plan and scope of work within 3 months of permit issuance.
- DOFAW or another qualified entity approved by the Parties will prepare a draft Year 1 report, and circulate it by February 1 (covering the previous calendar year) to KIUC and USFWS for review and comment. This report will also include a draft study implementation plan and scope of work for the second year of work, and a detailed budget, and the actual cost of the second year of work will not exceed $180,000 (2010 dollars).
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, within 30 days.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the final Year 1 report within an additional thirty days.
- KIUC will convey to the Endangered Species Trust Fund the funds budgeted for year two within 30 days of receipt of the final Year 1 report.
- DOFAW or another qualified entity approved by the Parties will prepare a draft Final report covering the entire two year study, and circulate it by February 1 (covering the previous calendar year) to KIUC and USFWS for review and comment.
- KIUC and USFWS will complete their review, and provide any written comments to DOFAW or another qualified entity approved by the Parties, within 30 days.
- DOFAW or another qualified entity approved by the Parties will complete and distribute the Final report within an additional 30 days.
- If DOFAW or another qualified entity approved by the Parties fails to complete any of the above tasks, the Parties may find another entity to perform the remaining work with the remaining funds.

5.6.2.7 Re-Allocation of Mitigation Project Funds Among Projects

The mitigation project funds which KIUC has committed to spend on the specific projects described in Sections 5.6.2.2 through 5.6.2.6, above, are based on initial cost projections developed by the Parties. In the event that the actual cost of implementing any of these specific projects is greater than the amount projected, that cost increase may be met by reallocating up to 20% of the cost of one or more of the other projects, so long as the stated goals and objectives of those other projects will still be satisfied.

5.6.2.8 Seek to Have NTBG Grant a Conservation Easement in Upper Limahuli Valley

If the HCP and associated incidental take authorizations remain in effect beyond three years, then in the fourth and fifth years KIUC will seek to have the NTBG grant a conservation easement for the Upper Limahuli Valley or provide other equivalent assurances to ensure that the Upper Limahuli Valley will continue to be preserved and managed for the benefit of breeding seabirds (and other species of plants and animals) in perpetuity. At its option, KIUC may implement this measure in advance of year four.

5.6.2.9 Potential Additional Mitigation in Years 4 and 5

If, on the second anniversary after permit issuance the parties agree that the HCP and associated incidental take authorizations are likely to need to remain in effect beyond three years, then the parties shall meet and evaluate, based on new information generated through the implementation of the mitigation measures described above, what additional measures should be implemented in Years 4 and 5 beyond the measures described above. Such additional mitigation measures could include, for example, performing a population viability analysis, conducting radar surveys of the Covered Species, conducting habitat management activities in the Wainiha Valley or other suitable location, etc. The total annual cost of such additional mitigation measures shall not exceed $130,000 (the approximate difference between the committed mitigation expenditures in Year 2 and in Year 4 [see Table 7.2]).

5.7 CONSERVATION MEASURES AND NET ENVIRONMENTAL BENEFIT

Under Hawai‘i’s endangered species statute, an HCP must increase the likelihood that the Covered Species will survive and recover, and must provide a net environmental benefit [HRS §§195D-4(g) and 21(b)]. This HCP meets that standard.

As explained above, through this HCP KIUC has minimized and is continuing to minimize the impacts of its streetlights and facility lighting by replacing previously unshielded lights with shielded lights, modifying lighting at its power stations, and adopting and adhering to standards that will ensure that future lighting maintains or exceeds the present standards. KIUC is also minimizing the impacts of its power lines and other facilities by implementing physical modifications to certain locations determined to present to greatest risk of seabird collisions (see, for example, the discussion in Section 5.4.2.2 of its participation in a project that will result in the undergrounding of 1.7 miles of power lines between the Lydgate Substation and the Kapa‘a Bypass Road, a segment which includes the Wailua River area in which a relatively large number of downed seabirds are retrieved by the SOS program each year).

Unavoidable impacts of KIUC’s facilities remain, but its proposed conservation program mitigates those impacts and provides a net benefit to the Covered Species. Even using estimates of the effects of KIUC facilities that are higher than those anticipated, the habitat improvement and other mitigation measures described in this Chapter would increase the likelihood of species survival and recovery and produce a net environmental benefit. The principal reason for this is that the KIUC-supported SOS+ program leads to the retrieval and safe release of far more birds that are downed by causes unrelated to KIUC’s activities than its facilities adversely affect.

This conclusion is consistent with findings reported by Ainley, *et al*. (1995:47-48), who assessed the effectiveness of the original SOS program in mitigating the impact of power line mortality on fledglings. Their report observed that few of the downed birds that are aided by the SOS effort would recover on their own and concluded:

> *"Whatever parameter values one uses for reproductive success and breeding probability, however, the results are qualitatively similar: the cessation of the SOS program would contribute significantly to the decline of the Kaua'i population of Newell's shearwaters."*

Stated another way, Ainley, *et al*. concluded that modeling results indicated that population decline in the Newell's Shearwater population would be almost twice as great in the absence of SOS as it would be in its presence.

Ainley, *et al*. conducted their analysis and reached this conclusion at a time when the SOS Program was run almost entirely by volunteers and when little effort had been made toward training the volunteers, to targeting specific areas with an eye to improving seabird retrieval rates, or to providing enhanced veterinary care for downed birds. Moreover, in the absence of a written, peer-reviewed operations manual for the SOS Program, there was limited ability to use each year's experience to improve the program in subsequent years and limited ability to coordinate the SOS Program with other species recovery efforts. This changed when KIUC began implementing the SOS+ Program in cooperation with DOFAW in 2005, and the improved program will continue to be supported as part of this HCP.[59] As a consequence, SOS can become an ever-more-effective means of assisting Covered Species recovery efforts.

Comparing the number of birds that are successfully released as a result of the KIUC-funded SOS Program shows that they exceed the requested take authorization by a substantial amount. Since the best available scientific evidence indicates that virtually all of these would have died were it not for the intervention of the SOS Program, KIUC's SOS+ efforts under the HCP would contribute more birds to the species' Kaua'i populations than its facilities and activities are adversely affecting. As a result, KIUC believes that the SOS+ program alone would be sufficient to satisfy the Chapter 195D standard for producing a net environmental benefit and increasing the likelihood of species survival and recovery.

Despite this, and to ensure beyond any reasonable doubt that this HCP will result in a net benefit, KIUC is also providing the funding necessary to perform substantial breeding colony management and predator control activities that will increase the number of fledglings. KIUC-funded research will also enhance knowledge of (and management capabilities for) at sea populations of the Covered seabird species. It will also help identify additional breeding colonies where active intervention could be beneficial and provide a basis for effective and efficient of seabird populations. These mitigation measures demonstrate that this HCP clearly exceeds the net benefit standard of Chapter 195D.

[59] During the years that KIUC has been involved with the SOS Program, and particularly during the years when it has had primary responsibility for implementing and/or fundingthe expanded and improved SOS+ Program (2005 onward), KIUC, with the strong support of the USFWS and DLNR, has significantly increased the number of field personnel on the ground during the fallout season. It has also instituted procedures that significantly increase the on-ground coverage and standardization of the SOS efforts. The improved SOS+ Program has a much-enhanced veterinary and rehabilitation intervention element which is showing early signs of increasing the survivability of weak and/or injured birds. As a result, the release rate among retrieved injured birds increased substantially, a change which tends to promote the survival of the species.

CHAPTER 6 – ALTERNATIVES CONSIDERED

Section 10(a)(2)(A) of the ESA requires applicants to consider alternative actions to the take of Federally listed species and explain the reasons why those alternatives were not selected. The *Endangered Species HCP Handbook* (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996) identifies two alternatives commonly considered in HCPs: (1) an alternative that would produce take below levels anticipated for the proposed project, and (2) a "no action" alternative, in which no permit would be issued and take would be avoided.

This Chapter of the HCP discusses four alternatives, including a "no action" alternative, a "no take" alternative, and two alternative conservation programs. None of these alternatives were selected for the reasons described below.

6.1 NO ACTION ALTERNATIVE

Under the "No Action" alternative, KIUC would not construct any new facilities, but would continue to operate its existing facilities and would not receive an incidental take permit from either the USFWS or DLNR for its existing facilities or related operations. Under this alternative, any "take" of the Covered Species by KIUC's facilities or related operations would be unauthorized. This alternative was not selected because (1) the continued growth of the residential population and the tourism industry on Kaua'i make it likely that KIUC will be required to construct new energy production and/or distribution facilities in the future, and (2) unavoidable take of the Covered Species by existing facilities and related operations would continue, but would neither be minimized, mitigated nor authorized.

6.2 NO TAKE ALTERNATIVE

The "No Take" alternative would require KIUC to modify its existing facilities and operations and to construct and operate all new facilities in such a way as to prevent any take of the Covered Species. As discussed in this HCP, certain existing KIUC facilities and operations presently result in take of Covered Species. These include: (i) electrical transmission and distribution lines and their supporting poles and towers, which the Covered Species may collide with, and (ii) street lights and facility lighting which may attract or disorient the Covered Species and cause "fallout."

Although certain modifications to KIUC facilities may have the potential to reduce the possibility of take, they cannot eliminate all potential for such take. The only ways that KIUC could eliminate the possibility of take from its facilities and operations are (1) undergrounding all overhead electrical lines (distribution lines, transmission lines, and individual services lines) and (2) eliminating street lighting, and divesting itself of all responsibility for the many utility poles which support telephone and cable television lines owned by other entities.

These approaches are neither feasible nor practicable. The existing KIUC system includes hundreds of miles of overhead electrical lines. The estimated cost of undergrounding electrical lines on Kaua'i is approximately $4-9 million per mile, depending on the type of line and site specific conditions.[60] Given that KIUC has among the highest electricity rates in the country and a very small base of

[60] Estimates in 2009 for different situations are as follows:

- Standard Single-Circuit Transmission $4.2 million - $5.3 million per mile;
- Standard Double-Circuit Transmission $4.5 million - $6.5 million per mile;
- Standard Single-circuit Transmission Plus 1-circuit of distribution - $6.9 million - $7.9 million per mile;
- Standard Single-circuit Transmission Plus 2-circuits of distribution - $7.7 million - $8.7 million per mile;
- Distribution Only, 1-circuit of distribution - $2.6 million per mile;
- Distribution Only, 2- circuits of distribution - $3.4 million per mile.

Above estimates are average costs including typical adders like risers, pullboxes and etc. Special digging conditions can vary estimates significantly up to 40%.

ratepayers, and given the financial requirements imposed by its federal and private sector lenders, undergrounding is not financially feasible. Also, it is not feasible to eliminate nighttime lighting for reasons of public health and safety.

6.3 BREEDING COLONY MANAGEMENT ONLY ALTERNATIVE

The HCP proposes a comprehensive conservation program designed to avoid and minimize impacts to the Covered Species, and to mitigate unavoidable impacts. With respect to mitigation, KIUC, the USFWS and DLNR considered extensively the possibility of instituting colony management that includes a predator control program at one or more Covered Species breeding colonies. The best available scientific information indicates that the largest threat to the Covered Species is predation by invasive species, such as rats, cats and pigs, and by habitat change brought about by invasive plant species. KIUC and the agencies initially believed that seabird breeding success could be substantially improved by instituting predator control measures and/or habitat enhancement measures at one or more existing breeding colonies, and that the mitigation measures in this HCP should focus almost exclusively on breeding colony management. Such measures could include fencing, trapping of mammalian predators, poisoning of rats, eradication of non-native vegetation and other similar means.

During the course of preparing this HCP, KIUC conducted field assessments at five different breeding colony sites on Kaua‘i. These sites were selected in consultation with the USFWS and DLNR as having the highest potential for success. After extensive field work, however, KIUC determined that predator control and/or habitat enhancement work could not be implemented effectively at any of these locations for one or more of the following reasons: the Covered Species appeared to no longer breed there; predator control work was not possible due to physical constraints (remote locations, lack of access, severe terrain); and on-the-ground predator control or habitat enhancement work using accepted and approved techniques was likely to result in more harm than benefit to the Covered Species (e.g., by creating new trails into colonies which could then be used by mammalian predators). Both USFWS and DLNR reached the same conclusion through extensive additional field research by DLNR and deliberations by the inter-agency Newell’s Shearwater Working Group.

The agencies have identified several locations at which Covered Species colony management and predator-control projects are currently available for immediate work and funding. These include, but are not limited to, Lehua Island, Lāna‘i, and Upper Limahuli Preserve. The latter is included as a location for mitigation measures in this HCP, but work at other locations could be substituted if that became necessary. While breeding colony management has excellent long-term potential for benefit to the species, it’s full benefits will not become available immediately. To provide immediate benefit, this short-term HCP also achieves mitigation through implementation of the expanded and enhanced SOS+ program. Consequently, a “breeding colony management only” alternative is not appropriate.

6.4 LONG-TERM KIUC-ONLY HCP

This HCP covering a relatively short period was prepared at the request of DOFAW and USFWS after those agencies reviewed the long-term HCP that KIUC submitted in October 2007. The agencies determined in December 2008 that they are unable to issue long-term take authorization based on existing information. As a result, this alternative is not feasible.

CHAPTER 7 – PLAN IMPLEMENTATION

7.1 HCP ADMINISTRATION

KIUC will administer this HCP under the direction of the USFWS and DLNR. In addition, outside experts may be periodically consulted, including biologists from other agencies (e.g., National Park Service, USGS), private conservation organizations, conservation partnerships (e.g., Nēnē Recovery Action Group), consultants, and academia. When appropriate, and as requested by USFWS and DLNR, HCP-related issues may be brought before the ESRC for formal consideration.

KIUC, USFWS, and DLNR will meet regularly while the permits are in place. The purpose of the regular meetings will be to evaluate the efficacy of monitoring methods, compare the results of monitoring to the estimated take, evaluate the success of mitigation, and develop recommendations for future monitoring and mitigation. Regular meetings will also provide opportunities to consider the need for adaptive management measures, or changes to the monitoring protocol or mitigation measures. In addition, KIUC will meet annually with the ESRC to provide updates of monitoring, mitigation, and adaptive management, and to solicit input and recommendations for future efforts. Additional meetings/conferences may be called by any of the parties at any time to address immediate concerns.

7.2 MONITORING AND REPORTING

Monitoring and reporting by KIUC will address both compliance and effectiveness. "Compliance Monitoring" will verify KIUC's implementation of the HCP terms and conditions. Annual reports and other deliverables as described below will be provided to USFWS and DLNR to allow them to verify that KIUC has performed all of the required activities and tasks on schedule. The ESRC will also review the annual reports, and make any appropriate recommendations to the Board of Land and Natural Resources. "Effectiveness Monitoring" will evaluate the impacts of the authorized take and the success of the HCP's mitigation program. The monitoring will involve surveys to make sure the authorized level of take is not exceeded, and the effects of take are minimized and mitigated to the maximum extent practicable (i.e., minimization and mitigation measures are sufficient and successful).

7.2.1 COMPLIANCE MONITORING

The purpose of compliance monitoring is to ensure that KIUC, and the other entities responsible for implementing the measures detailed in Chapter 5 using KIUC funds, are carrying out their obligations. KIUC, DOFAW, and the agencies whose work KIUC is funding as detailed in Chapter 5, will each continually track the status of their fulfillment of their respective obligations. Those obligations and the timetable for their fulfillment are described in Chapter 5, and are summarized in Table 7.1 below.

7.2.2 EFFECTIVENESS MONITORING

Effectiveness monitoring is intended to help determine whether the measures being implemented as part of the HCP's conservation program are as effective as had been predicted when the HCP was developed and approved. Effectiveness monitoring evaluates the effectiveness of an HCP's conservation measures in achieving the stated objectives and includes an evaluation of the ongoing impacts to the Covered Species.

Table 7.1 Compliance Tracking

Minimization/Mitigation Measure	*Lead Entity*	*Task*	*Deadline*
Wailua River Area Undergrounding (5.4.2.1)	KIUC	Engineer Underground Electric Lines: Kūhiō Highway – Kāpa‘a Bypass Road to Lydgate Substation	2009
Continue to Support Undergrounding (5.4.2.2)	KIUC	Continue looking for opportunities to underground lines in conjunction with Highway projects	Ongoing
		Continue to encourage developers to underground lines in new developments	
Continue Using Bird-Friendly Lighting (5.5.1)	KIUC	Continue to use only luminaries with cutoff optics	Ongoing
		Make outdoor lighting design guidelines available to public via its website (www.kiuc.coop) and other means	
Promote Bird-Friendly Practices (5.5.2)	KIUC	Continue to encourage developers to underground power lines	Ongoing
		Encourage the County of Kaua‘i to adopt a new zoning ordinance requiring that all new developments on the island locate all of their utility lines underground	
		Actively pursue alternative sources of funding to mitigate the high cost of undergrounding lines	
Fully Fund SOS+ (5.6.2.1)	KIUC	Execute agreement with KHS (or other agency-approved entity)	Within 30 days of permit issuance
Conduct SOS Community Outreach (5.6.2.1)	KIUC	Implement community outreach Program	Spring-Fall Each Year/Ongoing
Provide Technical Support for SOS (5.6.2.1)	KIUC	Provide KHS with technical support	Continuous
Operate SOS+ (5.6.2.1)*	KHS	Operate SOS+ Program in accordance with current version of SOS Program Manual	Spring-Fall/ Ongoing
	KHS	Prepare annual SOS Data Report and Submit to DLNR and USFWS	Annually by December 31
	KHS	Prepare and distribute annual SOS report	End of Q1 Annually
	KIUC	Notify DOFAW/DLNR of any problems with SOS	Within 30 days of discovery
	KHS	Resolve problems with SOS Work with DOFAW/DLNR	Within 30 days of notification

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
Breeding Colony Habitat Management and Predator Control: Year 1 (5.6.2.2)*	KIUC	Negotiate framework agreement with NTBG/Other that provides budget for seabird colony-related habitat protection/improvement	August 15, 2009
	NTBG/Other	Prepare a draft scope of work covering the work KIUC will fund	September 15, 2009
	USFWS/ DOFAW/KIUC	Comment on draft scope of work for colony work	October 15, 2009
	NTBG/Other	Sign formal letter of intent to execute a contract for required work	December 1, 2009
	KIUC	Convey funds for Year 1 work to Endangered Species Recovery Fund	Within 30 days of permit issuance or at such earlier date agreed upon by parties
	NTBG/Other	Prepare and circulate a draft report detailing the seabird colony work implemented with KIUC funds during Year 1	February 1
	USFWS/ DOFAW/ KIUC	Provide written comments on the draft Year 1 report	March 1
	NTBG/Other	Prepare and distribute a final report	April 1
Colony Work: Subsequent Years (5.6.2.2)*	NTBG/Other	Prepare a draft scope of work covering the work KIUC will fund for subsequent year	Minimum of 3 months before end of previous program year
	USFWS/ DOFAW/KIUC	Comment on draft scope of work for colony work	Within 30 days of scope submittal
	NTBG/Other	Sign formal letter of intent to execute a contract for required work	Within 45 days of receipt of comments on draft scope
	KIUC	Convey funds for Subsequent Year work	December 1, Prior to start of Program year
	NTBG/Other	Prepare and circulate a draft report detailing the work implemented with KIUC funds during the prior calendar year	Annually, February 1
	USFWS/ DOFAW/ KIUC	Provide written comments on the draft report	Annually, March 1
	NTBG/Other	Prepare and distribute a final report	Annually, April 1

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
At-Sea Capture Study (5.6.2.3)*	DOFAW or other qualified entity approved by the Parties	Circulate draft study plan and scope of work to Parties	September 30, 2009
	KIUC/USFWS	Review, provide comments to DOFAW or another qualified entity approved by the Parties	October 31, 2009
	DOFAW or other qualified entity approved by the Parties	Finalize study plan, scope of work	November 30, 2009
	KIUC	Deposit budgeted funds into Endangered Species Trust Fund	Within 30 days of permit issuance
	DOFAW or other qualified entity approved by the Parties	Insure that required permits are in place	March 2010
	DOFAW or other qualified entity approved by the Parties	Implement the study during peak season of seabird congregation	June and July 2010 and 2011
	DOFAW or other qualified entity approved by the Parties	Prepare draft Year 1 report and circulate to KIUC and USFWS	September 30, 2010
	KIUC and USFWS	Review draft Year 1 At-Sea Capture Study report and provide written comments to DOFAW or another qualified entity approved by the Parties	October 31, 2010
	DOFAW or other qualified entity approved by the Parties	Complete and distribute final Year 1 At-Sea Capture Study report	November 30, 2010
	DOFAW or other qualified entity approved by the Parties	Prepare draft Final report covering the entire At-Sea Capture Study and circulate to USFWS and KIUC	September 30, 2011

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
	KIUC and USFWS	Review draft Final At-Sea Capture Study report and provide written comments to DOFAW or another qualified entity approved by the Parties	October 31, 2011
	DOFAW or other qualified entity approved by the Parties	Complete and distribute final At-Sea Capture Study report	November 30, 2011
Update At-Sea Population Estimates (5.6.2.4)*	KIUC (w/ USFWS & DOFAW)	Enter into a Memorandum of Agreement or other suitable instrument with NOAA (or another approved entity) that provides for analyzing the at-sea seabird data in order to update population estimates as originally developed by Spear et al	Sign letter of intent within 30 days of permit issuance
	NOAA (or other approved entity)	Prepare and submit a draft scope of work and detailed budget for analyzing the at-sea seabird data in order to update population estimates	Within 3 months of permit issuance
	USFWS/ DOFAW/ KIUC	Provide NOAA (or other approved entity) written comments on the draft scope of work	Within 30 days of receipt of draft scope of work
Update At-Sea Population Estimates (5.6.2.4) (Continued)*	NOAA (or other approved entity)	Issue final scope of work	Within 60 days of receipt of written comments
	KIUC	Execute contract with NOAA (or other approved entity) for conduct of work and convey funds budgeted in the final scope of work to NOAA (or other approved entity)	Within 30 days of permit issuance
	NOAA (or other approved entity)	Prepare and circulate a draft report	Within 18 months of permit issuance
	USFWS/ DOFAW/ KIUC	Provide written comments on draft report to NOAA/other approved entity)	Within sixty days of report submittal
	NOAA (or other approved entity)	Prepare and distribute a final report	Within 24 months of permit issuance.
Two-Year Auditory Survey to Locate Additional Seabird Breeding Colonies (5.6.2.5)*	DOFAW or other qualified entity approved by the Parties	Prepare a draft study implementation plan, scope of work, and detailed budget and circulate them to KIUC and USFWS for review and comment.	By September 30, 2009
	KIUC & USFWS	Review draft study implementation plan, scope of work, and detailed budget, and provide any written comments to DOFAW or another qualified entity approved by the Parties	By October 31, 2009

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
	DOFAW or other qualified entity approved by the Parties	Finalize the study implementation plan and scope of work	By November 30, 2009
	KIUC	Convey the funds budgeted in the final scope of work to the Endangered Species Trust Fund	Within 30 days of permit issuance
	DOFAW or other qualified entity approved by the Parties	Ensure that all required permits and approvals needed to implement the study are in place	March 2010
	DOFAW or other qualified entity approved by the Parties	Implement the study during the peak season each year	June and July, 2010 and 2011
	DOFAW or other qualified entity approved by the Parties	Prepare a draft Year 1 report, and circulate it to KIUC and USFWS for review and comment	By September 30, 2010
	KIUC & USFWS	Review draft Year 1 report and provide any written comments to DOFAW or another qualified entity approved by the Parties	By October 31, 2010
	DOFAW or other qualified entity approved by the Parties	Complete and distribute the final Year 1 report	By November 30, 2010
	DOFAW or other qualified entity approved by the Parties	Prepare draft Final report covering the entire two year study, and circulate it to KIUC and USFWS for review and comment	By September 30, 2011
Continued Two-Year Auditory Survey to Locate Additional Seabird Breeding Colonies (5.6.2.5) (Continued)*	KIUC and USFWS	Review report and provide any written comments to DOFAW or another qualified entity approved by the Parties	By October 31, 2011
	DOFAW or other qualified entity approved by the Parties	Complete and distribute the Final report covering the entire two year study	By November 30, 2011

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
Fund Development and Implementation of Appropriate Underline Monitoring Program (5.6.2.6)*	DOFAW or other qualified entity approved by the Parties	Prepare a draft study implementation plan, scope of work, and detailed budget for the first year of work, and circulate them to KIUC and USFWS for review and comment	By October 15, 2009
	USFWS and KIUC	Review draft study implementation plan, scope of work, and detailed budget, and provide written comments to DOFAW or another qualified entity approved by the Parties	By November 15, 2009
	DOFAW or other qualified entity approved by the Parties	Prepare and distribute final study implementation plan, scope of work, and budget	Within 30 days of receipt of USFWS/KIUC comments
	KIUC	Convey to the Endangered Species Trust Fund the funds budgeted in the final scope of work	Within 30 days of receipt of final scope
	DOFAW or other qualified entity approved by the Parties	Ensure that all required permits and approvals needed to implement the scope of work, including approvals for site access, are in place	Within three months of permit issuance
	DOFAW or other qualified entity approved by the Parties	Implement the Year 1 study in accordance with the final study implementation plan and scope of work	Begin within three months of permit issuance
	DOFAW or other qualified entity approved by the Parties	Prepare draft Year 1 report (covering the previous calendar year) and draft study implementation plan, scope of work, and detailed budget for the next year of work	By February 1, 2011
	KIUC and USFWS	Review draft Year 1 report and provide written comments to DOFAW or another qualified entity approved by the Parties	Within 30 days of receipt of report
	DOFAW or other qualified entity approved by the Parties	Complete and distribute the final Year 1 report	Within 30 days of receipt of comments
	KIUC	Convey to the Endangered Species Trust Fund the funds budgeted for year two	Within 30 days of receipt of final Year 1 report

Minimization/Mitigation Measure	***Lead Entity***	***Task***	***Deadline***
	DOFAW or other qualified entity approved by the Parties	Prepare draft Year 2 cumulative report (covering the previous calendar year) and circulate it to KIUC and USFWS for review and comment	By February 1, 2012
	KIUC and USFWS	Review draft Year 2 cumulative report, and provide any written comments to DOFAW or another qualified entity approved by the Parties	Within 30 days of receipt of draft Year 2 report
	DOFAW or other qualified entity approved by the Parties	Finalize and distribute the Year 2 cumulative report	Within 30 days of receipt of comments
Seek to Have NTBG Grant a Conservation Easement in Upper Limahuli Valley (5.6.2.8)	KIUC	Initiate discussion with NTBG	Q1 of 2013
	KIUC	Inform USFWS/DOFAW of Likelihood of Success	Q2 of 2013
	KIUC	Finalize Draft Easement Documents/Inform agencies of non-agreement	By end of Year 2013
Proposed DOFAW Compliance Monitoring	DOFAW	Develop draft of detailed compliance monitoring plan.	September 15, 2009
	USFWS/KIUC	Review and Comment on draft compliance monitoring plan.	October 15, 2009
	DOFAW	Finalize and distribute detailed compliance monitoring plan to USFWS and KIUC	November 30, 2009
	KIUC	Convey the funds budgeted for the compliance monitoring provided for elsewhere in this plan to the Endangered Species Trust Fund.	Within 30 days of permit issuance
	DOFAW	Prepare Draft Annual Compliance Monitoring Summary and circulate to USFWS and KIUC for 30-day review and comment.	Annually by January 30
	USFWS/KIUC	Comment on draft annual compliance monitoring report	Annually by February 28
	DOFAW	Finalize and distribute annual compliance monitoring report and monitoring procedure modifications for following year.	Annually by March 30
*The detailed work scopes and contract documents that will govern implementation of this measure will include a provision requiring each entity carrying out the work to inform KIUC promptly should they become aware of any problem that might adversely affect their ability to fulfill their obligations. Upon receipt of any such notification, KIUC will work with the informing party to identify the steps that need to be taken to eliminate the problem and, within 30 days of the notification KIUC will present the proposed resolution to the Agencies for review and approval. Such notification will be provided sooner if, in the opinion of KIUC and/or the informing party, earlier notification would promote a speedy resolution.			

This short-term HCP is unique relative to many other HCP's, in that a significant component of its mitigation program consists of conducting research on Covered Species population size and trends. The USFWS and DOFAW have determined that such research is necessary to develop a comprehensive conservation program for the Covered Species (i.e., DOFAW's proposed island-wide Kaua'i Seabird HCP), and to provide longer-term incidental take authorization. Some of these critical research projects in effect constitute "Effectiveness Monitoring", even though in this HCP they are labeled as "Mitigation Measures". For example, one purpose of the at-sea capture study described in Chapter 5 is to identify and quantify adult seabirds which were previously retrieved, rehabilitated and released to the wild (after being banded so that they could be later identified) by the SOS Program.

Continued implementation of the SOS+ program also provides effectiveness monitoring benefits through its enhanced data gathering and analysis procedures. Continuing to add to the decades-long database that has been compiled through the SOS Program will provide important insights into the extent to which all measures being carried out on behalf of the Covered Species are leading to increased numbers. The breeding colony management and predator control efforts which this HCP will fund in the Limahuli Valley also has an effectiveness monitoring component.

7.2.3 ANNUAL REPORT

For each fiscal year (July 1 to June 30) that this HCP remains in effect, KIUC will prepare and submit to DOFAW and USFWS an Annual Report. That report will include a description of the Program Year's activities and accomplishments, an analysis of the problems and issues encountered in meeting or failing to meet the objectives set forth in the HCP, areas needing additional technical advice, the status of funding, and plans and management objectives for the next fiscal year, including any proposed modifications thereto.

As described in Chapter 5, and summarized above in Table 7.1, several different entities will be responsible for implementing specific tasks pursuant to this HCP. KIUC's Annual Report will describe and discuss all of the implementation work performed by KIUC during the year. It will also describe and discuss tasks implemented by other entities, based on the reports which those entities are obligated to provide to KIUC as described in Chapter 5 and Table 7.1. To ensure that those other entities' reports provide the appropriate information, the entities responsible for carrying out the measures described in Sections 5.6.2.2 through 5.6.2.6 will prepare and circulate to all Parties for their review and comment a proposed Table of Contents for their future report(s) within sixty days of KIUC depositing funds for the work into the Endangered Species Trust Fund. The Parties will then work cooperatively to reach agreement on these Tables of Contents within the following sixty days.

The schedule for KIUC's production of the Annual Report is as follows:

- KIUC will prepare and circulate to USFWS and DOFAW a draft Annual Report for review and comment by July 31.
- USFWS and DOFAW will provide to KIUC any comments they may have on the draft Annual Report by August 31.
- KIUC will submit to USFWS and DOFAW a final Annual Report by September 30.

7.3 ADAPTIVE MANAGEMENT

According to USFWS policy [see 65 Fed. Reg. 35242 (June 1, 2000)], adaptive management is defined as a formal, structured approach to dealing with uncertainty in natural resources management, using the experience of management and the results of research as an on-going feedback loop for continuous improvement. Adaptive approaches to management recognize that the answers to all management questions are not known and that the information necessary to formulate answers is often unavailable. Adaptive management also includes, by definition, a commitment to change management practices when determined appropriate.

In most HCPs, mitigation measures consist primarily of managing preserved terrestrial or aquatic habitat for the benefit of the species in question. Such habitat is then monitored on a regular basis, and the resulting monitoring data is used to "adapt" management efforts over time in order to maximize benefits for the species. In the case of the present short-term HCP, the opportunity for adaptive management within the time frame of the HCP is limited. However, two of the largest components of the proposed effort, the SOS Program and the power line monitoring, have incorporated within them plans for an annual learning/feedback loop that is intended to make any appropriate improvements to the programs based on initial implementation efforts and results.

The *SOS Manual*, which guides implementation of the SOS Program, has been updated annually since it war first issued in 2005. The 2008 edition specifically notes this when it states:

> *The SOS Operations Manual was envisioned as a "living document" to be revised and updated based on practical experience, advances in animal care, and changing data needs. This 2008 edition of the SOS Operations Manual is derived from the procedures which DOFAW established for SOS over time, but it incorporates numerous improvements that take advantage of the practical experience gained by running the program over the past few years. The annual SOS Program critique meeting with all of the various stakeholders and participants including DOFAW, USFWS, KIUC, Kaua'i Humane Society (KHS), Hawaii Wildlife Center (HWS) and Kaua'i Veterinary Clinic (KVC) held at the end of each season has been particularly helpful in this regard.*
>
> *This 2008 update of the SOS Operations Manual has been prepared by KIUC's consultants in close consultation with DOFAW, USFWS, and KHS representatives. In drafting this revised SOS Operations Manual, KIUC has made every effort to meld together the valuable input of all the involved parties. As the operator of the program, DOFAW will ultimately decide whether to adopt this revised Manual in whole or in part.*

Similar provisions for adaptive management are being built into the proposed monitoring program. For example, the monitoring plan concept provides for beginning with 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 for the first two years, with monitoring during the remaining years of the ITP/ITL to be determined by the Parties based on the results of the first two years of monitoring.

7.4 NO SURPRISES ASSURANCES, & CHANGED/UNFORESEEN CIRCUMSTANCES

7.4.1 OVERVIEW

The USFWS' "No Surprises" Rule (50 CFR 17.22, 17.32) provides that once an incidental take permit has been issued, and so long as the HCP 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.

To implement these assurances, an HCP must identify and analyze reasonably foreseeable "Changed Circumstances" that could affect a species or geographic area during its term (50 CFR 17.3). Should such a Changed Circumstance occur, the permittee is required to implement the measures specified in the HCP to respond to this change.

In contrast, "Unforeseen Circumstances" are events affecting a species or geographic area covered by the HCP that: (1) could not reasonably have been anticipated by the applicant or USFWS/DLNR during the development of the HCP, and (2) 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. If an Unforeseen Circumstance occurs during the term of the HCP, and if the USFWS determines that additional conservation and mitigation measures are deemed necessary to respond to such Unforeseen Circumstances, then the USFWS may require more conservation measures of the permittee, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the HCP's operating conservation program for the affected species, and if such measures maintain the original terms of the HCP to the maximum extent possible. (50 CFR 17.22).

DLNR provides generally similar assurances, but without differentiating between Changed Circumstances and Unforeseen Circumstances. These assurances are specified by statute (HRS §195D-23).

7.4.2 CHANGED CIRCUMSTANCES

The following sections identify the Changed Circumstances which are reasonably foreseeable by KIUC, the USFWS, and DLNR.

7.4.2.1 Listing of New 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. To the extent that KIUC, the USFWS or DLNR determine that any newly listed species would likely be taken by, or that the designated Critical Habitat of such species would be adversely modified or destroyed as a result of, the Covered Activities, KIUC will implement measures identified by the USFWS and/or DLNR to avoid or minimize take or adverse modification or destruction of Critical Habitat until such time as its incidental take permits are amended to obtain permit coverage for these species or until the USFWS and DLNR notify KIUC that such measures are no longer needed.

Unforeseen Circumstances: There are no unforeseen circumstances associated with the listing of new species under the ESA.

7.4.2.2 Designation of Critical Habitat

If the USFWS designates Critical Habitat for one of the Covered Species, and such Critical Habitat may be adversely modified by the Covered Activities, the USFWS may consider this to be a Changed Circumstance. If the USFWS makes such a determination, then it will reevaluate the incidental take permit and may revise the activities covered by it to ensure that the activities allowed by the permit are not likely result in adverse modification of any designated Critical Habitat. KIUC will implement such necessary modifications until such time as it has applied for and the USFWS has approved an amendment of the incidental take permit in accordance with applicable statutory and regulatory requirements, or until the USFWS notifies KIUC that the modifications are no longer required.

Unforeseen Circumstances: There are no unforeseen circumstances associated with the designation of new Critical Habitat under the ESA.

7.4.2.3 Hurricane

Hurricanes periodically strike or affect the island of Kaua'i. The two most recent hurricanes to affect the island were Iwa in 1982, and 'Iniki in 1992. Hurricane 'Iniki caused devastating damage.

Risk Assessment. Hurricanes can affect the activities covered by the HCP in several ways. First, they can result in the sudden and widespread destruction of KIUC facilities that require extensive and immediate repair, thereby requiring an intensity and immediacy of work not otherwise needed. Second, a hurricane may pose a threat to the Covered Species by directly killing adult birds, severely altering protective vegetation in breeding colonies thereby resulting in increased exposure to predation by alien mammalian species, and (depending on the time of year it strikes) by killing eggs and chicks before they have fledged. Finally, they can alter the natural and built environment in areas

surrounding KIUC facilities in ways that increase or decrease the potential effects of those facilities on the Covered Species.

Assessment of Likelihood of Occurrence. As noted in Section 3.2.3.4, several hurricanes have struck or affected Kaua‘i in the last 50 years. Because climatic trends point toward a period of increased cyclonic storms in this part of the Pacific Ocean, the likelihood of a hurricane striking the island during the term of this HCP is sufficient to warrant treating the event as a Changed Circumstance.

Preventative Measures. No measures are available to prevent hurricanes in the HCP area. KIUC's policy of undergrounding key facilities where practical will reduce the extent of the facilities that could be affected by future hurricanes and, therefore, the potential need for emergency repair work that could affect the Covered Species. Some of the mitigation measures identified in the HCP are aimed at enhancing and managing breeding colony habitat; to the extent that they create additional nesting areas that may escape hurricane force winds that devastate other unprotected areas, these may minimize the potential adverse effects of a hurricane compared with the net effects which could occur were such measures not instituted. While not entirely "preventative", the enhanced veterinary response that is a part of the SOS+ program that is part of the HCP is likely to result in the survival of birds that would otherwise die as a result of hurricanes.

Planned Response. Since hurricanes are a natural occurrence which cannot be prevented, no specific response to a hurricane is planned. Should a hurricane strike Kaua‘i during the term of the HCP, resulting effects on the Covered Species will be considered based on the best available information at the time, and habitat enhancement and management efforts may be modified should the parties to the HCP determine that a response is necessary. In evaluating how to repair any lines that might be destroyed in the event of a hurricane occurring during the HCP term, KIUC will consider the costs and benefits of undergrounding those lines (e.g., underground lines would be safe from future hurricanes, underground lines do not cause take of Covered Species and thus do not require mitigation for take). As discussed in Section 5.5.1, KIUC has already committed to using shielded lights for all streetlights needing repair or replacement.

Unforeseen Circumstances. No unforeseen circumstances exist for this event.

7.4.2.4 Invasive Species

Introduced alien species of both plants and animals have had, and will continue to have, a detrimental effect on the Covered Species. Alien plants have displaced native vegetation from former breeding colony areas, greatly reducing or even eliminating the suitability of the area for Covered Species. Predation by alien mammalian species has been shown to constitute the greatest single threat to the Covered Species.

Risk Assessment. Based on current information, alien plant and animal species pose a substantial risk to the Covered Species.

Assessment of Likelihood of Occurrence. Existing data indicate that alien plants and animals are currently having a substantial adverse affect on the Covered Species. The likelihood that the threat from this source will increase during the term of this HCP is sufficient to warrant treating the event as a changed circumstance.

Preventive Measures. Breeding colony habitat enhancement and management activities which are in part focused on the control of alien species are a key component of the conservation program in this HCP. Such efforts are already being implemented at Lehua Island, and others will be implemented at the Upper Limahuli Preserve as described in Chapter 6.

Planned Response to Invasive Species. The breeding colony habitat enhancement and management activities to be funded as described in Chapter 6 will focus on controlling alien mammalian predators. Some recent studies have shown, however, that alien plant species can also cause severe adverse

effects on the Covered Species. Accordingly, potential adverse impacts of alien plant species will be considered as part of the colony management work in the Upper Limahuli Preserve.

Unforeseen Circumstances: Due to the well-documented effects of alien plants and animals on the Covered Species, no unforeseen circumstances exist for this event.

7.5 FUNDING

7.5.1 FUNDING FOR MINIMIZATION AND MITIGATION MEASURES

As described in this HCP, KIUC has already implemented many minimization and mitigation measures and paid for these out of the Cooperative's funds. The total estimated annual cost of implementing this HCP for the up-to five years that it may be in effect is summarized in Table 7.2.

Table 7.2 Annual HCP Expenditures Following Permit Issuance

Item(s)	***Amount (US$/Year)***				
	Year 1	***Year 2***	***Year 3***	***Year 4***	***Year 5***
SOS Program	$200,000	$200,000	$200,000	$200,000	$200,000
Limahuli Valley(Note 1)	$227,691	$264,267	$260,830	$271,330	$255,808
At-Sea Capture Study	$40,000	$40,000	0	0	0
At-Sea Population Estimate	$100,000	0	0	0	0
Auditory Survey for Colonies	$98,000	$98,000	0	0	0
Underline Monitoring[61]	$180,000	$180,000	$180,000	$180,000	$180,000
Seek Limahuli Conservation Easement	$0	$0	$0	$10,000	$10,000
Undefined Mitigation(Note 2)	$0	$0	$0	$130,000	$130,000
Compliance Monitoring by DOFAW(Note 3)	$65,000	$65,000	$65,000	$65,000	$65,000
Grand Total	***$910,691***	***$847,267***	***$705,830***	***$856,330***	***$840,808***

Note 1: Contingency for Limahuli could increase the amount for that item.

Note 2: The total annual cost of such additional mitigation measures shall not exceed $130,000 (the approximate difference between the committed mitigation expenditures in Year 2 and in Year 4.

Note 3: Financial contribution requested by DOFAW to provide compliance monitoring under HRS 195D. Exact funding for this item TBD but will not exceed $100,000/year..

Source: Compiled by Planning Solutions, Inc.

The estimates are in 2010 dollars, and will be adjusted as appropriate during the term of the HCP to account for inflation. The adjustment will be made using the Consumer Price Index (CPI) for Honolulu.

The U.S. Department of Labor's Bureau of Labor Statistics updates the Honolulu CPI twice each year. The CPI for the first half of the year (January through June) is usually issued in August; the CPI for the second half of the year is issued in February. For the purpose of this HCP, KIUC will pay

[61] As noted in Sections 1.2.7 and 5.6.6, KIUC will spend up to $180,000 per year for each of the first two years of the HCP on underline monitoring. KIUC will also fund or conduct additional follow-up underline monitoring in the remaining years of this HCP as later determined by the Parties to be appropriate based on the results of the first two years of monitoring. Since the cost of such additional follow-up monitoring is unknown, KIUC has used the same $180,000 per year figure for Years 3, 4 and 5.

the year-over-year inflation adjustment for each calendar year in a lump sum no more than 30 days after the year-end CPI figures are released. In general, this means that the inflation adjustment will be paid in March of each year.[62]

Section 10(a)(2)(B)(iii) of the ESA requires an HCP applicant to ensure that adequate funding for the plan will be provided. Similarly, HRS Section 195D-4(g) requires the applicant to guarantee that adequate funding for the plan will be provided. However, Section 195D-4(g) also requires the applicant to "post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take."

As the public utility which provides the sole electrical service on the island, KIUC receives a continual and reliable stream of income from its residential, commercial and government entity customers. As required by the Public Utilities Commission, its rates for electrical service provide sufficient revenue to cover the cost of its operations. KIUC's Board of Directors has determined that its revenue stream is sufficient to cover the cost of implementing this HCP.

By resolution, the KIUC Board of Directors will approve the HCP and Implementing Agreement, which will bind KIUC to carrying out the terms and conditions and funding obligations of the HCP. As part of these obligations, for the duration of the HCP, KIUC in its annual budget process will include a budget line item that is sufficient to cover all HCP obligations. KIUC will document the approval of this budget line item each year in the annual report it will file pursuant to Section 7.2.3. In addition, KIUC will post a bond or provide an irrevocable letter of credit in the amount of $250,000 to further guarantee funding will be available to implement its obligations under this HCP.

Given its reliable public utility income stream, its legal obligations under the HCP and Implementing Agreement, its annual budgeting commitment, and the additional safeguard of a bond, KIUC has satisfied the funding assurance and guarantee requirements of both the ESA and Chapter 195D.

7.5.2 FUNDING FOR CHANGED CIRCUMSTANCES

Given the nature of KIUC's facilities and activities, KIUC does not expect that any new species listings, or any new designation of Critical Habitat for listed species, would result in any requirements to take any specific action to avoid take, jeopardy or adverse modification, beyond the measures specified in this HCP. As a result, KIUC does not expect to incur any additional costs should such Changed Circumstances occur.

With respect to hurricanes and invasive species, KIUC expects that any warranted future changes to alien species control and bird monitoring efforts (as described in Section 5.6.2.2) would require only a re-direction of funds already provided for in the HCP, and not any additional funds. In contrast, should a hurricane cause damage to predator control infrastructure items funded in whole or in part through this HCP, KIUC will contribute up to the amount of money originally provided for such infrastructure item(s) (as described in Table 5.2), adjusted for inflation, to repair or replace such item(s). KIUC's operating revenues would be sufficient to cover such an emergency expense.

7.6 IMPLEMENTING AGREEMENT

An Implementing Agreement which specifies the obligations of KIUC, the USFWS and DLNR with respect to this HCP has been executed, and is attached as Appendix D**.**

[62] To illustrate this using the dollar amounts shown in Table 7.2, if "Year 1" is 2010 and if the CPI increases by 4 percent over the course of January-December 2010, then the inflation adjustment for that year would be$31,320 (calculated as $783,000*.04), and KIUC would pay that amount in March 2011.

7.7 REVISIONS AND AMENDMENTS

There are two types of changes which may be made to the HCP and/or the incidental take permits: Minor Amendments and Major Amendments. All revisions and amendments will be processed in accordance with all applicable legal requirements.

7.7.1 MINOR AMENDMENTS

Minor Amendments are changes to the HCP provided for under the operating conservation program, including adaptive management changes and responses to Changed Circumstances. They also include revisions which do not significantly modify the scope or nature of activities or actions covered by the incidental take permits in terms of their affect on the Covered Species. Minor Amendments may include, but are not limited to, the following:

- Correction of any maps or exhibits to correct errors in mapping or to reflect previously approved changes in the HCP and/or incidental take permits.
- Modifying existing or establishing new measures to further minimize or avoid take of the Covered Species.
- Modifying reporting protocols for Annual Reports.
- Minor changes to monitoring or reporting protocols.
- Revising breeding colony habitat enhancement and management techniques.
- Any other modifications to the HCP that are consistent with the biological goals and objectives described in Section 5.3 that will not result in operations under the HCP that are significantly different from those analyzed in connection with the HCP as approved, adverse impacts on the environment that are new or significantly different from those analyzed in connection with the HCP as approved, or take of Covered Species not analyzed in connection with the HCP as approved, including but not limited to the approval or execution of agreements to facilitate execution and implementation of the HCP, or actions by KIUC to delegate any of its duties under this HCP to a third party under its direct control.

KIUC, DLNR or USFWS may submit a proposed Minor Amendment, including a schedule for implementation, to the other Parties for consideration. The other Parties shall each respond in writing to the proposal within sixty (60) calendar days of receipt of the request. The responses shall either (1) concur with the proposed Amendment; (2) concur with the proposed Amendment with requested changes; (3) identify additional information necessary to enable evaluation of the proposed Amendment, or (4) disapprove the proposed Amendment, stating reasons for the disapproval. All Parties must agree in writing to any Minor Amendment, including the schedule for implementation, before implementation of such Amendment. Any proposed Minor Amendment which is disapproved by one of the Parties may be resubmitted as a proposed Major Amendment.

7.7.2 MAJOR AMENDMENT

A Major Amendment includes but is not limited to the following:

- Adding a new species to the list of Covered Species contained in the HCP and/or the incidental take permits.
- Changes to the Covered Activities which were not addressed in the HCP as originally adopted, and which otherwise do not meet the criteria for a Minor Amendment as discussed above.
- Extending the term of the incidental take permits.

A Major Amendment requires submittal to the 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, and the National Environmental Policy Act may vary based on the nature of the amendment.

7.8 SUSPENSION/REVOCATION

The USFWS or DLNR may suspend or revoke their respective permits if KIUC fails to implement the HCP in accordance with the terms and conditions of the permits or if suspension or revocation is otherwise required by law. Suspension or revocation of the permits shall be done in accordance with applicable federal or state law.

7.9 PERMIT RENEWAL

Upon expiration, and to the extent permitted by law, the incidental take permits may be renewed without the issuance of a new permit, provided that the permit is renewable, and that biological circumstances and other pertinent factors affecting the Covered Species are not significantly different than those described in the original HCP. To renew the permit, KIUC must submit to the USFWS and DLNR, in writing:

- A request to renew the permits;
- Reference to the original permit numbers;
- Certification that all statements and information provided in the original HCP and permit application, together with any approved HCP amendments, are still true and correct, or inclusion of a list of changes;
- A description of what take has occurred under the existing permit; and
- A description of what activities under the original permit the renewal is intended to cover.

If the USFWS and/or DLNR concur with the information provided in the request, they shall renew the permit consistent with their respective permit renewal procedures. If KIUC files a renewal request and the request is on file with the USFWS and DLNR at least 30 days prior to the permits' expiration, the permits shall remain valid while the renewal is being processed, provided the existing permit is renewable. If KIUC fails to file a renewal request 30 days prior to permit expiration, the permits shall become invalid upon expiration. KIUC must have complied with all annual reporting requirements to qualify for a permit renewal.

7.10 PERMIT TRANSFER

In the event of sale or transfer of ownership of KIUC or any of its facilities during the term of the permits, a new permit application, permit fee, and an Assumption Agreement will be submitted to the USFWS and DLNR by the new owner(s). The new owner(s) will commit to all requirements regarding the take authorization and mitigation obligations of this HCP unless otherwise specified in the Assumption Agreement and agreed to in advance by the USFWS and DLNR.

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CHAPTER 9 – GLOSSARY OF TERMS AND ACRONYMS

Adaptive management
: A method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned.

ahupua‘a — A traditional unit of land in ancient Hawai‘i that usually includes a region between two bounding ridges, from the ocean to the mountain peaks

Alien — Introduced to Hawai‘i by humans

APLIC — Avian Power Line Action Committee

APP — Avian Protection Plan (USFWS)

Biological goals
: The broad, guiding principles for the operating conservation program of the HCP. Habitat-based goals are expressed in terms of amount and/or quality of habitat. Species-based goals are expressed in terms specific to individuals or populations of that species.

Biological objectives
: The different components needed to achieve the biological goal such as preserving sufficient habitat, managing the habitat to meet certain criteria, or ensuring the persistence of a specific minimum number of individuals.

BMP — Best Management Practice

CFR — Code of Federal Regulations

Crepuscular — Active at twilight hours (dawn and dusk)

dB — Decibel, the basic, logarithmic unit of sound level measurement

dBA — A-weighted sound level: Sound level measurement weighted to be most sensitive to the frequencies audible to the human ear

DBEDT — Department of Business, Economic Development and Tourism, State of Hawai‘i

DLNR — Department of Land and Natural Resources, State of Hawai‘i

DOFAW — Division of Forestry & Wildlife (DLNR)

DOH — Department of Health, State of Hawai‘i

Domesticated — Feral species, not considered established in the wild on the Island of O‘ahu

Endangered — Listed and protected under the State or Federal Endangered Species Acts as an endangered species

Endemic — Native and unique to the Hawaiian Islands

EPA — Environmental Protection Agency

EPRI — Electric Power Research Institute

ESA — Endangered Species Act of 1973, as amended

ESRC — Endangered Species Recovery Committee

◦F — Fahrenheit degrees

FEMA — Federal Emergency Management Agency, U.S. Federal Government

FIRM — Flood Insurance Rate Map

GIS — Geographic Information Systems

gpm — Gallons per minute

HAR	Hawai‘i Administrative Rules
Harass	The term “harass” in the ESA definition of take means “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.”
Harm	The term “harm” in the ESA definition of take means “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.”
HCP	Habitat Conservation Plan
HRS	Hawai‘i Revised Statutes
IBRCC	International Bird Rehabilitation & Rescue Center
ICM	Interim Conservation Measure
Incidental Take	Defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."
Incidental Take Permit	The incidental take permit process was established under section 10(a)(1)(B) of the ESA. Under this provision the Secretary of the Interior and Secretary of Commerce may, where appropriate, authorize the taking of Federally listed wildlife or fish if such taking occurs incidentally during otherwise legal activities.
Indigenous	Native to the Hawaiian Islands, but also found elsewhere naturally
IPP	Independent Power Producer
IRP	Integrated Resource Plan
KEBRT	Kaua‘i Endangered Bird Recovery Team
KIUC	Kaua‘i Island Utilities Cooperative
kV	Kilovolt
kWh	Kilowatt hour
LESC	Līhu‘e Energy Service Center
makai	Towards the ocean
mauka	Inland; towards the mountains
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
moku	District; a Hawaiian land division within an *ahupua‘a*
MPH	Miles per hour
MSL	Mean sea level
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESH	Abbreviation for Newell’s Shearwater
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce, U.S. Federal Government

Nocturnal	Active at night-time, after dark
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service, Department of the Interior, U.S. Federal Government
OEQC	Office of Environmental Quality Control, Department of Health, State of Hawai‘i
pH	Measure of acidity; the negative logarithm (Base 10) of the effective molar concentration of hydronium ions in water
PM_{10}	Concentration of airborne Particulate Matter that will pass through a 10 micrometer filter
PMRF	Pacific Missile Range Facility
ppt	parts per thousand, by weight unless otherwise specified
PM	Particulate matter
PRG	Preliminary Remediation Goals (EPA-defined, for ambient air quality)
PTT	Platform Transmitter Terminals
PUC	Public Utilities Commission
ROW	Right-of-Way
SAAQS	State Ambient Air Quality Standards
SCS	Soil Conservation Service, US Department of Agriculture (now the Natural Resource Conservation Service)
SHPD	State Historical Preservation Division, Department of Land and Natural Resources, State of Hawai‘i
SHPO	State Historic Preservation Officer
SLUC	State Land Use Commission, State of Hawai‘i
SMA	Special Management Area
SMP	Special Management Area Permit
SOS	Save Our Shearwaters program
Take	As defined by the ESA: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."
Threatened	Listed and protected under the ESA as a threatened species
TMK	Tax Map Key
TNCH	The Nature Conservancy of Hawai‘i
UBC	Uniform Building Code
UIC	Underground Injection Control
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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APPENDIX A. POWER LINE LOCATIONS OF CONCERN

R. E. David and R. H. Day

2002

A Field Review of Power Line Locations on the Island of Kaua'i of Particular Concern to the Newell's Shearwater, and Hawaiian Petrel.

Prepared for: Planning Solutions, Inc., and Kaua'i Electric.

REVIEW OF POWER LINE LOCATIONS ON THE ISLAND KAUA‘I OF PARTICULAR CONCERN TO THE NEWELL’S SHEARWATER AND HAWAIIAN PETREL

Prepared for:

Planning Solutions, Inc.
1210 Auahi Street, Suite 221
Honolulu, Hawai‘i 96814

and

Kauai Electric
4463 Pāhe‘e Street
Līhu‘e, Hawai‘i 96766–2032

Prepared by:

Reginald E. David
Rana Productions, Ltd.
P.O. Box 1371
Kailua-Kona, Hawai‘i 96745-1371

Robert H. Day
ABR, Inc., Environmental Research and Services
P.O. Box 80410
Fairbanks, Alaska 99708-0410

October 2002

Purpose of the Study

Kauai Electric (KE) has committed to preparing a Habitat Conservation Plan (HCP), and applying for an incidental take permit under Section 10 of the ESA, 16 U.S.C. § 1539. The HCP will contain conservation measures designed to minimize and mitigate impacts of the Company’s facilities on Hawaiian Petrel (*Pterodroma sandwichensis*)[1] and Newell’s Shearwater (*Puffinus auricularis newelli*), two seabird species listed as threatened and endangered respectively, under the Endangered Species Act of 1973, as amended (“ESA”), 16 U.S.C. §§ 1531 et seq..

In recognition of the current threats to the populations of these birds on Kaua‘i, the Company has proposed to undertake certain Interim Conservation Measures (ICMs) while the HCP is being developed and before it is approved. While KE and the Service have not yet signed a formal Memorandum of Agreement (MOA) on these measures, KE has proceeded to implement the ICMs that it has proposed.

One of the items in KE’s proposed MOA was aimed at gathering additional information on areas where KE facilities had been previously identified as potentially causing mortality to the two species. More specifically, it reads, in part:

> *KE’s research team will review published information, consult with DOFAW and Service representatives, and compile a list of areas where mortality is still occurring on a regular basis (i.e., “hotspots” identified on page A-1). Team members will visit these areas and conduct appropriate surveys of those that still appear to have conditions likely to cause high mortality. This is important because these locations may offer some of the best opportunities for management actions that positively affect the species.*

Power Line Hotspots

Members of the study team conducted their survey between July 15th and the 19th, 2002. We inspected all historically known areas in which concentrations of downed seabirds have been collected by the Save our Shearwaters (SOS) program. They include: (1) Waimea at Waimea River valley, (2) ‘Ele‘ele at Hanapēpē River valley, (3) Lāwa‘i at Lāwa‘i Stream valley, (4) Wailua at Wailua River valley, (5) Keālia at Kapa‘a Stream valley, (6) Hanalei at Hanalei River valley, and (7) Wainiha at Wainiha River valley. The locations of these areas, which were identified in consultation with Division of Fish and Wildlife (DOFAW) and Service staff, are shown on Figure 1. The aim of the inspection was to determine if there are design measures that Kaua‘i Electric could adopt to reduce or eliminate the risk that electric power lines and other KE structures pose to nocturnally flying seabirds.

[1] The Hawaiian endemic endangered sub-species of the Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*) has been elevated to a full species, based on the differences in vocalizations, and morphology between it and the nominate Galapagos species (*Pterodroma p. phaeopygia*). The new common name of the Hawai‘i breeding species is Hawaiian Petrel and the scientific name is (*Pterodroma sandwichensis*) (American Ornithological Union 2002).

In addition to examining the known "hotspots", members of the study team drove the major roads during daylight hours looking for other locations where bird/electric power line interactions might be of concern. The roads traveled, which are shown on Figure 2, extended from Wainiha Bay on the north shore of the island, to the Pacific Missile Range on the southwest shore.

Findings

We identified three areas in which we felt that even after replacing all the unshielded lights that the existing power lines still pose risks to one or both of the seabirds under discussion.

- Kūhiō Highway Adjacent to Keālia Beach. The area on the west side of Kūhiō Highway adjacent to Keālia Beach has historically been an area from which numerous downed birds have been recovered. The current threat has been greatly reduced as the ironwood trees located on the west side of the power lines have grown tall enough to shield the lines. However, there is still a gap in the ironwood barrier located roughly in the center of this stretch. Additionally there is another gap across from the north end of the beach adjacent to the new post office. The lines running south from Kapa‘a Stream for one span are also unshielded by vegetation. Kaua‘i Electric does have marker balls installed on the span crossing the stream and on the one immediately to the north of the stream. Adding marker balls to the three unshielded spans identified may help to reduce the risk these lines still pose to seabirds.
- Wailua Stream at the Mouth of Wailua Valley. The area from the Coco Palms Hotel south to the Holiday Inn Sunspree Hotel in Wailua has historically been an area from which numerous downed birds have been recovered. The power lines crossing the Wailua Stream at the mouth of Wailua Valley still pose a threat to seabirds. The combination of the shear size of the valley, coupled with a large number of unshielded lights in the Wailua House Lots subdivision located on the north side of the river, greatly add to the threat that the unshielded power lines pose to nocturnally flying seabirds.
- ‘Ele‘ele Along Kaumuali‘i Highway. Numerous downed birds have historically been recovered from the area along the transmission lines and supporting towers that extend from the Port Allen Generating Station through ‘Ele‘ele along Kaumuali‘i Highway. These lines are quite high and are immediately adjacent to a string of formerly unshielded street lights. Kaua‘i Electric replaced all of these unshielded lights in the summer of 2002, reducing the risk that the lines pose to seabirds. However, because these lines are strung well above the mean vegetation height, they may still pose a threat to seabirds transiting the area.

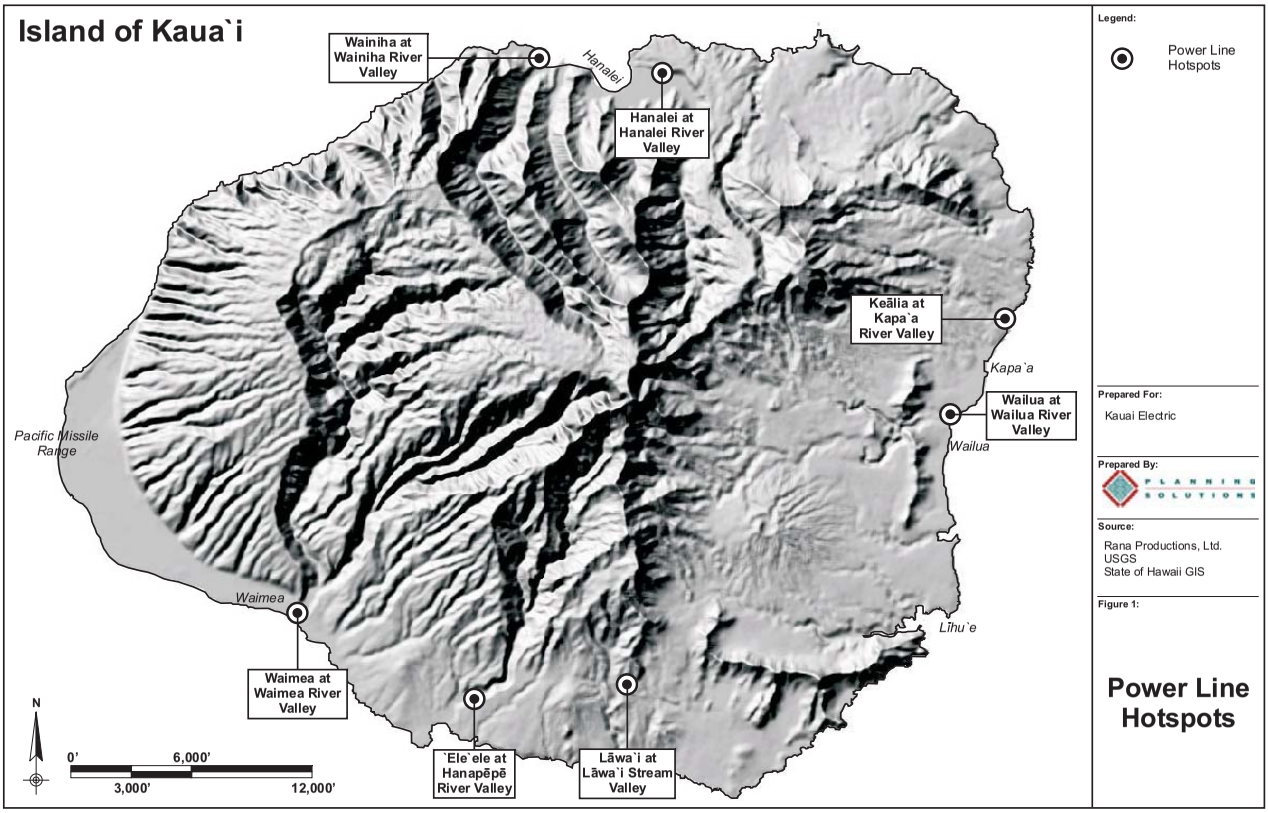
Recommendations

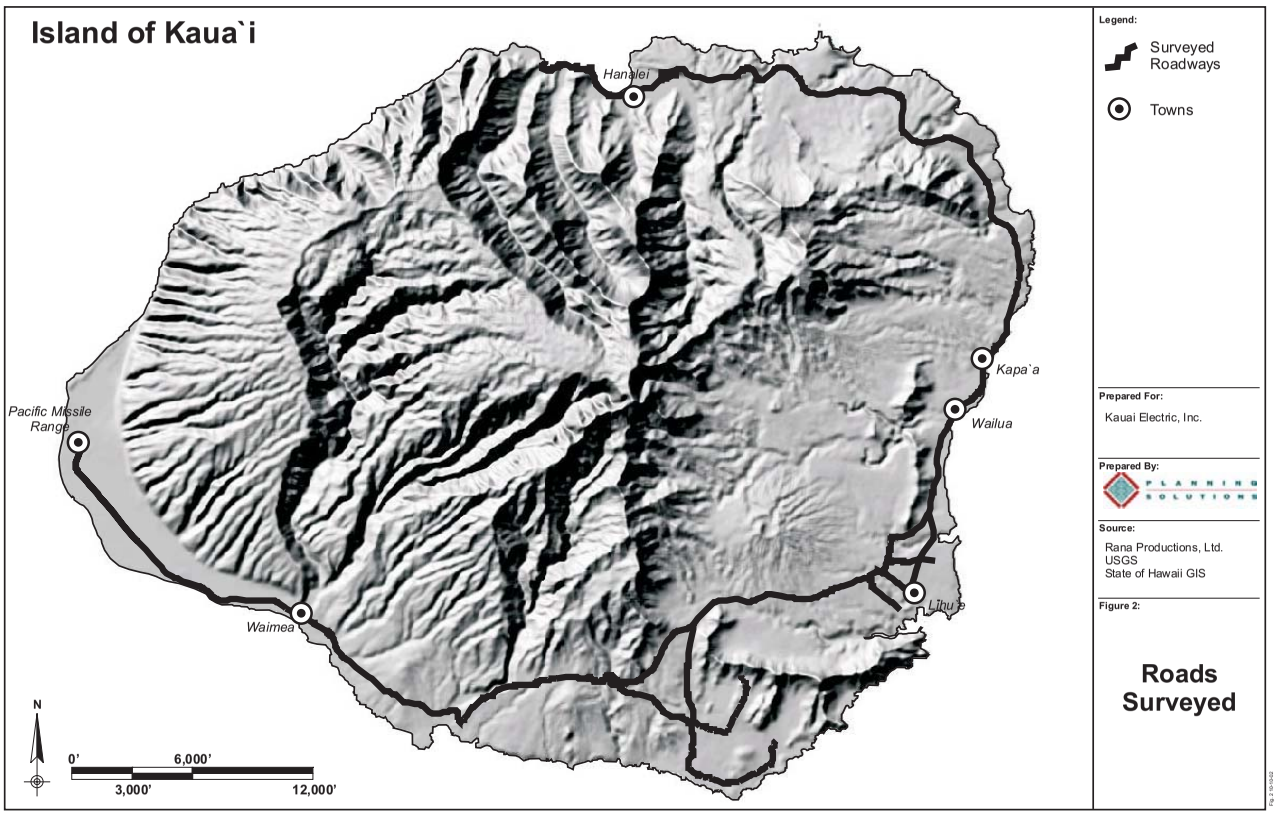
On the basis of this review, we have the following recommendations:

- KE should install marker balls or other suitable visual deflectors on the three unshielded electric power line spans in the Keālia Beach area and on the transmission lines extending from the Port Allen Generating Station, north to the upper end of the ‘Ele‘ele subdivision.
- We believe the electrical power lines crossing Wailua Stream present more of a hazard than do those in the other two locations identified. KE should install marker balls or other suitable visual deflectors on the power line span crossing this stream as well as to the adjacent spans on both the north and south side of the bridge. KE replaced the remaining 53 unshielded lights in the Wailua House Lots subdivision in July and August, 2002, and there is reason to believe that that this shielding of the lights combined with the addition of visual deflectors will significantly reduce the downings in this area. We recommend that KE work with the SOS program to closely monitor bird recoveries from this area for the next one to two years to attempt to document any change in the number of downed birds recovered. If KE's light replacement and installation of visual deflectors on these power lines does not lead to a significant reduction in the number of downed birds being recovered in this area as documented by the SOS program, then KE should consider other means of limiting harm for these specific power lines.

Literature Cited

American Ornithologist's Union. 2002. Forty-third supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 119:847-858


Island of Kaua`i
Wainiha at Wainiha River Valley
Hanalei
Hanalei at Hanalei River Valley
Keālia at Kapa`a River Valley
Kapa`a
Wailua at Wailua River Valley
Wailua
Pacific Missile Range
Waimea
Waimea at Waimea River Valley
Lihu`e
`Ele`ele at Hanapēpē River Valley
Lāwa`i at Lāwa`i Stream Valley
N
0'
6,000'
3,000'
12,000'
Legend:
Power Line Hotspots
Prepared For:
Kauai Electric
Prepared By:
Source:
Rana Productions, Ltd.
USGS
State of Hawaii GIS
Figure 1:
Power Line Hotspots


Island of Kaua`i
Hanalei
Kapa`a
Wailua
Pacific Missile Range
Waimea
Lihu`e
N
0'
6,000'
3,000'
12,000'
Legend:
Surveyed Roadways
Towns
Prepared For:
Kauai Electric, Inc.
Prepared By:
Source:
Rana Productions, Ltd.
USGS
State of Hawaii GIS
Figure 2:
Roads Surveyed

APPENDIX B. M-250A2 LUMINAIRE SPECIFICATIONS

M-250A2 POWR/DOOR® LUMINAIRE WITH CUTOFF OPTICS

APPLICATIONS
- For residential streets, access roads, parking lots where light trespass could be a problem

SPECIFICATION FEATURES
- Powr/Module ballast assembly
- Filtered optics
- Universal two-bolt slipfitter
- Die-cast aluminum housing with electrocoat gray paint finish
- Adjustable mogul base socket (street side) – E39 standard
- ALGLAS® finish on reflector
- No-tool PE receptacle
- Plug-in ignitor
- True 90° cutoff—no light above 90° (meets RP8-2000 for full cutoff)
- External stainless steel bail latch
- UL / cUL listed for wet location available as an option
- Plastic pest guard standard (not required for 2 in. pipe)

ORDERING NUMBER LOGIC

M2AC	15	S	1	N	2	G	MC3	1	F
PRODUCT IDENT	WATTAGE	LIGHT SOURCE	VOLTAGE	BALLAST TYPE	PE FUNCTION	LENS TYPE	IES DISTRIBUTION TYPE	FILTER	OPTIONS
XXXX	XX	X	X	X	X	X	XXX	X	XXX
M2AC = M-250A2 with Cutoff Optics	05 =50 07 =70 10 =100 15 =150 (55V) 17 =175 20 =200 21 =100/150 (55V) 25 =250 71 =70/100 NOTE: Dual wattage connected for lower wattage	S = HPS M = MH C = Merc Standard: Lamp not included.	60Hz 0 = 120/208/240/277 Multivolt 1 =120 2 =208 3 =240 4 =277 5 =480 7 =120X240 8 = 240V Ballast 120V PE Receptacle not reconnectable D =347 F =120X347 T =220 50Hz 6 =220 R =230 Y =240 NOTE: Dual voltage connected for lower voltage	See Ballast Selection Table A = Autoreg C = Merc-Reg G = Mag-Reg with Grounded Socket Shell H = HPF Reactor or Lag M = Mag-Reg N = NPF Reactor or Lag P = CWI with Grounded Socket Shell S = Series (in Top Housing)	1 = None 2 = PE Receptacle NOTE: Receptacle connected same voltage as unit except as noted. Order PE Control separately.	See Photometric Selection Table A = Acrylic Clear Globe G = Glass L = Polycarbonate Clear Globe S = Sag Glass Clear Globe NOTE: 150 watt Maximum with Acrylic or Polycarbonate Clear Globes.	See Photometric Selection Table S = Short M = Medium C = Cutoff 2 = Type II 3 = Type III	1 = Fiber gasket 2 = Charcoal with elastomer gasket	F = Fusing (Not available with multivolt or dual voltage) J = Line Surge Protector, Expulsion Type U = UL / cUL listed (all HPS and up to 175W MH) with glass or polycarbonate

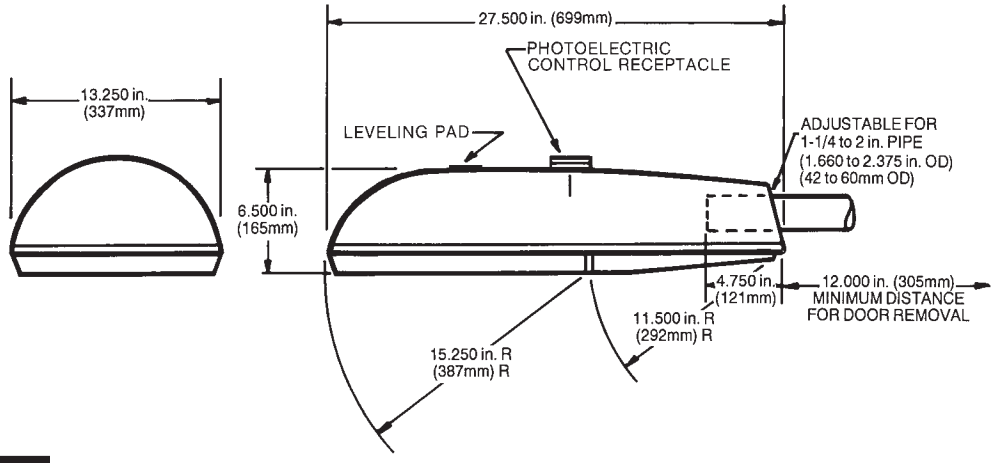
PHOTOMETRIC SELECTION TABLE

Wattage	Light Source	Lens Type	IES Distribution Type Photometric Curve Number (Socket Position) All light sources are clear unless otherwise indicated. MC2	MC3	SC2
50, 70, 100, 150 (55v)	HPS	Clear globe, acrylic or Polycarbonate	N/A	177287 (1A)	N/A
50	HPS	Clear globe, glass	452543 (2CL)	452544 (1CL)	N/A
70	HPS	Clear globe, glass	452545 (3CL)	452546 (1CL)	N/A
100	HPS	Clear globe, glass	452547(2CL)	452548 (1CL)	N/A
150 (55v)	HPS	Clear globe, glass	452549 (2CL)	452550 (1CL)	N/A
50, 70, 100, 150 (55v)	HPS	Glass, flat	177286 (2CL)	177285 (1CL)	N/A
200	HPS	Clear globe, glass	452551 (2CH)	452552 (2DL)	N/A
250	HPS	Clear globe, glass	N/A	452553 (2CH)	N/A
200, 250	HPS	Glass, flat	177303 (2DH)	177304 (1DH)	N/A
175, 250	MH	Glass, flat	N/A	N/A	177299(1B)
100, 175, 250	Merc	Glass, flat	N/A	N/A	177299(1B)

NOTE: N/A=Not Available
*Meets RP8-2000 for full cutoff with flat glass

M-250A2 POWR/DOOR® LUMINAIRE WITH CUTOFF OPTICS

FIXTURE DIMENSIONS



DATA

Approximate Net Weight	20-30 lbs	9-14 kgs
Effective Projected Area		
Flat Glass Unit	0.9 sq. ft. max	0.08 sq. M max
Clear Acrylic Globe Unit	1.0 sq. ft. max	0.09 sq. M max
Suggested Mounting Height	20-40 ft.	6-12 M

REFERENCES
See Page R-48 for start of Accessories.
See Page R-52 for Explanation of Options and Other Terms Used.
See Pole and Bracket Section Page P-2 for pole selection.

BALLAST SELECTION TABLE

		Ballast Type/Voltage												
		60Hz										50Hz		
Wattage	Light Source	Multi-volt	120	208	240	277	480	120X240	347,120X347	240/120 PE R	220	220	230	240
50	HPS	H,N	H,N	H,N	H,N	H,N	H,N	H,N	H,N	H,N	N/A	N/A	N/A	N/A
70,100,150(55V)	HPS	A,H,N	A,G,H,M,N,P	A,G,H,M,N	A,G,H,M,N,P	A,G,H,M,N	G,M	G,M,P	G*,H,M*,N	G,M,N	N/A	H,M,N	H	M††
100/150(55V)	HPS	N/A	H,N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
200	HPS	A,P	A,H,N,P	A,H,N,P	A,H,N,P	A,P	A	A,P	N/A	A,H,N	N/A	N/A	N/A	N/A
250	HPS	A,P	A,H,N,P	A,H,N,P	A,H,N,P	A,P	A,P	A,P	A,P	A,H,N	H	A,H,N	H	A,H
175,250	MH	A	A,P	A,P	A,P	A,P	A,P**	A,P	A,P	A	N/A	A	N/A	N/A
100,175,250	Merc	C	C,N	C	C,H,N	C	C	C	N/A	C,H,N	N/A	N/A	N/A	N/A

NOTE: N/A=Not Available
††150(55V)only
*Not available in 120X347 volt
**Not available in 175W

M2AC — SUGGESTED CATALOG ORDERING NUMBERS

Catalog Number	Wattage	Light Source	Voltage (60 Hz)	Ballast Type	Refractor Type	Photometric Distribution
M2AC10S1N2GMC21	100	HPS	120	NPF Reactor	Glass	MC2
M2AC15S1N2GMC21	150	HPS	120	NPF Reactor	Glass	MC2
M2AC25S0A2GMC31	250	HPS	Multivolt	Auto-Regulator	Glass	MC3

All GE suggested catalog ordering numbers come with PE receptacle. PE control must be ordered separately. Order and install SCCL-PECTL if no PE is desired.

Multivolt ballasts can be for either 120, 208, 240, or 277 volt incoming power supply.

APPENDIX C. LATEST SOS OPERATIONS MANUAL

PROPOSED OPERATIONS MANUAL

SAVE OUR SHEARWATERS PROGRAM
CALENDAR YEAR 2005

PREPARED FOR:
Kaua'i Island Utility Cooperative

PREPARED BY:

RANA PRODUCTIONS
&
PLANNING SOLUTIONS

APRIL 1, 2005

Introductory Note and Acknowledgments

The State of Hawaii, through its Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW), has since 1979 operated a program on Kaua‘i called “Save our Shearwaters” or “SOS.” This program seeks to retrieve, rehabilitate and release back into the wild, downed seabirds such as Newell’s Shearwaters, Hawaiian Petrels, Band-rumped Storm-Petrels and occasionally other species. For the last several years, the Kaua‘i Island Utility Cooperative (KIUC) has worked cooperatively with the U.S. Fish and Wildlife Service (USFWS) and DOFAW on seabird conservation issues. As part of that effort, KIUC contributed substantial funding for and participated in the operation of the SOS Program in 2003 and 2004.

As a result of the collective efforts of DOFAW, USFWS and KIUC in 2003 and 2004, all parties concluded that the SOS Program could be enhanced so as to provide greater conservation benefits to seabirds that nest on Kaua‘i. As part of such an enhancement, KIUC agreed with the USFWS in a Memorandum of Agreement to prepare a proposed Manual for the SOS Program. This Manual reflects the procedures which DOFAW has established for SOS over time, and certain modifications to the program suggested by DOFAW, USFWS, and/or KIUC.

This document has been prepared by KIUC’s consultants in close consultation with DOFAW and USFWS representatives. In drafting this proposed Manual, KIUC has made every effort to meld together the valuable input of all the involved parties. At the end of the day, however, this document is merely a proposal, and not an official document. As the operator of the program, DOFAW will ultimately decide whether to adopt this proposed Manual in whole or in part.

We would like to thank Tom Telfer who while DOFAW Kauai Wildlife Manager started and nurtured the SOS Program for more than a quarter of a century. Without him, other DOFAW staff, and the hundreds of Kaua‘i residents who have volunteered over the years to recover downed birds and deliver them to the SOS Aid-stations, the SOS Program would not exist. Together, they have recovered and released over 29,000 Newell’s Shearwaters, 220 Hawaiian Petrels and 15 Band-rumped Storm-Petrels.

We would also like to give particular thanks to Thomas Ka‘iakapu, Alan Silva, and the rest of the present DOFAW staff. They have not only continued Tom Telfer’s work, they have also been extremely helpful in developing this Program Manual. We also extend our heartfelt thanks to the 2004 SOS season field crew, Laura Arnold, Marion McHenry, and James Oyadamori,. They field-tested many of the protocols contained in this manual and provided valuable insights and recommendations based on their on-ground experience.

Finally, we would like to thank the numerous people that reviewed drafts of this document and made valuable suggestions. Their insights have not only improved the SOS Program, they have made this manual more readable. Mahalo to Norma Bustos, Scott Fretz, Thomas Ka‘iakapu, Tom Savre, and Bill Standley of DOFAW, Holly Freifeld, Jenness McBride, Keith Swindle, Eric VanderWerf and Brenda Zaun of the USFWS and Jay Holcumb and Susan Kaveggia of the IBRCC for their input and support.

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CHAPTER 1 – INTRODUCTION

1.1 BACKGROUND

1.1.1 ORIGIN AND PURPOSE OF SOS PROGRAM

Kaua‘i is home to numerous seabird species, including some species like the Newell's Shearwater (*Puffinus auricularis newelli*), Hawaiian Petrel (*Pterodroma sandwichensis*) and Band-rumped Storm-Petrel (*Oceanodroma castro*) that are listed as threatened or endangered under state and/or federal law. These seabirds breed on Kaua‘i, but spend most of their lives at sea. Fledglings of these three species make their first flight to the ocean each fall, but many are unsuccessful. While there are believed to be multiple causes of this, many are known to be confused by artificial lights, eventually exhausting themselves and falling to the ground; others collide with man-made structures including power lines, buildings, cars, and other obstacles. Adult shearwaters apparently are either less attracted to lights or are stronger flyers and more experienced; thus they collide with man-made structures at the same rate as do hatch-year birds. Since 1979, the State of Hawai‘i, through its Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW), has operated a program on Kaua‘i called "Save our Shearwaters" or "SOS." Under the SOS Program, Kaua‘i residents have been encouraged to retrieve downed seabirds during the fall fledging season and take them to local aid stations established at county fire stations, hotels and other locations. DOFAW personnel then retrieve the birds on a daily basis, evaluate their condition, band them, and release the healthy birds back into the wild. During the course of the SOS Program's 26-year history, more than 29,000 Newell's Shearwaters, 220 Hawaiian Petrels and 15 Band-rumped Storm-Petrels have been recovered. Approximately 97% of the Newell's Shearwaters recovered by SOS have been hatch year birds on their first flight to the ocean[1]. Approximately 92% of these recovered birds survive and are released back into the wild.

1.1.2 PURPOSE OF SOS PROGRAM MANUAL

In 2003 and 2004, the Kaua‘i Island Utility Cooperative (KIUC) helped fund and implement the SOS Program. In 2004, both DOFAW and the U.S. Fish and Wildlife Service (USFWS) devoted additional manpower to implementation and evaluation of SOS. As a result of those collective efforts, all three entities concluded that the effectiveness of SOS could be enhanced by making certain modifications to the program, and by developing a detailed program Manual.

This SOS Program Manual details the protocols, procedures and specific methodologies to be employed in order to recover as many downed birds as possible and ensure that the recovered birds are handled in such a way as to maximize the number of birds that are released in a healthy condition each year. It is hoped that this manual will represent the template that will be followed in implementing the SOS Program in future years and that the manual will be reviewed and updated on a regular basis to incorporate the latest scientific and commercial information. This manual has been prepared with input and review from USFWS and DOFAW biologists, wildlife program managers, and USFWS enforcement personnel.

[1] The age class of the birds is determined by examining the birds for remnant natal down, those with down are classed as Hatch Year Birds those without as adults.

1.2 ORGANIZATION OF THIS MANUAL

The remainder of this manual is divided into the following parts:

Chapter 2 details the qualifications required for individuals filling the SOS Program Manager and field crew positions. The federal and state banding and endangered species permits needed to operate the SOS Program in accordance with both federal and state wildlife regulations are also detailed in this section.

Chapter 3 describes the organization of the SOS staff and details the specific duties and responsibilities of each SOS personnel position. It also details the key program schedule milestones.

Chapter 4 describes and details the extensive training program that all SOS personnel will be required to complete. The training program includes both theoretical and practical training in bird identification, animal handling, bird banding, rehabilitation and veterinary intervention guidelines, release parameters and protocols, data collection, and field operations and safety.

Chapter 5 describes rehabilitation and veterinary intervention guidelines and details specific rehabilitation and veterinary actions and release parameters for rehabilitated seabirds.

Chapter 6 describes data analysis and reporting guidelines and timelines.

Chapter 7 consists of appendices that contain a wide range of related material. It provides contact information for all entities and parties involved in the SOS Program as well as copies of all of the SOS Program data forms that will be used in reporting data and other ancillary information required to manage the SOS Program on an annual basis.

CHAPTER 2 STAFF QUALIFICATIONS, RESPONSIBILITIES & PERMITS

2.1 INTRODUCTION AND OVERVIEW

The SOS staff is comprised of a Program Manager, a seasonal full-time senior field technician and two seasonal part time positions. The SOS Program Manager has overall responsibility for managing and directing the program. The seasonal full-time senior field technician is the Program Manager's key field-person who in turn will be responsible for the smooth and safe running of the field operations. The Program Manager ultimately reports to the head of the Kaua'i Island DOFAW office.

This Chapter of the SOS Manual describes the qualifications that individuals operating the SOS Program should possess. Intended as a guideline rather than as a set of hard and fast rules, it is divided into the following subsections:

- Section 2.2 summarizes the responsibilities of the Program Manager and the desired qualifications of the individual who fills that role.
- Section 2.3 describes the responsibilities and preferred qualifications of the individuals who will carry out the fieldwork.
- Section 2.4 discusses the permits that must be held by the individuals and/or organizations carrying out the work of the SOS Program.

The qualifications for, and specific responsibilities of the positions are discussed below.

2.2 PROGRAM MANAGER RESPONSIBILITIES & QUALIFICATIONS

2.2.1 PROGRAM MANAGER RESPONSIBILITIES

The position of SOS Program Manager is a full-time position that encompasses a variety of tasks interspersed throughout the calendar year. There is an active bird recovery field season which runs from approximately July through December. In addition, the Program Manager must carry out numerous program organization and training activities, conduct public outreach efforts, identify potential sources of grant funding, and prepare applications for grants during other months of the year. It is possible to split these responsibilities among more than one person, but doing so increases the likelihood that insufficient time would be available to the SOS Program to carry out all of the responsibilities in the best possible manner.

The SOS Program Manager will be responsible for hiring the field crew staff, organizing, setting-up, and conducting the bulk of the training program. The SOS Program Manager will also be responsible for securing and maintaining field and safety equipment, overseeing the day-to-day running of the field portions of the SOS Program, managing SOS personnel, analyzing the data collected, and preparing all necessary reports. The SOS Program Manager will also participate in the field collection, banding and release of birds, and attendant nighttime road-side searches. The Program Manager will oversee the rehabilitation program, possibly delegating some responsibilities to the seasonal full-time senior field technician.

During the non-fallout period of the year, the SOS Program Manager will be responsible for designing and implementing public outreach program components. The Program Manager will also be responsible for interacting with DOFAW and the USFWS and where appropriate, with other entities over other seabird research issues and management opportunities associated with listed

seabirds and the SOS Program. The SOS Program Manager will also be responsible for identifying and pursuing research opportunities, for preparing and submitting grant proposals to appropriate funding entities, and for maintaining and raising public awareness of the need for the program and the opportunities for public support of it.

The SOS Program Manager will operate under the direction of the DOFAW, Kaua‘i Division Office, under the direct supervision of the DOFAW Kaua‘i Wildlife Manager. This position is currently filled by Mr. Thomas Ka‘iakapu. All field activities will be conducted in concert with DOFAW staff.

2.2.2 PROGRAM MANAGER QUALIFICATIONS

The program manager should have at least three years amount of field experience handling birds, and managing field crews. The applicant should have excellent computer and inter-personal communication skills, since a large portion of the work involves managing people and interacting with multiple agencies, working groups, and private entities. Previous experience with the SOS Program or a similar wildlife recovery program is desirable. Facility with data analysis and report preparation and attendant computer skills is mandatory. Previous experience identifying and securing wildlife research grants is desirable. Well-developed skills in public interpretation and education (I&E) are desirable. Certification as an avian rehabilitator or the willingness to undergo off-island seabird rehabilitation training on the Mainland is desirable. The program manager will be required to complete the staff training program described in Chapter 4, and to show sufficient proficiency to be able to oversee field crew personnel in the various skills required to fulfill their specific jobs.

2.3 FIELD CREW RESPONSIBILITIES & QUALIFICATIONS

In addition to the SOS Program Manager identified in Section 2.1, the program will require a seasonal full-time field technician and one to two additional part-time field technicians.[2] All field crew staff should have hands-on experience in handling wildlife, preferably seabirds. Previous experience with the SOS Program or a similar wildlife recovery program is desirable. All field crew personnel will be required to complete the staff training program provided for in Section 4, and to demonstrate their proficiency in all of the skills taught in the training program. All field crew staff members will be required to own, insure, and maintain a dependable motor vehicle suitable for use in pickup operations. They will be reimbursed for the use of this vehicle as provided for in their employment contract. The following subsections describe the responsibilities of those positions and the desired qualifications of the individuals who would fill the various roles.

2.3.1 SEASONAL FULL-TIME FIELD TECHNICIAN RESPONSIBILITIES & QUALIFICATIONS

The Program will hire one seasonal full-time person for roadside and aid-station pickup and for night-time roadside searches as directed by the Program Manager for the duration of pickup activity. The seasonal full-time senior field technician will be the Program Manager’s key field-person and will be responsible for the smooth and safe running of the field operations conducted by the part-time field technicians. This individual will be responsible for a regular day-time pick-up route, banding and releasing birds, overseeing the rehabilitation and veterinary intervention triage activities and running the rehabilitation facility under the direction of a trained avian rehabilitator and/or a veterinarian.

Individuals occupying this position should have hands-on experience in handling wildlife, preferably seabirds. Previous experience with the SOS Program or a similar wildlife recovery programs is

[2] “Seasonal full-time” means a person working 40 hours per week for a portion of the year on a contract basis. “Part-time” means a person working less than 40 hours per week on a contract basis.

desirable, but not required. Certification as an avian rehabilitator or the willingness to undergo seabird rehabilitation training on the Mainland is desirable, but not required.

2.3.2 SEASONAL PART-TIME FIELD TECHNICIANS RESPONSIBILITIES & QUALIFICATIONS

One or two additional part-time field technicians will be required to implement the SOS Program. These individuals will be responsible for picking up birds from the SOS Aid-stations and delivering them either to the release points or to the designated rehabilitation and veterinary intervention triage area. In certain cases, these individuals will also assist with banding and releasing birds as directed by the senior field technician or the SOS Program Manager.

Individuals applying for this position should have hands-on experience in handling wildlife, preferably seabirds. Previous experience with the SOS Program or a similar wildlife recovery programs is desirable, but not required.

2.3.3 VOLUNTEERS

Historically, volunteers made up a significant part of the SOS Program field crew. This stemmed from a high public awareness of the Shearwater fallout problem and the efforts of a few dedicated individuals. Participation has lessened over the past several years, at least partly due to DOFAW staff time constraints that have made it difficult to spend the requisite amount of effort arranging for and coordinating volunteer help.

The majority of downed birds turned into SOS Aid-stations are recovered by local citizen volunteers that are not paid members of the SOS Program. Without their continued efforts to recover birds the SOS Program could not continue to be successful. There are numerous opportunities and benefits to involving volunteers in specific SOS Program tasks beyond simply taking birds to SOS Aid-stations (e.g., search additional routes, observe birds real-time in the vicinity of hot-spots during peak periods, etc.). One of the tasks assigned to the SOS Program Manager is to identify volunteer opportunities within the SOS Program and work to bring those opportunities to fruition through the public outreach component of the SOS Program.

2.4 ENDANGERED SPECIES AND BANDING PERMITS

Because SOS Program personnel band, handle, and rehabilitate endangered seabirds and birds protected under the Migratory Bird Treaty Act, the Program Operator must have various federal and State of Hawai‘i permits to ensure that the program and individual field personnel are in compliance with these laws. The SOS Program Manager will be responsible for ensuring that the Program and the personnel who participate in it are covered by the appropriate permits.

2.4.1 FEDERAL ENDANGERED SPECIES ACT PERMIT

So long as DOFAW continues to operate the SOS Program, the program does not require a separate federal Endangered Species Act permit. Designated state employees are exempted from Federal Endangered Species Act permit requirements under 50 CFR 17.21(c) and 50 CFR 17.31(b) and may take endangered and threatened species in order to aid a sick, injured, or orphaned specimen; dispose of a dead specimen; or salvage a dead specimen.

If the SOS Program were to be run by an entity other than the State, that entity would be required to apply for and secure a federal Endangered Species Act Recovery Act scientific/recovery permit to

operate the program (50 CFR 17.22(a) and 50 CFR 17.32(a))[3]. The time required to obtain the needed approval is such that a decision to use a non-State organization for the any particular SOS field season would need to be made well in advance (no later than April 1st), in order to ensure that the approvals can be obtained in sufficient time to operate the SOS Program.

2.4.2 STATE ENDANGERED SPECIES PERMIT

So long as DOFAW continues to operate SOS, the program does not require a state endangered species permit, because this is an existing state program covered under that agency's existing wildlife management program. However, if the SOS Program were to be run by a third party (e.g., a non-profit organization), then that entity would be required to apply for and secure a state endangered species permit to operate the program. It takes about the same amount of lead time to secure a state endangered species permit as it does to secure the equivalent federal permit, as described above.

2.4.3 FEDERAL BIRD BANDING PERMIT

All field personnel must be listed on a current federal bird banding permit allowing banding in the state of Hawai‘i. This requirement may be met by already being included on the DOFAW bird banding permit, or by being added to the permit under which DOFAW operates its bird banding operations. The SOS Program Manager is responsible for ensuring that once staff members have been adequately trained and are proficient bird-banders, that they are added to the existing DOFAW permit.

If the SOS Program is to be staffed separately from DOFAW (e.g., by a nonprofit organization), that entity must apply for and secure a federal bird banding permit and all field personnel will need to be added to that permit. Again, sufficient lead time must be allowed in order to secure this permit.[4]

2.4.4 FEDERAL MIGRATORY BIRD TREATY ACT PERMIT

Wildlife rehabilitators who care for birds protected under the Migratory Bird Treaty Act are required to have a valid Migratory Bird Treaty Act Permit.

[3] Federal endangered Species Act scientific/recovery permits for Hawai‘i are issued and administered by the U.S. Department of the Interior, U.S. Fish & Wildlife Service, Region 1, in Portland Oregon. Applying for, and receiving, a new permit takes between three and six months. Thus if the SOS Program is going to operate under an agency or entity other than DOFAW it will be imperative that this permitting process commences as soon as possible after the decision is reached on the structure/management of the program is reached.

[4] Federal banding permits are issued and administered by the U.S. Department of the Interior, U.S. Geological Survey Patuxent Wildlife Research Center in Maryland. Applying for, and receiving, a new banding permit takes between three and six months. Thus if the SOS Program is going to operate under an agency or entity other than DOFAW it will be imperative that this permitting process commences as soon as possible after the decision is reached on the structure/management of the program is reached.

CHAPTER 3 GUIDELINES FOR SPECIFIC TASKS

This Chapter provides guidelines for specific activities that are undertaken as part of the SOS Program. Section 3.1 details specific guidelines for performing non-training tasks. Section 3.2 outlines a timetable for these activities. Section 3.4 presents a prioritized list for implementing the various components of the SOS Program in case all components of the program can not be implemented in the 2005 season for one reason or another.

3.1 GUIDELINES FOR SPECIFIC TASKS

The guidelines outlined in this section are designed to assist the Program Manager in initiating and running the SOS Program in a standardized fashion each year. Equally important, it advises field crew staff of the things that are expected of them.

3.1.1 HIRING FIELD PERSONNEL

If field personnel are hired by DOFAW there are three different avenues for effecting such hires. (1) They could be brought on as "emergency hires" under the discretion of the District Office or DOFAW's Administration office in Honolulu. This is the process that has been followed in the past, with the exception of the past two years when field crew members were hired via private individual contracts using KIUC funds. (2) A full time Program Manager could conceivably be engaged as a "Temporary hire" through the Pacific Cooperative Studies Unit (PCSU), which generally handles DOFAW and other conservation agencies soft money hires in Hawai‘i. (3) Alternately, one could create a full time position and hire through the DLNR's Human Resources Department. This is the least likely avenue for the 2005 season for two reasons. First, the state's Human Resource protocols are in the process of being changed. Second, the State is normally unwilling to create a full time position without an assurance that "hard money" is, and will continue to be, available.

If a third party (such as a non-profit organization) were to hire field crew personnel they would be hired using an private individual employment contract between the entity and the individuals hired.

3.1.2 COORDINATING WITH OTHER AGENCIES (NOTIFICATIONS/PERMITTING)

The Program Manager will ensure that all the names of all field crew personnel are added to all endangered species and banding permits as required by law before beginning field work. Prior to the initiation of field work each year, the Program Manager is responsible for notifying the County of Kaua‘i Police Department of the SOS Program's starting and ending dates, providing them with a list of field personnel that includes their telephone numbers, a description of their individual vehicles and license plate numbers. The Program Manager must also certify to the Police Department that all field personnel will wear SOS Program tee shirts or other identifying clothing or badges and that their vehicles will display SOS Program magnetic signs on their doors.

The Program Manager is also responsible for contacting the USFWS law enforcement division prior to the onset of the field season and notifying them of the SOS Program's starting and ending dates, and providing them with the names of field personnel and their contact information prior to the start of the field season. Contact information for the County of Kaua‘i Police Department and the USFWS Law Enforcement Division is provided in Section 7.1.

3.1.3 DEPLOYING AID STATIONS

The shearwater aid-stations are maintained by DOFAW staff and stored at the Līhu‘e base yard when not deployed. The Program Manager will ensure that the aid-stations are clean and in good repair

prior to deployment. DOFAW staff will deploy the SOS Aid-stations according to the Program Schedule detailed in Section 3.2.4. The Program Manager is responsible for seeing that the SOS Aid-stations are recovered and re-furbished as necessary following the termination of the field season.

3.1.4 HACK BOXES AND HACK BOX MAINTENANCE

Currently the SOS Program operates several "hack boxes". These are release pens located on cliffs above the ocean from which birds are released back into the wild. The Program Manager will inspect the two permanent hack boxes located on the ocean side of the Līhu'e Airport, and the box located on the cliffs within the Princeville resort on the North Shore prior to the onset of the field season to ensure that they are clean and in good repair. Should either hack box require refurbishment the Program Manager will notify DOFAW staff of the specific repairs needed and will inspect the completed repairs to assure that the boxes are ready to accept birds when the season begins.

3.1.5 MANAGING FIELD CREWS

The Program Manager, and when directed, the seasonal full-time senior field technician, will be responsible for managing the field crews during the season. Management responsibilities include ensuring that:

- all field crew staff conduct their assigned duties in a safe manner,
- standardized pickup routes and searches are conducted as directed,
- night-time road side searches are conducted as directed, with special attention paid to safety protocols,
- downed birds are handled, banded and released in accordance with the appropriate protocols,
- all required data and photographs are collected in accordance with the detailed protocols.

The Program Manager will contact field crew staff members on a daily basis to ensure that all of the assigned tasks are being completed as directed and that any problems that field crew staff may have encountered are dealt with promptly. The Program Manager will periodically accompany each field crew staff member on his or her appointed rounds to ensure that quality standards are met. When necessary, the Program Manager will work to remedy any short-falls in field methodology.

The Program manager will schedule a weekly team meeting with the field staff to discuss the practical aspects of the ongoing field season, and to discuss any problems developing in data collection or other challenges encountered in the course of recovering birds and collecting the field data. The primary goals of the meetings will be to ensure that there is a timely and concise sharing of information and that any challenges that arise can be addressed in a timely and efficient manner.

3.1.6 STANDARD DAYTIME PICKUPS (INCLUDING AID -STATION COLLECTIONS)

Each field crew staff member will be assigned a standard day-time pickup route and a specific list of aid-stations she/he is responsible for servicing. Field staff will run pick-up routes beginning at 7:00 a.m. until they have completed servicing all of the SOS Aid-stations on their individually assigned routes each day. The Program Manager will make pickup route assignments and schedule specific staff members to each route. In preparing the schedule, the Program Manager will ensure all routes are covered seven days a week. Day-time standard pickup personnel will document and retrieve both live birds and dead birds found along their individual assigned routes as well as those they pick up from their assigned aid-stations. They will assess the condition of each bird recovered, band all the live birds deemed healthy enough to be released, document the pickup on the appropriate forms, place the birds in transport carriers, and transport them to one of the following: (i) a release sites (as detailed in Section 3.1.4), (ii) the rehabilitation and veterinary triage area (as detailed in Section 5.2

or an appropriate disposal location. Dead birds will be documented, and either salvaged, or in the case of badly damaged or rotting carcasses disposed of (as detailed in Section 4.2.12)

Special care in following safety guidelines and protocols detailed in Section 4.2.3 is imperative while carrying out these activities. It is not permissible to compromise the safety of the Field crew staff and/or the general public in an effort to recover a downed bird.

3.1.7 CONDUCTING NIGHT-TIME ROADSIDE SEARCHES

The Program Manager and the full-time senior field technician will each be assigned a standardized night-time roadside search route. The specific route maps will be developed no later than two weeks prior to the onset of the field season and will be included in Section7.4.12. Each of these routes will be run starting 30 minutes after sunset and 11:30 pm. nightly during the eight-week period when the potential for fallout is expected to be greatest.

Night-time pickup personnel will document and retrieve both live and dead birds found along their individual assigned routes. They will process the birds they find in the same fashion as described in Section 3.1.6, with the one exception that any birds recovered that are deemed healthy enough to be released will be released after sunrise at the closest release site. Because of the decreased visibility, nighttime pickups can be more hazardous than those conducted during daylight hours. Consequently, it is imperative that personnel follow the safety guidelines and protocols detailed in Section 4.2.3. The safety of the program workers and/or the general public should not be compromised in an effort to recover a downed bird.

3.1.8 INITIATING VETERINARY INTERVENTION AND REHABILITATION PROGRAM

The Program Manager will initiate contact with the licensed veterinarian identified in Chapter 5 at least 60 days prior to the onset of each field season (or no later than June 15th of each calendar year the SOS Program is to operate), to ensure that the veterinarian identified in Section 7.1 is willing and able to assist the SOS Program during the field season. The Program Manager will work with the licensed veterinarian to determine what if any supplies or facilities that will be required to either treat injured birds or rehabilitate weak, underweight or dehydrated birds. The Program Manager is responsible for ensuring that those supplies and/or facilities are available prior to the onset of the field season and will ask the licensed veterinarian to confirm their satisfaction with the supplies that have been provided prior to the start of the field season.

The Program Manager will ensure that the holding facility detailed in Section 5.3 is ready and stocked with necessary supplies prior to the onset of the field season. When and if needed, the Program Manager will arrange for the veterinarian to provide a training program for assigned field crew in the care of birds that will require day-to-day rehabilitation care.

3.1.9 DATA ENTRY AND REPORTING

Data gathered during the course of the SOS Program will be entered into the SOS Database on an ongoing basis rather than held till the end of the season. Field personnel will turn completed data forms and digital photographs in to the Program Manager at least once each week. The default deadline for these submittals will be each Monday before noon. However, an alternate day may be agreed to by the Program Manager at the beginning of each season if requested by the individual fieldworker.

Timely data entry and reporting is essential so that the Program Manager can follow up with field crew personnel in the case of incomplete data, questions, or potential problems in an expeditious

manner. It will also allow the Program Manager to try to contact individuals who picked up birds to obtain additional information concerning the circumstances under which the bird was found. Following the end of the field season, the Program Manager will analyze the data as outlined in Section 6.3.2.

Monthly Reports. The Program Manager will prepare a monthly report detailing activities and results of those activities conducted during the previous month and submit this to the Kaua'i Wildlife Division Supervisor no later than the 7th day of each month. During the field season these monthly reports will primarily document the ongoing efforts and results of the SOS recovery efforts. During the remainder of the year the reports will summarize the results of program analyses, efforts to obtain grant funding for special or on-going activities, and the results of other relevant short-term activities.

Annual Report. The annual report will report on all phases of the SOS Program and detail the results of the year's recovery efforts and detail recommendations on modifications to be implemented in the following years SOS Program.

3.1.10 DIGITAL PHOTOGRAPHY MANAGEMENT

The Program Manager will ensure that digital photographs and attendant data collected by the field staff are appropriately accessioned into the Photo Database and supporting hard copy photographs filed in the photo album. Digital photographs should be labeled using data entered on the appropriate Photo Log Form detailed in Section 4.2.7.4 and download from the individual flashcards or cameras. Copies of the photographs should be printed out and appropriately labeled and placed in the annual SOS Photo album. This task will be completed on a weekly basis so as to ensure that no photographs are lost and that any additional information that the Program Manager deems necessary can be collected from the individual field staff members in a timely fashion.

3.1.11 IDENTIFYING AND PURSUING OTHER SOS RELATED STUDIES/PROTOCOLS

The Program Manager will work with Federal and State agencies, including the DOFAW, USFWS, and possibly private entities to identify potential research and management opportunities as well as potential funding sources and partners. Many possible topics of interest have been identified through field work conducted by DOFAW, USFWS and KIUC biologists, though most have not been investigated to a point that likely funding sources or partners can be identified and pursued. The Program Manager will work with the Newell's Shearwater Working Group to prioritize suitable programs and studies and to attempt to find funding and partners to implement the selected programs.

3.1.12 PURSUING PROGRAM GRANTS

Once potential research and management opportunities have been identified and prioritized, the Program Manager will work with USFWS, DOFAW, and other agencies and funding organizations to identify potential funding sources and match them with the appropriate programs. The Program Manager will be responsible for applying for grants and/or other forms of funding to implement these selected research and management programs on an annual basis.

3.1.13 CONDUCTING PUBLIC OUTREACH EFFORTS

The Program Manager will be responsible for overseeing and assisting in the development of an integrated Information and Education (I&E) program. SOS Program public outreach and information efforts span a variety of venues and target audiences. At the basic level the public needs to be re-introduced to the SOS Program and the downing issue on an annual basis. Broader efforts to educate

residents and students about the threats and possible minimization efforts that they as individuals may be able to implement will require the development of an integrated I&E program. Television and radio spots alerting the island's residents of the SOS Program and general downing information will be prepared and aired prior to, and during the fallout season. Educational modules will be developed and introduced into the Island school system prior to the onset of the fallout season. Individual modules of the I&E program will be initiated at different times during the course of the year, and in many instances by different entities.

Many of the individual modules and products have already been created for the 2004 season. The Program Manager will review all existing materials and programs and consult with appropriate individuals, agencies, and organizations regarding their applicability to the 2005 season.

3.2 PROGRAM SCHEDULE

The program schedule proposed below is based on the dates used for the SOS Program in 2004 and on information generated during the 2004 season. It is possible that following review and interagency discussion some of these dates will be changed to reflect funding and/or staffing realities expected for the 2005 SOS season. A graphic presentation of the proposed SOS Program implementation schedule is provided later in this document.

3.2.1 YEAR ROUND PROGRAM

As proposed, the SOS Program will operate year-round. There will be no cessation of activities after the field season has ended as has been the case in past years. Scheduled start and end dates for the various broad tasks are presented below. These dates are intended as guidelines and should be construed to be fluid as many activities, except possibly some of the field season tasks, overlap other activities.

3.2.2 PUBLIC OUTREACH AND INFORMATION

Public outreach and information efforts will be initiated as early in the calendar year as is feasible. For Calendar Year 2005, this will depend upon who assumes the Program Manager position. Flyers, newsletters, newspaper articles, radio spots and possibly television spots re-introducing the SOS Program and the downing issue to the general public will be initiated no less than 30 days prior to the fallout season (i.e., no later than September 1st). Individual modules of the I&E program will be initiated at different times during the course of the year, though most are likely to be implemented 30 to 60 days prior to the deployment of the Shearwater Aid-Stations and continue through the end of the calendar year on an annual basis.

3.2.3 TRAINING PROGRAM

A staff training program will be scheduled one week prior to the deployment of the SOS Aid-stations. Additional training sessions may be required for part-time hires that will commence work in the second month of the field season. This training will be provided prior to their working independently (i.e., without being accompanied by a previously trained staff member).

The SOS Program Manager is responsible for organizing and implementing the training program. The Program Manager will work in concert with DOFAW and USFWS staff to ensure that the practical training is appropriate and fulfills the goal of training the staff personnel to a level where they can demonstrate that they are proficient in the skills necessary for them to conduct fieldwork in a safe and consistent fashion on a day-to-day basis.

Hands-on bird handling and banding training will be undertaken under the direct guidance of an experienced bander such as an experienced DOFAW, USFWS or program biologist, who will be required to "sign off" on the individual's demonstrated proficiency in handling and banding endangered seabirds.

The Program Manager will conduct the classroom training with the assistance of DOFAW staff. The practical training will be conducted by a combination of the Program Manager, DOFAW staff, a qualified seabird bander, and possibly USFWS personnel, if the Program Manager is not a qualified bander at the onset of the practical training program.

The Program Manager will coordinate the training program with DOFAW and USFWS staff as necessary. The Program Manager will arrange for and reserve an appropriate room in which to conduct the classroom training, assemble a sufficient number of SOS Program Manuals for all attendees, and gather all of the necessary field gear and other materials required to operate the training program. The Program Manager will contact a qualified seabird bander and secure permission for the practical banding training at the Kilauea Point National Wildlife Refuge, or other suitable Wedge-tailed Shearwater colony (The Program Manager may be a qualified bander having the skills necessary to conduct this phase of the practical training). The Program Manager will notify all field personnel of the date, time and location of the training sessions well in advance of the program.

3.2.4 AID-STATION DEPLOYMENT AND EXTRACTION

SOS Aid-stations will be deployed during the week of September 12, and retrieved as close to the end of the week of December 15.

3.2.5 DAY-TIME STANDARD PICKUP ROUTES

Daily day-time standard pickup routes will commence on September, 15st and conclude on the Friday of the week of December, 15^{t}. If SOS Aid-stations are deployed earlier than September 15, then daily day-time standard pickup routes will be begin as soon as the aid-stations have been deployed and continue until they have been extracted.

3.2.6 NIGHT-TIME ROADSIDE SEARCHES

Night-time roadside searches will begin on October 1st and conclude on November 30th. This is the period when fallout is traditionally concentrated. Data collected over the past 26-years shows a direct correlation between the volume of downed birds and moonless nights in October and November. Based on lunar cycles, the peak fallout periods during the 2005 season will likely be during the first and last weeks in October and during the first week in November.

3.2.7 DATA COLLATION

Data entry will commence on September 1st and conclude following the end of the field season. Monthly data collation and analysis will be conducted in such a manner as to provide the necessary information for inclusion in monthly progress reports. Final data collation and analysis will start as soon as feasible following the termination of the field season.

3.3 SOS PROGRAM IMPLEMENTATION TIMELINE

An SOS Program Implementation Time Line is provided in Section 7.4.1

3.4 PRIORITIZED IMPLEMENTATION GUIDELINES

It is conceivable that adequate funds or other organizational strictures may delay the full implementation of the expanded SOS Program as presented in this manual during the 2005 season, or possibly even in future years. The following set of guidelines prioritize (in descending order of biological importance) the specific components of the SOS Program. This is done to assist in making decisions on which components to fund over the short term if all components can not be implemented simultaneously.

1. Recovery and release of as many healthy birds as possible from the SOS Aid-stations and daily day-time routes. Coupled with the basic public outreach components alerting island residents to the start of the shearwater fallout season and what to do to help.
2. Recovery and release of as many healthy birds as possible from night-time roadside searches before they fall victim to vehicles, predation or any other of the numerous perturbations that threaten downed seabirds away from standard pickup routes.
3. Recovery and rehabilitation of as many injured or otherwise compromised birds as possible.
4. Documentation and recovery of as many dead birds as possible along both day-time and night-time road-side searches.
5. Development and initiation of a comprehensive public information and education program.
6. Design and funding development for long-term seabird research and recovery projects.

CHAPTER 4 STAFF TRAINING PROGRAM

4.1 INTRODUCTION

All SOS Program personnel will be required to attend and satisfactorily complete an appropriate training program prior to the onset of the field season each year. The curriculum is intended to provide classroom and field training in all aspects of the fieldwork and data collection that staff will be tasked with undertaking. By standardizing the training program and requiring that all personnel take the training on an annual basis, the Program Manager and wildlife regulatory agencies can be sure that individuals charged with implementing the SOS Program:

- have received adequate theoretical and practical training on the tasks they will be required to fulfill;
- have demonstrated their individual proficiency in handling and banding recovered seabirds; and
- are able to conduct fieldwork in a safe and consistent fashion on a day-to-day basis.

The training program has two basic modules; classroom instruction and practical hands-on field training. The classroom module will give staff an overview of the SOS Program and introduce them to the operational procedures needed to organize for and carry out their day-to-day program responsibilities. The field training module will give staff members practical (hands-on) training and experience in the handling and banding of birds, the rehabilitation and veterinary intervention guidelines and release protocols they are to follow, and the practical use of the safety equipment issued to them.

4.2 CLASSROOM TRAINING CURRICULUM

4.2.1 INTRODUCTION TO THE SOS PROGRAM

Each staff member will be issued a copy of the SOS Program Manual prior to the start of the training program. Those attending training sessions will be asked to familiarize themselves with its organization and general content before beginning training.

At the beginning of the classroom training, the Program Manager or her/his designated representative will summarize the organization and contents of the Manual and direct staff to where specific information is located within it. The Program Manager will emphasize that many of the activities that they may be asked to carry out are governed by state and federal wildlife permits and that the training will introduce them to the provisions that are applicable to their work, and that it is essential that they adhere to those provisions. The Program Manager will explain the organization of the program, explaining the responsibilities of each team member as detailed in Chapter 3 . The Program Manager will make sure that the persons attending the training sessions understand the chain of command and know exactly whom (among the persons whose information is provided in Section 7.1 of the Manual) they should contact in the event they have questions or encounter situations that they are not sure how to handle.

Staff members will be required to read the entire Manual and after completing the training program and prior to initiating field work, will be expected to acknowledge that they have read and understood sections of the Manual that are relevant to their area activities and responsibilities and will follow the protocols laid out in it by signing the training acknowledgement page in the manual.

4.2.2 STATE AND FEDERAL PERMITS

A copy of all necessary executed state and federal wildlife permits will be included in the manual in Section 7.2. Additionally any letters extending authority to the individuals covered under the permits or to a third party acting as the State's agent will also be included. (See Section 2.4 for a discussion of the permits required to undertake the activities associated with the SOS Program under a different aegis).

4.2.3 SAFETY AND USE OF SAFETY EQUIPMENT

Traffic on Kaua'i is heavy in many areas where field crew staff may wish to stop to recover downed seabirds. In some locations there is little room to safely stop a vehicle and to ensure that it is out of the roadway travel area. In order to provide for their safety, the Program Manager will issue the following safety gear to each field crew member:

- Two traffic cones;
- Six traffic flares;
- One orange safety vest;
- One glow baton;
- One cell phone;
- Two magnetic SOS Program car signs; and
- Three SOS Program tee-shirts;
- Hand-held flashlight & headlamp (night-time roadside search staff).
- *General*. Field crew staff are not to endanger themselves and the general publics safety is not to be compromised in an effort to recover a downed bird. The above safety equipment will be carried, or where appropriate, worn by all field crew staff at all times while conducting SOS Program activities. SOS Program staff will wear orange safety vests at all times when operating a vehicle and/or picking up downed seabirds. Staff will affix SOS Program car signs to vehicles at all times when conducting SOS Program activities. Whenever practical, field crew will wear an SOS Program tee shirt when in the field to make sure that they are easily identifiable as authorized workers. When vehicles must be stopped in exposed areas along roadways, drivers will place a traffic safety cone 20-feet in front and 20-feet behind the roadside tires of the vehicle.
- *Use of Cell Phones*. Cell phones issued to Program staff are to be used only to carry out the daily operation of the SOS Program, to notify the Program Manager of problems, or to summon appropriate emergency assistance if needed. Cell phones will be preprogrammed prior to the onset of field work with SOS Program staff contact names and numbers, as well as any necessary emergency service numbers that the Program Manager may deem necessary.

Additional Nighttime Precautions. Staff members assigned to conduct night-time roadside searches are to adhere to the highest safety standards possible. When parked alongside roadways after dark vehicle interior lights will be turned on, and a hand-held flashlight or headlamp will be used at all times when outside the vehicle. In the event that a worker is involved in an accident or has a disabled vehicle after dark, the driver will light and deploy flares in a similar fashion to those used for the traffic cones to ensure that drivers of other vehicles can see and avoid the disabled vehicle.

4.2.4 MAINTENANCE OF MILEAGE AND REIMBURSEMENT LOG

All staff members are responsible for keeping track of the mileage and any reimbursable out of pocket expenses that they incur in the pursuit of their assigned tasks. Each field crew member desiring to be reimbursed for use of their own vehicle in support of the SOS Program will maintain and complete a bi-weekly mileage and reimbursement log and turn them into the Program Manager at

the end of the reporting period for processing. Blank forms are found in Section 7.4.2. An electronically generated version of this form may be submitted in lieu of the paper form, providing it contains all of the data fields presented in the hard copy form.

4.2.5 LABOR HOURLY LOG

All staff members are responsible for keeping track of the hours that they work. Each field crew member will maintain and complete a bi-weekly hourly labor log and turn it into the Program Manager at the end of his/her reporting period for processing. Blank forms are found in Section 7.4.3. An electronically generated version of this form may be submitted in lieu of the paper form, providing it contains all of the data fields presented in the hard copy form.

4.2.6 INFORMATIONAL MATERIAL FOR GENERAL PUBLIC ON SOS PROGRAM

During the course of performing SOS Program duties, field crew members may be approached by members of the public who have questions about the Program and/or the Shearwater downing issue in general. It is important that staff respond politely and thoughtfully to all questions that they are asked. The dissemination of information about steps that members of the public should follow in handling and recovery birds, as well as potential minimization actions that individuals can take to reduce the risk of birds being downed is important in allowing the Program to achieve its goals. DOFAW has produced an excellent flyer that addresses many of the questions that may be raised about the SOS Program (see Section 7.4.4 for copy). Each field team member will be given a supply of these brochures to hand out prior to the onset of field activities and is responsible for maintaining his or her supplies of these over the course of the season. The Program Manager will supply these upon request.

4.2.7 DATA FORMS AND DATA ENTRY CODES

It is imperative that data gathered on live and dead birds in a consistent fashion. The SOS Program uses the following five data forms to collect and report on the data collected in the field:

- Newell's Shearwater & Hawaiian Petrel Retrieval Data Form (see Section 7.4.5 for copy);
- Other Seabird Retrieval Data Form (see Section 7.4.6 for copy);
- Seabird Mortality Log (see Section 7.4.7 for copy);
- Photo Log (see Section 7.4.8 for copy); and
- Toe Tag (see Section 7.4.9 for copy).

A correctly completed example is included with each blank form. These examples should be used as guidance when filling in forms during field activities. The data entry codes to be used in recording data are included in Section 7.4.10.

4.2.7.1 Use of the Newell's Shearwater & Hawaiian Petrel Retrieval Data Form

The Newell's Shearwater & Hawaiian Petrel Retrieval Data Form is to be used to enter data on these two listed seabird species recovered alive. The vast majority of the birds that are recovered by the SOS Program each year are Newell's Shearwaters. Consequently, the data gathered on the majority of the birds that are handled will be entered onto this form. The form is also to be used to record data on Hawaiian Petrels recovered or retrieved alive from aid-stations. Data to be gathered and entered on this form is as follows:

- ***PAGE #*** – Starting with the first page that data is to be recorded, enter the number 1. Number successive pages with the next highest number (2, 3, 4, etc.).

- ***BAND SERIES*** – Each band series consists of 100 bands, in strips of 25 bands each, and are pre-numbered. The series number should be entered in this space at the top of each page. In the example the series is 815-25501 – 25525.
- ***BAND #*** – This column is pre-printed with numbers running from 01 to 25 and on subsequent pages from 26 to 50, 51-75, and 76 – 100. These numbers correspond to the last 2 digits of the band numbers in the series being used.. Find the appropriate line that corresponds to the last two digits of the band that you banded a bird with. Enter the 3 previous numbers on the band in front of the pre-printed number. In both the examples we have entered 255 – if all bands that follow on this page are from this same series, then there is no need to re-enter the same number in subsequent lines.
- ***PICK UP DATE*** – This entry is for the month and day that you recovered the bird. Use alpha numeric symbols, using the first three letters of the month followed by the numeric day of the month. In the first example, NOV/5 is entered, indicating that the bird was recovered on November 5th. In the second example, the NOV/6 entry indicates that this bird was recovered on November 6th.
- ***PICK UP LOCATION*** – This entry is for the location where the bird was recovered. In the case of birds retrieved from aid-stations, there may or may not be any information on the write-on board as to where the bird was originally recovered. Enter any information provided on the write-in board as it may be useful. If there is no information, enter Unknown; otherwise enter the location the bird was recovered. For birds recovered during the course of roadside searches, enter the location where they were recovered. In the first example, the Kalapaki Beach Park entry indicates that the bird was originally recovered in Kalapaki Beach Park. In this instance, the bird was actually retrieved from an aid-station and the original recovery location was written on the write-on board at the station. The second entry in the example is "Hawaiʻi Air Guard Station-Kokeʻe," indicating that the bird was recovered at the Hawaii Air Guard Station in Kokeʻe.
- ***UTM*** – This entry is for the GPS coordinates of the location where the bird was recovered. In the first example, no data was entered because the bird was retrieved from an aid-station. In the second example, the GPS coordinates of where the bird was recovered were entered since we have exact information on the location that the bird was recovered.
- ***AID ST*** – This space is for the code for the Aid-Station from which the bird was retrieved. The aid station should be entered using the data codes listed on the Data Entry Codes List located in Section 7.4.10. In the first example, the "E" indicates that the bird was recovered from the Līhuʻe Fire Station aid-station. In the second example, no data is entered in this field since the bird was not retrieved from an aid-station.
- ***SECT*** – Enter the sector code for the sector in which the bird was recovered, use the Sector Map, provided in Section 7.4.11 to determine the correct sector and enter the appropriate data code for that sector. Section 7.4.10 lists the Sector codes. The Code 12 in the first example indicates that this bird was recovered in the Marriott Hotel Sector. The Code 30 in the second example shows that this bird was recovered in the Kokeʻe Sector.
- ***AGE CLASS*** – This space is for the age class of the bird as determined using the procedures detailed in Section 4.2.10. The "HY" in the first example indicates that this bird was a hatch-year bird. The "AD" in the second indicates that this bird was an adult bird.
- ***RELEASE SITE*** – This space in the form is for the data code for the Release Site from which the bird was released (see the Data Entry Codes List in Section 7.4.10). For example, "OPO" entered in the first example indicates that the bird was released from the Opoi Hack Box, located *makai* of the airport. "PTA" in the second example indicates that this bird was released from the Port Allen Hack Box.

- ***REMARKS*** – This space is for brief comments about the bird that may be of interest, e.g., that the bird flew away immediately upon release, that there was a lot of down on the bird, etc. If the bird recovered is a Hawaiian Petrel or a Band-rumped Storm-Petrel, then you should enter the appropriate species alpha code from Section 7.4.10 showing that the bird in question was not a Newell's Shearwater. The code entered in the first example indicates that the bird had lots of down and was very frisky. The second example, "HAPE – in dog kennel", indicates that the bird was a Hawaiian Petrel, not a Newell's, and that it was found in a dog kennel.
- ***PHOTO #*** – This is a flag box, if flagged it indicates that you have taken photographs of the recovered bird, the release, circumstances surrounding the downing etc. If photos are taken information on is entered in the Photo Log, see Section 4.2.7.4. The absence of a flag in the first example indicates that there are no photographs of this bird. The presence of a flag in the second example shows that there is one or more photograph of the bird.
- ***NOTE #*** – If this box is flagged it means that additional information about the bird has been recorded (e.g., its release date and time, the circumstances surrounding the downing, etc. If additional notes were recorded they are to be entered into the Field Notebook, see Section 4.2.7.5 for more information. In both examples the box is flagged, indicating that additional information on these birds has been recorded.

4.2.7.2 Use of the Other Seabird Retrieval Data Form

This form is used to enter data on other live seabird species recovered (i.e., not a Newell's Shearwater, or Hawaiian Petrel). Based on past experience, the most regularly recovered species that will be entered on this form are Wedge-tailed Shearwaters and White-tailed Tropicbirds. Instructions for making entries in this form follow. Where the instructions are the same as for the Endangered Species Retrieval Data Form, that is simply noted.

- ***PAGE #*** – Starting with the first page that data is to be recorded, enter the number 1, followed by your initials. Number successive pages with the next highest number (2, 3, 4, etc.).
- ***#*** – These are pre-numbered, and are used in conjunction with the page number for additional information logged in the Photo Log or in the Field Notebook, see Sections 4.2.7.4, and 4.2.7.5 for additional information on how these numbers are used.
- ***SPECIES*** – This space is for the four letter species alpha code for the seabird species recovered listed in Section 7.4.10 . The "WTSH" entered as the first example indicates that the recovered bird was a Wedge-tailed Shearwater. The code "WTTR" entered in the second example indicates that the bird recovered was a White-tailed Tropicbird.
- ***PICK UP DATE*** – Same as Endangered Seabird Retrieval Data Form.
- ***PICK UP LOCATION*** – Same as Endangered Seabird Retrieval Data Form.
- ***UTM*** – Same as Endangered Seabird Retrieval Data Form.
- ***AID ST*** – Same as Endangered Seabird Retrieval Data Form.
- ***SECT*** – Same as Endangered Seabird Retrieval Data Form.
- ***AGE CLASS*** – Same as Endangered Seabird Retrieval Data Form.
- ***RELEASE SITE*** – Same as Endangered Seabird Retrieval Data Form.
- ***REMARKS*** – Same as Endangered Seabird Retrieval Data Form.
- ***PHOTO*** # – Same as Endangered Seabird Retrieval Data Form.

4.2.7.3 Use of the Seabird Mortality Log

This form is only to be used to enter data on all dead seabird species recovered For the most part, data is entered on this form in the same fashion it is for the two previous forms. Instructions for completing fields that differ from those already described follow below.

- ***PAGE #*** – Starting with the first page that data is to be recorded, enter the number 1, followed by your initials. Number successive pages with the next highest number (2, 3, 4, etc.).
- ***SPECIES*** – Enter the four letter species alpha code (from the list in Section 7.4.10) for the seabird species recovered.
- ***PICK UP DATE*** – Same as Endangered Seabird Retrieval Data Form.
- ***TIME*** – Enter the time of day that the bird was recovered in military time (24 hour clock).
- √– You should check this flag box if you removed the dead bird from the road. The box is checked in the first example indicating that following data gathering the bird was removed from the road and disposed of in an appropriate fashion.
- ***REMARKS*** – This space is for brief comments about the bird that may be of interest, i.e., that it was observed being hit by a vehicle, was found flat on the road, was found stuck in a fence, etc.
- ***PHOTO #*** – This is generally the same as for the Endangered Seabird Retrieval Form. Flagging the box indicates that you have taken photographs of the dead bird, the circumstances surrounding the downing, etc. Information detailing the images is entered in the Photo Log. The box is checked for all three examples indicating that we did in fact take photographs of these birds. Note: Photographs will be taken of most dead birds to document the mortalities and the circumstances under which they occurred.
- ***AGE CLASS*** – Same as Endangered Seabird Retrieval Data Form.

4.2.7.4 Use of the Photo Log

This form is to enter data on photographs taken of birds and situations associated with recoveries and mortalities recorded on the three forms detailed above. For the most part, data is entered on this form in the same fashion it is for the two previous forms. Instructions for completing fields that differ from those detailed for the Endangered Seabird Retrieval Data Form follow below.

- ***PAGE #*** – Starting with the first page that data is to be recorded, enter the number 1, followed by your initials. Number successive pages with the next highest number (2, 3, 4, etc.).
- ***ID #*** - Enter the unique recovery number identifying the bird or situation surrounding a specific bird that the photographs were taken of. Data codes can be found on the Data Entry Codes List located in Section 7.4.10. In the first example, the entry "ES-2550", indicates that the photographs are of the bird banded and entered on an Endangered Seabird Retrieval Data Form with band # 2550. In the second example, "ML-1-1" indicates that the photographs are of a bird recorded on Page 1, Record 1 of the Endangered Seabird Mortality Log, as do the photos documented on the next to lines. "OS-1-1" In the fifth example signifies that the photograph is of a bird documented on Page 1, Record 1 of the Other Seabird Retrieval Data Form. A separate line is to be used for each photograph taken.
- ***PHOTO #'s*** – This field is for a unique photo number for each image. The number should be created using the following formula month/day/image # (using a two-digit number) taken of the particular bird. "110501" in the first example indicates that this photo was taken on November 5th and it was the first and only photo of this bird recorded. "110601" in the second example indicates that this photo was taken on November 6th and it was the first photo taken of this bird. "110602" in the third example indicates that it was the second photo taken of the same bird recorded on the line

above this one, and the next entry ("110603") indicates that this was the third photograph taken of the same bird.

- ***PICK UP DATE*** – Same as Endangered Seabird Retrieval Data Form.
- ***SPECIES*** – Enter the four letter alpha code for the seabird species recovered.

4.2.7.5 Use of Field Notebook

The field notebook is to be used to enter additional data, behavioral, habitat and situational information associated with birds and situations recorded on the four forms described above. All information on specific birds or situations that won't fit on any of the other data forms that might be of interest to Program managers, scientists, or regulators, should be entered into the Field Notebook. Enter the unique recovery number identifying the bird or situation surrounding a specific bird before each set of notes that you enter in the Field Notebook. Data codes can be found on the Data Entry Codes List located in Section 7.4.10.

4.2.7.6 Use of Toe Tags

Toe Tags are used to identify specific dead birds that are salvaged and stored for later examination. The field worker is responsible for completing a Toe Tag for each dead bird that is in good enough condition to salvage, i.e., not flattened or rotting. Toe Tags should be filled in using a fine point Sharpie © permanent marker. The completed Toe Tag should be tied to the leg (s) of the carcass and both the carcass and the tag should be inserted into a Ziploc © freezer bag. Toe tags should be filled out for all dead seabirds salvaged. The following data should be entered on the Toe Tag.

- ***PICK UP DATE*** – This space is for entering the date that you recovered the carcass. Use alpha numeric symbols, using the first three letters of the month followed by the numeric day of the month, and then the year. In the example we entered NOV/15/05, indicating that the carcass was recovered on November the 15th 2005.
- ***SPECIES*** – This space is for the four letter alpha code for the seabird species recovered (see 7.4.10).
- ***ID #*** - This space is for the unique recovery number identifying the bird or situation surrounding a specific carcass. Data codes can be found on the Data Entry Codes List located in Section 7.4.10. In the example, "ML-1-1" indicates that the carcass is of a bird recorded on Page 1, Record 1 of the Endangered Seabird Mortality Log.

4.2.8 INTRODUCTION TO BIRD BANDING AND BIRD HANDLING EQUIPMENT

The Program Manager will issue each field crew member a bird banding tool box, containing the following items:

- Banding pliers;
- Spreader pliers;
- Pesola 1000 gram scale;
- Weighing bag;
- USFWS bird bands size # 4 (100);
- Latex disposable surgical gloves for handling birds;
- Bird handling towel;
- Rite-in-the-rain© observation note book;
- Toe tags;
- Writing implements including a Sharpie permanent Marker Pen to fill in Toe Tags;

Additionally, field crew members will be provided with a pet carrier, SOS bird transport rack, Styrofoam cooler, 2 gallon size Ziploc freezer bags, digital camera and a GPS unit.

4.2.9 SEABIRD IDENTIFICATION

The SOS Program primarily handles five seabird species:[5]

- Newell's Shearwater (*Puffinus auricularis newelli*)
- Hawaiian Petrel (*Pterodroma sandwichensis*)
- Band-rumped Storm-Petrel (*Oceanodroma castro*)
- Wedge-tailed Shearwater (*Puffinus pacificus*)
- White-tailed Tropicbird (*Phaethon lepturus dorothea*)

Newell's Shearwaters make up the great majority of the birds recovered by the program each year. More specifically, each year over the past few years the program has recovered approximately 500 Newell's Shearwaters, but only around 10 Hawaiian Petrel, 1 Band-rumped Storm Petrel, 15 Wedge-tailed Shearwater, and 3 White-tailed Tropicbirds.

Identifying the five most regularly recovered species does not present many identification problems; only two species, Newell's Shearwater and Wedge-tailed Shearwater, superficially resemble each other, while the other three are easily separable. Photographs of these five species are included in Section 7.3. The Program Manager and the DOFAW Kaua'i Wildlife Manager, Mr. Thomas Ka'iakapu, both have copies of comprehensive field guides to the birds of Hawai'i and the Tropical Pacific. These can be used to assist in identifying unknown or uncommonly encountered species. If a bird is encountered that can not be identified or is an uncommon species take photographs of the bird and then transport to the DOFAW baseyard and notify the Program Manager for instructions on the appropriate protocols to follow in handling the bird.

Key Identification characteristics of each species are presented below. For the purpose of discussing the identification of these seabirds we'll discuss how to identify an unknown species by comparing them to a Wedge-tailed Shearwater – a species that you will be handling during the practical banding portion of this training program.

- **Wedge-tailed Shearwater –** Length: 41-46cm (16-18 in), Wing Span: 97-104 cm (38-41 in), Weight 450 grams (16 oz). Bill: Dark gray – long, thin and with a hook at the distal end. Legs/Feet: flesh-white. Iris: Brown. A medium sized shearwater, light gray-brown above with a paler throat. Upperwings mainly light gray-brown. Underparts and underwings mostly white; sides of breast, flanks, inner underwing-coverts and undertail-coverts mottled with varying degrees of brown.
- **Newell's Shearwater -** Length: 30-35cm (12-14 in), Wing Span: 76-89 cm (30-35 in), Weight 400 grams (14 oz). Bill: Blackish– long, thin and with a hook on the distal end, similar to Wedge-tailed Shearwater. Legs/Feet: Blackish tarsus with pinkish webs. Iris: Black. A smallish very dark, almost black shearwater with pure white underparts, and underwings with black tip and trailing edges on the underwings. Conspicuously white sides of rump are a very obvious field mark. White throat, extending upwards on sides of neck and behind ear-coverts (See photo). Newell's always look darker than Wedge-tailed Shearwater and Hawaiian Petrel. Newell's are noticeably smaller than Wedge-tailed Shearwaters.

[5] Several other seabird species, including Bulwer's Petrel (*Bulweria bulwerii*), Christmas Shearwater (*Puffinus nativitatis*), Red-footed Booby (*Sula s. rubripes*), Brown Booby (*Sula leucogaster plotus*), Laysan Albatross (*Phoebastria immutabilis*) and various terrestrial alien species are delivered to the SOS Aid-stations by members of the general public. For any of these species field crew members will notify the Program Manager for instructions on how to handle each bird.

- **Hawaiian Petrel -** Length: 43cm (17 in), Wing Span: 91cm (36 in), Weight 450 grams (16 oz). Bill: Black. Legs/Feet: Bluish-flesh, webs distally black. Iris: Brown. A typical long-winged gadfly petrel, blackish-brown cap extends below eyes and onto the sides of neck, forming a partial collar. Body dark velvety brown, slightly paler than cap, underparts white. Upperwings dark velvet-brown, primaries and secondaries slightly darker, but lacks typical Pterodroma "M" mark. Underwing mostly white, with blackish margins, distinctive diagonal bar extending across coverts; axillaries white with small blackish patch (diagnostic). Birds tend to look grayish-blue with black heads. Bill is shorter and stubbier than either shearwater species (See photo). Looks round headed with relatively small bill when compared to either shearwater species.
- **Band-rumped Storm-Petrel -** Length: 19-21cm (7.5-8.5in), Wing Span: 42-45 cm (16.5-18in), Weight 38-45 grams (1.5 oz.). Bill: Black. Legs/Feet: Black. Iris: Dark brown. A tiny, cardinal-sized blackish-brown bird with a white rump band and uppertail-coverts. Upperwings blackish-brown; greater coverts brownish-grey forming a paler diagonal band. Underwings dark brownish-gray, tail blackish. Legs long in proportion to the body size.
- **White-tailed Tropicbird -** Length: 38-40 cm (15-16 in), without 33-40 cm tail streamers, Wing Span: 89-96 cm (35-38 in), Weight 300 grams (11 oz.). Bill: Yellowish, occasionally horn to orange, juveniles often have blackish tip. Legs/Feet: Yellowish, webs blackish. Iris: Brownish. A predominately white bird with distinctive tail streamers. Head mostly white, with black stripe extending upwards from the gape passing through the eye. Upperparts mostly white, scapulars tipped with black. Underparts white; longer flank feathers tipped with black. Upperwings, webs of outer 4-5 primaries mostly black, with black median coverts, inner secondaries and their coverts forming conspicuous diagonal stripe across otherwise pure white wing. Underwing translucent white, tail streamers white. Belly and streamers often tinged reddish from soil in burrows in adult nesting birds. Juvenile bird distinctly barred grayish-black – no tail streamers (most of the White-tailed Tropicbirds recovered are juvenile birds).

4.2.10 DETERMINING THE AGE OF RECOVERED SEABIRDS

The vast majority of birds recovered each year by the SOS Program are juvenile birds, most downed on their maiden voyage from the breeding colonies to the ocean. For example, 97% of the Newell's Shearwaters recovered to date have been hatch-year birds. Most of the adult birds that are recovered are recovered near the beginning of the season.

In the case of Newell's Shearwaters, the hatch-year birds generally appear glossy black above and very pure white below. In contrast, adult birds tend to be more grayish-brown above, with numerous worn feathers, and often fairly stained or abraded belly feathers. In the case of the White-tailed Tropicbird, the lack of tail streamers and the vermiculated grayish-black feathering distinguishes hatch-year birds from adults (See Photo in Section 7.3). In the case of the other four species, determining the appropriate age class can be more challenging. Many of the hatch-year birds still sport varying amounts of natal down (See Photo in Section 7.3). When down is not obvious on a bird, it is usually possible to dislodge small amounts of down by gently scratching the top of the head against the lay of the feathers with your finger nail, small tufts of down will usually fall off, rather like dandruff.

General behavior is also a good indication of the age class of the recovered birds. Adults tend to be vigorous and want to fly or waddle away from humans; many of the hatch-year birds are relatively sedentary, and will often just sit still where placed, while making little effort to flee or hide.

4.2.11 PROCEDURES FOR DOCUMENTING AND PROCESSING LIVE BIRDS

The purpose of documenting the birds retrieved is to record when and where the bird was recovered, to document its condition and age class, and to gather as much information as practical on the environmental setting that may have contributed to the downing of each bird recovered alive. It should always been borne in mind that the primary goals of recovering downed live seabirds is to assess each bird's condition and process it for release in a way that maximizes the probability that it will survive and reproduce. The following subsections describe the steps to follow when processing and recording data associated with each live bird recovered.

4.2.11.1 Steps for Processing and Recording Data on Live Birds Found in SOS Aid-Stations

1. Identify the bird to species. If in doubt, take photographs to allow for later identification. Do not process unidentified or non-native birds. Transport any unidentified birds and non-native species to the DOFAW Baseyard and notify the Program Manager for instructions on how to handle the bird(s).
2. Check the bird for bands; if banded, record the band number on appropriate seabird recovery form included in Section 7.4.5 or 7.4.6.
3. Record as much information about the bird's original location as possible, information entered on the aid-station write-on board will usually be minimal. Enter information on appropriate seabird recovery form.
4. Erase the entry for the bird from the aid-station data board.
5. Assess the bird's condition.
6. If the bird is injured, deliver it as soon as practical to the veterinarian identified in Section 5.8.
7. If the bird appears uninjured, weigh it.
8. If the bird is a Newell's Shearwater or Hawaiian Petrel and under 300 grams, deliver it as soon as practical to the veterinarian identified in Section7.1, and notify the Program Manager that a bird has been delivered to the veterinarian.
9. If the bird is healthy and vigorous, band the bird. If the bird is other than a Newell's Shearwater or Hawaiian Petrel proceed to step # 13.

   - Newell's Shearwater # 4
   - Hawaiian Petrel # 4
10. Stow in SOS bird transport rack for later release.
11. Transport all birds to be released to the closest release site.
12. Place banded birds into the hack-box (only place as many birds into the hack-box at one time as the sign on the box indicates is the maximum number allowed in the box at one time). Release all banded birds..
13. All other seabirds recovered will be transported to the DOFAW baseyard and the Program Manager will be notified.
14. The Program Manager or DOFAW biologist will band these birds with the appropriate size band listed below:

    - Band-rumped Storm-Petrel # 2
    - Wedge-tailed Shearwater # 5
    - White-tailed Tropicbird # 3B - 4 [6]

[6] The Bird Banding Lab states that White-tailed Tropicbirds should be banded with # 4 bands. Personal experience in Hawai'i indicates that a 3B band is a better fit in almost all instances. Band with a 3B and check for fit; if it seems too tight, replace with a # 4 band (Brenda Zaun and Beth Flint, USFWS, personal communications).

- Red-footed or Brown Booby # 7B
- Laysan Albatross # 7B

15. The Program Manger or their designee will then transport and release the banded birds as outlined in Step 11 and 12.

4.2.11.2 Steps for Processing and Recording Data on Live Birds Found Outside of Aid Stations

1. Identify the bird to species if in doubt take photographs to allow for later identification, do not document non-native birds. Unidentified or non-native birds should not be processed, but rather transported to the DOFAW Baseyard and handled as detailed in Step 16.
2. Retrieve the bird if/when safe to do so (If possible photograph the bird in-situ first).
3. Take photographs and describe each photo on a Photo Log (see Section 7.4.8). These should include an overall photograph(s) with bird shown in relation to other identifiable features and a Close-up of bird (so that bird can be identified to species).
4. Record date, time, and GPS location (as close to bird's original location as possible) on Photo-Log (Section 7.4.8).
5. Check the bird for bands and record band number if banded on appropriate seabird recovery form.
6. Assess the bird's condition.
7. If injured, deliver the bird as soon as practical to the veterinarian identified in Section 5.3.1.
8. If uninjured, weigh the bird.
9. If the bird is a Newell's Shearwater or Hawaiian Petrel and under 300 grams, then deliver it as soon as practical to the veterinarian identified in Section7.1, and notify the Program Manager that a bird has been delivered to the veterinarian.
10. Record specific information on possible cause(s) of downing-such as: stuck to a fence, on road under a power line, landed unharmed on lighted football field, etc. Record any other notes or observations on the birds location, behavior that may be of interest in observations notebook.
11. Estimate distance to nearby streetlights, ball field, other exterior lights and power line marker balls or bird diverters.
12. If healthy and vigorous band the bird.
13. Stow in SOS bird transport rack for later release.
14. Transport all birds to be released to the closest release site.
15. Place banded birds into the hack-box (only place as many birds into the hack-box at one time as the sign on the box indicates is the maximum number allowed in the box at one time). Release all banded birds.
16. All other seabirds recovered will be transported to the DOFAW Baseyard and the Program Manager will be notified.
17. The Program Manager or DOFAW biologist will band these birds with the appropriate size band listed below:

    - Band-rumped Storm-Petrel # 2
    - Wedge-tailed Shearwater # 5
    - White-tailed Tropicbird # 3B - 4 [7]
    - Red-footed or Brown Booby # 7B
    - Laysan Albatross # 7B

18. The Program Manger or their designee will then transport and release the banded birds as outlined in Step 14 and 15.

4.2.12 DOCUMENTING AND PROCESSING DEAD BIRDS

The purposes of documenting dead birds that are found are to: (i) understand when and where birds are dying; (ii) estimate the condition and age class of the bird involved to better understand the significance of the loss to the population and factors that may have contributed to its death; and (iii) gather information on the environmental setting that may have contributed to the death of each bird processed. Analyzing mortality data can facilitate a better understanding and identification of specific risks that result in mortalities to the seabirds species recovered by the SOS Program. The following subsections describe the steps to follow when processing and recording data associated with each dead bird recovered. Some of these are the same as the procedures that are to be followed in handling live birds.

4.2.12.1 Steps for Processing Dead Birds Found in the SOS Aid Stations by SOS Personnel

1. Identify the bird to species. If in doubt, take photographs to allow for later identification. Do not document or retrieve non-native birds.
2. Record the date and time the bird was recovered in the Mortality Log.
3. If the carcass is in good enough condition to salvage, i.e., not flattened or rotting, fill out a Toe Tag.
4. Check the bird for bands and record the band number in the Mortality Log.
5. Record as much information as possible about the location where the bird was found in the Mortality Log. This information is typically limited if the dead bird is from an aid station and the only information is that which was left on the aid-station board.
6. Estimate distance to nearby streetlights, ball field, other exterior lights and power line marker balls or bird diverters.
7. If a Toe Tag is completed, ensure that all of the requested information is filled out completely.
8. For salvageable carcasses, attach the Toe Tag to the bird's leg, bag bird in Ziploc © freezer bag, stow in Styrofoam cooler and transfer carcass to the freezer located in the DOFAW base yard at the end of the day.
9. Non-salvageable dead birds should be disposed of at the nearest County Refuse Facility – store the carcasses in a plastic garbage bag until able to dispose of them in a sanitary fashion.

4.2.12.2 Steps for Processing Dead Birds Found Outside of Aid Stations by SOS Personnel

1. Identify the bird to species. Take a photograph of the bird in situ. Do not document or retrieve non-native birds.
2. Record date and time in the Mortality Log.
3. Use the GPS unit to determine the place the bird was found. Try to stand as close to the exact spot as possible, but do not endanger yourself. If there are tall structures or other things near the site the bird is found that may be related to the bird's downing, try to obtain a position of that as well. Enter all information in the Mortality Log.
4. Take in-situ photographs of the bird and surrounding area and record the spot from which each photograph was taken and the direction that the camera is facing in the Photo Log . Try to obtain an overall photograph(s) showing the relationship of the dead bird to other identifiable features.
5. Retrieve the bird if/when safe to do so.
6. Check the bird for bands and record band number if banded in the Mortality Log.
7. If in doubt as to the correct species identification, take close-up photographs of the bird (so that bird can be identified to species by my more experienced staff members).
8. Record the distance of the bird to the nearest human-related structure (e.g., street light pole, building, utility pole, power line, power line marker ball or bird diverter if present etc.).

9. Record and/or photograph the number(s) on the nearest utility pole (if nearby) to help confirm the location.
10. Record specific information on possible cause(s) of downing and death (e.g., stuck to a fence, smashed on road under a power line, killed by cat after landing in vicinity of lighted playfield, etc.).
11. Disposing of the collected bird depends upon its condition. If the recovered carcass is a fresh specimen, then collect the body, attach a completed Toe Tag, bag the bird in Ziploc freezer bag, stow the bag in a Styrofoam cooler, and transfer carcass to the freezer located in the DOFAW base yard at the end of the day. If the recovered carcass is smashed and/or rotten, then remove it from the road if it is safe to do so and dispose of it either by tossing the carcass into the weeds (if the location is away from human habitation or transport the carcass to the nearest County Refuse Facility after recording the recovery information in the Mortality Log.

4.2.13 ROUTE MAPS

Individual team members will be assigned to specific day-time pickup routes and some will also be assigned to night-time roadside searches. The day-time pickup routes are designed to service the 13 SOS Aid-stations. Both the daily day-time and the night-time search routes are designed to search as many miles of roadway in the highest downing areas (hotspots) for downed birds before they are either hit by cars or disappear into roadside vegetation. Specific routes and route maps are located in Section 7.4.12. These routes and maps will be prepared no-later than two weeks prior to the onset of the field season and placed in the appropriate Sections identified above.

4.2.14 DIGITAL PHOTOGRAPHY

Digital cameras are an important tool for gathering data on seabirds recovered during the SOS Program, and each field crew member is issued one. A Xerox copy of the instruction manual will be provided to the crew member. (Original instruction manuals will be kept in the DOFAW Kaua‘i Wildlife Managers office.) . Field crew members will familiarize themselves with the basic controls and use of the camera issued to them prior to the practical field training portion of the training program.

4.2.15 GPS

The use of global positioning system (GPS) units provides accurate spatial information concerning where a bird was recovered or killed. This information will be entered into a Geographic Information System (GIS), and that spatial information will be analyzed in conjunction with other information that is collected to better understand specific risks facing seabird species on Kaua‘i.

A Xerox copy of the instruction manual originally packaged with the GPS unit will be provided to the crew member. The original instruction manuals will be kept in the DOFAW Kaua‘i Wildlife Managers office). Field crew members will familiarize themselves with the basic controls and use of the GPS unit issued to them prior to the practical field training portion of the training program.

The SOS Program records GPS information in the UTM format using the NAD83 Datum. The SOS Program Manager is responsible for ensuring that units are loaded with the most current version of the operating software before they are issues to field workers. The current latest software for the Garmin© GPS units which were used during the 2004 SOS season is version 3.6 released in December 2003.

4.3 PRACTICAL FIELD TRAINING

The practical field training session will be held at the Kilauea Point National Wildlife Refuge, or at another suitable Wedge-tailed Shearwater colony. Its purpose is to give field staff hands-on experience implementing the procedures they have studied previously in the classroom portion of the training program. In the absence of special circumstances, individuals who have not previously completed the classroom-training element should not participate in the practical field training.

4.3.1 PRACTICAL USE OF SAFETY EQUIPMENT

The instructor will show all field crew staff how to wear safety garments and how to deploy traffic safety cones and flares. She/he will go over the safety guidelines detailed in Section 4.2.3, answer questions, and observe and correct field workers as they practice deploying the markers in a real-world setting.

4.3.2 DIGITAL PHOTOGRAPHY TUTORIAL

The instructor will conduct a practice session with the previously issued digital cameras. Students will be asked to collect the required photographic documentation from a staged "downing". The instructor will review the images and demonstrate to any one having problems taking appropriately composed, in-focus, properly exposed images how to produce acceptable images, and how to download and label photographs. The key skills to be mastered are:

- How to power up the camera;
- How to change or charge the camera batteries;
- How to compose an image; and
- How to check the photograph to ensure that it is focused and properly exposed.
- How to download and label photographs.

4.3.3 GPS TUTORIAL

The instructor will conduct a practice session with the previously issued GPS units. Students will be asked to collect the required locational information from the staged "downing" used for the digital photography tutorial. The key skills to be mastered are:

- How to power up the GPS unit;
- How to change the batteries in the GPS unit;
- How to record a position in the GPS unit; and
- How to read and retrieve the data from the GPS unit.

4.3.4 IDENTIFYING SEABIRDS

The instructor will provide the field crew members opportunities to identify the seabirds at the refuge. The goal of this training is for crew members to gain confidence identifying the common seabirds present on the Island. The Program Manager will provide a comprehensive seabird field guide and a more general field guide to the birds of Hawai‘i and the Tropical Pacific for trainees to become acquainted with. These books will be used during the field season to identify any birds recovered that the correct identification is not obvious.

4.3.5 BIRD HANDLING AND BANDING

4.3.5.1 Proper Handling and Recovery of Birds

The instructor will demonstrate the proper use and care of the equipment that has been issued to the field workers (see Section 4.2.8). Additionally the team will visit both a shearwater aid-station and a hack box and the instructor will show them how to use both.

The goal of handling and processing birds is t do so as quickly as possible, and with the least amount of repeated disturbance to the birds as possible. Birds will be processed in the following order:

- Retrieve bird and inspect for injury.
- Place bird in numbered tube within the transport Rack.
- Record appropriate information on appropriate Data Forms (enter tube # - very important).
- Transport bird to release site.
- Weigh bird at release site.
- Record Data on appropriate Data Form (s).
- Band bird.
- Release bird.

The Program Manager or master bander will demonstrate how to pick up and handle a seabird using a Wedge-tailed Shearwater as a subject. Trainees will be shown how to handle, inspect and assign an age class to a bird in the hand, how to stow birds in the SOS bird transport rack, how to weigh a bird using a Pesola scale and weigh bag, and then how to place birds in the hack-box and to hand-release birds. Each field crew member will be required to practice handling, inspecting, aging, weighing and stowing a live bird in the transport rack. Field workers will be taught how to use pet carriers to transport small birds such as Band-rumped Storm-Petrels (which tend to move around too much in the SOS bird transport rack) and to transport injured or birds larger than the tubes in the SOS bird transport rack.

4.3.5.2 Dummy Banding Field-Training

Each field crew member will bring their Banding tool box (see Section 4.2.8) to the practical training session. To ensure that field crew members learn the correct way to band seabirds, initial practice will be conducted using wooden dowels rather than live birds. Since practical banding training using live birds will be using Wedge-tailed Shearwaters as banding subjects, the dummy banding exercise will use # 5 USFWS bird bands (the same size used for Wedge-tailed Shearwaters) and one-quarter inch diameter wooden dowel. The master bander will show the trainees how to handle the bands and the banding pliers and will affix a band to a dowel as an example. Each field crew member will be required to practice affixing a band to a wooden dowel until the master bander is satisfied that each trainee has mastered the correct way to handle and band a dowel.

Once the trainees have learned the proper technique for affixing a band, the master bander will demonstrate the correct use of the spreader pliers to remove improperly affixed bands. Each crew member will be required to practice removing a band from a wooden dowel until the master bander is satisfied that each trainee has mastered the correct way to remove a band from a dowel.

4.3.5.3 Wedge-tailed Shearwater Practical Banding

Following the successful completion of the dummy banding exercise, trainees will be taught to band live birds. As previously mentioned, the practical banding training will be done using Wedge-tailed Shearwaters. The master bander will show the trainees how to pickup and hold a seabird and how to use remnant down to assign an age class to the birds. The master bander will then demonstrate how to band a live bird. Following the demonstration, each trainee will practice banding Wedge-tailed Shearwaters. The trainees will band as many birds as the master bander feels are necessary for each trainee to become proficient in the task.

The instructor will pay special attention to showing how to finish a band so that both edges are neatly and tightly closed. Bands that are skewed or not tightly closed can injure the birds leg, or get caught on vegetation, fishing lines and the like, a potential death sentence for the banded bird.

The master bander will also demonstrate the correct use of the spreader pliers to remove a band from a Wedge-tailed Shearwater. Each crew member will be required to practice removing bands from live birds. The practice will continue until the master bander is satisfied that each trainee is able to remove a band from a live bird properly.

4.3.6 VETERINARY AND REHABILITATION INTERVENTION GUIDELINES

The Program Manager will go over the veterinary and rehabilitation intervention guidelines detailed in Section 5 with the field crew. All veterinary and/or rehabilitation care provided to any recovered birds will either be conducted by a licensed veterinarian or be directed under the direct supervision of a licensed veterinarian or licensed bird rehabilitator. See Section 5 for a detailed discussion of the triage process and handling of sick, injured or weak birds.

4.3.7 BIRD RELEASE TECHNIQUES AND GUIDELINES

All field crew members will be shown the hack box sites and other approved release sites around the island. Birds will be released during daylight hours only, and as soon after processing as is practical. Birds that are healthy and ready for release will be placed in the Hack-box. Do not place more birds in the hack-box than the maximum numbered allowed in the box at one time (the number varies from box to box and is posted on the outside of the box). Birds that had been placed in a hack box and are found to still be there the following day will be transported to the triage area for evaluation. Once evaluated, the appropriate veterinary and/or rehabilitation intervention guidelines detailed in Section 5 will be followed.

CHAPTER 5 REHABILITATION AND VETERINARY INTERVENTION

5.1 INTRODUCTION

Although the majority of seabirds recovered by the SOS Program are immediately releasable, a small number of them are obviously injured, sick, undernourished, and/or dehydrated, and require medical care and/or rehabilitation. In some cases, proper veterinary care can make the difference between the birds' survival and death. This chapter of the SOS Operations Manual contains guidelines for veterinary and rehabilitation intervention to assist SOS Program personnel in making decisions about the appropriate way to handle recovered birds that are unfit for immediate release. This chapter was developed with the assistance of the International Bird Rehabilitation and Research Center (IBRCC), an internationally recognized seabird rehabilitation organization with extensive experience in the retrieval, rehabilitation, and recovery of numerous seabird species around the world.

5.2 REHABILITATION AND VETERINARY INTERVENTION GUIDELINES

All veterinary and/or rehabilitation care will be conducted in accordance with 50 CFR §17.21, 17.31, 21.12 and 21.31. While the veterinarian is responsible for all medical aspects of the treatment and rehabilitation, he or she does not necessarily have to be physically present during all bird treatment and care, provided that the personnel providing rehabilitation are certified rehabilitators or working under the direct supervision of the attending veterinarian.

Any bird displaying any of the following conditions will require veterinary and/or rehabilitation intervention:

- Acute head and spinal traumas;
- Broken bill;
- Paralysis (legs);
- Drooping wing;
- Emaciation;
- Dehydration;
- Wing or leg fractures;
- Substantial blood loss;
- Hypothermia/Hyperthermia.

5.3 REHABILITATION GUIDELINES

The following guidelines are to be used in 2005 as a basis for seabird rehabilitation as directed by a licensed veterinarian. The veterinarian (or in years after 2005, the trained rehabilitator) may choose to modify these protocols and record keeping.

5.3.1 PERSONNEL

During the 2005 SOS season, one of the licensed veterinarians identified in Section 5.8 will direct any rehabilitation efforts required of the Program. Following the 2005 season, as the program develops a pool of trained rehabilitators, they will likely take over the bulk of the rehabilitation work. In either case, personnel tending/holding listed species for longer than 48 hours will need to secure a Migratory Bird Treaty Act permit to under take these activities, see Section 2.4.4 for a discussion of this permit. If it becomes necessary to train a rehabilitator other than the SOS veterinarian, the IBRCC has offered to train a Kaua'i-based person at one of their West Coast facilities.

5.3.2 FIELD TRIAGE, STABILIZATION AND TRANSPORT

The SOS worker handling a bird should conduct a brief field examination of a bird if injuries or sickness are suspected. Head traumas can be detected visually by checking the eyes, mouth, and head. Paralysis can be a sign of acute trauma, including spinal trauma. Manually palpating both wings and legs can identify or rule out fractures. If fractures, head trauma, or any other injuries are found, or if a bird displays signs of being dehydrated, a veterinarian should see the bird, diagnose its condition, and provide or recommend treatment and/or rehabilitation.

Interaction with humans can cause severe stress to wild animals, especially when they are sick or injured. To minimize additional stress, place the bird in the SOS bird transport rack, and keep human noise and visual distraction to a minimum during transportation to the veterinarian.

Knowing the natural or normal behaviors of Newell's Shearwaters and Hawaiian Petrels will help further determine if a bird needs medical treatment. Grounded shearwaters and petrels tend to "crawl" around the ground looking for a place to hide that is similar to the burrows in which they nest. They often looked stunned or confused. Do not automatically assume that this means the bird needs medical treatment. Shearwaters and petrels are specially adapted for swimming and digging; their legs and feet are placed so far back on their bodies that they do not walk upright like other seabird species, such as albatrosses and boobies. Field crew members should make a point of studying the way that healthy shearwaters and petrels behave on the ground, in the hand, and in hack-boxes to develop a feel for what is normal behavior for a healthy bird of all species that they are likely to handle. Knowing the "norm" will help immeasurably in recognizing a bird that may need special assistance.

5.3.2.1 Personnel Safety Precautions

When handling a sick, injured, or weak bird, it is always important to remember that human safety is the principal consideration, closely followed by the safety of the bird. Accordingly, SOS Program staff should:

- Wear safety goggles and surgical gloves while performing an exam or handling a bird (under stress, birds will peck and scratch).
- Remember that Shearwaters have strong feet and sharp nails which can inflict wounds and so protect yourself accordingly.
- Be sure to have a current tetanus shot.

Since it is inevitable that bird handlers will incur minor injuries that will require first aide treatment, rehabilitation centers should have a first aid kit on site for minor cuts or bites.

5.3.2.2 Bird Handling Procedures

When picking up or otherwise handling a bird, do the following whenever possible:

- Cover it with a towel or pillowcase.
- Fold the bird's wings into its body while controlling the head.
- Grasp firmly the head behind the neck and the base of the skull where the mandibles end, all the while ensuring the bill is controlled.
- While restraining birds with the use of a towel, pillowcase or by hand, keep in mind that by wrapping the bird too tight one may impede the bird's ability to breath.
- Avoid taping a bill shut.

- When birds are being moved or transferred, hold the bird at waist level and away from face and other people to avoid injury from pecking and biting.
- Work in teams when possible.

5.3.2.3 Evaluation and Admission

The evaluation and admission process of a bird requiring rehabilitation involves the following steps:

- Minimize undue stress to the bird (e.g., keep voices low and talk to a minimum; cover the bird with a towel or pillowcase).
- Take the bird's temperature.
- Weigh the bird.
- Assess the presence of injuries, such as fractures or head traumas.
- Record overall impression of bird's attitude (e.g., BAR, QAR, NAR, depressed, alert)[8].
- Assess dehydration level.
- Take hematology samples for (PCV, TP, and BG).
- Place a temporary leg band on each bird.
- Keep complete and accurate medical records by filling in and maintaining SOS Veterinary forms.
- Physical Exam Form, which can be found in Section 7.14.13.

Taking the temperature of the bird is of foremost importance when performing an initial examination. The normal temperature for a bird is between 102˚F and 105˚F. If a bird's temperature is below or above these values, immediately halt the examination and treat for hypothermia or hyperthermia. Once the temperature is within the normal range, continue the examination. After stabilizing the bird, minimizing stress is imperative. Well-ventilated dark boxes in cages imitate the natural burrowing habitat of shearwaters and petrels and can greatly reduce stress while in captivity. Keep noise and human foot traffic to the lowest level practical. During the examination, keep the bird covered with a towel or a pillowcase; only allow the head to be exposed when it is being examined. Check the skin and feathers for signs of abnormalities. Any bruising will appear green beneath the skin. Signs of blood on feathers and/or skin should be further examined to determine the source and treatment. Palpate wings, legs, and spine to rule out any obvious fractures. Examining the mouth will give an indication of the level of the bird's dehydration (see Table 5-1) while also confirming the absence of blood or foreign objects.

Check the eyes and determine if the pupils are equally dilated. Any signs of blood, cuts, or discharge in or around the eyes should be recorded. Using a stethoscope, listen to the lungs and heart. Any wheezing, popping, and crackling in the lungs also should be noted. Occasionally, a heart murmur may be detected in birds that are extremely anemic. Examine the musculature and determine the bird's condition. Use the following descriptions to determine body condition:

- Normal - well-fleshed;
- Thin - can feel and see keel but still has sufficient muscle bilaterally of the keel;
- Emaciated - protruding or sharp keel.

[8] Medical care terminology codes are provided in Section 7.4.14.

Table 5-1. Clinical Signs of Dehydration.

% Dehydration	*Clinical Signs*
<5	Not detectable
5-6	Subtle loss of skin elasticity
7-10	"Tenting" of the skin Loss of brightness around the eyes Slow upper eyelid turgor Dry, ropey mucous membranes
10-12	"Tented" skin stands in place Muddy color to scales of fee Dry membranes Cool extremities Rapid heart beat Depressed
12-15	Extreme depression. Shock. Near death

Source: Redig, P., 1984. "Fluid Therapy and Acid Base Balance in the critically Ill Patient". Proceedings of the International Conference on Avian Medicine, Toronto, Canada. pp. 59-73.

5.3.2.4 Blood Samples

Taking blood samples will likely not be needed for the majority of the SOS birds provided that birds do not have acute traumas or will not be in rehabilitation more than 48 hours. For birds requiring more extensive and long-term care, taking a small blood sample can give the wildlife rehabilitator a good indication of the bird's overall health (Table 5.2). Venipunctures should be performed by a veterinarian or an experienced wildlife rehabilitator. This sampling will require no more than 0.10-0.15 ml of blood, which is usually drawn from the medial metatarsal vein into microhematocrit tubes. Using a 25 gauge needle or a 27 gauge for smaller birds, the blood is usually drawn from the medial metatarsal vein (leg vein). Although the medial metatarsal vein is optimal, dehydration can sometimes compromise the use of that particular area. Alternately, the jugular vein can be used, but this vein should be accessed only by a veterinarian. Taking samples from the brachial wing vein should be avoided because of the risk of further stress on the bird and the potential of creating a hematoma that may rupture when the bird returns to activity or flying.

5.3.2.5 Thermoregulation

Thermoregulatory problems are more prevalent when restraining wild animals than when handling domestic species. Wild animals tend to struggle excessively and produce excess body heat that must be dissipated. The following are signs of hyperthermia:

- Increased heart rate and respiratory rate;
- Open-mouth breathing or panting;
- Seizures or convulsions;
- Temperature > 106 ˚ F.

The following are signs of hypothermia:

- Temperatures < than 100˚ F;
- Shivering (this can be due to stress as well);
- Depressed or lethargic behavior.

Table 5-2. Blood Parameters for Hematocrit and Blood Glucose Tests in Seabirds.

	Normal Values	Low Value	High Value
Packed Cell Volume (PCV)	40-53%	<30% 1. parasites 2. anemia 3. molt	>55% 1. dehydration TX: fluids
Total Protein (TP)	3-6 gm/dl	< 2.5 gm/dl 1. parasitism 2. emaciation 3.chronic disease (especially hepatic and renal)	>7 gm/dl 1. dehydration 2. shock 3. infection Very high >11gm/dl 1. chronic lymphoproliferative disease
Blood Glucose (BG)	200-365mg/dl	< 200 mg/dl (hypoglycemia) 1. starvation 2. malnutrition 3. hepatopathics 4. septicemia 5. endocrinopathies 6. long term stress TX; Oral dextrose 2.5-10% or place Karo™ syrup on the inside of the bird's gums	>365 mg/dl (hyperglycemia) 1. diabetes

5.3.2.6 Zoonoses

Zoonoses are diseases that are transmittable from animals to humans. Free-ranging birds can carry diseases that may pose a risk to humans. Avian flu is a good example of such a disease. Individuals with deficient immune systems are more susceptible to contracting zoonotic diseases than healthy individuals. Zoonotic diseases can be spread by:

- Skin contact;
- Ingestion of feces (i.e., poor hygiene);
- Indirectly, via a vector (e.g., needle sticks, insect bites).

To reduce the risk of contracting a zoonotic disease, always follow the following personal hygiene steps when handling birds under medical care:

- Wear latex surgical gloves when handling a bird;
- Wash your hands with soap and water after handling birds;
- Wash hands well before and after eating;
- Clean all cuts and bites immediately.

5.3.3 HUSBANDRY

Husbandry covers many facets of animal care from proper caging and good hygiene while wild birds are in rehabilitation. The following husbandry guidelines should be followed while handling the birds.

5.3.3.1 Caging

The use of appropriate caging can reduce or prevent any secondary problems from developing, such as pressure sores, feather contamination, foot lesions, and prevent infectious disease transmission while the birds are in rehabilitation.

- Use visual barriers (e.g., towel or pillowcase lining the cage door) at all times except when birds are being examined or having treatments.
- Provide soft towels or other similar material as padding/substrate for shearwaters and petrels.
- Position a dark, well-ventilated box on its side in the cage for the bird to hide in.
- Do not use caging with uncovered wire doors or walls as these can cause feather damage and potential injuries to the bill and feet.

5.3.3.2 Hygiene and Disinfecting

Routine disinfection of medical instruments and frequent cage cleaning can greatly reduce the chances of disease transmission while birds are being treated. Accordingly, persons charged with caring for the birds should:

- Change newspaper and towels that line the bottom of the cages twice a day to prevent the bird from sitting in its own feces and contaminating its feathers.
- Keep transport boxes and pet carriers free of feces and lined with a clean towel.

5.4 RE-HYDRATION METHODS AND PROTOCOLS

Birds that have been on the ground for a long period of time or have not eaten recently may be dehydrated. Dehydration may be indicated by a variety of symptoms. These can include sunken eyes, wrinkled skin or bill, ropey saliva, and a slow skin turgor/capillary refill time (CRT). Visual inspection of the bird can determine the severity of dehydration, as well as blood values (Table 5-1). The following methods can be followed to re-hydrate a bird in need of this care:

- Oral Pedialyte™ or an electrolyte solution or Lactated Ringers Solution (LRS) with or without the inclusion of 5% dextrose;
- intravenous LRS with or without the inclusion of 5% dextrose;
- subcutaneously LRS with no dextrose;
- intraosseous LRS.

If a bird is mildly dehydrated (5% or less), then oral fluids are appropriate. The most common method of administering fluids to birds is gavage, otherwise known as tube feeding. Warm Pedialyte® or an electrolyte solution can be given by gavage in the field as well as in a rehabilitation facility. A bird deemed to be moderately dehydrated (5-8%) can be hydrated with gavage and/or subcutaneously using LRS, or intravenously at the veterinarian's discretion. Severe dehydration (8% or higher) will often require intravenous or intraosseous fluids. These latter two procedures require strict asepsis and medical training to perform, and should be attempted only by a veterinarian because of the potential risks to the bird (e.g., bone infection).

5.5 FEEDING PROTOCOLS

If a bird is significantly underweight or needs to be held for rehabilitation or veterinary care, feeding may be required to restore or maintain body weight. The following protocols detail an appropriate feeding regimen. Blood values will determine whether a bird can be given solid food or requires an elemental diet. An example of a typical feeding schedule is presented in Section5.5.3.

5.5.1 STANDARD FEEDING

The following guidelines should be followed when feeding birds normally.

- If blood work is normal, offer washed squid, or non-oily fish (ideally night or surf smelt) in small dishes or pans. These containers must be small enough to prevent a bird from climbing into them, thus avoiding the problem of feathers becoming contaminated with fish oil.
- If Total Protein (TP) is <2.0 gm/dl, feed Ensure® instead of squid or fish (Table 5-4).
- If a bird has a TP over 2.0 gm/dl and will not eat, then force-feeding fish will often stimulate a bird to start eating fish on its own.
- Avoid unnecessary gavage feeding if a bird can eat on its own.

5.5.2 AVIAN GAVAGE

This is a standard method of force-feeding birds that won't feed themselves. When performing gavage feeding, the veterinarian should be careful to:

- Use a clean, sterile tube.
- Use a lubricated catheter (water or a water soluble lubricant such as KY jelly™) to facilitate insertion.
- Warm the fluid or food to between 102˚F-105˚F (the normal body temperature of the birds).
- Insert the tube vertically on the side of the glottis, making sure to avoid the trachea.
- Stop inserting the tube as soon as you feel resistance; this will be the stomach area.

Always perform the following three checks when tube feeding a bird to verify the tube is not in the trachea (if fluid or food is forced into the trachea and lungs, the bird will likely die):

- Palpate the neck; if the tube is in the esophagus, two dense round structures can be felt (the catheter and the trachea).
- Look inside the mouth to make sure the catheter is not in the glottis.
- Watch the catheter as it is being inserted; if it is in the proper position you will see it slide down the side of the neck.

5.5.3 SAMPLE FEEDING SCHEDULE

Table 5-3 presents an example of a feeding schedule for a Newell's Shearwater that has Total Protein < 2.0g/dl. The first two feedings in this regime should start with a smaller amount (10cc), then gradually build up to 20-30ccs. This will ensure that a bird will not regurgitate and aspirate food or fluids.

5.6 REHABILITATION RELEASE PARAMETERS

Before release, a pelagic bird should be waterproof, possess ≥ 90% of normal PCV and TP values for that individual species (Table 5-4), and display normal behavior. Additionally, adult birds should be within 10 percent of normal body weight for the species. Hatch year Newell's Shearwaters and Hawaiian Petrels should weigh at least 300 grams before release. Some birds do not adapt well to captivity and are highly stressed. If a bird continuously loses weight, release is probably the best option for that bird if it is waterproof and uninjured, even if it is underweight.

Table 5-3. Example Feeding Schedule: Newell's Shearwater with a Total Protein < 2.0g/dl.

7:30 AM	20-30 cc Pedialyte® *
8:30 AM	20-30 cc Ensure
10:00 AM	20-30 cc Pedialyte®
11:00 AM	20-30 cc Ensure
12:30 PM	20-30 cc Pedialyte®
1:30 PM	20-20 cc Ensure
3:00PM	20-30 cc Pedialyte®
4:00 PM	20-30 cc Ensure

5.7 VETERINARY TREATMENT GUIDELINES

All veterinary care administered to recovered birds is to be conducted by a licensed veterinarian. The following broad guidelines are suggested as a framework under which veterinary triage and more detailed veterinary care and decisions can be made.

5.7.1 STABILIZATION

The veterinarian's first task after receiving a bird is to stabilize it in accordance with the following guidelines and principals:

- Stabilize the bird as soon as practical after delivery.
- Triage-evaluate all severely injured birds to determine if euthanasia is appropriate. Undue suffering can be alleviated quickly for untreatable birds and limited resources dedicated to other birds with a better chance of survival.
- Provide appropriate ventilation and temperature control.
- Minimize stress by keeping foot traffic and noise in the area where the bird is kept at a low level.

5.7.2 MEDICAL PROCEDURES AND TREATMENTS

Since pelagic birds spend the majority of their life on the ocean and only come to land to breed, they are prone to certain land-borne diseases. The most common infectious disease seen in captive pelagic birds is *aspergillosis.* If a bird will be in captivity for more than 72 hours, administer Itraconazole (Sporonox®) on a prophylactic basis. This is an antifungal medication that is given at a dose 15mg/kg orally once a day. Blood samples should be taken only if necessary for the diagnosis or to monitor recovery and treatment. If required, the procedures outlined in Section 5.3.2.4 should be followed.

5.7.3 HEAD AND SPINAL TRAUMAS

Recent findings strongly suggest that Dexamethasone should not be used in treating head injuries.[9] Overall, there is no statistical benefit to steroid use in head injuries, although there are some situations in which a veterinarian should consider their use. For the most part, the same guidance applies to acute spinal cord trauma. However, there is one form of steroid, methylprednisolone, which has been

[9] Pokras, M.A., M. Murray. "Throw Away Your Dex!! A Polemic on Why Rehabilitators Should NOT Use Dexamethasone." *Wildlife Rehabilitation Bulletin.* Volume 22, No. 1, Spring/Summer 2004, pp4-5.

shown to have significant beneficial effects. However, for this drug to work optimally, it must be used within four hours or this steroid will have little or no benefit. If this window of opportunity has been missed, do not administer this drug. Do not artificially warm an animal unless it is severely hypothermic. A cooler environment than normal body temperatures may, in fact, be helpful.

5.7.4 OTHER MEDICAL TREATMENTS THAT MAY BE NECESSARY

Veterinarians may wish to consider the following treatments in appropriate circumstances:

- Radiographs (rule out or find fractures or metabolic bone disease);
- Treatment of vomiting or seizures;
- Parenteral (e.g., not oral) fluid administration;
- Additional blood panels and/or CBCs;
- Fecal examination (direct and floatation) if internal parasites are suspected.

5.8 VETERINARY PERSONNEL

As previously mentioned all veterinary care administered to recovered birds is to be provided by a licensed veterinarian. The veterinarian identified as the Programs' "Primary" veterinarian for the 2005 season is:

Dr. Joanne Woltmon DVM
Kaua'i Veterinary Clinic
1864 Haleukana Street
Līhu'e, Kaua'i 97766
(808) 245-4748

Dr. Simms, whose office is in Kilauea, is available to treat birds needing medical care, but is unable to undertake rehabilitation. Injured birds recovered on Northern Kaua'i can be taken to him rather than to Dr. Woltman – he is also available when Dr. Woltman's office is closed, he can be reached at:

Dr. Scott Simms DVM
Pegasus Veterinary Clinic
7481 Ko'olau Road
Kilauea, Kaua'i

(808) 828-2822

5.8.1 VETERINARY RESPONSIBILITIES, FACILITY EQUIPMENT AND SUPPLIES

The following broad guidelines outline basic veterinary responsibilities and the basic necessary supplies and equipment that should be stocked to treat recovered seabirds.

Veterinarian Responsibilities:

- Use of controlled substances (e.g., euthanasia, sedatives);
- Necropsy performance or supervision;
- Triage birds and pre-release evaluations;
- Keeping thorough medical records;
- Ensuring that birds are receiving adequate and optimal care.

Facility Equipment and Supplies:

- Seatabs™(multi-vitamins for birds and marine mammals)
- Itraconazole
- Vetrap®
- Ensure™
- French catheters sizes 12-16 gauge
- Feeding tubes with catheter tip-60cc
- Disinfectant (Roccal D® or Chlorahexidine®)
- Thermometer
- Surgical gloves
- Protective goggles
- Digital gram scale
- Centrifuge
- Refractometer
- Pedialyte®

5.8.2 VETERINARY RELEASE PARAMETERS

Before being cleared for release by the veterinarian, a pelagic bird should be waterproof, possess ≥ 90% of normal Packed Cell Volume (PCV) and Total Protein (TP) values for that individual species, and display normal behavior. Additionally, adult birds should be within 10 percent of normal body weight for the species. Hatch year Newell's Shearwaters and Hawaiian Petrels should weigh at least 300 grams before release. Some birds do not adapt to captivity and are highly stressed. If a bird continuously loses weight, even though waterproof; release is still probably the best option for that bird.

Table 5-4 displays normal weights and blood values for the three main seabird species handled by the SOS Program. Athorough search of the literature did not yield blood values for Newell's Shearwater. Collecting serological samples sufficient to allow the development of this information would be a valuable benefit of the veterinary intervention program.

5.8.3 EUTHANASIA PROTOCOLS

Euthanasia should be considered if birds have injuries or are compromised in any way that will prevent their survival in the wild. Situations that may be appropriate for euthanasia are auditory and visual impairments, certain limb fractures, such as those close to the joint, broken bills, and blood values that have Packed Cell Volumes lower than 15% and Total Protein lower than 1.0 g/dl. If birds are determined by a licensed veterinarian to be un-releasable, then the bird is to be euthanized or otherwise disposed of in accordance with 50 CFR § 21.31(e)(4)(iii) and (iv), which states:

Table 5-4. Normal Blood Values – By Species.

Newell's Shearwater (*Puffinus auricularis newelli*)

	Juvenile Mean (+/-SD)	**Adult Mean (+/-SD)**
Weight		391.2 g +/-29.6g
Packed Cell Volume (PCV)	?	?
Total Protein (TP)	?	?
Glucose (BG)	?	?

Hawaiian Petrel (*Pterodroma sandwichenis)*

	Juvenile Mean (+/-SD)	**Adult Mean (+/-SD)**
Weight	495 g +/- 62 g	432 g +/-32 g
Packed Cell Volume (PCV)	49 (5) %	49 (4)%
Total Protein (TP)	2.7 (0.9) g/dl	3.1 (0.5) g/dl
Glucose (BG)	316 (35) mg/dl	329 (43) mg/dl

Wedge-tailed Shearwater (*Puffinus Pacificus*)

	Juvenile Mean (+/-SD)	**Adult Mean (+/-SD)**
Weight	467 g +/- 50 g	390 g +/- 35 g
Packed Cell Volume (PCV)	37 (3)%	48 (3)%
Total Protein (TP)	3.2 (0.4) g/dl	3.4 (0.4) g/dl
Glucose (BG)	202 (23) mg/dl	248 (28) mg/dl
Source: Work, T. M. "Weights, Hematology, and Serum Chemistry of Seven Species of Free-Ranging Tropical Pelagic Seabirds". *Journal of Wildlife Diseases*, 32 (4), 1996, pp 643-657.		

"(iii) You must euthanize any bird that cannot feed itself, perch upright, or ambulate without inflicting additional injuries to itself where medical and/or rehabilitative care will not reverse such conditions. You must euthanize any bird that is completely blind, and any bird that has sustained injuries that would require amputation of a leg, a foot, or a wing at the elbow or above (humero-ulnar joint) rather than performing such surgery, unless:

(A) A licensed veterinarian submits a written recommendation that the bird should be kept alive, including an analysis of why the bird is not expected to experience the injuries and/or ailments that typically occur in birds with these injuries and a commitment (from the veterinarian) to provide medical care for the bird for the duration of its life, including complete examinations at least once a year;

(B) A placement is available for the bird with a person or facility authorized to possess it, where it will receive the veterinary care described in paragraph (e)(4)(iii)(A) of this section; and

(C) The issuing office specifically authorizes continued possession, medical treatment, and rehabilitative care of the bird.

(iv) You must obtain authorization from your issuing Migratory Bird Permit Office before euthanizing endangered and threatened migratory bird species. In rare cases, the Service may designate a disposition other than euthanasia for those birds. If Service personnel are not available, you may euthanize endangered and threatened migratory birds without Service authorization when prompt euthanasia is warranted by humane consideration for the welfare of the bird.

(v) You may place nonreleasable live birds that are suitable for use in educational programs, foster parenting, research projects, or other permitted activities with persons permitted or otherwise authorized to possess such birds, with prior approval from your issuing Migratory Bird Permit Office."

CHAPTER 6 REPORTING AND DATA ANALYSIS

6.1 INTRODUCTION

To effectively monitor the efficacy of the SOS Program and its protocols, program managers must receive timely reports during the fallout season. It is also important that they be able to review the data in totality following the end of each season so that they can determine if and how the Program ought to be revised for the following season. The analysis of the data collected during the course of one season and the integration and analysis of that data with the data set that comprised the 26-year history of the program can shed light on trends in recovery patterns from spatial, temporal, quantitative and other parameters.

6.2 REAL TIME REPORTING

The Program Manager will review the data sheets as they come in from the field, regularly contact field workers, and otherwise monitor the results of the fieldwork. This will make it possible to respond to unexpected conditions or findings in time to modify protocols or take other action on a real-time basis. During the course of the fallout season it is also conceivable that unique situations may arise which require coordinating a response with outside agencies, such as the U.S. Fish & Wildlife Service.[10] Field crew members encountering a situation like this should immediately notify the Program Manager, who in turn will notify the Kaua'i Wildlife Manager, Mr. Thomas Ka'iakapu, who will follow up with the responsible parties and who will notify the U.S. Fish & Wildlife Service Law Enforcement Division (see contact information in Section 7.1).

6.3 YEAR END REPORTING

The Program Manager will prepare two reports following the end of the SOS season.

- The first is a Year-End Data Report. That report will contain copies of the individual field sheets as well as a tabular summary of that data.
- The second is a Year-End Program Report summarizing the activities conducted during the course of the previous season and the results that they produced. The annual report will:
- Include a detailed account of the activities that SOS staff undertook throughout the year. Provide a compilation of the data gathered, including a record of the way in which each bird that was handled was ultimately released or disposed of.
- Present GIS generated maps of the locations of all downed birds recovered at locations other than Aid-Stations.
- Analyze changes in bird recoveries (if any) from the previous year and identify known or possible causes for the observed changes.
- Recommend ways in which the SOS Program ought to be modified for the following season.

The following subsections provide a more detailed discussion on how this material will be presented and which agencies it would be helpful to consult concerning appropriate changes to the program.

[10] It is difficult to identify specific examples of what these unique situations might be in advance. However, an extreme example might be: "A circus has come to town that has exposed lights that seem to have led to the downing of 44 birds in the past 24 hours".

6.3.1 SUMMARY OF PROGRAM ACTIVITIES

The report will include a summary of all of the activities that the SOS Program engaged in over the course of the year. This may be done in tabular format and is intended to provide a brief written record of the personnel who were involved, the work that they undertook, and any work products that they produced.

6.3.2 ANALYSIS OF THE ANNUAL DATA COLLECTED

Following the end of the field season the Program Manager will analyze the year's data to discern trends in seabird recovery on a spatial, temporal, or other basis. The data will be used to determine the following:

- The number of birds of each species recovered.
- The age class makeup of each species recovered.
- Mortality percentages for each species recovered.
- Recoveries of each species by sector.
- Mortality of each species by sector.
- Bird recoveries by age class and species as correlated to the moon phase.

The analysts will also attempt to determine if the data reveal any area(s) with unusually high numbers of downings or other items that deserve additional attention. Results of the data analysis will be presented in a written report which will include appropriate figures and maps that depict geographical data analysis results. A good example of an annual data analysis report of SOS data was prepared by KIUC's consultants for the 2003 data set (*Data Report and Analysis: Save our Shearwater Program 2003 Updated*).

6.3.3 TREND ANALYSIS

The annual data set will also be added to the master database which contains all of the SOS data gathered between 1979 and 2004. The entire data set will be analyzed in an attempt to discern trends or changes in the status of recovery results. The review will consider trends in the following factors:

- Number of birds of each species recovered.
- Age class makeup of each species recovered.
- Mortality percentages for each species recovered.
- Recoveries of each species by sector.
- Mortality of each species by sector.
- Bird recoveries by age class and species as correlated to the moon phase

From these results, the Program Manager may be able to advise on specific physical threats, such as "hotspots" that can be remediated prior to the start of the next breeding season. The data analysis may also suggest changes in methodologies or protocols that ought to be considered for the program next year – any such recommendations will be included in the annual report.

To promote better understanding of the species and the operation of the SOS Program, the Data Report and annual program report will be made available in electronic form to facilitate wide distribution and use. Copies of the database and other digital files along with an electronic as well as hard copies of the reports will be distributed to DOFAW and to the USFWS after completion.

6.3.4 RECOMMENDED PROGRAM MODIFICATIONS

In order for the SOS Program to evolve as new information and seabird management protocols and priorities are developed, the annual report will identify modifications that should be considered for

subsequent years. These recommendations will be based on empirical data gathered during the course of the SOS season and on emerging seabird management protocols, equipment development (e.g., lighter radio transmitters), and on implementation partnerships and funding opportunities that present themselves. Some of these emerging opportunities will suggest changes to SOS protocols and/or methodologies that can be rapidly adopted and implemented by the program manager and program staff. Other opportunities and suggested recovery and habitat management actions may require governmental agency action, and/or long-term interagency and stakeholder cooperative agreements and funding.

CHAPTER 7 APPENDICES

7.1 CONTACT INFORMATION

EMERGENCY POLICE/FIRE/AMBULANCE 911

Division of Forestry and Wildlife (DOFAW)

Thomas Ka‘iakapu	Kaua‘i Wildlife Manager	274-3440
DOFAW	Office Number	274-3433

U.S. Fish & Wildlife Service

Brenda Zaun	Kilauea Point National Wildlife Refuge	826-6641 Office 635-6349 Cell
	Kiluaea Point National Wildlife Refuge	828-1413
Keith Swindle	Special Agent Division of Law Enforcement	808-541-2389 Office 808-221-3558 Cell

Kauai County Police Department

Program Manager

Field Crew

Veterinarian
Dr. Joanne Woltmon DVM
Kaua‘i Veterinary Clinic
1864 Haleukana Street,
Lihue, Kaua‘i 96766 245-4748 (office) 651-0531 (cellular)

Scott Sims, DVM 828-2822 Office
Pegasus Veterinary Clinic 651-7771Cell
7481 Koolau Road
Kilauea, HI 96754

Wildlife Rehabilitator

7.2 STATE AND FEDERAL WILDLIFE HANDLING PERMITS

7.3 SEABIRD PHOTOGRAPHS

7.3 SEABIRD PHOTOGRAPHS

Newell's Shearwater

Note the strongly demarcated black and white plumage, the black forehead and the length and shape of the bill and compare these features to the Hawaiian Petrel shown in the next photograph.

Hawaiian Petrel

Note the extensive amount of white on the forehead, the grayer back and wing plumage and the difference in the shape and size of the bill and “tubenose” between this species and the Newell’s Shearwater shown in the previous photograph. Also note the residual natal down on the head, indicating that this is a hatch-year bird.

Wedge-tailed Shearwater

Note the brown, mottled plumage and the lack of a white throat, forehead or sides of the neck. Note the large size of this species when compared to either the Newell's Shearwater and Hawaiian Petrel presented in the two previous photographs. The pink/bone feet and legs on this species also separate it from the two aforementioned species which have dark/grey/black legs and feet. Also note the large size of the bill when compared to the other species as well as the different shape of the "tubes". Also note the residual natal down on the head, indicating that this is a hatch-year bird.

White-tailed Tropicbird

Note the difference in shape and size of this species from the three previously illustrated seabirds. Note the black and white vermiculated plumage on the back and dorsal wing surfaces – this characteristic indicates that this is a hatch-year bird. Note the thick yellow/horn bill – no "tubes" when compared to the previous species. Adults lack the vermiculation and usually have two long white tail streamers, which are longer than the body.

Band-rumped Storm-Petrel

Note the tiny size of this species when compared to the previous four species illustrated. Note the almost completely dark brown plumage, small size and shape of the bill and the shape of the "tube" Note the residual natal down on the forehead indicating that this species is a hatch-year bird. This species also has a white rump band and white upper tail coverts.

7.4 FORMS

7.4.1 SOS PROGRAM IMPLEMENTATION TIME LINE

SOS PROGRAM TIME LINE

	MONTH	APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		JAN		FEB		MAR	
		0-15	16-30	0-15	16-31	0-15	16-30	0-15	16-31	0-15	16-31	0-15	16-30	0-15	16-31	0-15	16-30	0-15	16-31	0-15	16-31	0-15	16-28	0-15	16-31
Sect.	**TASK or POSITION**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**
2.2.1	**Program Manager**																								
2.3.1	**Seasonal Full Time Field Tech**																								
2.3.2	**Seasonal Part Time Tech 1**																								
2.3.2	**Seasonal Part Time Tech 1**																								
1.1.2	**SOS Manual Delivery**																								
3.1.2	**Coordinating with Other Agencies**																								
	Notify Police of Program dates etc.																								
	Notify USFWS of Program dates etc.																								
3.1.3	**Deploying SOS Aid-station**																								
	Repair Aid Stations																								
	Deploy Aid-Stations																								
3.1.4	**Hack-Box Maintance**																								
	Repair Hack boxes																								
	Deploy Hack temporary boxes																								
3.1.8	**Veterinary & Rehabiltation Program**																								
	Notify vet of upcoming season																								
	Gather vet and rehab Supplies																								
3.2.2	**Public Outreach**																								
	Prepare Public Outreach Program																								
	Run TV & Radio Spots																								
	Conduct School Outreach																								
3.2.3	**SOS Training**																								
	Conduct SOS Training																								
3.2.5	**Day-Time Standard Pickup**																								
	Conduct Day-time Pickups																								
3.2.6	**Night-Time Searches**																								
	Develop Night-time Search Maps																								
	Conduct Night-time Searches																								
3.3.7	**Data entry and collation**																								
	Enter SOS Data																								
3.2.4	**Extract/Store Aid Stations**																								
	Pull, clean and store SOS Aid-stations																	*							
6	**Reporting & Data Analysis**																								
6.2	Real Time Reporting																								
6.3.2	Analyze SOS Data																								
6.3	Prepare Annual Report																								

7.4.2 MILEAGE AND REIMBURSEMENT LOG

EXAMPLE

SOS 2005 - FIELD CREW REIMBURSABLE MILEAGE & EXPENSE LOG

NAME: _____

REPORTING PERIOD (week of): _____

DATE	*PURPOSE OF TRIP*	*MILES*
1/1/2005	*Regular Daytime Aid Station Pickup: West End*	*64*
1/1/2005	*Take Bird to Vet*	*18*
1/2/2005	*Regular Daytime Aid Station Pickup: West End*	*64*
1/3/2005	*Nighttime Search of Upper Wailua*	*30*
	TOTAL MILES FOR PERIOD	176

REIMBURSABLE EXPENSES

DATE	*DESCRIPTION*	*AMOUNT*
1/1/2005	*Materials used to repair aid station*	*15.00*
1/1/2005	*Consumable Materials used to transport Bird*	*3.00*
	TOTAL	*18.00*

ATTACH ALL RECEIPTS ITEMIZED ABOVE

APPROVED BY: _____ DATE APPROVED: _____

SOS 2005 - FIELD CREW REIMBURSABLE MILEAGE & EXPENSE LOG

NAME: _____

REPORTING PERIOD (week of): _____

DATE	*PURPOSE OF TRIP*	*MILES*
	TOTAL MILES FOR PERIOD	

REIMBURSABLE EXPENSES

DATE	*DESCRIPTION*	*AMOUNT*
	TOTAL	

ATTACH ALL RECEIPTS ITEMIZED ABOVE

APPROVED BY: _____ DATE APPROVED: _____

7.4.3 LABOR HOURLY LOG BLANK FORMS

EXAMPLE

SOS 2005 - FIELD CREW LABOR HOURLY LOG

NAME: *Darryl G. Soon*

REPORTING PERIOD (Week of) *January 1, 2005*

DATE	*START*	*FINISH*	*HOURS*
1/1/2005	*0500*	*1215*	*7.25*
1/2/2005	*0600*	*1230*	*6.5*
1/3/2005	*0530*	*1330*	*8.0*
1/4/2005	*0530*	*1130*	*6.0*
1/4/2005	*1645*	*2030*	*3.75*
1/7/2005	*0500*	*1215*	*7.25*
TOTAL HOURS FOR PERIOD			*38.75*

SOS 2005 - FIELD CREW LABOR HOURLY LOG

NAME: _____

REPORTING PERIOD (Week of) _____

DATE	*START*	*FINISH*	*HOURS*
TOTAL HOURS FOR PERIOD			

7.4.4 DOFAW SOS PROGRAM INFORMATIONAL BROCHURE

7.4.5 NEWELL'S SHEARWATER & HAWAIIAN PETREL RETRIEVAL DATA FORM

EXAMPLE

Page *RD-3* **NEWELL'S SHEARWATER & HAWAIIAN PETREL DATA FORM (SOS - 2005) Band Series** ***815-25501-25525***

BAND #	PICK UP DATE	PICK UP LOCATION	UTM	AID ST	SECT	AGE CLASS	RELEASE SITE	REMARKS:	PHOTO #'s	NOTE #
255 01	***NOV/5***	***Kalapaki Beach Park***		***E***	***12***	***HY***	***OPO***	***Lots of down, very frisky***		√
255 02	***Nov/6***	***Hawaii Air Guard-Koke'e***	433536/2449015		***30***	***AD***	***PTA***	***HAPE- in dog kennel***	√	√
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
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19										
20										
21										
22										
23										
24										
25										

Page _____ NEWELL'S SHEARWATER & HAWAIIAN PETREL DATA FORM (SOS - 2005) Band Series _____

BAND #	PICK UP DATE	PICK UP LOCATION	UTM	AID ST	SECT	AGE CLASS	RELEASE SITE	REMARKS:	PHOTO #'s	NOTE #
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

7.4.6 OTHER SEABIRD RETRIEVAL DATA FORM

EXAMPLE

Page *1-RD* **OTHER SEABIRDS SALVAGE DATA FORM (SOS – 2005)**

#	SPECIES	PICK UP DATE	PICK UP LOCATION	UTM	AID ST	SEC	AGE CLASS	RELEASE SITE	REMARKS:	PH √	NT √
1	*WTSH*	*Nov/5*	*Kalapaki Beach Park*		*E*	*12*	*HY*	*OPO*	*Very frisky*		
2	*WTTB*	*NOV/6*	*Hawaii Air Guard Koke'e*	*433536/2449015*		*30*	*AD*	*PTA*	*Hanging on fence unhurt*	√	√
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

Page _____ **OTHER SEABIRDS SALVAGE DATA FORM (SOS – 2005)**

#	SPECIES	PICK UP DATE	PICK UP LOCATION	UTM	AID ST	SEC	AGE CLASS	RELEASE SITE	REMARKS:	PH √	NT √
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

7.4.7 SEABIRD MORTALITY LOG

EXAMPLE

Page ***1-RD***

SEABIRD MORTALITY LOG (SOS-2005)

#	SPECIES	DATE	TIME	√	LOCATION FOUND	UTM or AID STATION	AGE	COMMENTS	PH √	NO √
1	***NESH***	***Nov/5***	***1600***	√	***Pono Kai Roadway***	***411155/2443000***	***HY***	***Flat road kill***	√	
2	***HAPE***	***NOV/6***	***800***		***Unknown***	***B***	***AD***	***Dead in aid station***	√	√
3	***BRSP***	***NOV/7***	***1800***		***Air Guard Station – Koke'e***	***433536/2449015***	***AD***	***Dead in dog kennel***	√	√
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

NOTE: Check √ this box only if you removed the bird from the road.

SEABIRD MORTALITY LOG (SOS-2005)

#	SPECIES	DATE	TIME	√	LOCATION FOUND	UTM or AID STATION	AGE	COMMENTS	PH √	NO √
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										

NOTE: Check √ this box only if you removed the bird from the road.

7.4.8 PHOTO LOG

EXAMPLE

Page *1-RD*

PHOTO LOG (SOS - 2005)

ID#	DATE	SPECIES	PHOTO #'S	DESCRIPTION AND COMMENTS
ES-2550	***Nov/5***	***NESH***	***110501***	***NESH with lots of down on neck***
ML-1-1	***Nov/6***	***NESH***	***110601***	***Flat on road***
			110602	***Road sign next to bird with feathers on it***
			110603	***Dead bird with Toe Tag in frame***
OS-1-1	***Nov/10***	***WTSH***	***111001***	***Typical HY bird***

Page _____

PHOTO LOG (SOS - 2005)

ID#	DATE	SPECIES	PHOTO #'S	DESCRIPTION AND COMMENTS

7.4.9 TOE TAG

The Program Manger shall either order pre-printed tags, or have a pre-inked rubber stamp made to stamp blank tags with the following information:

DATE: _____

SPECIES: _____

ID #: _____

7.4.10 DATA ENTRY CODES

2005 SOS PROGRAM DATA ENTRY CODES

SPECIES CODES

Newell's Shearwater	NESH
Hawaiian Petrel	HAPE
Band-rumped Storm-Petrel	BRSP
Wedge-tailed Shearwater	WTSH
Christmas Shearwater	CHSH
White-tailed Tropicbird	WTTP
Red-footed Booby	RFBO
Brown Booby	BRBO
Unknown	O

AID STATIONS

Waimea Fire Station	A
Hapaepe Fire Station	B
Kalaheo Fire Station	C
Koloa Fire Station	D
Lihue Fire Station	E
Mariott Hotel	F
Kapaa Fire Station	G
Kauai Medical Group - Kilauea	H
Princeville Fire Station	I
Hanalei Liquor Store	J
Poipu Fire Station	K
Lihue International Airport	L
Princeville Sheraton Hotel	Q
Found dead by staff	M
Died in captivity	N
Unknown	O

UTM

Use NAD 83 Datum, save in UTM format.

SECTORS

Hanalei	1
Princeville	2
Kilauea	3
Anahola	4
Kealia	5
Kapa'a	6
Waipouli	7
Wailua	8
Wailua Homsteads	9
Hanamaulu	10
Lihue	11
Mariott Hotel	12
Nawiliwili	13
Puhi	14
Kipu	15
Poipu	16
Kukuiula	17
Koloa	18
Lawai	19
Kalaheo	20
Port Allen	21
Eleele	22
Hanapepe	23
Salt Pond	24
Kaumakani	25
Pakala	26
Waimea	27
Kekaha	28
PMRF	29
Kokee	30
Omao/Maluhia	31
Wainiha	32
Others	33
At Sea	34
Unknown	35

OVER →

2005 SOS PROGRAM DATA ENTRY CODES

RELEASE SITES

Waimea Pier	WAI	
Port Allen	PTA	
Poipu	POI	
Nawiliwili	NAW	
Opoi	OPO	(Makai of Airport)
Lydgate Park	LYD	
Kapaa	KAP	
Kilauea	KIL	
Princeville	PRV	
Hanalei	HAN	

AGE-CLASS

Adult	AD
Hatch Year	HY
Unknown	U

REMARKS FIELD

Enter Remarks, Injuries, Bands,
Later release etc….

MORTALITY LOG

Enter appropriate Alpha code:

NESH – Newell's Shearwater
HAPE – Hawaiian Petrel
BRSP – Band-rumped Storm-Petrel

PHOTO LOG

ID#
For NESH, HAPE & BRSP
ES- plus last five digits of band #

For Dead Bird
ML – plus page # and Line #

For Other Seabirds
OS- plus page # and Line #

Photo #s
Numeric
Month/Day/sequential number of photos of same bird, i.e., 110503
November 5th, 3rd photos of same bird

TOE TAG

Date mm/dd/yr
Species, enter Alpha code:

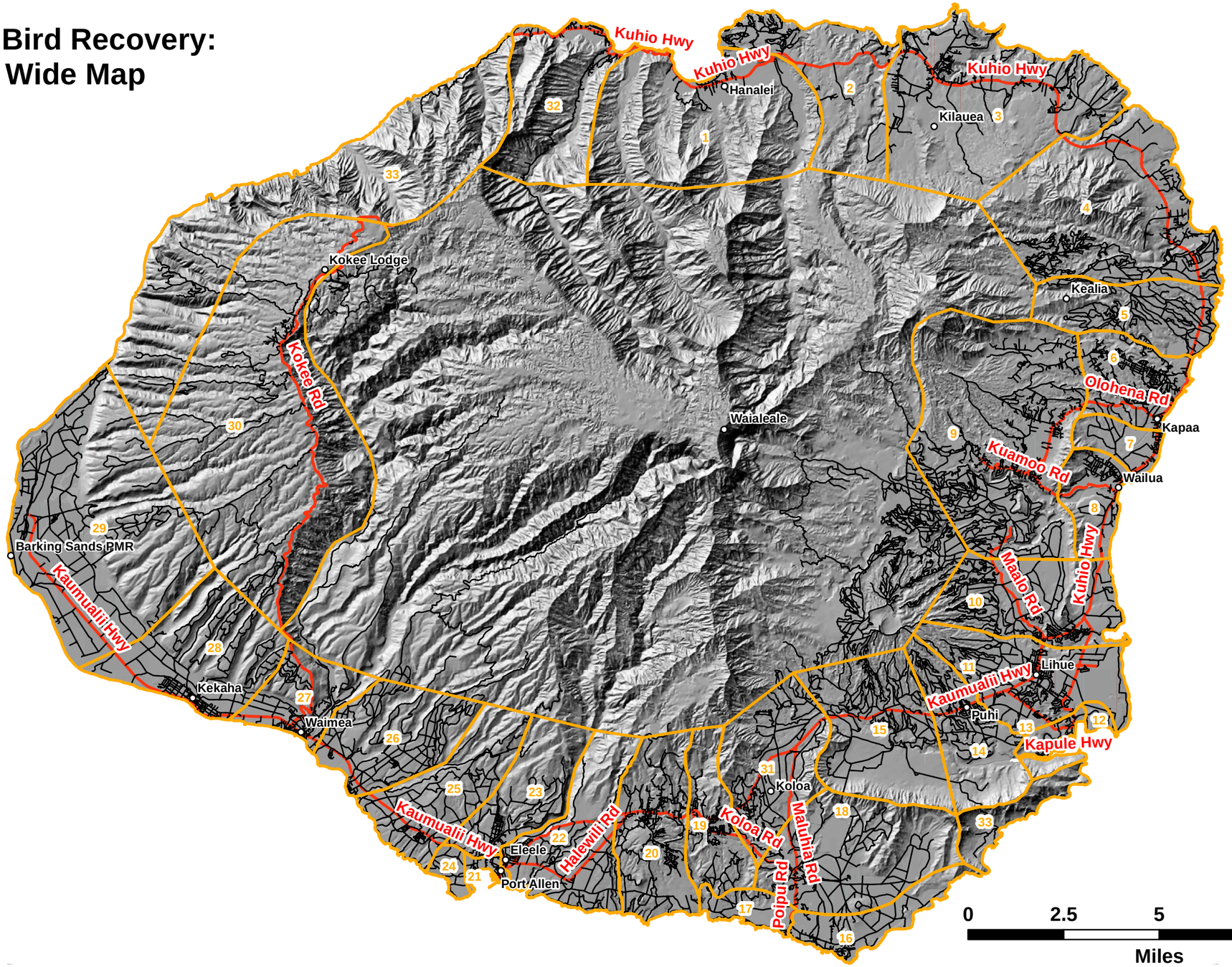
NESH – Newell's Shearwater
HAPE – Hawaiian Petrel
BRSP – Band-rumped Storm-Petrel

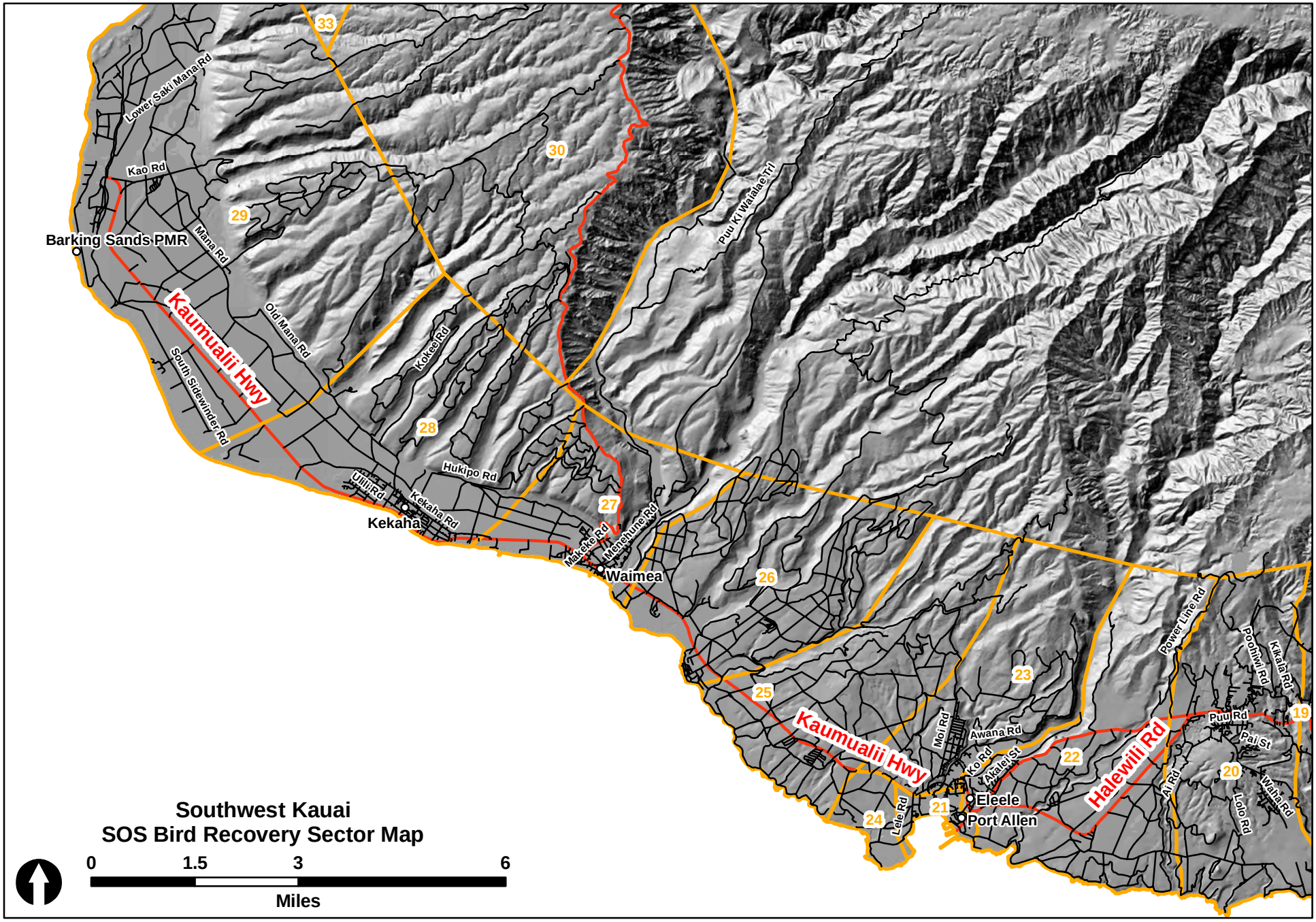
ID#
For NESH, HAPE & BRSP
ML – plus page # and Line #

OVER →

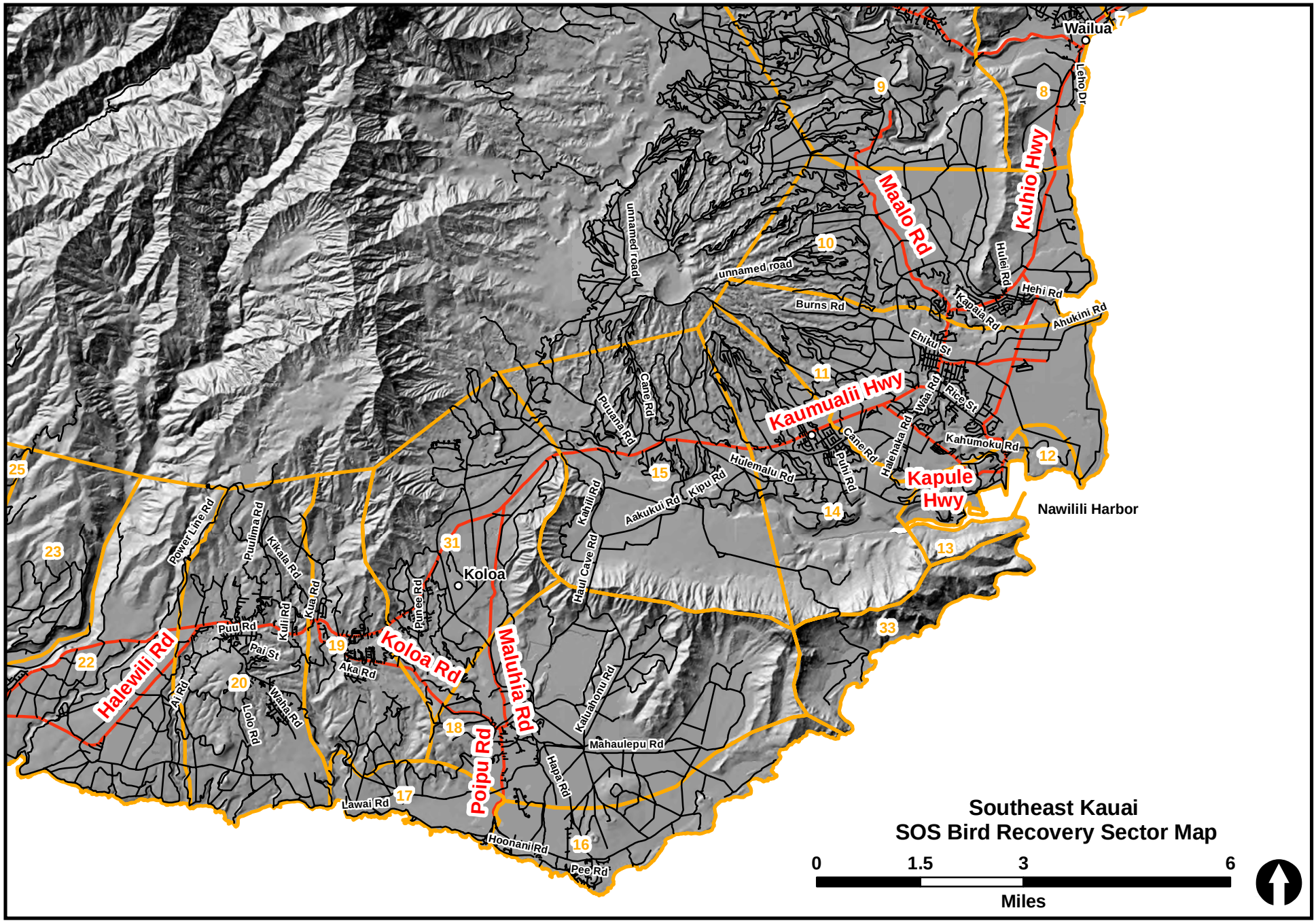
7.4.11 SECTOR MAPS

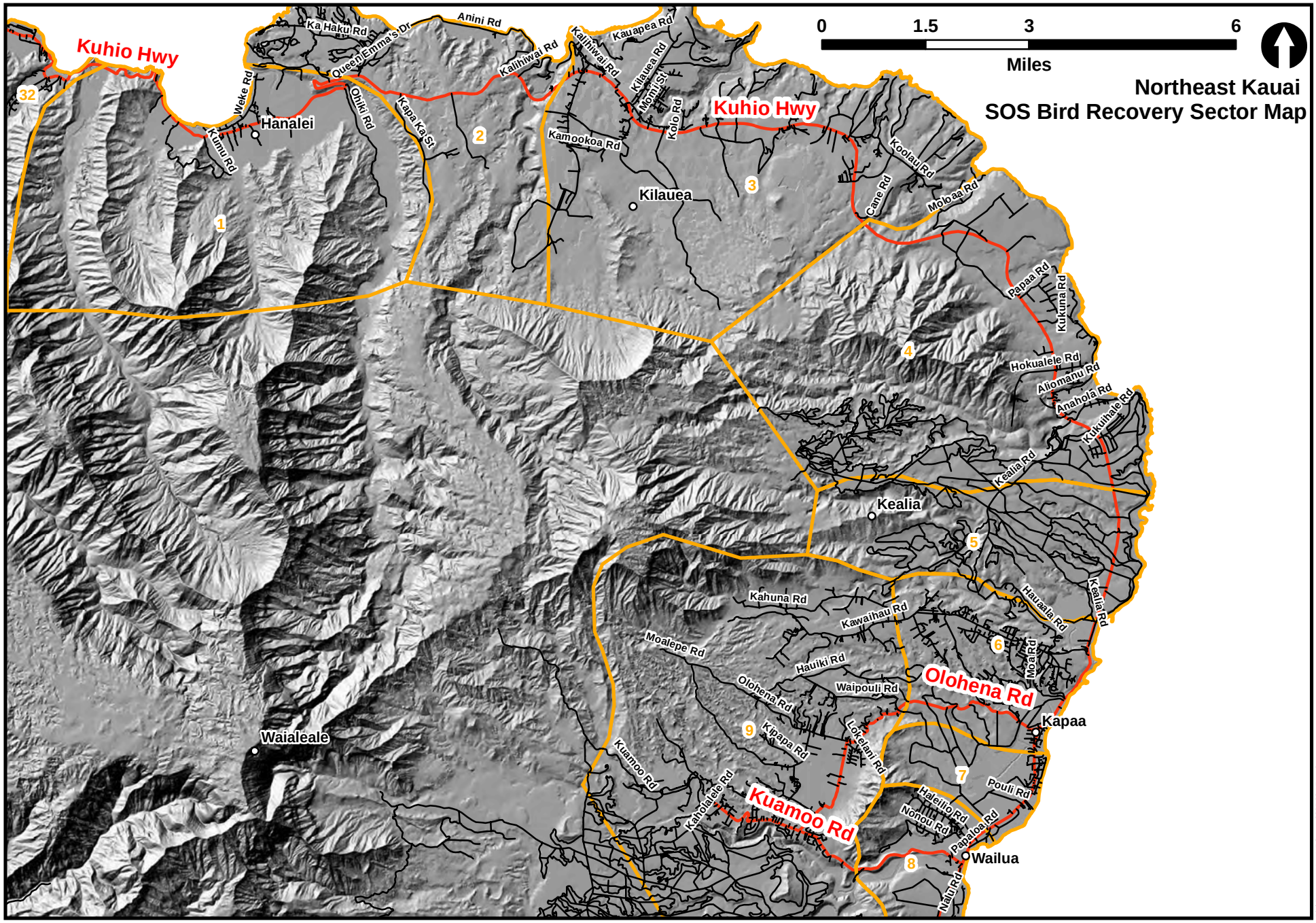
Kauai SOS Bird Recovery: Island Wide Map





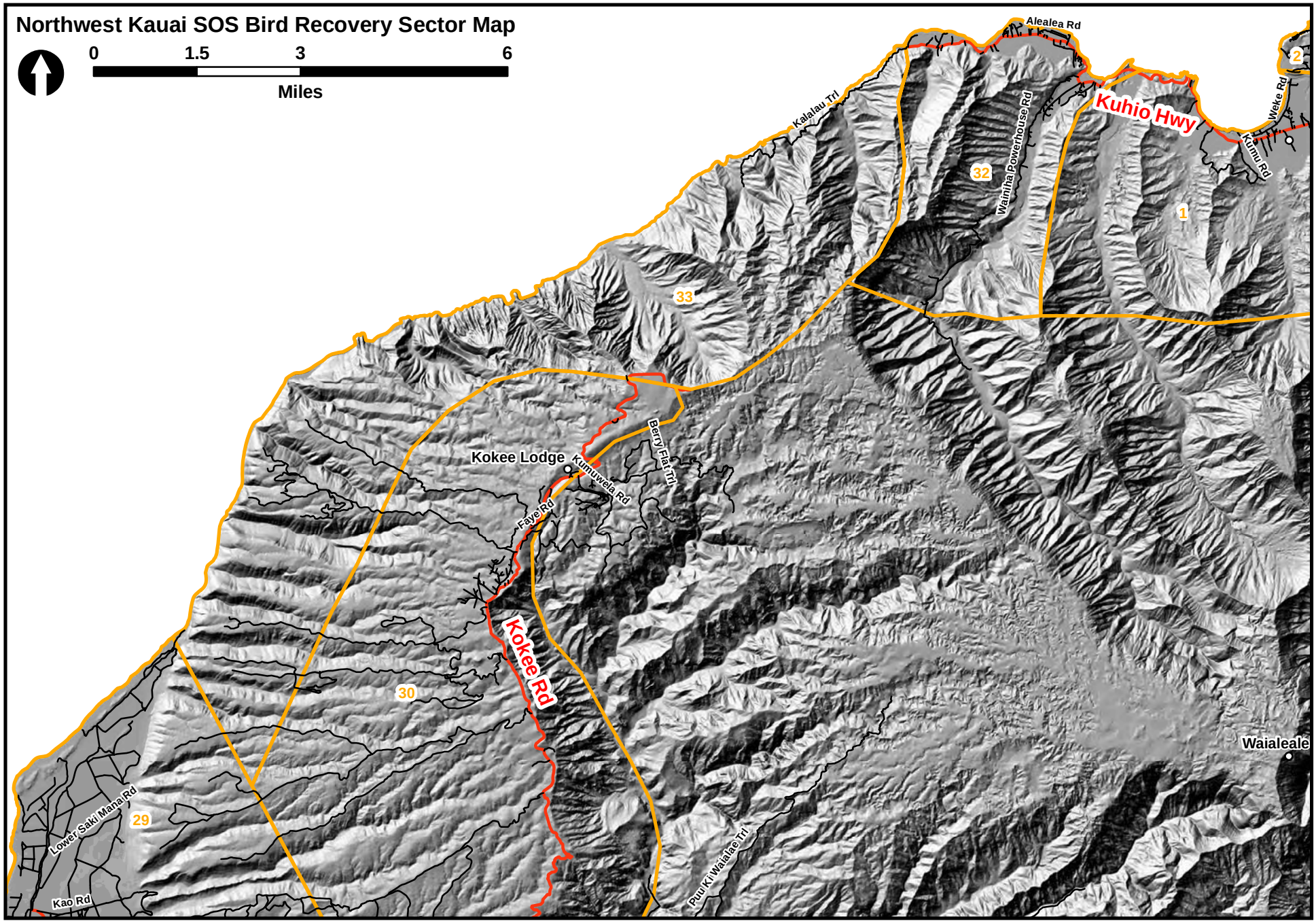
Bird Recovery Map SW Sector 2005-03-17.mxd


Wailua
Leho Dr
Kuhio Hwy
Maalo Rd
Hulei Rd
Hehi Rd
Kapaia Rd
Ahukini Rd
Ehiku St
Rice St
Waa Rd
Kaumualii Hwy
Kahumoku Rd
Halehaka Rd
Puhi Rd
Cane Rd
Kapule Hwy
Nawilili Harbor
Hulemalu Rd
Kipu Rd
Aakukui Rd
Kahili Rd
Haui Cave Rd
Kaluahonu Rd
Mahaulepu Rd
Hapa Rd
Hoonani Rd
Pee Rd
Lawai Rd
Poipu Rd
Maluhia Rd
Koloa Rd
Koloa
Puuiana Rd
unnamed road
unnamed road
Burns Rd
Puuiima Rd
Kikala Rd
Kuli Rd
Kua Rd
Puu Rd
Pai St
Aka Rd
Punee Rd
Halewili Rd
Ai Rd
Lolo Rd
Waiha Rd
Power Line Rd
9
8
10
11
12
13
14
15
16
17
18
19
20
22
23
25
31
33
7
0
1.5
3
6
Miles
Southeast Kauai
SOS Bird Recovery Sector Map
Bird Recovery Map SE Sector 2005-03-16.mxd



Bird Recovery Map NE Sector 2005-03-17.mxd

Northwest Kauai SOS Bird Recovery Sector Map



Bird Recovery Map NW Sector 2005-03-17.mxd

7.4.12 NIGHT-TIME ROADWAY SEARCH MAPS

7.4.13 SOS VETERINARY PHYSICAL EXAM FORM

SOS VETERINARY PHYSICAL EXAM FORM

Save Our Shearwaters Program

Intake Date/time_____ Animal Intake Number_____

Examiner's Name_____

Animal and Physical Exam Information

Temporary Band No._____ Species_____

Age **Chick Sub-Adult Adult Unknown** Sex **Male Female Unknown**

Weight _____g. Temperature_____°F Dehydration_____%

Heart Rate_____/min Resp. Rate_____/min CRT_____ sec.

(Circle)

Attitude **BAR QAR Nonresponsive** Body Condition **Normal Thin Emaciated**

Head/mouth/Bill NSL Other_____

Eyes/Ears NSL Other_____

Heart/Lungs NSL Other_____

Gastrointestinal NSL Other_____

Musculo-skeletal NSL Other_____

Integument NSL Other_____

Intake Diagnostics And Initial Plan

PCV_____ TP_____ BG_____ Blood Taken?

Initial Fluids Given? _____

Initial Feeding Plan_____

Treatment Plan_____ Itraconazole? **No Yes Dose**_____

Disposition Information

Disposition Status **Released Died Euthanized** Date_____

Disposition Location _____ Federal Band No._____

7.4.14 SOS MEDICAL TERMINOLOGY CODES

SOS MEDICAL TERMINOLOGY CODES

BAR- Bright, Alert, Responsive
BID-Twice a day
CNS-Central Nervous System
Capillary Refill Time (CRT)-The number of seconds it takes for the gums, tongue, or eyelid to refill (return to redness) after digital pressure is applied. A normal CRT is 1 second or less.
Dx-Diagnosis
QAR- Quiet, Alert, Responsive
NAR-Non-responsive
NSL-No significant lesions
O.D.-Right eye
O.S.-Left eye
QID-Four times a day
R/O-Rule out
SID- Once a day
SOB-Shortness of Breath
TID-Three times a day
TX-Therapy
WDWN-Well developed and well nourished

7.4.15 TRAINING ACKNOWLEDGEMENT FORM

2005 SOS PROGRAM

FIELD CREW TRAINING AKNOWLEGMENT

I have read and understand the SOS Program Manual and by signing below, I agree to follow all procedures and protocols detailed in the manual unless otherwise instructed by the Program Manager.

FIELD CREW WORKER

PRINTED NAME:_____

SIGNATURE:_____ DATE:_____

PROGRAM MANAGER:

PRINTED NAME:_____

SIGNATURE:_____ DATE:_____

APPENDIX D. IMPLEMENTING AGREEMENT

IMPLEMENTING AGREEMENT

for the

KAUA‘I ISLAND UTILITY COOPERATIVE
HABITAT CONSERVATION PLAN

by and between

KAUA‘I ISLAND UTILITY COOPERATIVE,

UNITED STATES FISH AND WILDLIFE SERVICE, and

HAWAI‘I DEPARTMENT OF LAND AND NATURAL RESOURCES

_____, 2009

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1.0 PARTIES

This Implementing Agreement is made by and between the Kaua‘i Island Utility Cooperative (KIUC), the United States Fish and Wildlife Service (USFWS), and the Hawai‘i Department of Land and Natural Resources (DLNR).

These entities may be referred to as the “Parties” and individually as a “Party.” The USFWS and DLNR may be referred to collectively as the “Wildlife Agencies” and individually as a “Wildlife Agency,” and KIUC may be referred to as the “Permittee.”

2.0 RECITALS AND PURPOSES

2.1 Recitals. The Parties have entered into this Agreement in consideration of the following facts:

(a) The island of Kaua‘i has been determined to provide, or potentially provide, habitat for two seabird species which are listed as threatened or endangered pursuant to the federal Endangered Species Act, 16 U.S.C § 1531 et seq. (ESA). Those species are the Hawaiian Petrel (*Pterodroma sandwichensis*) and the Newell’s Shearwater (*Puffinus auricularis newelli*);

(b) The island of Kaua‘i has also been determined to provide, or potentially provide, habitat for a third seabird species, the Band-rumped Storm-Petrel (*Oceanodroma castro*), which is a Candidate for listing under the ESA;

(c) All three seabird species identified above are listed as threatened or endangered pursuant to Hawai‘i Revised Statutes (HRS) Chapter 195D;

(d) KIUC has developed a series of measures, described in the Habitat Conservation Plan (HCP), that will minimize and mitigate to the maximum extent practicable the effects of Take of Covered Species incidental to KIUC’s Covered Activities, and that will also increase the likelihood that the Covered Species will survive and recover, and provide a net environmental benefit .

2.2 Purposes. The purposes of this Agreement are:

(a) To ensure implementation of each of the terms of the HCP;

(b) To describe remedies and recourse should any Party fail to perform its obligations as set forth in this Agreement; and,

(c) To provide assurances to Permittee that, pursuant to the USFWS “No Surprises” regulations and similar provisions in HRS Chapter 195D, as long as the terms of the HCP, the Permit, and this Agreement are properly implemented, no additional mitigation will be required of KIUC, with respect to Covered Species, except as provided for in this Agreement or required by law.

3.0 DEFINITIONS

The following terms as used in this Agreement will have the meanings set forth below:

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3.1 Terms defined in Endangered Species Act and HRS Chapter 195D. Terms used in this Agreement and specifically defined in the Endangered Species Act (ESA) or HRS Chapter 195D, or in regulations adopted by the Wildlife Agencies under the ESA or HRS Chapter 195D, have the same meaning as in the ESA or HRS Chapter 195D and those implementing regulations, unless this Agreement expressly provides otherwise.

3.2 "Agreement" means this Implementing Agreement, which incorporates the HCP and Permits by reference.

3.3 "Changed Circumstances" means changes in circumstances affecting a Covered Species or the geographic area covered by the HCP that can reasonably be anticipated by the Parties and that can reasonably be planned for in the HCP (e.g. the listing of a new species, or a fire or other natural catastrophic event in areas prone to such event.) Changed Circumstances and the planned responses to those circumstances are described in section 7.4.2 of the HCP. Changed Circumstances are not Unforeseen Circumstances.

3.4 "Covered Activities" means certain activities carried out by KIUC that may result in incidental Take of Covered Species, and consists of the continued existence, operation and maintenance of all existing KIUC facilities, and the installation, operation and maintenance of certain future KIUC facilities, as described in Chapter 2 of the HCP.

3.5 "Covered Species" means the following species, each of which the HCP addresses in a manner sufficient to meet all of the criteria for the USFWS to issue an Incidental Take Permit under ESA § 10(a)(1)(B) and for DLNR to issue an Incidental Take License under HRS Chapter 195D: Hawaiian Petrel (*Pterodroma sandwichensis*), Newell's Shearwater (*Puffinus auricularis newelli*), and Band-rumped Storm-Petrel (*Oceanodroma castro*).

3.6 "HCP" means the Habitat Conservation Plan prepared by the Kaua'i Island Utility Cooperative.

3.7 "Listed Species" means a species (including a subspecies, or a distinct population segment of a vertebrate species) that is listed as endangered or threatened under the ESA and/or HRS Chapter 195D.

3.8 "Permit" or "Permits" means the Incidental Take Permit issued by the USFWS to KIUC pursuant to Section 10(a)(1)(B) of the ESA, and the Incidental Take License issued by DLNR to KIUC pursuant to HRS Chapter 195D, for Take incidental to Covered Activities, as such Permits may be amended from time to time.

3.9 "Permittee" means the Kaua'i Island Utility Cooperative.

3.10 "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any listed or unlisted Covered Species. Harm means an act that actually kills or injures a member of a Covered Species, including an act that causes significant habitat modification or degradation where it actually kills or injures a

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member of a Covered Species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

3.11 "Unforeseen Circumstances" means changes in circumstances affecting a Covered Species or geographic area covered by the HCP that could not reasonably have been anticipated by plan developers and the Wildlife Agencies at the time of the HCP's negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species.

3.12 "Unlisted Species" means a species (including a subspecies, or a distinct population segment of a vertebrate species) that is not listed as endangered or threatened under the ESA or HRS Chapter 195D.

4.0 OBLIGATIONS OF THE PARTIES

4.1 Obligations of Permittee.

4.1.1 Chapters 5 and 7 and Appendix C of the HCP describe the measures KIUC is obligated to implement in order to avoid, minimize, mitigate and monitor the effects of its Covered Activities on the Covered Species.

4.1.2 KIUC will fully and faithfully perform all obligations assigned to it under this Agreement, the Permits, and the HCP.

4.2 Obligations of the Wildlife Agencies.

4.2.1 Permit Issuance. Upon approval of the HCP by the Wildlife Agencies and execution of this Agreement by all Parties, and satisfaction of all other applicable legal requirements, the USFWS will issue KIUC a Permit under Section 10(a)(1)(B) of the ESA, and DLNR will issue KIUC a Permit under HRS Chapter 195D, authorizing incidental Take by KIUC of each Covered Species resulting from Covered Activities.

4.2.2 Permit coverage. The Permits will identify all Covered Species. The Permit issued by the USFWS will take effect for the Covered Species which are also Listed Species under the ESA [i.e., the Hawaiian Petrel (*Pterodroma sandwichensis*), and Newell's Shearwater (*Puffinus auricularis newelli*))] at the time the Permit is issued. Subject to compliance with all other terms of this Agreement, the Permit issued by the USFWS will take effect for a Covered Species which is an Unlisted Species (i.e., Band-rumped Storm-Petrel (*Oceanodroma castro*)) upon the listing of as threatened or endangered under the ESA. The Permit issued by the DLNR will take effect for all of the Covered Species at the time the Permit is issued.

4.2.3 "No surprises" and "Incentives" assurances. Provided that Permittee has complied with its obligations under the HCP, this Agreement, and the Permits, the Wildlife Agencies can require Permittee to provide mitigation beyond that provided for in the HCP only in accordance with the ESA "No Surprises" regulations at 50 C.F.R. §§ 17.22(b)(5) and 17.32(b)(5), and the HRS Chapter 195D "Incentives" provisions at HRS Section 195D-23.

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4.3 Additional Obligations of DLNR. As described in Sections 5.6.2.3, 5.6.2.5 and 5.6.2.6 of the HCP, DLNR will conduct certain monitoring of the Covered Species using funds to be provided by KIUC. Should DLNR become unable to complete such monitoring, DLNR shall notify and consult with the USFWS and KIUC as soon as possible to identify appropriate substitute entities to complete such monitoring on its behalf, and DLNR shall then make all necessary arrangements to ensure that such substitute entity or entities completes such monitoring using the funds provided by KIUC. Any failure by DLNR to complete such monitoring shall not constitute a basis upon which either Wildlife Agency may revoke or suspend the Permits.

4.4 Additional Obligations of USFWS. For the measure described in Section 5.6.2.4 of the HCP, USFWS will use its best efforts to assist KIUC in entering into an agreement with the National Oceanic and Atmospheric Administration (NOAA), or another entity approved by the Parties and NOAA, to implement the measure.

4.5 Interim obligations upon a finding of Unforeseen Circumstances. If either the USFWS or DLNR or both make a finding of Unforeseen Circumstances, during the period necessary to determine the nature and location of additional or modified mitigation, KIUC will avoid contributing to appreciably reducing the likelihood of the survival and recovery of the affected species.

5.0 INCORPORATION OF HCP

The HCP and each of its provisions are intended to be, and by this reference are, incorporated herein. In the event of any direct contradiction between the terms of this Agreement and the HCP, the terms of this Agreement shall control. In all other cases, the terms of this Agreement and the terms of the HCP shall be interpreted to be complementary to each other.

6.0 TERM

6.1 Initial Term. This Agreement and the HCP shall become effective as between KIUC and DLNR on the date that DLNR issues the Permit under HRS Chapter 195D, and as between KIUC and USFWS on the date that USFWS issues the Permit under the ESA. This Agreement, the HCP, and the Permits will remain in effect for a period of five years from the issuance of the original Permits, except as otherwise provided below.

6.2 Three-Year Decision Point: Long-Term Take Authorization. Within three (3) years of issuance of the Permits, (a) the Parties will jointly assess newly developed information and the status of DLNR's proposed island-wide Kaua'i Seabird Habitat Conservation Plan (KSHCP) and (b) based upon the outcome of that assessment, KIUC will promptly determine and notify the Wildlife Agencies whether it will seek to obtain long-term federal and state incidental take authorizations through the KSHCP (if it has been or soon will be completed and approved) or through its own long-term HCP. KIUC and the Wildlife Agencies desire and anticipate that KIUC will in fact obtain long-term take authorizations through participation in the KSHCP. Only in the unlikely event that this is not available or if satisfactory terms of participation cannot be obtained would KIUC independently seek long-term take authorizations

through the preparation of its own long-term HCP. Regardless of the manner in which long-term incidental take authorization is obtained, any such long-term take authorization and any associated HCP and other agreements would supersede this Agreement, the HCP and the Permits. If long-term take authorizations are not obtained by the end of the 5-year term, the 5-year term may be extended with the agreement of all three Parties and to the extent allowed by law.

6.3 Extension of the Permits. To the extent authorized by applicable law and regulations then in effect, upon Agreement of the Parties the Wildlife Agencies may extend the Permits beyond their initial term. If Permittee desires to extend the Permits, it will so notify the Wildlife Agencies at least 180 days before the scheduled expiration of the Permits. Extension of the Permit constitutes an extension of the HCP and this Agreement for the same amount of time, subject to any modifications to the HCP and this Agreement agreed upon by the Parties.

7.0 FUNDING

KIUC warrants that it has, and will expend, the funds identified in Chapter 5 and Section 7.5 of the HCP, as such funds may be necessary to fulfill its obligations under the HCP. KIUC will promptly notify the Wildlife Agencies of any material change in Permittee's financial ability to fulfill its obligations. In addition to providing any such notice, KIUC will provide the Wildlife Agencies with a copy of its annual report each year of the Permits, or with such other reasonably available financial information that the Parties agree will provide adequate evidence of KIUC's ability to fulfill its obligations.

8.0 MONITORING AND REPORTING

8.1 Planned periodic reports. As described in the Chapter 7 of the HCP, KIUC will submit periodic reports describing its activities and results of the monitoring program provided for in the HCP.

8.2 Other reports. KIUC will provide, within 30 days of being requested by either or both of the Wildlife Agencies, any additional information in its possession or control related to implementation of the HCP that is requested by the Wildlife Agencies for the purpose of assessing whether the terms and conditions of the Permits and the HCP, including the HCP's adaptive management plan, are being fully implemented.

8.3 Certification of reports. All reports will include the following certification from a responsible KIUC official who supervised or directed preparation of the report:

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

8.4 Monitoring by Wildlife Agencies. The Wildlife Agencies may conduct inspections and monitoring in connection with the Permits in accordance with the ESA and its implementing regulations (see, e.g. 50 C.F.R. § 13.47), HRS Chapter 195D and its implementing regulations, and the HCP.

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9.0 CHANGED CIRCUMSTANCES

9.1 Permittee-initiated response to Changed Circumstances. Changed Circumstances identified and planned for in the HCP are specifically listed in section 7.4.2 of the HCP. KIUC will give notice to the Wildlife Agencies within seven (7) calendar days after learning that any of the Changed Circumstances has occurred. As soon as practicable thereafter, but no later than thirty (30) calendar days after learning of the Changed Circumstance, KIUC shall begin implementing the remedial conservation measures identified in section 7.4.2 for the specific Changed Circumstance to the extent necessary to mitigate the effects of the Changed Circumstance on Covered Species. KIUC will promptly report to the Wildlife Agencies on its actions, and KIUC will begin implementing the remedial conservation measures without awaiting notice from the Wildlife Agencies. Such changes are provided for in the HCP, and hence do not constitute Unforeseen Circumstances or require amendment of the Permits or HCP.

9.2 Wildlife Agency-initiated response to Changed Circumstances. If a Wildlife Agency determines that a Changed Circumstance has occurred and that KIUC has not responded in accordance with section 7.4.2 of the HCP, the Wildlife Agency will so notify Permittee and direct Permittee to make the required changes. Within thirty (30) calendar days after receiving such notice, KIUC will make the required changes and report to the Wildlife Agencies on its actions. Such changes are provided for in the HCP, and hence do not constitute Unforeseen Circumstances or require amendment of the Permits or HCP.

9.3 Listing of species that are not Covered Species. In the event that a non-Covered Species that may be affected by Covered Activities becomes listed under the ESA or HRS Chapter 195D, KIUC will implement the "no take/no jeopardy/no adverse modification" measures identified by the Wildlife Agency with jurisdiction over the species until the Permit(s) is amended to include such species, or until the Wildlife Agency notifies KIUC that such measures are no longer needed to avoid jeopardy to, Take of, or adverse modification of the critical habitat of, the non-Covered Species.

10.0 ADAPTIVE MANAGEMENT

10.1 Permittee-initiated adaptive management. KIUC will implement the adaptive management provisions in Section 7.3 of the HCP when changes in management practices are necessary to achieve the HCP's biological objectives or to respond to monitoring results or new scientific information. Permittee will make such changes without awaiting notice from the Wildlife Agencies, and will report to the Wildlife Agencies on any actions taken pursuant to this section.

10.2 Wildlife Agency-initiated adaptive management. If the Wildlife Agencies determine that one or more of the adaptive management provisions in the HCP have been triggered and that Permittee has not changed its management practices in accordance with Section 7.3 of the HCP, the responsible Wildlife Agency will so notify KIUC and direct KIUC to make the required changes. Within thirty (30) calendar days of receiving such notice, KIUC will make the required changes and report to the Wildlife Agencies on its actions. Such changes are provided for in the HCP, and hence

do not constitute Unforeseen Circumstances or require amendment of the Permits or HCP.

10.3 Reductions in mitigation. KIUC will not implement adaptive management changes that may result in less mitigation than provided for Covered Species under the original terms of the HCP, unless the Wildlife Agency with jurisdiction over the affected Covered Species first provides written approval. KIUC may propose any such adaptive management changes by notice to the responsible Wildlife Agency, specifying the adaptive management modifications proposed, the basis for them, including supporting data, and the anticipated effects on Covered Species, and other environmental impacts. Within 120 days of receiving such a notice, the responsible Wildlife Agency will either approve the proposed adaptive management changes, approve them as modified by the Wildlife Agency, or notify KIUC that the proposed changes constitute permit amendments that must be reviewed under Section 11.0 of this Agreement.

10.4 No increase in Take. This section does not authorize any modifications that would result in an increase in the amount and nature of Take, or increase the impacts of Take, of Covered Species beyond that analyzed under the original HCP and any amendments thereto. Any such modification must be reviewed as a permit amendment under Section 11.0 of this Agreement.

11.0 MODIFICATIONS AND AMENDMENTS

11.1 Minor amendments.

(a) Minor Amendments are changes to the HCP provided for under the operating conservation program, including adaptive management changes and responses to Changed Circumstances. They also include revisions which do not significantly modify the scope or nature of activities or actions covered by the incidental take Permits in terms of their affect on the Covered Species. Any Party may propose minor amendments to the HCP or this Agreement by providing notice to all other Parties. Such notice shall include a statement of the reason for the proposed amendment and an analysis of its environmental effects, including its effects on operations under the HCP and on Covered Species. The other Parties shall each respond in writing to the proposal within sixty (60) calendar days of receipt of the request. The responses shall either (1) concur with the proposed Amendment; (2) concur with the proposed Amendment with requested changes; (3) identify additional information necessary to enable evaluation of the proposed Amendment, or (4) disapprove the proposed Amendment, stating reasons for the disapproval. All Parties must agree in writing to any Minor Amendment, including the schedule for implementation, before implementation of such Amendment. Any proposed Minor Amendment which is disapproved by one of the Parties may be resubmitted as a proposed Major Amendment pursuant to Section 11.2 of this Agreement. The Wildlife Agencies will not propose or approve a Minor Amendment if the Wildlife Agencies determine that such amendment would result in operations under the HCP that are significantly different from those analyzed in connection with the original HCP, adverse effects on the environment that are new or significantly different from those analyzed in connection with the original HCP, or additional Take not analyzed in connection with the original HCP.

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(b) Minor Amendments may include, but are not limited to, the following:

(1) Correction of any maps or exhibits to correct errors in mapping or to reflect previously approved changes in the HCP and/or incidental take permits;

(2) Modifying existing or establishing new measures to further minimize or avoid take of the Covered Species;

(3) Modifying reporting protocols for Annual Reports;

(4) Minor changes to monitoring or reporting protocols;

(5) Revising breeding colony habitat enhancement and management techniques; and

(6) Any other modifications to the HCP that are consistent with the biological goals and objectives described in the HCP that will not result in operations under the HCP that are significantly different from those analyzed in connection with the HCP as approved, adverse impacts on the environment that are new or significantly different from those analyzed in connection with the HCP as approved, or take of Covered Species not analyzed in connection with the HCP as approved, including but not limited to the approval or execution of agreements to facilitate execution and implementation of the HCP, or actions by KIUC to delegate any of its duties under this HCP to a third party under its direct control.

11.2 Major Amendments.

(a) Major Amendments may include, but are not limited to, the following:

(1) Adding a new species to the list of Covered Species contained in the HCP and/or the incidental take permits;

(2) Changes to the Covered Activities which were not addressed in the HCP as originally adopted, and which otherwise do not meet the criteria for a Minor Amendment as discussed above; and

(3) Extending the term of the incidental take permits.

(b) A Major Amendment requires submittal to the 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 ESA, HRS Chapter 195D, and the National Environmental Policy Act may vary based on the nature of the Amendment.

12.0 REMEDIES, ENFORCEMENT, AND DISPUTE RESOLUTION

12.1 In general. Except as set forth below, each Party shall have all remedies otherwise available to enforce the terms of this Agreement, the Permits, and the HCP.

12.2 No monetary damages. No Party shall be liable for damages to any other Party or other person for any breach of this Agreement, any performance or failure

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to perform a mandatory or discretionary obligation imposed by this Agreement or any other cause of action arising from this Agreement.

12.3 Injunctive and temporary relief. The Parties acknowledge that the Covered Species are unique and that their loss as species would result in irreparable damage to the environment, and that therefore injunctive and temporary relief may be appropriate to ensure compliance with the terms of this Agreement.

12.4 Enforcement authority of the United States. Nothing contained in this Agreement is intended to limit the authority of the United States or the State of Hawai‘i to seek civil or criminal penalties or otherwise fulfill its enforcement responsibilities under the ESA or HRS Chapter 195D or other applicable law.

12.5 Permit Suspension. The Wildlife Agencies may suspend the Permits, in whole or in part, for cause, to the extent allowed by the ESA, HRS Chapter 195D, associated implementing regulations, or other applicable laws and regulations in force at the time of such suspension. Except where the Wildlife Agencies determine that emergency action is necessary to avoid irreparable harm to a Covered Species, they will not suspend the Permits without first (1) requesting the Permittee to take appropriate remedial actions, and (2) providing the Permittee with written notice of the facts, conduct and legal authority which may warrant the suspension and an adequate and reasonable opportunity for the Permittee to demonstrate why suspension is not warranted.

12.6 Reinstatement of Suspended Permit. In the event a Wildlife Agency suspends a Permit, in whole or in part, as soon as possible but no later than twenty (20) calendar days after such suspension, the suspending Wildlife Agency shall meet and confer with the Permittee concerning how the suspension can be ended. At the conclusion of any such conference, the Wildlife Agency shall identify reasonable, specific actions, if any, necessary to effectively redress the suspension. In making this determination, the Wildlife Agencies shall consider the requirements of the ESA or HRS Chapter 195D and their implementing regulations, the conservation needs of the Covered Species, the terms of the Permit and of this Agreement and any comments or recommendations received during the meet and confer process. As soon as possible, but not later than thirty (30) calendar days after the conference, the suspending Wildlife Agency shall send Permittee written notice of any available, reasonable actions, necessary to effectively redress the deficiencies giving rise to the suspension. Upon performance or completion, as appropriate, of such actions, the Wildlife Agency shall immediately reinstate the Permit. It is the intent of the Parties that in the event of any total or partial suspension of the Permit(s), all Parties shall act expeditiously and cooperatively to reinstate the Permit(s).

12.7 Circumstances Likely to Constitute Jeopardy to Species. In the event of circumstances in which continuation of the Covered Activities would appreciably reduce the likelihood of survival or recovery of a Covered Species in the wild, the Wildlife Agencies may suspend the Permits on an emergency basis, in whole or in part, without resorting to the procedures specified in Section 12.6 above. The period of such emergency suspension shall not last longer than ninety (90) calendar days.

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12.8 Dispute Resolution. In the event of any dispute among one or more of the Parties regarding this Agreement, the Permits or the HCP, the disputing Party will notify the other Parties of the dispute in writing. All Parties will then meet and confer within thirty (30) calendar days of the receipt of such notification, and the Parties will use exercise their best efforts and good faith to promptly and cooperatively resolve the dispute within an additional thirty (30) calendar days. If at the end of that period the dispute has not been resolved, the dispute shall elevated to the President and CEO of KIUC, the Field Supervisor for the USFWS Pacific Islands Field Office, and the DLNR Chairperson, who shall personally meet and confer within the next thirty (30) calendar days and who shall exercise their best efforts and good faith to promptly and cooperatively resolve the dispute. If the Parties are unable to resolve the dispute despite these efforts, the Parties may avail themselves of any legal remedies otherwise available to them.

13.0 CONSULTATIONS WITH OTHER PUBLIC AGENCIES

Nothing in this Agreement is intended to alter the obligation of a federal agency to consult with the USFWS pursuant to Section 7 of the ESA (16 U.S.C. §1536(a)). Unless otherwise required by law or regulation, in any consultation under Section 7 involving the Permittee and a proposed development project, enhancement, or other activity contemplated by the scope of the HCP that may adversely affect one or more Covered Species, the USFWS shall ensure that the Biological Opinion for the proposed project is consistent with the Biological Opinion issued for the HCP and Permits, provided that the proposed project is consistent with the HCP and the Permits. Unless otherwise required by law or regulation, in any such future Section 7 consultation the USFWS shall not impose measures on Permittee in excess of those that have been or will be required by this Agreement, HCP, and Permits. Before completing a Section 7 consultation for a Covered Activity in which the USFWS proposes to require a measure in excess of the requirements of this Agreement, the HCP, or the Permits, the USFWS shall meet and confer with Permittee to discuss alternatives to the imposition of the measures that would meet the applicable legal or regulatory requirements.

14.0 MISCELLANEOUS PROVISIONS

14.1 Force Majeure. In the event that Permittee is wholly or partially prevented from performing obligations under this Agreement because of unforeseeable causes beyond the reasonable control of and without the fault or negligence of the Permittee, including, but not limited to, acts of God, labor disputes, sudden actions of the elements not identified as Changed Circumstances, or actions of a non-participating federal agency, state agencies or local jurisdictions ("Force Majeure"), Permittee shall be excused from whatever performance is affected by such unforeseeable cause to the extent so affected, and such failure to perform shall not be considered a material violation or breach, provided that nothing in this section shall be deemed to authorize any Party to violate the ESA, and provided further that:

(a) The suspension of performance is of no greater scope and no longer duration than is required by the Force Majeure;

(b) Within fifteen (15) days after the occurrence of the Force Majeure, Permittee shall give the Wildlife Agencies written notice describing the particulars of the occurrence;

(c) Permittee shall use its best efforts to remedy its inability to perform (however, this paragraph shall not require the Permittee to incur extraordinary expenses or settlement of any strike, walk-out, lock-out or other labor dispute on terms which in the sole judgment of the Permittee is contrary to its interest); and

(d) When Permittee is able to resume performance of its obligations, Permittee shall give the Wildlife Agencies written notice to that effect.

14.2 No partnership. Neither this Agreement nor the HCP shall make or be deemed to make any Party to this Agreement the agent for or the partner of any other Party.

14.3 Notices. Any notice permitted or required by this Agreement shall be in writing, delivered personally, or by overnight mail, to the persons listed below, or shall be deemed given five (5) business days after deposit in the United States mail, certified and postage prepaid, return receipt requested and addressed as follows, or at such other address as any Party may from time to time specify to the other Parties in writing. Notices may be delivered by facsimile or other electronic means, provided that they are also delivered personally or by overnight or certified mail. Notices shall be transmitted so that they are received within the specified deadlines.

Field Supervisor
United States Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd., Room 3-122
Honolulu, Hawaii 96850
Telephone: 808-792-9400
Facsimile: 808-792-9580

Chairperson
Board of Land and Natural Resources
1151 Punchbowl Street, Rm 325
Honolulu, Hawaii 96813
Telephone: 808-587-0390
Facsimile: 808-587-0160

President and CEO
Kaua‘i Island Utility Cooperative
4463 Pahe‘e Street, Suite 1
Lihue, Hawaii 96766-4300
Telephone: 808-246-4300
Facsimile: 808-246-4389

14.4 Entire agreement. This Agreement, together with the HCP and the Permits, constitutes the entire agreement among the Parties. It supersedes any and all other agreements, either oral or in writing, among the Parties with respect to the subject

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matter hereof and contains all of the covenants and agreements among them with respect to said matters, and each Party acknowledges that no representation, inducement, promise or agreement, oral or otherwise, has been made by any other Party or anyone acting on behalf of any other Party that is not embodied herein.

14.5 Elected officials not to benefit. No member of or delegate to Congress shall be entitled to any share or part of this Agreement, or to any benefit that may arise from it.

14.6 Availability of funds. Implementation of this Agreement and the HCP by the USFWS is subject to the requirements of the Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Agreement will be construed by the Parties to require the obligation, appropriation, or expenditure of any money from the U.S. Treasury. The Parties acknowledge that the USFWS will not be required under this Agreement to expend any federal agency's appropriated funds unless and until an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

14.7 Duplicate originals. This Agreement may be executed in any number of duplicate originals. A complete original of this Agreement shall be maintained in the official records of each of the Parties hereto.

14.8 No third-party beneficiaries. Without limiting the applicability of rights granted to the public pursuant to the ESA, HRS Chapter 195D, or other federal or state law, this Agreement shall not create any right or interest in the public, or any member thereof, as a third-party beneficiary hereof, nor shall it authorize anyone not a Party to this Agreement to maintain a suit for personal injuries or damages pursuant to the provisions of this Agreement. The duties, obligations, and responsibilities of the Parties to this Agreement with respect to third parties shall remain as imposed under existing law.

14.9 Relationship to the ESA and other authorities. The terms of this Agreement shall be governed by and construed in accordance with the ESA, HRS Chapter 195D, and applicable federal and state law. In particular, nothing in this Agreement is intended to limit the authority of the Wildlife Agencies to seek penalties or otherwise fulfill their responsibilities under the ESA or HRS Chapter 195D. Moreover, nothing in this Agreement is intended to limit or diminish the legal obligations and responsibilities of the Wildlife Agencies as agencies of the federal government. Nothing in this Agreement will limit the right or obligation of any federal agency to engage in consultation required under Section 7 of the ESA or other federal law; however, it is intended that the rights and obligations of Permittee under the HCP and this Agreement will be considered in any consultation affecting Permittee or its Covered Activities.

14.10 References to regulations. Any reference in this Agreement, the HCP, or the Permits to any regulation or rule of the Wildlife Agencies shall be deemed to be a reference to such regulation or rule in existence at the time an action is taken.

14.11 Applicable laws. All activities undertaken pursuant to this Agreement, the HCP, or the Permits must be in compliance with all applicable state and federal laws

and regulations.

14.12 Successors and assigns. This Agreement and each of its covenants and conditions shall be binding on and shall inure to the benefit of the Parties and their respective successors and assigns. Assignment or other transfer of either of the Permits shall be governed by the Wildlife Agencies' regulations in force at the time.

IN WITNESS WHEREOF, THE PARTIES HERETO have executed this Implementing Agreement to be in effect as of the date the Permits are issued.

BY _____ Date _____
Field Supervisor
United States Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

BY _____ Date _____
Chairperson
Board of Land and Natural Resources
Honolulu, Hawaii

BY _____ Date _____
President and CEO
Kaua'i Island Utility Cooperative
Lihue, Hawaii

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APPENDIX E. ALREADY-IMPLEMENTED CONSERVATION MEASURES

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COMPLETED EFFORTS TO AVOID & MINIMIZE IMPACTS OF EXISTING FACILITIES

Pursuant to two Memorandums of Agreement between KIUC and the USFWS (2002, 2004), and in other years on its own initiative, KIUC implemented many measures intended to avoid or minimize the effect that its facilities and activities have on the Covered Species. These "interim conservation measures" were implemented in consultation with the USFWS and DLNR and were based in part on agency assurances that KIUC would receive full credit for such measures in the incidental take permit processes. Those measures that have been completed, or largely completed, are summarized below.

COMPLETED MINIMIZATION MEASURES

- *Use Only Full-Cutoff Streetlights*. In the 1980s KIUC (and its predecessor Kauai Electric) began replacing unshielded street lights across the Island with full-cutoff (shielded) lights as part of its normal maintenance program. One of the first conservation measures it implemented after beginning preparation of this HCP was to complete the replacement effort. Because of these efforts, all KIUC-operated streetlights (well over 3,000) are now full-cutoff design, and the Cooperative uses only full-cutoff lamps in new installations. It is the only electric utility in Hawai'i to have achieved this goal, and it represents a substantial minimization of impacts upon the Covered Species.
- *Evaluated Power Lines and Install Marker Balls to Deter Bird Collisions at Highest Collision-Risk Locations*. KIUC installed Tanna Marker Balls© at two locations where data indicated they might increase line visibility/reduce the potential for collision. On the basis of information from this experiment and a review of other information, it concluded that measurable benefits could not be obtained without adding so many marker balls that it would over-load the power lines, thereby causing unacceptably high levels of failures.
- *Tested Durability of Commercially Available Bird-Diverter Devices*. KIUC researched other types of markers more visible to night-flying birds. It installed six of one highly rated type (FireFly©) in 2004 to test their durability and feasibility for potentially widespread use on Kaua'i. All six devices failed within a few months, and KIUC concluded the relatively windy maritime environment that is characteristic of Kaua'i, made FireFly© devices unsuitable for use on its system. This judgment has recently been confirmed through discussions with others familiar with their use in windy locations.
- *Power Line Collision Risk Field Research and Associated Measures*. Historically KIUC's existing overhead transmission and distribution system has been designed following good engineering practice that emphasizes electrical performance, durability, serviceability, and economy. KIUC also conducted intensive studies at four locations where previous scientific research indicated the risk of seabird-power line collisions is highest. These studies included the first-on Kaua'i use of vertical radar to record Covered Species flight altitudes. Copies of the resulting reports have been provided to the agencies so that they could make them available on-line. The results of these studies suggest that under non-storm weather conditions, at least, the vast majority of the seabirds are flying at altitudes well above those occupied by KIUC facilities.
- *Installed and Maintain Shielded Lights at Port Allen*. KIUC modified existing facilities and revised existing operating procedures at its Port Allen Generating Station. It greatly reduced outdoor lighting, shielded and reduced the wattage of outdoor lights within the facility boundaries. KIUC has committed to maintain all of the above improvements for the term of this HCP. As a result, KIUC has minimized light-related affects of the Port Allen facility to the maximum extent practicable.

- *Installed and Maintain Shielded Lights at Kāpaia Power Station*. KIUC incorporated a seabird-friendly plant lighting scheme into its construction of the Kāpaia Power Station, which was completed in 2002. The design uses a large number of low-wattage lights placed close to one another and relatively close to the ground. As shown in the picture at right, enclosures for the 150 watt high-pressure sodium (HPS) lamps in the "Mongoose Series Luminaire" used in the parking and outdoor work areas completely cover the lighting elements except for the downward facing glass. This design reflects all the light downward; there is no upward or lateral light transmission. The "Petrolux II" lamps, which are used for area lighting around buildings, have the same design concept but use lower wattage lamps. There are approximately 80 fixtures distributed around the Kāpaia Power Station, strategically located to ensure a safe working environment for night personnel, while at the same time projecting very little ambient glow outside the facility. The lighting scheme has been successful in that no downed birds have ever been found at the facility.

- *Implemented Seabird Training Program for KIUC Personnel*. Consistent with the APP Guidelines, KIUC has developed a Seabird Protection Training Program and is presenting it annually to all appropriate KIUC personnel, including managers, supervisors, field crews, and engineering, design, member services and public relations personnel. Training includes a review of activities identified in the HCP, KIUC's procedures for handling and reporting downed seabirds, general information on Hawai'i's seabirds, and recommended actions which KIUC personnel can take while off duty that can help reduce overall impacts on the Covered Species. The overall goal of the training program is to minimize the impacts of KIUC operations on the Covered Species, and more generally to instill sensitivity to seabird-related issues at all levels within the KIUC workforce.

COMPLETED MITIGATION MEASURES

KIUC has already implemented numerous measures to mitigate for the take caused by its facilities. They include the following:

- *Provided Support for Operation of Save Our Shearwaters Program During 2003 and 2004*. KIUC provided funding and technical support that allowed the Save Our Shearwaters Program to function during 2003 and 2004. Without its involvement, it is likely that the 300 to 400 birds that the program retrieved and released back to the wild each year would instead have died. KIUC's efforts provided a significant contribution to reduced mortality of the Covered Species during those years. Moreover, it had the intangible but extremely important effect of maintaining continuity and community support for the SOS Program.
- *Prepared Operations Manual for Enhanced & Expanded SOS Program*. During the course of the 2004 SOS season, the SOS Program Manager (provided for and funded by KIUC) worked with personnel from the USFWS, DLNR, International Bird Rehabilitation and Rescue Center (IBRCC), and other seabird experts to develop the first ever comprehensive *SOS Operations Manual*. KIUC prepared several drafts of the Manual, and on each draft solicited and received extensive comments from numerous experts within the agencies and entities mentioned above, both in person and in writing. The first *SOS Manual*, issued in early 2005, built upon the very successful historical SOS program, and reflected a significantly expanded and enhanced program which provided substantially greater conservation benefits to the Covered Species. This document was intended to be updated as necessary to incorporate new knowledge on the Covered Species and new protocols using improved technologies.

- *Implemented SOS+ in 2005-2008 under DLNR Oversight*. In early 2005, several factors led DLNR to ask KIUC to take over implementation of the SOS+ program during that year and beyond. These included challenges the State faced in maintaining sufficient its budgetary support for the SOS program and the capability that KIUC had gained during the 2003-04 seasons and in preparing the SOS Manual. KIUC responded positively to the request and operated the SOS Program during 2005, 2006, and 2007. With the full support of both DOFAW and the USFWS, in 2008 KIUC funded implementation of the SOS Program by the Kauai Humane Society. The following tables summarize disposition of the Covered Species that were retrieved during the course of the 2006, 2007, and 2008 SOS seasons. Virtually all of the live birds handled by the SOS+ program would have died had they not been retrieved, cared for, and released.

Table E-1. Covered Species Retrieved in 2006.

Species	Total	DOA	Released	Rehab & Released	Died in Captivity
Newell's Shearwater	467	58	356	36	17
Hawaiian Petrel	12	1	4	4	3
Band-rumped Storm-Petrel	1	1			
Totals	***480***	***60***	***360***	***40***	***20***
Source: KIUC SOS Program Summary					

Table E-2. Covered Species Retrieved in 2007.

Species	Total	DOA	Released	Rehab & Released	Died in Captivity
Newell's Shearwater	302	18	250	14	20
Hawaiian Petrel	10		6		4
Band-rumped Storm-Petrel	6		6		
Totals	***318***	***18***	***262***	***14***	***24***
Source: KIUC SOS Program Summary					

Table E-3. Covered Species Retrieved in 2008.

Species	*Total*	*DOA*	*Died in Aid Station*	*Released*	*Rehab & Released*	*Euthanized*	*Died in Care*
Newell's Shearwater	198	10	4	163	13	6	2
Hawaiian Petrel	4	0	0	4	0	0	0
Band-rumped Storm-Petrel	2	0	0	0	2	0	0
Totals	***204***	***10***	***4***	***167***	***15***	***6***	***2***
Source: KIUC SOS Program Summary, Tables 4.2 and 4.3.							

- *Conducted Field Evaluations of Potential Sites for Colony Enhancement*. KIUC-sponsored biologists carried out a number of searches for sites where colony enhancement work could be done that would lead to increased breeding success on the part of the covered species. Reports describing the studies of these sites (listed below) are available on the Department of Land and Natural Resources website.
  - Kaluahonu Seabird Colony. KIUC-retained biologists conducted field studies designed to evaluate the feasibility of implementing conservation activities at the Kaluahonu Seabird Colony. The studies: (1) measured the number of birds flying into the general area of the colonies, and (2) assessed the feasibility of using radar as an effective tool to determine the actual location of colonies on the ground. No Newell's Shearwaters or nesting burrows were detected during the course of the survey and the vegetation was found to have changed from the formerly densely covered ʻuluhe slopes to alien woody plant species, with large areas of the slopes covered with almost impenetrable stands of rose myrtle (*Rhodomyrtus tomentosa*) and strawberry guava (*Psidium cattleianum*).
  - Lumahaʻi Valley Seabird Colony. Anecdotal information suggested it is likely that active Newell's Shearwater colonies exist within Lumahaʻi Valley, on privately held lands which are owned by Kamehameha Schools. In September 2003, a KIUC consultant accompanied by biologists from the USFWS and the University of Hawaiʻi Sea Grant Program conducted a three-day on-ground survey in the upper end of the valley in an area that The Nature Conservancy of Hawaiʻi (TNCH) had been contracted to prepare a long-term natural resources management program. The survey showed that the upper Lumahaʻi Valley supports active colonies of both the Hawaiian Petrel and the Newell's Shearwater. It also found that the bowl shaped valley terminus above 1,300 feet in elevation represents one of the best remaining lowland ʻOhiʻa (*Metrosideros polymorpha*) wet forests remaining on the island of Kauaʻi and that the incursion of alien invasive plant species is still at a nascent stage and thus, likely controllable. Ultimately, the owners of this property decided that they were not ready to proceed with on-ground seabird colony restoration, management, or monitoring activities at that time.
  - Anahola Seabird Colony. Radar studies conducted in 2002 at the Anahola Memorial and Moalepe colony sites confirmed the continued presence of Newell's Shearwaters within these areas and at one additional colony located above Kalāheo which had not been visited in years. KIUC funded an aerial reconnaissance survey of these three colony areas. The survey indicated that apparently suitable Newell's Shearwater nesting habitat continues to exist on the northern faces of the Anahola massif, but that the southern, southeastern and southwest faces have been over-run by alien plant species all but precluding the presence of suitable habitat for the Covered Species. No overland route into the suspected colony area was located from the air, and the survey concluded that this would make on-ground work extremely strenuous and would require helicopter insertion, extraction and support.
  - Moalepe Seabird Colony. The aerial survey of the Moalepe colony site showed that the Moalepe area is a large drainage basin that has a large amount of suitable nesting habitat, both on Pohakiʻikiʻi and along the cliff faces on the north and south sides of the valley cut. Alien invasive plants were seen in the lower reaches of the drainage and, are moving up the stream cut, and are beginning to over-run the Pohakiʻikiʻi site. No obvious overland access route into the general colony area was visible from the air. On-ground work would require helicopter insertion, extraction and support.
- *Evaluated and Drew Conclusions from the Field Surveys*. Several conclusions were drawn from the extensive surveys conducted by KIUC at the Kaluahonu, Lumahaʻi Valley, Anahola Memorial, Moalepe, and Kalāheo sites, coupled with as yet unpublished results of surveys conducted at four of these five colonies by DLNR personnel:

- At the time of the survey, researchers only know the exact location of one colony in the survey area, that being the Kalāheo colony, which apparently is very small, and is located on lands owned by the State of Hawai‘i.
- Sites at Anahola and Moalepe have birds, but exactly where these colonies are located, and whether they are in fact accessible and suitable for on-ground conservation activities, is not known. These colonies are located on land owned by the State of Hawai‘i. (However, TNCH is apparently pursuing conservation activities at these locations.)
- Areas within the upper Lumaha‘i Valley support both Newell's Shearwater and Hawaiian Petrel nesting colonies, though the precise location of these colonies is currently unknown. As previously mentioned, lands within the valley are privately owned, and areas at the upper portions of the valley are within the Conservation District. Given the remote location, the need for landowner permission, and the Conservation District designation, securing all permission and approvals and developing a suitable management plan for any significant conservation activities would likely take at least several years. At present the land owners of this property are not ready to proceed with on-ground seabird colony restoration, management, or monitoring activities within the upper portion of Lumaha‘i Valley. (However, TNCH is apparently pursuing conservation activities at this location.)
- DLNR field surveys have identified areas within the Wainiha Valley that support breeding populations of both Hawaiian Petrel and Newell's Shearwaters, and the Department believes this area is a suitable place in which to implement on ground seabird colony management activities. Whether it is truly feasible to do so will be determined by whether the landowner is willing to have such activities mounted on their property. Additionally, similar regulatory hurdles would need to be resolved prior to implementing any such activities on these lands.

- *Analyzed Feasibility of Satellite & Radio Transmitter Technology For Tracking Seabirds Retrieved & Released by SOS+ Program*. The SOS Program has retrieved and released more than 31,000 Newell's Shearwaters and other seabirds since it was established. Although the best available information (e.g., medical evaluation, and in some cases rehabilitation, of retrieved birds by SOS biologists; observations by SOS staff of released birds' flight) indicates that the released birds successfully make their way out to the ocean, there has been no way to determine the long-term reproductive success of the released birds.[63] To address this gap in scientific information, in 2002 KIUC began researching the potential use of tracking devices on retrieved and released birds, looking for transmitter and battery pack combinations light enough to use on the Covered Species.[64] Thus far, the research has shown that the available satellite tracking devices are too heavy for use on Newell's Shearwaters.[65]
- *Consolidated, Standardized and Analyzed 25-Years of SOS Data on the Covered Species*. Since its inception in 1979, the SOS program had collected extensive amounts of data that could be of great value in seabird conservation efforts. However, none of those data had previously been analyzed. In 2003 KIUC's consultants took DLNR's 24 separate data files containing all SOS program bird recovery data gathered between 1979 and 2002 and integrated those data into a single database. KIUC then standardized the data fields across the years, identified and either corrected or eliminated spurious records, and reduced the data for analysis. KIUC then analyzed these data and

[63] Although most birds released by SOS have been banded, band recoveries have been insignificant. This is not surprising given that 97 percent of the birds retrieved by the SOS Program are hatch-year-birds, downed by one cause or another on their inaugural flight to the sea. Adult birds are rarely retrieved by SOS, and no agencies or private entities have conducted breeding colony searches to look for banded adults.

[64] Current endangered species protocols in Hawai‘i require that any device affixed to a free-flying endangered bird species not weigh more than 3 percent of the bird's body weight. In the case of a Newell's Shearwater which weighs between 350-425 grams, this would require a tracking device weighing between 10-13 grams.

[65] The lightest satellite tracking devices now available (including required waterproofing) weigh more than wildlife agencies allow to be attached to birds of the Newell's Shearwater's size (approximately 400 grams).

prepared two significant reports. The first report, entitled *Data Reduction and Summary of Statistics: Save Our Shearwaters (SOS) Bird Collection Database (1979-2002),* presented an overview of the data, and provided several summary products, including tables, graphs, and Microsoft Excel ™ spreadsheets, which have been used to facilitate interpretation of the data for use in this HCP. The second report, entitled *Data Analysis: Interpreting the Save Our Shearwaters Bird Recovery Database (1979-2002) for Habitat Conservation Planning*, examined in greater detail certain aspects of the SOS database that might provide guidance for this HCP process. KIUC provided this new Master SOS Database in electronic format to the USFWS and DLNR, as well as copies of the reports. Copies of these reports are available on the DLNR website.

- *Prepared & Distributed "Data Report and Analysis: Save Our Shearwaters Program 2003 Update"*. Following the end of the 2003 SOS season, KIUC's consultants added 2003 data to the Master SOS Database described above, and provided electronic copies of the Database to the USFWS and DLNR. They prepared a report detailing the 2003 SOS season data and how it related to prior year data. The report also made suggestions on how data gathering could be improved so as to allow more statistically rigid analysis of specific criteria associated with each downed bird in the future. KIUC provided copies of this report to the USFWS and DLNR. A copy of this report is available on the DLNR website.
- *Analyzed 25-Years of SOS Data, Then Prepared and Distributed "Data Report and Analysis: Save Our Shearwaters Program 2004 and 2005 Update*". Following the end of the 2004 SOS season, KIUC's consultants added the data from that year's SOS Program to the Master SOS Database, and provided electronic copies of the Database to both the USFWS and DLNR. KIUC also entered data from the 2005 SOS+ season into the database and prepared a summary data report and analysis which it provided to the USFWS and DLNR. A copy of the report is available on the DLNR website.
- *Monitored and Served as Clearinghouse for information on Latest Developments in Relevant Technologies*. While developing this HCP, KIUC researched the latest developments in power line-related bird protection technology. An example of one of these technological advances are the FireFly© bird diverters discussed above. It also accumulated information on light fixtures that minimize stray light. It has used the latest horizontal and vertical radar equipment to collect data on the flight elevations of the Covered Species in the vicinity of power line segments previously reported to be most problematic with respect to adverse effects on the Covered Species. KIUC monitored through its outside consultants the development of relevant bird collision avoidance and lighting technologies, and reported the resulting information to the DLNR and USFWS as it became available.
- *Assisted with Research On Retrieved Birds*. KIUC provided assistance to the USFWS and DLNR in scientific research on retrieved Covered Species carcasses to improve collective knowledge on taxonomy and population genetics, population demographics, health, and nutrition. An example of this type of collaborative effort was the necropsy workshop held in Honolulu in April 2007, at which biologists from the USFWS, DOFAW, USFWS Refuges Division, KIUC's consulting biologist, and others necropsied and collected tissue and serological samples from frozen specimens of the Covered Species collected over the years by the SOS Program and other agencies. These tissue samples were sent to various laboratories and researchers around the country for a host of different chemical and physiological studies of these species. A photographic record was kept of the workshop which will eventually provide illustrations for a detailed manual on how to necropsy these species and what to look for in the necropsied animals.
- *Contribute Funds Towards Implementation of a Seabird Predator Control Project on Lehua Island*. As described previously, KIUC has worked closely with the USFWS and DLNR in attempting to identify a seabird colony at which conservation activities, ideally including predator control activities, could be implemented. While investigations for one or more suitable colonies continued on Kaua'i, KIUC supported work on Lehua Island that the USFWS determined would benefit the

Covered Species. The work involved: (i) eliminating rabbits through hunting and trapping, (ii) eliminating rats through aerial and hand broadcasting of the rodenticide Diphacinone, and (iii) restoring native vegetation. KIUC contributed $80,000 to fund the recommended seabird-related work on Lehua Island. The scientists involved in this project believe that the eradication of predators from Lehua will greatly improve breeding opportunities and breeding success for several seabird species, including the Covered Species.

- *Conducted a Public Education and Awareness Campaign Each Summer Regarding Seabird Fallout, Methods of Reducing Seabird Impacts, and Public Participation in the SOS+ Program*. The success of the SOS+ program specifically, and of seabird conservation efforts on Kaua‘i generally, depends in large part on community education and awareness. KIUC implemented an extensive public education and awareness program in 2004, and expanded that effort in 2005, 2006, 2007, and 2008. The following is a description of the 2005 through 2008 programs.
  - *2005 Outreach*. The 2005 community outreach efforts began with a flyer insert that was provided to all 29,800 KIUC members informing them of the proper steps to take in the event they discover a downed seabird. The insert also explained KIUC’s light shielding program, pursuant to which KIUC has shielded more than 3,000 streetlights. The insert also provided contact information for the SOS+ Coordinator at KIUC, the USFWS and DLNR. The outreach effort continued with publication of an extensive article in the Fall issue of KIUC’s membership magazine containing color photos of the Covered Species and detailed information regarding the SOS+ program and many aspects of the birds’ behavior. Another effort used to reach a broad audience was a special edition of the local cable television show “Wala‘au with Dickie Chang.” KIUC’s primary vehicle for youth outreach was the traveling puppet show of “Storybook Theater” which was presented at ten Kaua‘i elementary schools. Another youth outreach effort was the presence at the Līhu‘e football stadium during nighttime football games of SOS+ staff and agency personnel. These individuals were able to raise the visibility of the SOS+ program, interact and educate both parents and students, and assist with birds downed because of the bright stadium lights. On a broader community level, KIUC and its SOS+ staff worked hard to build relationships within the Kaua‘i Fire Department. KIUC SOS+ staff also made visits to the local Rotary Clubs.
  - *2006 Outreach*. KIUC continued its extensive public education and awareness program in 2006. Activities ranged from member-wide programs and school and community presentations to enhanced coordination and cooperation with other organizations. Among the most notable of these was the partnership KIUC developed with the Kaua‘i Humane Society (KHS), where the bulk of the seabird rehabilitation took place. KIUC also continued the other outreach activities it had initiated in 2005. These included: (i) making presentations about the SOS program to island schools; (ii) making presentations at community events such as the Banana Poka Festival at Kōke‘e State Park and the June 2006 KIUC Members Meeting; (iii) working with the Youth Conservation Corps in a project to clean, furbish, and paint the SOS aid stations; (iv) helping arrange and participating in a number of TV and radio shows; (v) participating in meetings at which the SOS Program was discussed; and (v) providing seabird response training to other Kaua‘i businesses. These included sessions with the Marriott Beach Resort staff, crew of the Norwegian Cruise Lines vessel *Pride of America*, and residents of the Marriott Beach Resort.
  - *2007 Outreach.* KIUC continued its public outreach program in 2007. Its efforts included a wide variety of activities, including the following: (i) inclusion of SOS brochure in all bills mailed to customers; (ii) publication of an SOS advertisement in KIUC’s members magazine; (iii) creation of a 2007 SOS poster that includes a picture of a Newell’s Shearwater (to assist the public in identifying the bird), explanation of what to do with a downed bird, and a list of SOS aid stations; (iv) publication of an activity book for grades K-3, and planned classroom presentations; (v) continued promotion of SOS at all fire stations, and at hotels, harbor patrol, and the Kauai Police Department, through meetings, and gifts of SOS T-shirts and cookies; (vi)

broadcast of SOS public service announcement on radio stations throughout the SOS season; (vii) repeats of Wala‘au television programs from last year, and creation of a new episode in early October featuring the new SOS Program Coordinator, one of the SOS veterinarians, and a DOFAW representative; and (viii) creation and airing of an SOS television commercial.

- *2008 Outreach.* KIUC and KHS personnel teamed together to continue its public outreach program in 2008. Its efforts included a wide variety of activities, including the following: (i) design of a new SOS logo; (ii) publication of an SOS article in KIUC's members bi-monthly magazine *Currents*; (iii) article in September bill insert "Watts Up" delivered to all customers; (iv) updated 2008 SOS poster that includes a picture of a Newell's Shearwater (to assist the public in identifying the bird), explanation of what to do with a downed bird, and a list of SOS aid stations; (v) produced new aluminum release site signs; (vi) publication of an activity book for grades K-3, and planned classroom presentations; (vii) continued promotion of SOS at all fire stations, hotels, harbor patrol, and the Kaua‘i Police Department, through meetings, and gifts of SOS T-shirts and cookies; (viii) continued broadcast of SOS public service announcement on radio stations throughout the SOS season; (ix) SOS Programs on Wala‘au television programs; and (x) creation and airing of an SOS television commercial.