BIOLOGICAL and CONFERENCE OPINIONS

OF THE
U.S. FISH AND WILDLIFE SERVICE
FOR THE

Kauai Lagoons Habitat Conservation Plan and Incidental Take Permit Application (TE-75220A-0)

Island of Kauai
May 11, 2012
Service File: 1-2-2011-F-0410

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2011-F-0410

Memorandum

To: Chief, Division of Consultation and Conservation Planning
Pacific Regional Office, Portland, Oregon

From: Field Supervisor, Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

Subject: Kauai Lagoons Habitat Conservation Plan and Incidental Take Permit Application, TE-75220A-0

This document represents the U.S. Fish and Wildlife Service's (Service) biological and conference opinions (Opinions) regarding our proposed issuance of an Endangered Species Act (ESA) section 10(a)(1)(B) incidental take permit (Permit) for the Kauai Lagoons Resort on Kauai, Hawaii. Kauai Lagoons LLC (the Applicant or KL) applied for an incidental take permit for the continued operation of the resort and new construction projects and plans to implement the Kauai Lagoons Habitat Conservation Plan (HCP) pursuant to the requested Permit. The biological opinion addresses impacts of Permit issuance and project implementation to the federally endangered Hawaiian goose (*Branta sandvicensis*), Hawaiian moorhen (*Gallinula chloropus sandvicensis*), Hawaiian coot (*Fulica alai*), Hawaiian duck (*Anas wyvilliana*), Hawaiian stilt (*Himantopus mexicanus knudseni*) and the Hawaiian petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*). The conference opinion addresses impacts of Permit issuance and project implementation to a candidate for listing, the band-rumped storm petrel (*Oceanodroma castro*). The above species are hereafter referred to as the "Covered Species." These Opinions were prepared in response to your January 31, 2012, request for initiation of formal consultation in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.).

These Opinions were based upon information in the following documents: (1) Kauai Lagoons HCP (Ebbin Moser & Skaggs LLP 2012), which is herein incorporated by reference; (2) Kauai Lagoons HCP Final Environmental Assessment (EA) (Service 2012); (3) Recovery Plan for the Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater (Service 1983); (5) Draft Revised Recovery Plan for the Nene or Hawaiian goose (*Branta sandvicensis*) (Service 2004); (6) Draft Revised Recovery Plan for Hawaiian waterbirds (Service 2005); (7) other biological literature cited herein (*see* Literature Cited); and (8) other information in our files. The decision

record for this consultation is on file at the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii.

Consultation History

On January 31. 2012, the Service's Pacific Regional Office submitted a formal request for consultation on the proposed Permit action to the Pacific Islands Fish and Wildlife Office (PIFWO). A complete administrative record is available at PIFWO.

1.0 DESCRIPTION OF THE PROPOSED ACTION

Activities Covered Under the Proposed Permit and HCP

Project Overview

The Service proposes to issue a Permit to the Applicant for the incidental take of the Covered Species resulting from activities associated with the operation of KL including future construction of new buildings. Approval of the proposed HCP will address, in part, measures the Applicant will take to minimize and mitigate the incidental take for the Covered Species.

The proposed action is detailed in the HCP (Ebbin Moser & Skaggs LLP 2012) and the Final EA, which are incorporated herein by reference (Service 2011). Table 1 summarizes the Applicant's requested levels of incidental take for each of the Covered Species; Table 2 outlines the Applicant's proposed measures to mitigate for the incidental take for each Covered Species.

Table 1. Average Amount of Anticipated Take.

Covered Species	Total Take /Impact over 30-year Permit Term (includes both direct and indirect take)
Hawaiian goose	17 mortality *or* non-lethal injuries
Hawaiian moorhen	40 mortality and 30 non-lethal injuries
Hawaiian coot	110 mortality and 180 non-lethal injuries
Hawaiian duck	36 mortality *or* non-lethal injuries
Hawaiian stilt	38 mortality *or* non-lethal injuries
Newell's shearwater	27[1] mortality *or* non-lethal injury
Hawaiian petrel	1 mortality *or* non-lethal injury
Band-rumped storm-petrel	1 mortality *or* non-lethal injury

[1] No take of listed seabird species is expected to occur prior to the construction of new buildings. Construction of phase 1 of the new Marriott Vacation Club complex is anticipated to be completed in 2015. The projected amount of take (1 bird per year) is therefore 27 over the life of the 30-year permit term.

Table 2. Mitigation Summary for Covered Species.

Covered Species	Proposed Mitigation
Hawaiian goose	KL shall continue ongoing management for breeding Hawaiian geese by conducting predator control for cats and rats in areas where Hawaiian geese are present. KL will provide $85,000 to the Hawaii Department of Land and Natural Resources' (DLNR) Endangered Species Trust Fund to provide predator control and management for Hawaiian geese that are translocated from Kauai Lagoons to other islands.
Hawaiian waterbirds (*Hawaiian moorhen, Hawaiian coot, Hawaiian stilt and Hawaiian duck*)	KL shall conduct habitat management and predator control for cats and rats in areas where Hawaiian waterbirds are present. These activities have been found to be effective in promoting successful onsite breeding and foraging.
Hawaiian seabirds (*Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel*)	KL shall contribute funds toward the Kauai Seabird Habitat Conservation Plan (KSHCP) currently being developed by DLNR and the Service. The exact amount of the financial contribution shall be determined by KSHCP when finalized, and is required to fully offset take through conducting habitat management and predator control in existing seabird colonies on Kauai. In the event that KSHCP is unavailable, Kauai Lagoons shall instead contribute the amount necessary to provide adequate mitigation. These funds shall then be applied toward a seabird-benefiting project with the approval of the Service.

Action Area

The action area consists of all areas to be affected directly or indirectly by the action including roadways, buildings, golf courses, and grounds of KL. The oceanfront resort property encompasses approximately 600 acres, and contains two 18-hole golf courses, a golf and racquet club facility, a network of man-made navigable lagoons, a restaurant, commercial development, and associated parking areas. The existing complex is comprised of three structures (totaling 78 units) and two subdivisions. KL is bordered by the Marriott Kauai Resort and Beach Club to the west and by the Lihue Airport to the north and east (Figure 1).

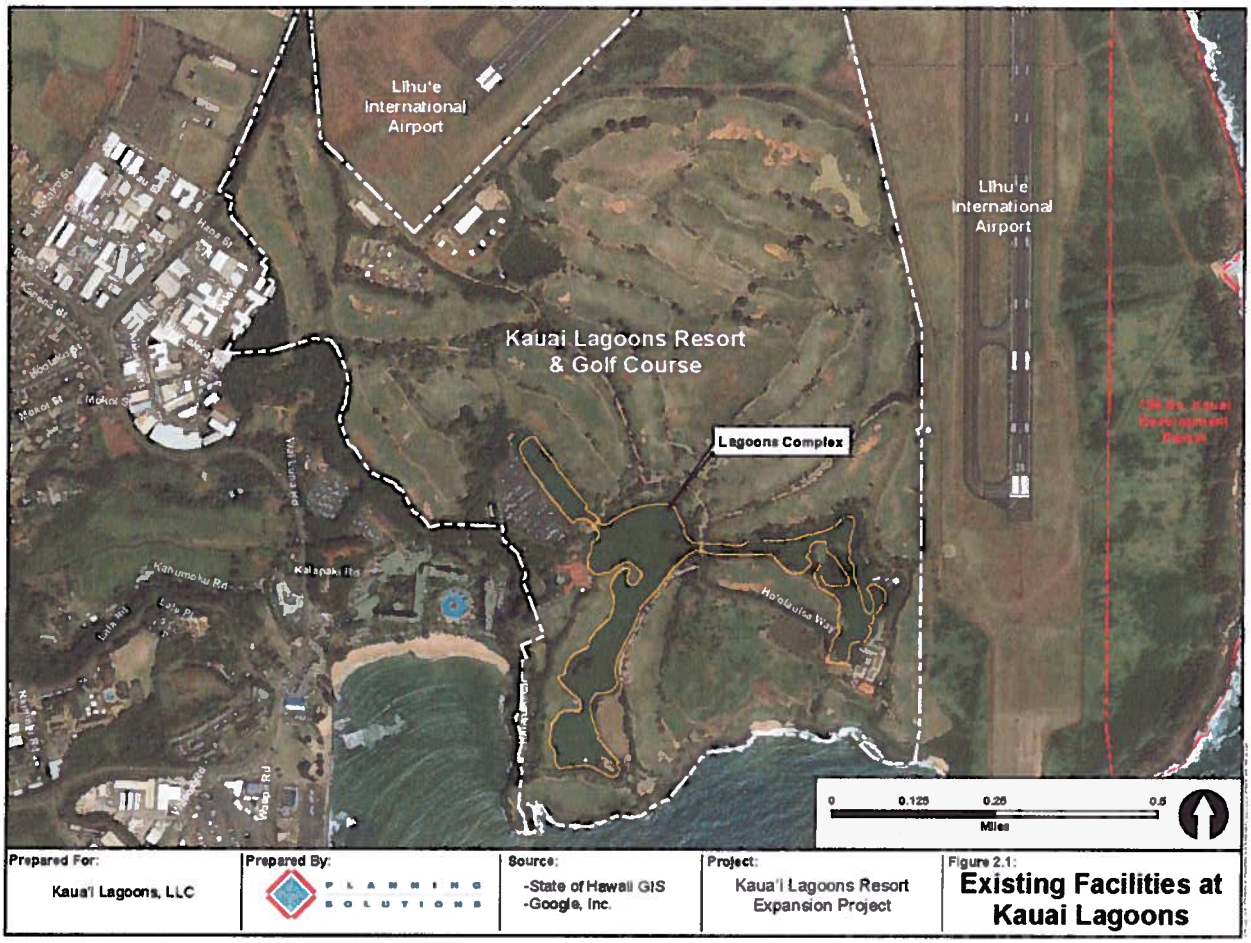

Figure 1. Satellite photograph of existing facilities at Kauai Lagoons.

Project Description Summary

The proposed Permit action and HCP include the following: 1) operation and management of the resort and golf courses; (2) construction of new buildings and infrastructure; and 3) implementation of mitigation actions.

Project Components

Ongoing Operation and Maintenance Activities

Existing KL facilities require ongoing maintenance to ensure safe and efficient operation. Examples of facilities requiring maintenance include: roadways, cart paths, bike paths, parking lots, sewer lines, utilities, exterior lighting, and resort and clubhouse structures.

Covered Ongoing Operations and Maintenance Activities:

- Maintenance of existing facilities including building pads, buildings, swimming pools, water features, tennis courts, golf course complex, recreational picnic shelters, and associated structures, facilities, and access routes. Because outdoor lights could attract seabird species covered in the HCP, KL would only conduct lighted outdoor work during nighttime hours in emergency situations.

- Maintenance of existing landscaping. Regular mowing and other maintenance activities on the landscaped areas.

- Driving and bicycling activities by employees, contractors, and the public on established roadways, sidewalks, and paths in accordance with posted speed limits.

- Operation, management, and maintenance of all facilities.

- Operation, management, and maintenance of the golf course complex including regular mowing and other maintenance activities.

- Operation and maintenance of the man-made, navigable lagoons, and operation of boats on the lagoons. Clearing of vegetation in the lagoons will be done occasionally to accommodate intended uses of the lagoon and to maintain its aesthetic value to the resort.

Measures to Avoid and Minimize Impacts to Covered Species from Ongoing Operation and Maintenance Activities:

1. **Roadways:**
   KL shall post permanent signage on all roadways stating that the speed limit is 15 mph and install Covered Species warning signs throughout the resort property. KL shall install speed bumps on roadways wherever necessary to ensure compliance with the posted speed limit.

2. **Lighting:**
   All existing external lights shall be modified or replaced to one of the following three types: shielded lights, cut-off luminaries, or indirect lighting. Spotlights aimed upward, or spotlighting of structures and landscaping on the project site, shall be prohibited.

   As part of the seabird fallout monitoring program, KL's biologists shall analyze the onsite seabird fallout monitoring data on an ongoing basis to determine if any particular lighting or lit areas within the resort development attracts or downs birds on a regular basis. If this is found to be the case, steps will immediately be taken to re-design, re-configure or eliminate any potential light attraction sources that may be responsible.

3. **Grounds Management and Maintenance:**
All management and grounds maintenance personnel will be required to attend the Endangered Species Awareness Program training every year. Biological monitors will notify all grounds management and maintenance personnel to avoid areas known to contain active nests or high concentrations of Covered Species. All grounds maintenance personnel shall be instructed to contact one of the biological monitors before proceeding with any particular grounds management or maintenance activity that has the potential to adversely affect any of the Covered Species. In the event that grounds maintenance personnel observe any injured or dead Covered Species, they shall follow the Emergency Response Protocol (Ebbin Moser & Skaggs LLP 2012, Appendix A).

4. **Owner Education:**
Owners and residents of the resort will be informed of the various endangered species issues, restrictions, and special rules. Compliance with special regulations will be ensured through the Covenants, Conditions, and Restrictions (CC&Rs) that shall be part of the contractual requirements associated with property ownership at KL.

Once the project is completed, KL will use several avenues to educate, instruct, and require compliance with specific conditions associated with this application for all of its new resort owners and residents. The owners and residents shall be educated on the various endangered species issues, restrictions, and special rules associated with complying with the terms of the permit.

Current owners will be apprised of issues such as appropriate trash receptacles, disposal of trash, landscape design, and maintenance shall be included in the CC&Rs. The CC&Rs will restrict owners to two pets per condominium, and require that all pets remain on a leash whenever outside. Walking pets will also be restricted to areas designated by KL. Kauai County ordinance and KL leash laws for both dogs and cats will be enforced. Security guards at the KL property will identify and report animals to County law enforcement and to the Kauai Humane Society. Condominium owners are subject to the pet-related provisions of the CC&Rs noted above. Owners that violate these provisions are subject to enforcement action by KL and condominium board.

KL shall develop several endangered species information and education tools that will be used to educate owners and visitors to the resort regarding endangered species issues, restrictions, and special seasonal protocols. The following tools will be developed and distributed:

- A general Endangered Species Awareness Program to be shown on the dedicated resort information channel.

- An additional television module addressing seabird fallout to be shown on the dedicated resort informational channel during annual seabird fallout season.

- A printed endangered species awareness brochure to be included in sales materials, and as part of the in-room and condominium amenities.

- An additional brochure or information packet will be developed regarding seabird fallout and the Save Our Shearwater Program which will be included in the sales material, and as part of the in-room and condo amenities.

Golf Operations:
KL shall take the following measures to avoid and minimize impacts on the Covered Species associated with the operation of the golf course:

- Golf course management and maintenance crews will observe all the measures described in *Grounds Management and Maintenance* (above).

- In addition to the standard Endangered Species Awareness Program training that all KL personnel shall be required to undergo, all golf course starters and marshals shall receive additional training from the biological monitors to ensure they are able to (1) identify all Covered Species; (2) understand relevant Covered Species behaviors; (3) identify likely areas of occurrence; (4) employ measures that can be taken to avoid and minimize harm to the Covered Species; (5) implement non-harmful means which can be used to encourage the Covered Species to leave areas in which they may be at risk of harm; and (6) identify appropriate measures to take in response to any observed injury of a Covered Species. The starters and marshals shall always carry a two-way radio and/or cell phone, and the phone numbers of the biological monitors, so they can immediately consult with them in the event any urgent situations arise.

- Each day all KL golf operations personnel will participate in a morning briefing, which will include an update on observed Covered Species occurrences, locations, behavior, etc.

- The golf course starter (who must clear every golfer before they proceed onto the course), shall inform every golfer about the potential presence of the Covered Species on the course, their protected status under the ESA, the need to take all appropriate precautions to avoid causing harm to any Covered Species, and about the local rule (discussed below) applicable to play in areas where the Covered Species are nesting. KL will erect an educational kiosk at the starter location, which will include large color photographs of the Covered Species to be used as part of the educational briefing for all golfers.

- If a Covered Species is observed transiting through areas of the golf course where they may be at significant risk of injury from golf play, the starters or marshals will temporarily halt play in that location and allow the birds to voluntarily move out of harm's way.

- If a Covered Species is observed congregating and remaining on areas of the golf course where they may be at significant risk of injury from golfers, the golf course starters or marshals may encourage these birds to relocate in a non-harmful manner (i.e., without any physical contact). If the birds in question do not relocate, they may be physically relocated by the biological monitors only with approval from DOFAW and the Service.

- Each golf cart shall contain a laminated placard which replicates the key information contained at the educational kiosk.

- Each golf cart shall be equipped with a Global Positioning System (GPS) unit which players use during the course of play as they navigate the golf course. These GPS units will display a reminder about the Covered Species twice during each nine holes of play (for a total of four times during a full round of 18 holes of play). Golfers will be required to acknowledge these reminders.

- If golf operations personnel observe that a Covered Species has established a nest within the golf course, golf operations shall notify the biological monitors and erect appropriate warning signs near the nest to warn golfers. The starter will also point out these posted locations to all golfers as part of the educational briefing to ensure the nest is not disturbed.

- KL will officially adopt a "local rule" for golf play, which shall prohibit golfers who hit a ball into the immediate vicinity of a nesting Covered Species from retrieving the ball. Instead, the golfer would be allowed to move to the nearest point of relief away from the nest area. The starter will describe this local rule to all golfers as part of the educational briefing, and this local rule will be printed on the score card provided to each golfer.

- All golfers will be instructed to immediately contact the marshal or starter if they observe an injured Covered Species, or if they have concerns about any of the Covered Species during the course of golf play.

- If any golf operations personnel observe any dead or injured Covered Species, they shall implement the Emergency Response Protocols (Ebbin Moser & Skaggs LLP 2012, Appendix A).

Construction of New Facilities

The Applicant is developing additional facilities at KL based on its revised resort master plan, and pursuant to the Special Management Area Use Permit, Project Development Use Permit, Class IV Zoning Permit, subsequent amendments, and other approvals received from the County of Kauai beginning in 2005.

These projects would result in a total of 772 resort residential units (consisting of 707 condominium/time share units and 65 single-family residential lots), and support facilities including a new golf clubhouse, a 27-hole golf course complex, central operations building with a marketplace/café and administrative office facilities, commercial area, marketplace express-grill kitchen, fitness center, restaurant, public recreational facilities, sales facility, engineering/maintenance building and parking.

Grading and earthmoving activities associated with the complete development project would result in the disturbance of approximately 230 acres of land. Project grading and construction will occur in phases. To date, approximately 60 percent of total project grading and infrastructure construction has been completed. Impacts to listed species from activities that have already taken place have been addressed through a Memorandum of Understanding (MOU) between the Service and KL, the effects of which were evaluated through an internal section 7 consultation. The remainder of project grading and construction is expected to continue through 2018. The timing of each construction phase and specific details of building, sizes, and locations may change over time subject to market conditions and subject to any required permit modifications or approvals from the County of Kauai.

Both during and after the grading and construction described above, numerous resort operational activities will occur. These include facilities maintenance and repair, landscaping, and grounds maintenance, operation of the golf course operations, etc. similar to the regime of maintenance and operations activities for existing facilities.

Covered Activities:

- Grading and earth-moving activities associated with new construction.
- Installation and construction of infrastructure associated with new construction projects, including roadways, cart paths, bicycle and pedestrian paths, parking lots, sewer lines, utilities, and exterior lighting.
- Construction of new facilities, including building pads, buildings, swimming pools, water features, tennis courts, golf course complex, recreational picnic shelters, and associated structures, facilities, and access routes.
- Installation of landscaping associated with new infrastructure.

Measures to Avoid and Minimize Impacts to Covered Species from Construction Activities:

1. **Endangered Species Awareness Program:**
   An Endangered Species Awareness Program training session was developed in 2008, and has been used to train every employee, salesperson, manager, construction contractor, and trade contractor working at KL. This program was developed by KL in cooperation with the Service and DOFAW. The program is adaptive and is updated to reflect new

information. KL shall require every new employee or construction contractor working at the resort to complete this training program.

2. **Endangered Species Construction Contract Provisions:**
KL will implement provisions and restrictions (such as the Best Management Practices described below) to avoid and minimize take of the Covered Species, which will apply to all construction activities. These provisions shall be incorporated into construction contracts.

3. **Pre-construction Endangered Species Surveys:**
A biological monitor will conduct surveys of any new mass grading areas immediately prior to the grading activity. The surveys shall be of appropriate length and duration to determine if Covered Species are in the vicinity. If any of the Covered Species are observed, their locations and band combinations (if banded) will be recorded, and grading may not proceed until such individuals have left the grading area.

4. **Biological Monitors:**
KL will employ a minimum of two individuals as biological monitors. These individuals shall be trained biologists or otherwise qualified to serve in this role. The biological monitors will be responsible for performing the predator control, monitoring, and other similar functions. They will also coordinate any Covered Species translocation activities undertaken by DOFAW, pursuant to the Governor's Proclamation as described on page 50 of this document.

5. **Construction Monitors:**
During all periods of active grading or earth-moving activity, KL will deploy one or more construction monitors on the project site. Construction monitors are responsible for observing grading, earth-moving and general construction activity, and ensuring such activity does not adversely affect any Covered Species. The construction monitors will complete the Endangered Species Awareness Program training, and will be trained in the field on the project site by the biological monitors.

   The construction and biological monitors shall halt construction activities if they anticipate that any aspect of grading, earth-moving, or other construction activities pose a threat to any of the Covered Species. In such instance, the construction or biological monitor(s) will continue to observe the bird(s) in question until the species voluntarily leaves the area. If the bird(s) do not leave, it may be encouraged to relocate in a non-harmful manner (i.e., without any physical contact). If the species cannot be ushered from the area, it may be physically relocated out of the construction area by the biological monitors only with approval from DOFAW and the Service. Construction activity may resume when the biological monitors observe that the species has left the construction area.

6. **Fencing:**
When the size and location of the construction sites make it practicable, KL will erect and maintain solid fencing around discrete construction areas in order to exclude the Covered Species from entering these sites. Depending upon site-specific conditions, such fencing could consist of silt fencing, solid wood fencing, or other equivalent types of fencing. All such fencing will be inspected daily and repaired when necessary.

7. **Lighting:**
Prior to the construction of structures on the site, KL consultants shall meet with the architects, electrical engineers, and lighting designers to ensure that all lighting associated with the proposed resort development, including parking areas and accent lighting, will minimize impacts to covered seabird species. All new exterior lights shall one of the following three types: shielded lights, cut-off luminaries, or indirect lighting. Spotlights aimed upward, or spotlighting of structures and landscaping on the project site, shall be prohibited.

As buildings near completion and become electrified, lighting for each building shall be inspected after dark by a qualified biologist with experience in nocturnal seabird issues in Hawaii. The biologist would determine if any modifications to lighting are needed (e.g., fixtures, bulbs, lighting direction, shielding etc.) to ensure that all measures have been taken to minimize the potential impacts of light attraction to night flying seabirds to the maximum extent practicable.

8. **Construction Related Best Management Practices (BMPs)**
The following BMPs shall be implemented to ensure that construction parking, traffic, food and beverage trash, and other construction activities do not harm any Covered Species on the project site:

- KL, in consultation with a biological monitor, will designate one or more personal vehicle parking areas for construction personnel, away from areas where Covered Species are known to regularly occur or nest. All other areas will be off limits for parking.

- A speed limit of 15 miles per hour will be enforced for all vehicular traffic within the project area. Speed limit signs will be posted by KL throughout the project area.

- KL or its contractors will provide appropriate trash receptacles with lids and recycle containers at construction sites within the project area, and ensure that food scraps, beverage containers, and all other trash is disposed of properly.

- Signage will be erected delineating speed limits, parking areas, food disposal sites, and Hawaiian goose caution signs.

- KL will continue to install permanent roadside signs that display the speed limit and the phrase "Slow Down - Wildlife Crossing" with a photo of a Hawaiian goose on the

sign. In addition, free standing sandwich board signs that have the same message on one side, and the phrase "Please Do Not Feed the Geese" on the other side will be used in areas where Hawaiian geese are observed congregating. Warning signs attached to poles will be located close to every nest within the resort, with the phrase "Hawaiian Goose Nest – Do Not Approach" and an image of a Hawaiian goose on the sign.

- No nighttime construction requiring outdoor lighting shall occur during the annual seabird fallout season of September 15 to December 15.

- If any active Covered Species nest is found within an grading, earth-moving or construction area, all such activity within 500 feet of the nest will be immediately halted and the biological monitor(s) will immediately notify DOFAW and the Service. DOFAW and the Service will determine the appropriate buffer area around the nest. Within this buffer no grading or earth-moving activity shall occur so long as nesting activity continues. Grading and earth-moving activity outside of the determined buffer area may resume once it has been determined that nesting activity is completed and pair (with goslings if hatched) have moved away. Nesting pairs shall not be disturbed or eggs moved. Any buffer zone will be appropriately marked with construction fencing, flagging, or similar means. The buffer will remain in place until nesting is completed and any goslings have fledged, or the nest fails, or the nesting adults and their goslings have been removed and translocated by DOFAW pursuant to the Governor's Proclamation as described on page 50 of this document. .

- For any nesting actively by other Covered Species within the project area that could be affected by construction activity, KL will coordinate with DOFAW and the Service to determine whether any additional protective measures are appropriate.

Monitoring and Reporting Requirements

The ongoing monitoring of management efforts, bird presence, nesting, recruitment, predator control, and incidental take of the Covered Species that are part of the proposed HCP will provide important information needed to measure the success of the various onsite management actions. KL will implement the following monitoring program and submit an annual HCP compliance and monitoring report to the Service by September 30 each year of the 30-year permit term.

Habitat Management Monitoring

The goal of onsite habitat management is to ensure that on the ground actions associated with maintaining the vegetation on the KL property, as well as on the golf course, continues to provide nesting and foraging habitat for the four covered waterbird species. However, given the potential of collisions between airplanes and Hawaiian geese, KL will not purposefully enhance habitat that may further encourage Hawaiian goose breeding at the site. Any future changes to the general habitat management and maintenance activities on the property would depend upon future decisions by the Service and DOFAW, regarding the degree to which the onsite Hawaiian goose population should be reduced. The results of the Hawaiian goose and other waterbird species

monitoring and reporting would serve as the main indicator as to whether appropriate habitat management is occurring.

Predator Control Monitoring
The onsite biological monitors shall keep a detailed log of predator control efforts and results, which will be submitted in the annual HCP implementation and monitoring report.

Covered Species Monitoring

Hawaiian Goose Monitoring
For as long as Hawaiian geese remain on the property and the Permit is in place, the onsite biological monitors will monitor nesting activity, and nesting success, on a daily basis starting September 15 and ending on March 31 each year (or later if that year's nesting season is protracted). The monitoring will include band numbers, pair bonds, nest location, eggs laid, eggs hatched and goslings fledged, as well as all recorded mortalities. All data collected will be entered into a database. In addition to daily monitoring during the nesting season, KL will also perform monthly monitoring during the remainder of the year (April through August). All information will be provided to the Service in the annual HCP implementation and monitoring report.

Hawaiian Waterbird Monitoring
The onsite biological monitors will record information (e.g., waterbird numbers, nest locations if passively observed, young fledged, as well as all recorded mortalities) for all observed covered waterbird species on the resort property on a weekly basis between September 15 and March 31 each year, and on a monthly basis from April through August. These data would also be entered into the comprehensive monitoring database and provided to the Service in the annual HCP implementation and monitoring report.

Hawaiian Seabird Monitoring
The biological monitors and KL security staff (who shall receive training specifically regarding seabirds and their proper care and handling) will record all downed seabirds recovered on the resort property. The biological monitors will evaluate security staff searcher efficiency and carcass removal rates in the fall of 2012 and report the results in the following annual report. The biological monitors will similarly record the results of their own additional searches performed during the expected peak of the seabird fallout season. The records will include location, time, condition of the bird (i.e., apparently unharmed, injured, dead), and any apparent cause of the individual downing incident. These data will be entered into the comprehensive monitoring database and provided to the Service in the annual HCP implementation and monitoring report. KL will request that a SOS Aid Station be placed onsite during the fallout season each year.

Estimating Indirect Take

Monitoring of direct take will also be used to assess Project-related indirect take. It is assumed that take of an adult Hawaiian goose or Hawaiian waterbird during the breeding season may result in the loss or take of dependent eggs or young. Thus, for every Hawaiian goose or waterbird mortality during the breeding season, modifiers will be applied to estimate indirect take to account for the likelihood that a given adult is reproductively active and the likelihood that the loss of a reproductively active adult results in the loss of its young.

Mitigation

Mitigation measures proposed by KL to compensate for the expected impacts of the project on Covered Species were selected in collaboration with biologists from the Service, DOFAW, and with members of the Endangered Species Recovery Committee (ESRC). The mitigation proposed to compensate for impacts to Covered Species is based on anticipated levels of incidental take as determined through onsite surveys and observed levels of take at comparable properties on Kauai and elsewhere in Hawaii. Mitigation will offset anticipated direct and indirect take.

The proposed mitigation and adaptive management measures detailed in the HCP are summarized below. Mitigation will be implemented even if no project-related mortality is detected. Mitigation activities will be monitored and number of young fledged will be documented and reported to the Service.

Hawaiian Goose Mitigation

Mitigation for the Hawaiian goose was designed to offset the project's anticipated take of 17 mortalities and non-lethal injuries (includes direct loss and loss of dependent eggs and goslings) over the 30-year permit term (see Table 1). To compensate for this level of unavoidable take, KL will continue onsite habitat management, including predator control, which historically has been an effective means to protect and promote breeding Hawaiian geese. This will continue until the Hawaiian goose population has been translocated to other sites pursuant to the Governor's Proclamation. After the completion of the Governor's Proclamation in 2016, when the population of Hawaiian geese at KL is expected to be absent or greatly reduced, predator control efforts will be re-focused to protect covered Hawaiian waterbirds.

Additionally, KL shall provide funds to DLNR to be used to control predators and/or manage Hawaiian geese at the translocation site(s). Specifically, KL will make a one-time, up front contribution of $85,000 to the DLNR Endangered Species Trust Fund, for use by DOFAW (with approval by the Service) to conduct predator control and/or management operations at one or more of the off-island Hawaiian goose translocation sites. KL will make this payment within 30 days of issuance of the Permit. Management and predator control at translocation sites will help ensure long-term protection and breeding success of Hawaiian geese throughout their range and aid in the recovery of the species.

Hawaiian Waterbird Mitigation

The Permit authorizes the take of four Hawaiian waterbirds: Hawaiian moorhen (40 mortalities and 30 non-lethal injuries), Hawaiian coot (110 mortalities and 180 non-lethal injuries); Hawaiian duck (36 mortality or non-lethal injuries), and Hawaiian stilt (38 mortalities or non-lethal injury) (includes direct take and loss of dependent eggs and chicks) over the 30-year permit term. The presence and maintenance of the approximately 35-acres of lagoons and the surrounding habitats at KL provide substantial habitat to all of the covered waterbirds, particularly Hawaiian coots. In years of average or better rainfall, coots observed at KL use the perennial lagoons at the Resort beginning in the spring or summer. In drier winters the population of coots at the Resort increases dramatically. Management and maintenance of the lagoons at KL has provided important foraging, loafing, and breeding sites for all Hawaiian waterbirds. On-going predator control at KL for breeding Hawaiian geese has also provided protection for Hawaiian waterbirds. To offset the anticipated level of unavoidable take, KL will conduct predator control for waterbirds, to ensure they continue to receive the same level of predator control benefit which they were receiving indirectly as a result of the Hawaiian goose-focused predator control efforts of the last several years (which will be phased-out as the Hawaiian goose population at KL is translocated to other sites off-island). A summary of the mitigation actions will be included in the HCP's annual reports.

Hawaiian Seabird Mitigation

Mitigation for Hawaiian seabirds was designed to offset the project's anticipated take of 27 Newell's shearwaters, one Hawaiian petrel and one band-rumped storm-petrel over the 30-year permit term. As the majority of seabirds that are impacted by artificial lighting are fledglings, it is assumed that there will be no indirect take (loss of dependent eggs or chicks). Currently, there has been observed take of one seabird at KL. However, the future construction and occupation of new buildings at KL will increase the potential for take caused by light-attraction.

The next phase of construction at KL will be Marriott Vacation Club timeshare units, comprising a total of 292 units. Phase 1 of these timeshare units consists of three buildings and is currently anticipated to begin in 2013, and completion and occupancy (and thus internal and external illumination) is projected to occur prior to the fall 2015 seabird fallout season. Thus, based on current Resort development projections, the increase in potential for light-attraction take at KL will increase beginning in September 2015. Phases 2 and 3 of the Marriott Vacation Club (each are two-building complexes located on either side of Phase 1) are projected for completion and occupancy prior to the fall 2017 and fall 2018 seabird seasons, respectively. It is assumed that the potential for light-attraction seabird take will increase incrementally with the completion and occupancy of each of the three phases of the Marriott Vacation Club project, and reach its maximum level upon the completion of Phase 3.

To mitigate for unavoidable take of Hawaiian seabirds, KL will make a financial contribution to the mitigation program being created by the KSHCP currently being developed by DOFAW and the Service. The exact amount of that financial contribution is currently unknown because the KSHCP has not been finalized, but KL commits to pay the final per-bird per-year amount

established by the KSHCP and approved by DOFAW and the Service. The KSHCP intends to pool mitigation payments from numerous applicants, and utilize that money to perform habitat management and predator control work in several seabird breeding colonies on Kauai. The KSHCP is expected to be finalized and approved by late 2012, in advance of KL's need to mitigate for potential take which will not arise until the fall of 2015.

KL will make its mitigation payments to whatever entity is established by the KSHCP. KL will phase-in its mitigation payments in accordance with the phasing of construction, as each phase will increase the potential for seabird take, with the completion of all three phases being projected to result in the average annual take of one Newell's shearwater. The payment phasing will occur as follows:

- When Phase 1 of the Marriott Vacation Club is completed (projected to occur in 2015), KL will make a payment immediately prior to occupation to the entity established by the KSHCP in the amount of 50 percent of the KSHCP-established per-bird mitigation price. KL will continue making annual payments in that amount until Phase 2 is completed.

- When Phase 2 of the Marriott Vacation Club is completed (projected to occur in 2017), KL will make a payment immediately prior to that Phase being occupied in the amount of 75 percent of the KSHCP-established per-bird mitigation price. KL will continue making annual payments in that amount until Phase 3 is completed.

- When Phase 3 of the Marriott Vacation Club is completed (projected to occur in 2018), KL will make a payment immediately prior to that Phase being occupied in the amount of 100 percent of the KSHCP-established per-bird mitigation price. KL will continue making annual payments in that amount for the duration of the term of the HCP and Permit.

For financial assurances in the HCP, it is assumed based on prior and preliminary KSHCP estimates that the per-bird KSHCP mitigation fee will be $10,000. KL's financial assurances will be updated once the KSHCP program is finalized and approved, and a final per-bird mitigation fee is established. If the KSHCP program is not available, KL would instead contribute $10,000 (or whatever amount is determined by KL and approved by DOFAW and the Service at that time as providing adequate mitigation) per fledgling seabird take per year to a dedicated escrow account, and KL would then apply such funds to a seabird mitigation project determined in consultation with, and subject to, the approval of the Service and DOFAW. KL shall provide the funds necessary to complete the required mitigation and ensure the proposed mitigation plan is carried out. Mitigation will be implemented regardless of whether take is observed.

2.0 STATUS AND BASELINE OF THE SPECIES

Status of the Species

Hawaiian goose

Taxonomy and Species Description
The Hawaiian goose is a medium-sized goose, with an overall length of approximately 63 to 69 centimeters (25-27 inches). The plumage of both sexes is similar (Service 2004, p.4). This species is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands with limited freshwater habitat (Service 2004, p.iii). Compared to the related Canada goose (*Branta canadensis*), Hawaiian goose wings are reduced by about 16% in size and their flight is weak (Service 2004, p.21). Although Hawaiian geese are capable of inter-island and high altitude flight flight, they do not migrate from the archipelago (Banko *et al* 1999, p.9).

Historic and Current Distribution
It is speculated that Hawaiian geese were once widely distributed among the main Hawaiian Islands, however, subfossil evidence has not been found on Oahu or Niihau (Service 2004, p.6). The fossil record indicates the prehistoric (prior to 1778) range of the Hawaiian goose was much greater than was observed after colonization by Europeans (Banko *et al* 1999). However, it is difficult to estimate Hawaiian goose population numbers, either pre-Polynesian or pre-European contact because there is a limited understanding of species composition, or even the gross structure, of the vegetation prior to the arrival of the Polynesians (Service 2004, p.7). By 1952, approximately 30 Hawaiian geese remained. The release of captive-bred Hawaiian geese, which began in 1960, helped save the species from imminent extinction (Service 2004, p.2-3). As a result of such programs, wild populations of Hawaiian geese now occur on four of the main Hawaiian islands. As of 2009, the statewide population of wild Hawaiian geese was estimated to have reached 1,888-1,938 individuals; the wild populations on the islands of Hawaii, Maui, Molokai and Kauai were estimated to have 457, 416, 165, and 850-900 individuals, respectively (Marshall, pers. comm. 2010; USFWS & NRCS 2010).

Hawaiian geese use shrublands and grasslands and human-altered habitats ranging from coastal to alpine environments (Banko 1988, Banko *et al* 1999). On Hawaii and Maui, Hawaiian geese nest, raise their young, forage, and molt in grassy shrublands and sparsely vegetated lava flows. Some populations on these islands move seasonally from montane foraging grounds to lowland nesting areas. On Kauai, where mongooses are absent, Hawaiian geese are primarily found utilizing lowland habitats (Service 2004, p.19).

In April, 2011, Hawaii Governor Neil Abercrombie issued an emergency proclamation (referred to as the "Governor's Proclamation"), that suspended State endangered species and environmental compliance laws for Hawaiian geese at KL. The purpose was to allow DOFAW to act quickly in translocating the Hawaiian goose population at KL to sites on other islands to reduce the potential for aircraft collisions at the adjacent Lihue Airport. The translocation effort is being conducted under a Code of Federal Register that allows State employees to take listed species if that species constitutes a "demonstrable but non-immediate threat to human safety." The Governor's

Proclamation is effective for five years (beginning in April 2011 and ending in April 2016), during which time DOFAW plans to translocate all Hawaiian geese at KL, which is estimated to be more than 400 individuals and approximately 40% of Hawaiian geese on Kauai. This translocation effort will dramatically change the density and distribution of Hawaiian geese on all of the Hawaiian Islands. Although details of how many geese will be sent to each site are still unknown, it is anticipated that more than half will be translocated to Hawaii Island, approximately 50 to Maui, and the remaining population to Molokai. Further details of the translocation effort can be found in the Nene Translocation Plan developed by DOFAW (DOFAW 2012).

Life History

Hawaiian geese have an extended breeding season with eggs reported from all months except May, June, and July, although the majority of birds in the wild nest between October and March (Banko *et al* 1999, p.4). Nesting peaks in December and most goslings hatch from December to January (Banko *et al* 1999). The Hawaiian goose nests on the ground, in a shallow scrape in the dense shade of a shrub or other vegetation. A clutch typically contains 3 to 5 eggs, and incubation lasts for 29 to 31 days. Once hatched, the young remain in the nest for 1 to 2 days (Banko *et al* 1999, pp. 16-17). Fledging of captive birds occurs at 10 to 12 weeks, but may be later in the wild. During molt, adults are flightless for a period of 4 to 6 weeks, generally attaining their flight feathers at about the same time as their offspring. When flightless, goslings and adults are extremely vulnerable to predators such as cats, dogs, and mongoose. From June to September, family groups join others in post-breeding flocks, often far from nesting areas. The Hawaiian goose reaches sexual maturity at 1 year of age, but usually does not form pair bonds until the second year. Females tend to nest near their natal nesting area, while males more often disperse (Banko *et al* 1999).

Habitat Description

As mentioned earlier, the current distribution of wild Hawaiian geese has been highly influenced by the location of release sites for captive-bred birds. Hawaiian geese are known to occupy various habitat and vegetation community types ranging from coastal dune vegetation and non-native grasslands (such as golf courses, pastures, and rural areas) to sparsely vegetated low- and high-elevation lava flows, mid-elevation native and non-native shrubland, cinder deserts, native alpine grasslands and shrublands, and open and non-native alpine shrubland-woodland community interfaces (Banko *et al* 1999, pp.4-6). Hawaiian geese are browsing grazers; the composition of their diet depends largely on the vegetative composition of their surrounding habitats and they appear to be opportunistic in their choice of food plant as long as they meet nutritional demands (Banko *et al* 1999, pp.6-8; Woog and Black 2001, p.324). Hawaiian geese may exhibit seasonal movements to grasslands in periods of low berry production and wet conditions that produce grass with a high water content and resulting higher protein content. The sites used by Hawaiian geese for nesting range from coastal lowland to subalpine zones and demonstrate considerable variability in physiognomic features (Banko *et al* 1999, pp.4-5). However, the distribution of Hawaiian goose nesting sites is influenced by the location of release sites of captive-bred individuals (Banko *et al* 1999).

Threats, Recovery Strategy, and Ongoing Conservation Measures
Approximately 30 Hawaiian geese remained in the wild in 1952 (Service 2004, p.2). The Hawaiian goose was named Hawaii's State bird on May 7, 1957 (Service 2004, p.46) and captive-breeding efforts began in the 1960s (Service 2004, p.2). The Hawaiian goose was federally listed as endangered in 1967 (Service 2004, p.3). The Service has not designated critical habitat for the Hawaiian goose (Service 2004, p.3). The Hawaiian goose is also listed as endangered by the State of Hawaii (Service 2004, p.iii). Although the number of wild Hawaiian geese has substantially increased since 1952, the Hawaiian goose remains one of the most endangered geese in the world (Service 2004, p.3).

The current threats to Hawaiian goose recovery are: 1) predation by introduced mammals (especially mongooses, cats, rats, dogs, and feral pigs); 2) insufficient nutritional resources due to habitat degradation; 3) limited availability of suitable habitat due to habitat loss, fragmentation, and degradation; and 4) human-caused disturbance (including habituation to humans) and mortality (especially death due to vehicle collisions). Additional factors that may be affecting Hawaiian goose recovery but require further research include: 1) behavioral problems associated with small population sizes, captive-bred birds, and loss of genetic diversity; and (2) avian disease and parasites (Service 2004, p.27-28; Marshall, pers. comm. 2010).

The Service published a Draft Revised Recovery Plan for the species in 2004, and initiated a 5-year Review in 2009. The overall goal of the Service's "Draft Revised Recovery Plan for the Nene or Hawaiian Goose *(Branta sandvicensis)*" is to remove the Hawaiian goose from the Federal List of Endangered and Threatened Wildlife and Plants (delisting). The plan establishes a framework within which recovery actions are undertaken to ensure the long-term survival of the Hawaiian goose and to control or reduce the threats to the species to the extent that it is no longer in danger of extinction and warrants delisting. The interim goal is to accomplish increases in population sizes and geographic distribution of Hawaiian geese concomitant with control of threats sufficient to consider reclassification or downlisting of this endangered species to threatened status. To reach the recovery goal, there must be multiple self-sustaining Hawaiian goose populations on Hawaii, Maui Nui (Maui, Molokai, Lanai, & Kahoolawe), and Kauai, for at least 15 years. Additionally, the threats to the species must be reduced to allow for the long-term viability of these populations, and sufficient suitable habitat must be identified, protected, and managed in perpetuity on each of these islands such that the species no longer meets the definition of endangered or threatened under the ESA (Service 2004, p.49-50).

With the exception of Kauai, most wild populations of Hawaiian geese are not self-sustaining (Marshall, pers. comm. 2010). The Service defines "self-sustaining" as maintaining or increasing established population levels without additional releases of captive-bred Hawaiian geese, although habitat manipulation, such as predator control or pasture management, may need to be continued. Downlisting may be considered separately for a subset of the Hawaiian goose population if that population subset is shown to meet the definition of a distinct population segment and satisfy additional recovery criteria set forth by the Service (Service 2004, p.iv). Consideration for delisting can occur once all of the downlisting criteria have been met, and all population levels have shown a stable or increasing trend (from downlisting levels) for a minimum of 15 additional years (i.e. at least 30 years) (Service 2004, p.vi).

Captive releases have been an important part of the Hawaiian goose recovery strategy, however; the Service has determined that future releases of captive-bred Hawaiian geese must occur only at appropriate locations (i.e. sites chosen in relation to suitability of habitat in general, and uses of surrounding areas), and in conjunction with predator control, monitoring, and habitat maintenance (Marshall, pers. comm. 2010). In order for Hawaiian goose populations to survive, they must have relatively predator-free breeding areas and sufficient food resources; human-caused disturbance and mortality must be minimized and genetic and behavioral diversity maximized. At the same time, Hawaiian geese are highly adaptable, successfully utilizing a gradient of habitats, ranging from highly altered to completely natural, which bodes well for the recovery of the species (Service 2004, pp. iv-vi). Since 1962, the majority of Hawaiian goose releases has occurred on at Haleakala National Park on East Maui. Since 1994, Hawaiian geese have also been released at Hanaula in the West Maui mountains (Medeiros, pers. comm., 2007). Little is known about the exact distribution and movements of the birds released at Hanaula, although they have been recorded as far west as Lahaina and as far east as Haleakala National Park, indicating that at least some birds from this release site move extensively around the island (Medeiros, pers. comm. 2011).

Hawaiian Stilt

Taxonomy and Species Description

The Hawaiian stilt is a slender wading bird, black above (except for the forehead), white below, and with distinctive long, pink legs. Sexes are distinguished by the color of the back feathers (brownish female, black male) as well as by voice, which is lower in females. Downy chicks are well camouflaged, tan with black speckling. Immature birds have a brownish back and white patches on their cheeks (Hawaii Audubon Society 2005, p. 49). The total length of adult Hawaiian stilts is about 16 inches (40 centimeters) with the mass of males and females averaging 199 ± 13.8 g (n=42) and 206.2 ± 21.7 g (n=43), respectively (Robinson et al. 1999, p. 16).

Historic and Current Distribution

Hawaiian stilts were historically known from all of the major Hawaiian Islands, except Lanai and Kahoolawe (Service 2005, p. 25). Stilts are now found on all of the main Hawaiian Islands except Kahoolawe. No historical estimate of Hawaiian stilt population size is available, but by the early 1940s, the statewide population was estimated to be between 200 and 1,000 birds (Service 2005, p. 25). However, these population estimates did not account for the Hawaiian stilts present on Niihau and are therefore considered underestimates. The State of Hawaii DOFAW has conducted biannual waterbird surveys since the 1950s. Though Hawaiian stilt census data show high year-to-year variability in the number of stilts observed (Service 2005, p. 28), long-term census data indicate that statewide populations have been relatively stable or slightly increasing.

Currently, the population of Hawaiian stilts is considered to be stable to increasing (Service 2005, p. 28) and is estimated to be between 1,200 and 1,600 birds. DOFAW's biannual waterbird surveys detected between 500 and 2,000 individuals between 1986 and 2006 (Figure 2). Because Hawaiian stilts readily disperse between islands they are considered a homogenous meta-population (Service 2005, p. 28).

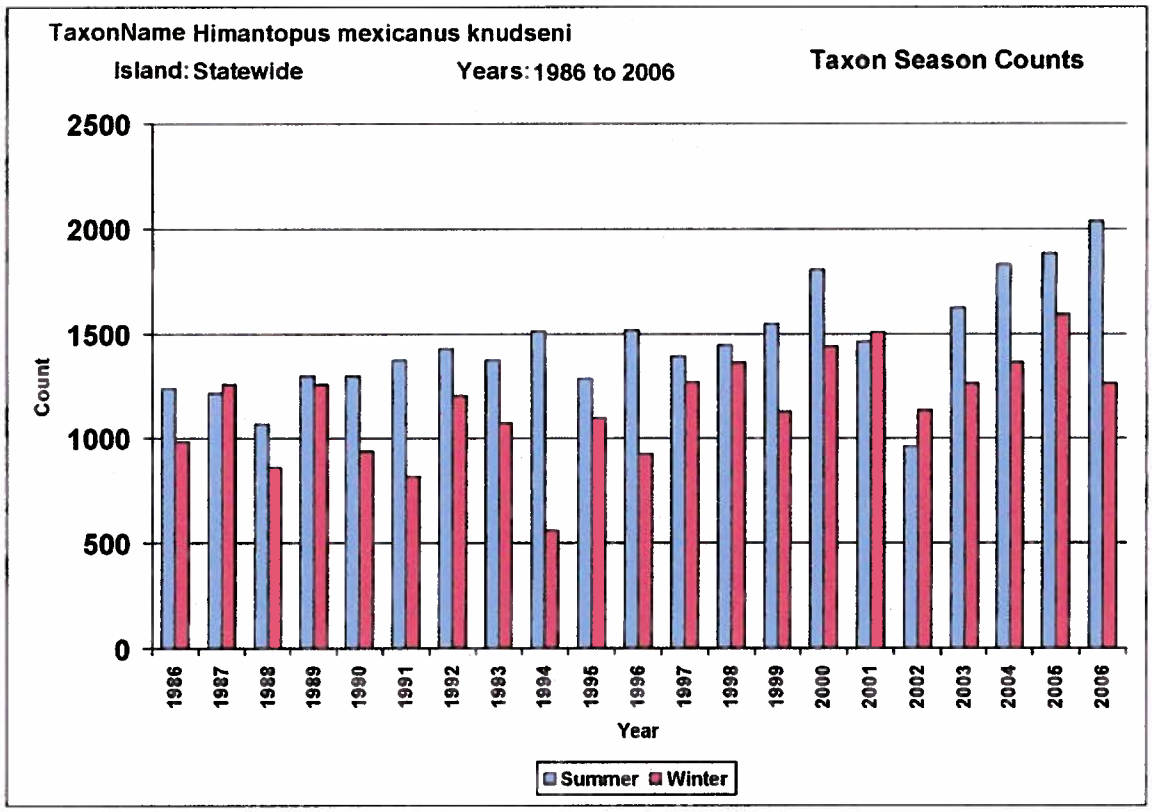

Figure 2. State Waterbird Surveys 1986 – 2006: Summer and Winter Counts of Hawaiian stilt. Data: Hawaii Waterbird Database-Hawaii Natural Heritage Program/University of Hawaii 2007

Life History

Hawaiian stilts prefer to nest on freshly exposed mudflats interspersed with low growing vegetation (Service 2005, p. 32). Nesting has also been documented on low relief islands (natural and man-made) in fresh or brackish ponds, man-made floating nest structures, floating wooden platforms, and cleared level areas near foraging habitats. The nest itself is a simple scrape on the ground. They have also been observed using grass stems and rocks for nesting material (Coleman 1981). Stilts defend an area of 66 to 99 feet (20 to 30 meters) around the nest and are semi-colonial.

The nesting season normally extends from mid-February through August (Robinson et al. 1999). Peak nesting varies among years and re-nesting can occur after loss of a clutch (Robinson et al. 1999). Stilts usually lay three to four eggs that are incubated for approximately 24 days (Coleman 1981; Chang 1990). Chicks are precocial, leaving the nest within 24 hours of hatching. Adults with three-day old chicks have been observed to move 0.3 miles (0.5 kilometers) from the nest site (Reed and Oring 1993). Young may remain with both parents for several months after hatching (Coleman 1981).

Habitat Description

Hawaiian stilts use a variety of aquatic habitats but are limited by water depth and vegetation cover. Hawaiian stilts are known to use ephemeral lakes, anchaline ponds, prawn farm ponds,

marshlands and tidal flats. Foraging habitat for Hawaiian stilts is early successional marshland or other aquatic habitat with a water depth less than 9 inches (22 centimeters) and perennial vegetation that is limited and low-growing. Native low-growing wetland plants associated with stilt nesting areas include water hyssop (*Bacopa monnieri*), sea purslane (*Sesuvium portulacastrum*), and the sedges makaloa (*Cyperus laevigatus*) and kaluha (*Bolboschoenus maritimus*) (Service 2005, p. 31). They may also use taro (*Colocasia esculenta*) ponds where the full-grown vegetation forms a protective canopy.

Stilts are opportunistic feeders. They eat a wide variety of invertebrates and other aquatic organisms available in shallow water and mudflats. Specific organisms taken include water boatmen (Corixidae), beetles (Coleoptera), possibly brine fly (*Ephydra riparia*) larvae, polychaete worms, small crabs, Mozambique tilapia (*Tilapia mossambica*), western mosquito fish (*Gambusia affinis*), and tadpoles (*Bufo* spp.) (Service 2005, p. 31).

Threats, Recovery Strategy, and Ongoing Conservation Measures
The Hawaiian stilt was listed as an endangered species on October 13, 1970 (Service 1970), pursuant to the Endangered Species Preservation Act of 1966. The original recovery plan was approved in 1978, and revised in 1985. The first draft of the second revision was released on May 1999, followed by the second draft of the second revision in May 2005. A species review has not yet been initiated pursuant to Section 4(c)(2) of the ESA which requires a 5-year review after listing. Critical habitat has not been designated for the Hawaiian stilt (Service 2005, p. 3).

General Threats for all Hawaiian Waterbirds
Threats are addressed as a combined assessment for all four species of Hawaiian waterbirds: the Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, and the Hawaiian duck. We are evaluating the threats on these four species of Hawaiian waterbirds jointly because they share common issues. The Hawaiian duck section also includes a unique threat of hybridization to that species.

The primary causes of the decline of the Hawaiian waterbirds are the loss of wetland habitat, predation by introduced animals, hunting in the late 1800s and early 1900s, disease, and environmental contaminants. A significant amount of Hawaii's wetlands have been lost due to human activities, including filling and draining for agriculture, houses, hotels, and golf courses. The Service estimates that 22,475 acres (9,095 hectares) of wetlands existed within the coastal plains of Hawaii in the 1780s. In 1990, the Service estimated that only 15,474 acres (6,262 hectares) remained, which is a decrease of 31 percent (Service 2005, p. 45).

The loss of suitable wetland habitat is compounded by the alteration of wetland plant communities due to invasion by non-native plants. Species such as California grass (*Brachiaria mutica*), pickleweed (*Batis maritima*), water hyacinth (*Eichornia crassipes*), Indian fleabane (*Pluchea indica*) and red mangrove (*Rhizophora mangle*) present a serious threat by outcompeting more desirable species and eliminating open water habitats. Unmanaged vegetation significantly reduces open water, shallow water, bare ground, and exposed mudflat habitat. All of these habitats are under serious threat without management to control these aggressive plant species (Service 2005, p. 45).

Introduced predators are considered a primary factor limiting Hawaiian waterbird populations. Small Indian mongoose, feral cats, and feral dogs are all presently found within wetlands and pose a serious threat to Hawaiian waterbird reproductive success. All three of these predatory species are known to take eggs, young birds, and even adults (Service 2005, p. 46). Both cats and dogs are of particular concern because of the close proximity of many of Hawaii's wetlands to urban areas. Other species, such as the cattle egret (*Bubulcus ibis*), American bullfrog (*Rana catesbeiana*), and rats have been observed congregating around nesting waterbirds just prior to chicks hatching (Woodside 1997, pers. comm.). Oahu National Wildlife Refuge (NWR) staff have documented predation of waterbird chicks by the cattle egret and the black-crowned night heron (*Nycticorax nycticorax*). A bullfrog was documented preying upon a Hawaiian moorhen chick at Hanalei NWR (Viernes 1995, 55:37). More recently, the "Key Predators" study of 2003 to 2004 on James Campbell NWR provided the first multiple observations of Hawaiian stilt chick predation by bullfrogs, which accounted for 45 percent of chick losses over the study period (Eijzenga 2005, p. 3).

The most prevalent disease affecting Hawaiian waterbirds is avian botulism. Avian botulism is caused by a toxin produced by a widespread bacterium (*Clostridium botulinum*). Normally dormant, these spores release toxins only when certain conditions occur, including warm temperatures and stagnant waters. Birds usually acquire the disease by eating invertebrates containing the toxin. Typical signs in birds include weakness, lethargy, and inability to hold up the head or to fly (Work 2008, pers. comm.). Botulism can occur in any area with standing fresh or brackish water frequented by waterbirds. Avian botulism outbreaks are common in Hawaii and are a significant cause of waterbird mortality (Pratt and Brisbin 2002, p. 36). The first outbreak in Hawaii occurred on Oahu at Kaelepulu pond, which is also known as Enchanted Lake, in Kailua in 1952. Since then, avian botulism outbreaks have been documented at Hanalei NWR on Kauai, Aimakapa pond at Kaloko-Honokahau National Historical Park on Hawaii, Ohiapilo pond on Molokai, and at Kealia NWR on Maui (Pratt and Brisbin 2002, p. 36). An outbreak at Hanalei National Wildlife Refuge on Kauai had total number of sick or dead birds with suspected or confirmed avian botulism type C found from December 5, 2011 through April 4, 2012 is 304. Of those, 82 percent are endangered species (55 percent Hawaiian duck, 18 percent Hawaiian coot, 4 percent Hawaiian moorhen, 4 percent Hawaiian stilt, <1% Hawaiian goose) and 18 percent are native non-endangered, migratory, or feral or introduced birds.

The possibility of West Nile virus or avian influenza reaching the Hawaiian Islands from the U.S. mainland or Asia is a recent concern. The impact these two diseases may have on the Hawaiian waterbirds is not known at this time, but they could have deleterious impacts if they reach the Hawaiian Islands.

Environmental contaminants in wetlands are of concern to Hawaiian waterbirds because the general diet of these birds makes them susceptible to toxins accumulated in the food chain (Ratner 2000, p. 1-2). In 1988, a fuel spill in Pearl Harbor caused direct mortality and nest abandonment of Hawaiian waterbirds at the Honouliuli unit of Pearl Harbor NWR (J. Leinecke 1993, pers. comm.). In 1996, an oil spill in Pearl Harbor imperiled the Hawaiian stilt as well as marine fisheries. Urban encroachment has the potential to negatively affect waterbirds' habitats via flushing of household and industrial products into water-collecting systems (storm drains and

roadside ditches) which lead to streams, wetlands, and the ocean. Currently, little is done to survey for toxicants at wetlands.

Preventing wetland loss, managing existing wetland habitat, and predator control at primary nesting sites are necessary actions to increase Hawaiian waterbird populations. As described in the Second Draft of the Revised Recovery Plan for Hawaiian Waterbirds, recovery of the Hawaiian waterbirds focuses on the following objectives: (1) increasing population numbers to a statewide baseline level; (2) establishing multiple, viable breeding populations throughout each species' historical range; and (3) establishing a network of wetlands on the main islands that are protected and managed for waterbirds (Service 2005, p. 71-72).

Protection of a wetland implies that the wetland is secure from development. Management of a site includes a written management plan; secure water sources; managed water levels; vegetation management; predator control; waterbird population monitoring; removal of mallard-Hawaiian duck hybrids; minimized human disturbance; and monitoring and control of avian diseases and environmental contaminants (Service 2005, p. 71).

The recovery strategy for the Hawaiian waterbirds relies on a combination of protection and management of core and supporting wetlands to maintain self-sustaining breeding populations. Core wetlands are defined as areas that provide habitat essential for the larger populations of Hawaiian waterbirds that comprise the bulk of the numbers prescribed for recovery. It is crucial for wetlands in these sites to be secure from conversion to non-wetland condition and to have sufficient enduring management to recover Hawaii's waterbirds. Supporting wetlands are additional areas that may not support the bulk of waterbird populations but provide habitat important for smaller waterbird populations or that provide habitat needed seasonally by segments of the waterbird populations during part of their life cycle (Service 2005, p. 66).

A variety of conservation measures have been implemented to protect Hawaii's endangered waterbirds. Efforts directly benefitting the Hawaiian waterbirds include a long-term hunting ban, protection of habitat through establishment and management of Federal and State refuges and sanctuaries, and predator control. Actions that inform conservation of the species include a biannual waterbird survey conducted by DOFAW since the mid-1950s, population monitoring, and research (Service 2005, p. 58-64).

Hawaiian Coot

Taxonomy and Species Description
The Hawaiian coot was considered a subspecies of the American coot (*Fulica americana*), but is now considered a distinct species (Service 2005, p. 11). Adults have a black head, a slate gray body with white undertail feathers, and a prominent white frontal shield and bill; feet are lobed rather than webbed and are greenish-gray. No reliable measurements of total length or size are available; however, the Hawaiian coot is slightly smaller in body size than the American coot which averages 13 to 17 inches (32 to 43 centimeters) in total length and 15 to 30 ounces (427 to 848 grams) in mass (Pratt and Brisbin 2002, p. 34).

Historic and Current Distribution

Hawaiian coots historically occurred on all of the main Hawaiian Islands except Lanai and Kahoolawe. Coots have typically been most numerous on Oahu, Maui, and Kauai (Service 2005, p. 12). Population estimates prior to the 1950s are not available; however, estimates from the late 1950s and early 1960s indicated a population of fewer than 1,000 birds. Hawaiian coots currently inhabit all of the main Hawaiian Islands except Kahoolawe. An estimate of the island-wide population, based on biannual waterbird counts conducted by DOFAW, suggests that the population is stable and is estimated at between 1,000 and 1,500 individuals (Figure 3). Hawaiian coots occur in coastal plain wetlands usually below 1,320 feet (400 meters) elevation on all the main Hawaiian Islands except for Kahoolawe; however, breeding is restricted to relatively few sites. About 80 percent of the population occurs on Kauai (Hanalei, Huleia, Opaekaa), Oahu (coastal wetlands and reservoirs such as Lake Wilson and Nuuanu Reservoir, Kahuku Point and along the windward shore), and Maui (Kanaha and Kealia Ponds, Nuu Pond) (Service 2005, p. 12). The remaining 20 percent of the population occurs in coastal ponds and playa wetlands.

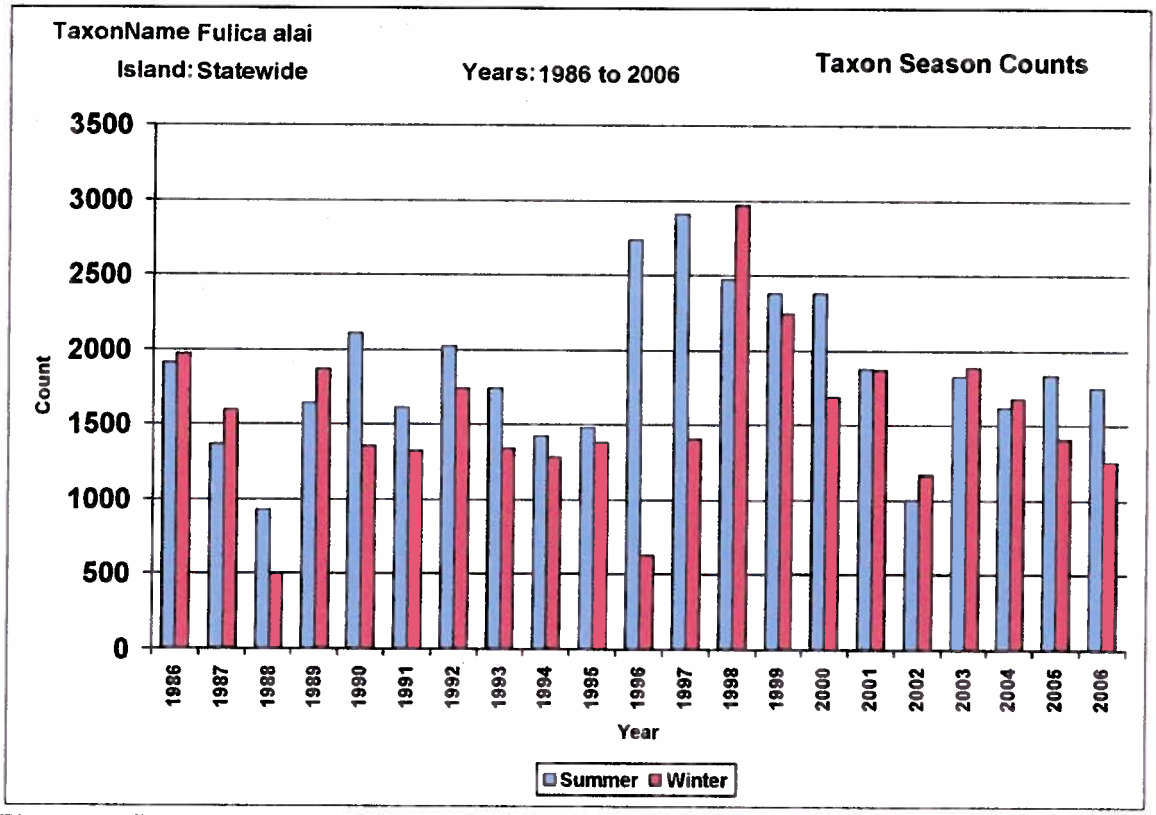

Figure 3. State Waterbird Surveys 1986 – 2006: Summer and Winter Counts of the Hawaiian coot. Data: Hawaii Waterbird Database-Hawaii Natural Heritage Program/University of Hawaii 2007

Life History

Life history and breeding biology are poorly documented. Nesting habitat includes freshwater and brackish ponds, irrigation ditches, and taro fields. Floating nests are constructed of aquatic vegetation and found in open water or anchored to emergent vegetation. Open water nests are

usually composed of mats of bulrush (*Schoenoplectus* spp.), water hyssop (*Bacopa monniere*) and Hilo grass (*Paspalum conjugatum*). Nests in emergent vegetation are typically platforms constructed from buoyant stems of species such as bulrush (*Schoenoplectus* spp.). Nesting occurs primarily from March through September, although some nesting occurs in all months of the year. The timing of nesting appears to correspond with seasonal weather conditions (Service 2005, p. 16). Nest initiation is tied to rainfall as appropriate water levels are critical to nest success. Clutch size range from three to ten eggs, and precocial young hatch after a 25-day incubation period.

Habitat Description

The species is somewhat gregarious and uses freshwater and brackish wetlands, including agricultural areas (*e.g.*, taro fields) and aquaculture ponds. Hawaiian coots generally occur in lowland (below 1,320 feet (400 meters) elevation) wetland habitats with suitable emergent plant growth interspersed with open water, especially freshwater wetlands, but also freshwater reservoirs, cane field reservoirs, sewage treatment ponds, taro loi, brackish wetlands, and limited use of saltwater habitats. However, on Kauai, some birds occur in plunge pools above 4,900 feet (1,494 meters) elevation and on the island of Hawaii, stock ponds up to 6,600 feet (2,000 meters) elevation. The species typically forages in water less than 12 inches (30 centimeters) deep, but will dive in water up to 48 inches (122 centimeters) deep. Compared to Hawaiian moorhen, Hawaiian coots prefer to forage in more open water. Logs, rafts of vegetation, narrow dikes, mud bars, and artificial island are utilized for resting. Ephemeral wetlands support large numbers during non-breeding season.

Hawaiian coots are generalists and feed on land, grazing on grass adjacent to wetlands, or in the water. They have been observed grazing from the surface of the water, or foraging by diving to obtain food resources. Food items include seeds and leaves, snails, crustaceans, insects, tadpoles, and small fish. The species will travel long distances, including between islands, when local food sources are depleted.

Some important habitats are located in National Wildlife Refuges and State sanctuaries and these sites receive management attention. However, other important habitats are not protected. These mostly include wetlands facing development or those used for agriculture or aquaculture. Examples include: playa lakes on Niihau; Opaekaa marsh and Lumahai wetlands on Kauai; Amorient prawn farms, Laie wetlands, Uko, Punahoolapa, and Waihee marshes, Waialua lotus fields, and Waipio Peninsula ponds on Oahu; Paialoa and Ooia playa fishponds on Molokai; and Opaeula, and Waiakea-LokoWaka ponds on the island of Hawaii (Service 2005, pp. 15-16).

Threats, Recovery Strategy, and Ongoing Conservation Measures

The Hawaiian coot was listed as an endangered species on October 13, 1970 (Service 1970), pursuant to the Endangered Species Preservation Act of 1966. The original recovery plan was approved in 1978, and revised in 1985. The first draft of the second revision was released on May 1999, followed by the second draft of the second revision in May 2005. A species review has not yet been initiated pursuant to Section 4(c)(2) of the ESA which requires 5-year review after listing. Critical habitat has not been designated for the Hawaiian coot (Service 2005, p. 3).

The threats to, and conservation needs of, Hawaiian waterbirds outlined above in the "Status of the Species" section for the Hawaiian stilt apply to the Hawaiian coot.

A variety of conservation measures have been implemented to protect Hawaii's endangered waterbirds. Efforts directly benefitting the Hawaiian coot include a long-term hunting ban, protection of habitat through establishment and management of Federal and State refuges and sanctuaries, and predator control. Actions that inform conservation of the species include a biannual waterbird survey conducted by DOFAW since the mid-1950s, population monitoring, and research.

Hawaiian Moorhen

Taxonomy and Species Description
The Hawaiian moorhen is an endemic subspecies of the common moorhen (*Gallinula chloropus*). It is a dark gray bird with a black head and neck, and white feathers on their flanks and on their undertail coverts. They have a distinctive red frontal shield, and their bill tip is yellow with a red base. Their legs and feet are greenish and without lobes. The Hawaiian moorhen usually measures about 13 inches (32 to 35 centimeters) in length and 11 to 16 ounces (310 to 456 grams) in mass, with males typically larger and heavier than the female (Bannor and Kiviat 2002, online p. 2). Both sexes are similar and have chicken-like cackles and croaks. The Hawaiian moorhen is similar to the common moorhen on the mainland in appearance. In Hawaiian legend, these birds were thought to have brought fire from the gods to the Hawaiian people.

Historical and Current Distribution
No historical population estimates are available for the endemic Hawaiian moorhen. Because they are such secretive birds, it is difficult to conduct population surveys for this species. It is believed that they were common on the main Hawaiian Islands, except Lanai and Kahoolawe, in the 1800s but radically declined by the mid-1900s. Surveys from the 1950s through the 1960s estimated only 57 individuals. Currently, Hawaiian moorhen inhabit the islands of Kauai and Oahu (Service 2005, p. 19). The State attempted a reintroduction of six moorhen (three females and three males) on May 18, 1983, to the island of Molokai at Kakahaia NWR. One of the banded birds was found dead January 2, 1985 and a local resident mistook the other five for chickens and they were consumed (Dibben-Young 2010, p. 58).

Hawaiian moorhens generally occur in wetland habitats below 410 feet (125 meters) elevation on the islands of Kauai and Oahu, although there have been reports from Keanae Peninsula on Maui and from the island of Hawaii. On Kauai, the largest populations occur in the Hanalei and Wailua river valleys. Hawaiian moorhens also occur in the irrigation canals on the Mana Plain of western Kauai and in taro fields. On Oahu, the species is widely distributed with most birds found between Haleiwa and Waimanalo; small numbers occur at Pearl Harbor and the leeward coast at Lualualei Valley. Historically, Hawaiian moorhens occurred on all the main Hawaiian Islands except for Lanai and Kahoolawe (Service 2005, p. 19).

Island-wide population estimates, based on biannual waterbird counts conducted by DOFAW, suggests that the population is increasing, but count numbers are variable. DOFAW's biannual

waterbird surveys detected between 80 and 450 individuals between 1986 and 2006 (Figure 4). However, these survey numbers are thought to be underestimates because of the moorhen's cryptic behavior. Standard survey methods in these counts include visual and aural detection. Recent research conducted by DesRochers (2008) in 2005 through 2007 has shown that passive surveys of cryptic waterbirds underestimate numbers of individuals present in the wetlands. Alternatively, broadcasting vocalizations of cryptic waterbirds to elicit responses increases detection. On average his research has shown that broadcasting calls increased moorhen detection by 30 percent.

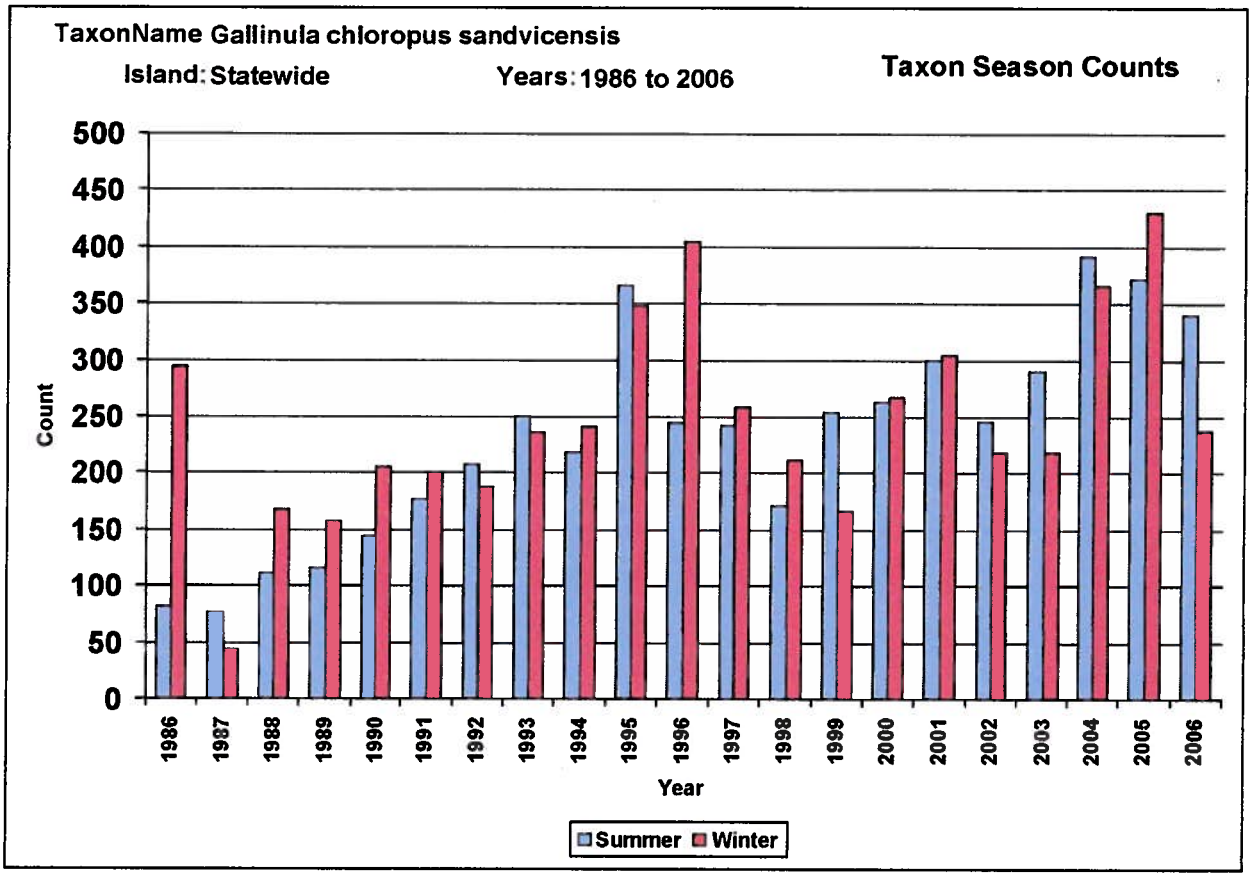

Figure 4. State Waterbird Surveys 1986 – 2006: Summer and Winter Counts of the Hawaiian moorhen. Data: Hawaii Waterbird Database-Hawaii Natural Heritage Program/University of Hawaii 2007

Life History

Hawaiian moorhens nest year-round but appear to have two active seasons from November through February and May through August (Service 2005, p. 23). It is believed that the timing of nesting is related to water levels and late succession wetland vegetation. The Hawaiian moorhen usually lays an average of five to six eggs, although clutches have been up to 13 eggs, and incubation is about 25 days (Service 2005, p. 23). Nesting phenology is apparently tied to water levels and the presence of appropriately dense vegetation. Platform nests are constructed in dense vegetation over water or near the waters' edge. The particular species of emergent plant used for nest construction is not as important as stem density and vegetation height (Service 2005, p. 23).

Moorhens are a precocial species; chicks are covered with down and are able to walk, but are dependent on parents for several weeks. Re-nesting and multiple broods during one season have been observed.

Habitat Description
Hawaiian moorhens are the most secretive of the native waterbirds, preferring to forage, nest and rest in dense late succession wetland vegetation. Most birds feeding along the waters edge or in open water will quickly seek cover when disturbed. The preferred habitat for moorhens includes interspersed dense stands of robust late succession vegetation near open water (approximately 50 percent water to 50 percent vegetation), floating or barely emergent mats of vegetation, and water depth less than 3 feet (1 meter) (Service 2005, pp. 22-23). Hawaiian moorhens are opportunistic feeders and their diet likely varies with habitat, but includes algae, grass seeds, insects, snails, introduced fishes, crustaceans, mollusks, emergent grasses, and wetland plants (Service 2005, p. 23).

Threats, Recovery Strategy, and Ongoing Conservation Measures
The Hawaiian moorhen was listed as an endangered species in 1967 (Service 1970), pursuant to the Endangered Species Preservation Act of 1966. The original recovery plan was approved in 1978, and revised in 1985. The first draft of the second revision was released on May 1999, followed by the second draft of the second revision in May 2005. A species review has not yet been initiated pursuant to Section 4(c)(2) of the Act which requires 5-year review after listing. Critical habitat has not been designated for the Hawaiian moorhen (Service 2005, p. 3).

The threats to, and conservation needs of, Hawaiian waterbirds outlined above in the "Status of the Species" section for the Hawaiian stilt apply to the Hawaiian moorhen. In addition to the overall Conservation Needs outlined in the Hawaiian stilt section, recovery of the Hawaiian moorhen also includes reestablishing populations on at least two additional islands (Maui, Molokai, Lanai, or Hawaii) (Service 2005, p. 74).

A variety of conservation measures have been implemented to protect Hawaii's endangered waterbirds. Efforts directly benefitting the Hawaiian moorhen include a long-term hunting ban, protection of habitat through establishment and management of Federal and State refuges and sanctuaries, and predator control. Actions that inform conservation of the species include a biannual waterbird survey conducted by DOFAW since the mid-1950s, population monitoring, and research (Service 2005, pp. 58-64).

Hawaiian Duck

Taxonomy and Species Description
The Hawaiian duck is one of two extant native duck species (Family: Anatidae) found in Hawaii and is closely related to the well-known, but non-native mallard. Both sexes are mottled brown and similar in appearance to a female mallard. Adult males have darker heads, with distinctive brown chevrons on the breast, flank and back feathers, and olive-colored bills (Engilis et al. 2002, online p. 2). Adult females are similar but are smaller than males on average and slightly lighter in color, with plainer, buff colored chin and back feathers.

Historical and Current Distribution
Historically, Hawaiian ducks occurred on all the main Hawaiian Islands except for Lanai and Kahoolawe. There are no population estimates prior to 1940, but in the 1800s they were fairly common in natural and farmed wetland habitats (Service 2005, p. 4). In 1949, an estimated 500 Hawaiian ducks remained on Kauai, and about 30 on Oahu. They were considered an occasional visitor to the island of Hawaii, and were presumed to be extirpated on Maui and Molokai (Service 2005, p. 5). By 1960, they were presumed extirpated from Oahu. From the 1950s through the early 1990s Hawaiian ducks were reintroduced to Oahu, Maui and Hawaii through a captive propagation and release program.

Hawaiian ducks are currently found in wetland habitats from sea level to 9,900 feet (3020 meters) elevation on all the main Hawaiian Islands except for Kahoolawe; populations on all islands except for Kauai originated from reintroduced birds. On Kauai, populations are found primarily in Hanalei NWR and montane streams. On Oahu, populations are found in Kawainui, Hamakua, and Heeia marshes, James Campbell NWR, and in wetland habitats in or near Punahoolapa, Haleiwa, Pearl Harbor, and Lualualei Valley, although many of these are thought to be hybrids. On Maui, Hawaiian ducks are found in Kahului, Kanaha and Kealia ponds. On the island of Hawaii populations occur in the Kohala Mountains, in Pololu, Waimanu and Waipio valleys, and Mauna Kea (Service 2005, pp. 5-6, 9).

The Hawaiian duck population is estimated to be approximately 2,000 individuals, but this is a best guess, with 80 percent of individuals occurring on Kauai (Engilis et al. 2002, p. 11). State biannual waterbird survey data count numbers range from 300 to 500 individuals (Figure 5). Because of the remoteness and inaccessibility of some habitats, the State waterbird counts are likely an underestimate. In addition, the impact of hybridization with feral mallards is variable between islands, and because it is difficult to distinguish between Hawaiian ducks, female mallards, and hybrids, the data collected from DOFAW's biannual waterbird surveys should be interpreted with care.

Life History
Hawaiian duck nesting biology is poorly understood. Although some pairs nest in lowland habitats on Kauai, Hawaiian ducks have also been observed nesting in the upper Alakai swamp (Service 2005, p. 10). Nesting occurs year round, but most activity occurs between January and May (Engilis et al. 2002, online p. 11). Nests are usually on the ground near water, but few nests are found in areas frequented by humans or areas supporting populations of mammalian predators. Generally 8 to 10 eggs are laid, and the precocial chicks hatch after an unknown incubation period, but likely less than 30 days.

Habitat Description
Hawaiian ducks occur in a wide variety of natural and artificial wetland habitats including freshwater marshes, flooded grasslands, coastal ponds, streams, montane pools, forest swamplands, taro, lotus, shrimp, and fish ponds, irrigation ditches, reservoirs, and mouths of larger streams (Service 2005, p. 10). Some important habitats are located on National Wildlife Refuges or on State lands and receive management attention. However, other important habitats

are not protected. These mostly include wetlands facing development or those used for agriculture or aquaculture.

Hawaiian ducks forage in a wide variety of freshwater habitats, including artificial wetlands. Hawaiian ducks move between feeding and breeding habitats, and are known to move between Kauai and Niihau. The species typically forages in shallow water less than 5 inches (13 centimeters) deep. Like mallards, Hawaiian ducks are opportunistic and their diet includes snails, dragonfly larvae, earthworms, grass seeds, green algae, and seeds/leaf parts of wetland plants. Hawaiian ducks are usually found alone or in pairs and are wary, especially when nesting or molting, although during the winter they may gather in larger numbers to exploit abundant food resources (Service 2005, p. 10).

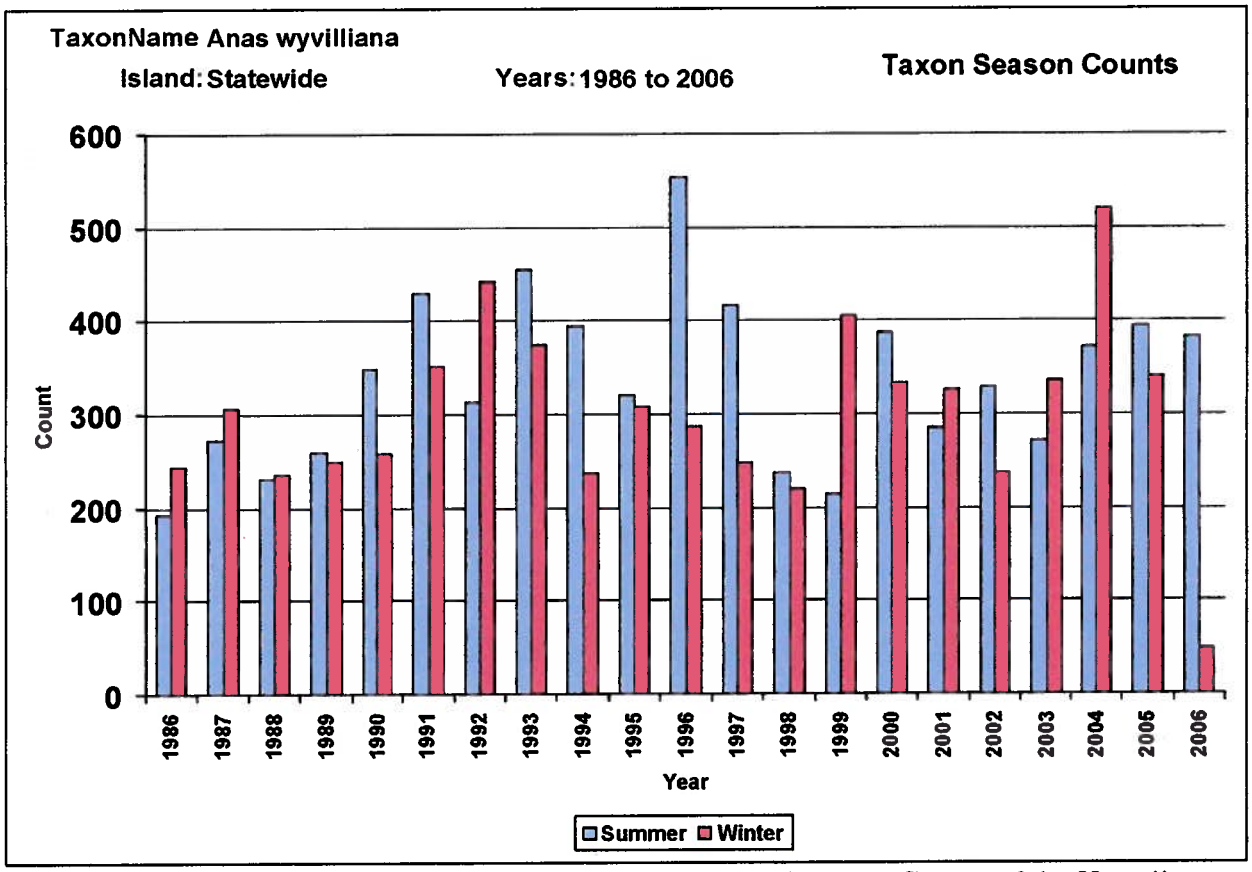

Figure 5. State Waterbird Surveys 1986 – 2006: Summer and Winter Counts of the Hawaiian duck. Data: Hawaii Waterbird Database-Hawaii Natural Heritage Program/University of Hawaii 2007

Threats, Recovery Strategy, and Ongoing Conservation Measures

The Hawaiian duck was listed as an endangered species in 1967 (Service 1970), pursuant to the Endangered Species Preservation Act of 1966. The original recovery plan was approved in 1978, and revised in 1985. The first draft of the second revision was released on May 1999, followed by the second draft of the second revision in May 2005. A species review has not yet been

initiated pursuant to Section 4(c)(2) of the ESA which requires 5-year review after listing (Service 2005, p. 3). Critical habitat has not been designated for the Hawaiian duck (Service 2005, p. 3).

The threats and conservation needs of Hawaiian waterbirds outlined above in the "Status of the Species" section for the Hawaiian stilt apply to the Hawaiian duck. However, the most important current threat to the Hawaiian duck is hybridization with non-native mallards (Service 2005, p. 11). This is especially problematic on Oahu where most of the individuals are hybrids. In addition, feral pigs (*Sus scrofa*) and goats (*Capra hircus*) significantly reduce the suitability of nesting habitat for Hawaiian ducks along montane streams. In addition to the overall conservation needs outlined in the Hawaiian stilt section, recovery of the Hawaiian duck includes removing the threat of hybridization to Hawaiian duck populations on Kauai, Niihau, Oahu, and Hawaii; and reestablishing Hawaiian duck populations on Maui and Molokai (Service 2005, p. 73).

A variety of conservation measures have been implemented to protect Hawaii's endangered waterbirds. Efforts directly benefitting the Hawaiian duck include a long-term hunting ban, protection of habitat through establishment and management of Federal and State refuges and sanctuaries, predator control, release of captive-bred Hawaiian ducks, and restrictions on importation of mallards. Additional conservation actions include developing public service announcements (PSA) to make the general public aware of the hybridization issue facing the Hawaiian duck. Public service announcements for Hawaiian duck conservation were developed by The Wildlife Society and released in 2008. Studies that center on field identification of Hawaiian duck-mallard hybrids have been completed. Along with those studies, a Hawaiian duck-mallard hybrid outreach plan has been completed, and the ultimate goal is removal of the hybrid threat. Actions that inform conservation of the species include a biannual waterbird survey conducted by DOFAW since the mid-1950s, population monitoring, and research (Service 2005, pp. 58-64).

Newell's Shearwater

Taxonomy and Species Description
Newell's shearwater is a member of the genus *Puffinus* and utilizes open tropical seas and offshore waters near its island breeding grounds on forested mountain slopes. Newell's shearwater is approximately 12 to 14 inches long, with a wingspan of 30 to 35 inches, and weighs approximately 14 ounces. Its plumage is glossy black above, and white below. It has a black bill that is sharply hooked at the tip. Its claws are well adapted for burrow excavation and climbing.

Historic and Current Distribution
Newell's shearwater was once abundant on all of the main Hawaiian Islands. In 1995 the population estimate, based on at-sea surveys was 84,000 birds (Spear et al. 1995, p. 624), with approximately 90 percent of the population nesting on the island of Kauai. Newell's shearwater also breeds on several other of the main Hawaiian islands where they nest in mountainous terrain between elevations of 500 and 2,300 feet. This species is known to nest on Hawaii, on Molokai, and may still nest on Oahu. The occurrence on Maui of injured, dead, or grounded adults in the

summer, low numbers of radar-detected birds exhibiting Newell's shearwater-like timing of movement, and the presence of juveniles in autumn suggest that this species also nests on Maui.

Recent ornithological radar surveys, combined with returns of downed birds to the SOS program, show an apparent decline of 75 percent in Newell's shearwater between 1993 and 2009 (Day et al. 2003, Holmes et al. 2009), resulting in a current population estimate of 21,000, with 18,900 on Kauai. Significant range reductions as well as an overall decline in distribution are documented, and at least three colonies documented as being active between 1980 and 1994 are now abandoned (Holmes et al. 2009). As with other long-lived species with low reproductive rates, population modeling has documented that the survival rate of breeding age adults has the biggest impact on the population (Griesemer and Holmes 2010).

Population models incorporating best estimates of Newell's shearwater breeding effort and success yielded a population decreasing at a rate of 3.2 percent annually (Ainley et al. 2001, p. 118). When variables describing the anthropogenic mortality suffered by Newell's shearwater (predation, light attraction and collision) were included, these models predicted a population decline of 30 to 60 percent over 10 years (Ainley et al. 2001, p. 122).

Life History

Most of the life history information for this species is based on studies of the Kauai population; life histories of birds on other Hawaiian islands may differ slightly. During their nine-month breeding season from April through November, Newell's shearwaters live colonially in burrows under ferns on forested mountain slopes. These burrows are used year after year and usually by the same pair of birds. A single egg is laid in late May or early June (Ainley et al. 1997b, pp. 13-15). Both sexes incubate and this period lasts approximately 45 days. Fledging occurs between October and November. The Newell's shearwater needs an open downhill flight path to become airborne.

Daily flights of breeding adults to and from the colonies occur only at night and just before dawn. On Kauai, Newell's shearwaters were found to exhibit almost no movement until after complete darkness, whereupon they moved inland in a wave that peaked for 30-40 minutes (Day and Cooper 1995, p. 1015). After that peak, the rate of movement decreased steadily until 90 min after complete darkness, after which few birds were seen. In the morning, Newell's shearwaters begin moving to sea in numbers approximately 40 minutes before the first measurable light and movement rates increase rapidly and peak just before dawn (Day and Cooper 1995, p. 1016).

Three age classes of Newell's shearwaters are recognized based on demographic factors and assumptions (from Ainley et al. 2001, p. 115): (1) young-of-year; (2) pre-breeding immature/adult (if recognizable); and (3) breeding adults. Only 46 percent of pairs that actively use a burrow actually breed in a given year on Kauai (Ainley et al. 2001, p. 117). First breeding occurs at approximately six years of age (Ainley et al. 1997b, p. 17).

A study of reproductive success at one Newell's shearwater colony on Kauai documented an average annual production of 0.66 young per pair (Ainley et al. 2001, p.117). No specific data exist on the longevity for this species, but other shearwaters may reach 30 years of age or more.

Habitat Description
On Kauai, Newell's shearwaters breed at elevations between 528 and 3,960 feet. Newell's shearwaters usually nest where the terrain is vegetated by an open canopy of trees with an understory of densely matted uluhe ferns (*Dicranopteris linearis*). Some Newell's shearwaters nest in other types of habitat such as on the walls of Waimea Canyon, Kauai, where a forest canopy is absent. Burrows used by Newell's shearwaters are most commonly placed at the base of trees, where the substrate may be easier for the birds to excavate.

Threats, Recovery Strategy, and Ongoing Conservation Measures
The Newell's shearwater was listed as an endangered species 1975 (Service 1983), pursuant to the Endangered Species Preservation Act of 1966. *The Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan* was published in 1983 (Service 1983). A species 5-year review was completed September 27, 2011 pursuant to Section 4(c)(2) of the ESA the review recommend uplisting to endangered due to precipitous decline in populations on Kauai over the last couple decades. Critical habitat has not been designated for the Newell's shearwater (Service 1983).

During the last 150 years, 75 percent of the forests on the main islands of the Hawaiian archipelago have been converted to agricultural, military, commercial or residential land uses, leading to a depletion of available nesting habitat for this species. The introductions of the mongoose (*Herpestes auropunctatus*), black rat (*Rattus rattus*), and Norway rat (*Rattus norvegicus*) have also played a primary role in the reduction of ground-nesting seabirds. Predation by feral cats (*Felis domesticus*) and barn owls (*Tyto alba*) has been observed. In addition, feral pigs (*Sus scrofa)* are known to collapse burrows as well as consume or prey upon shearwaters.

Another major threat is the species' attraction to light. Increasing urbanization and the accompanying artificial lights have resulted in substantial problems for fledgling Newell's shearwaters during their first flight to the ocean from their nesting grounds. When attracted to man-made lights, fledglings become confused and may suffer temporary night blindness. They often fly into utility wires, poles, trees, and buildings and fall to the ground. Since 1979 the Kauai District of DOFAW has supported the SOS program to collect "downed" Newell's shearwaters and Hawaiian petrels (*i.e.*, birds that have either collided with structures or fallen out, or have been injured or killed due to exhaustion caused by light attraction). According to SOS files, over 33,000 seabirds have been recovered to date (DOFAW 2008). The majority of the birds are Newell's shearwaters, which nest in greater numbers on Kauai than Hawaiian petrels. The lower number of Hawaiian petrels recovered is thought to be a function of their population size on Kauai, not due to differences in behavior or ability to detect structures in the dark.

The Draft Newell's Shearwater and Hawaiian Petrel Five-year Action Plan describes a recovery strategy that will 1) protect and enhance existing colonies, 2) create new colonies, 3) mitigate new and existing threats by a) implementing prioritized management actions, and b) undertaking research and outreach to support those actions. Actions identified to accomplish this strategy include conducting surveys for existing colonies, controlling threats at the highest priority colonies, and minimizing and monitoring terrestrial threats (light attraction, power line collisions).

The DLNR has been conducting auditory surveys for new areas containing nesting Newell's shearwater through their Kauai Endangered Species Recovery Program (KESRP) and is developing colony ranking criteria to identify where the goals of the action plan can be most successful. The minimum conditions necessary to effectively implement colony management that would be expected to achieve a measureable increase in seabird survival and/or reproduction include species presence, access to the areas occupied by breeding seabirds, and landowner authorization and commitment to maintain the managed area in way that is consistent with seabird conservation. To date, only two known nesting colonies occupied by Newell's shearwater (Hono o Na Pali Natural Area Reserve (NAR) and Upper Limahuli Valley) are currently suitable for immediate implementation of management actions focused on increasing seabird survival and reproduction. The State has developed a management plan for the Hono o Na Pali NAR that includes feral ungulate control, but little progress has been made due to the lack of funding. A 400-acre portion of the privately-owned Upper Limahuli Preserve has been fenced to create an ungulate free area known to contain nesting Newell's shearwaters.

While some efforts to protect existing nesting colonies of Newell's shearwater have been implemented on Kauai, they have been limited to constructing ungulate fencing around remaining areas of relatively intact habitat (Wainiha Valley, Upper Limahuli Valley, etc.). Habitat degradation due to feral ungulates is recognized as the primary threat to native ecosystems in Hawaii and the conservation and restoration of such areas is unsuccessful in the presence of ungulates (Hawaii Conservation Alliance 2005, p. 1). The only active control of cats and/or rats within an area occupied by nesting Newell's shearwaters on Kauai (on private property in Upper Limahuli Valley) began in 2009. Funding for the program is currently through the Kauai Island Utility Cooperative (KIUC, and its predecessor Kauai Electric) short-term HCP for up to the next five years. Long-term funding is anticipated to be obtained through an Island-wide HCP currently under development.

Efforts to reduce the level of light attraction and power line collisions began in the 1980's when KIUC began replacing unshielded street lights with full-cutoff (shielded) lights across the island as part of its normal maintenance program. All of the over 3,500 streetlights operated by KIUC are now shielded, as are the lights at the facilities it operates. In 2002 KIUC prepared an assessment of the power line segments originally identified by Ainley et al. (1995) as causing the most collisions (David and Day 2002). In 2007, KIUC began reconfiguring the lines along one of the "hotspot" areas along Kealia Beach by temporarily changing the uppermost electrical circuit from a vertical to a horizontal arrangement which eliminated three of four wire layers in the circuit and reduced the height by about 10 feet. KIUC has been coordinating with the Federal Highways Administration and Hawaii Department of Transportation to plan for the undergrounding of the lines along another hotspot segment near the Wailua River but the implementation has been delayed while issues related to the potential impacts of the project to cultural resources are being resolved (Standley pers. comm. 2011).

Hawaiian Petrel

Taxonomy and Species Description
The Hawaiian petrel is a medium-sized seabird in the family Procellariidae (shearwaters, petrels, and fulmars). The Hawaiian petrel is a large petrel; it is approximately 16 inches long (40 cm) and has a wing span of about 3 ft (90 cm). It has a dark gray head, wings, and tail, and a white forehead and belly. The Hawaiian petrel has a stout grayish-black bill that is hooked at the tip, and feet that are pink and black. The Hawaiian petrel was formerly treated as a subspecies of *P. phaeopygia*, and was commonly known as the dark-rumped petrel (Service 1983, pp.1-2). The Hawaiian petrel was reclassified as a full species in 1993 because of differences in morphology and vocalization. In 1997 the evolutionary split was confirmed by genetic analyses.

Historic and Current Distribution
The Hawaiian petrel was once abundant on all of the main Hawaiian Islands, except Niihau. Today, Hawaiian petrels breed in high-elevation colonies, primarily on east Maui and Mauna Loa on Hawaii Island, on Lanai, and to a lesser extent, on Kauai, and probably Molokai, Lehua, and sea stacks off Kahoolawe.

Based on pelagic observations, the total population including juveniles and subadults was estimated at 20,000 with a breeding population of 4,500 to 5,000 pairs in 1995 (Spear et al. 1995, p. 629). There have been no total population estimates made since then. Approximately 1,430 breeding pairs are known to occur in the mountains of east Maui. Approximately 1,000 Hawaiian petrel burrows have been found in Haleakala National Park, Maui (Bailey, pers. comm. 2011b) and an additional 600 breeding pairs are thought to occupy unsurveyed areas of the Haleakala Crater Rim (SWCA 2011). In addition, approximately 55 breeding pairs occupy the ATST mitigation site (ATST 2010) and the Auwahi project detected an additional 33 active burrows at Kahikinui (Tetra Tech 2012). Ainley (SWCA 2011, Appendix 25, p. 2) estimates there is a declining population of 600 breeding pairs of Hawaiian petrels nesting in the West Maui Mountains. The colony on Mauna Loa is estimated to be approximately 75 breeding pairs (Hu, pers. comm. 2008). Kauai populations are difficult to assess, and Cooper and Day (1995, p. iv) estimated there were between 1,400 and 7,000 individuals on that island in 1993. Ainley et al. (1997a, p. 28) estimated that there were 1,600 breeding pairs of Hawaiian petrel on Kauai. A breeding colony of the Hawaiian petrel was rediscovered on Lanai in 2006, near the summit of Lanaihale. Although the petrel colony was historically known to occur, its status was unknown and thought to have dramatically declined until surveys were conducted in 2006 (Penniman, pers. comm. 2007). The nesting habitat used by the Hawaiian petrel colony on Lanai is delineated by the approximate area of the uluhe ferns (*Dicranopteris linearis*). Monitoring and research on this population is ongoing, and its size has not been estimated with statistical confidence, but the population appears to be similar in abundance to the Haleakala population, where the largest number of breeding birds is currently known to exist (Penniman, pers. comm. 2011).

Life History
Seabirds nest on land and spend much of their time at sea where they are known to feed on squid, small fish, and crustaceans displaced to the surface by schools of tuna (Simons 1985). Hawaiian petrels have been tracked taking single trips exceeding 6,200 mi (10,000 km) circumnavigating

the north Pacific during the nestling stage. Hawaiian petrels have been recorded in the Gulf of Alaska. Annual survival rates for Hawaiian petrels range from 0.93 (in years with no predation to approximately 0.85 (estimated survival under moderate predation at Haleakala (Simons 1984 p. 1070).

Like other procellariiformes, Hawaiian petrels are highly philopatric, returning to the same burrow and mate each year (Simons 1985 pp. 233-234). Beginning in mid-February to early-March, after a winter absence from Hawaii, breeding and non-breeding birds visit their nests regularly at night. After a period of social activity and burrow maintenance they return to sea until late April, when they return to the colony site and egg-laying commences. From mid-March to mid-April, birds visit their burrows briefly at night on several occasions. Then breeding birds return to sea until late April or early May, when they return to lay and incubate their eggs (Simons 1985). Non-breeding birds visit the colony from February until late July (Simons and Hodges 1998, pp. 13-14). Information provided by Bailey and Duvall (December 9, 2010), confirmed by Fein's analysis of burrow camera data for the ATST site (Fein, pers. comm. 2009) indicating birds intermittently occupy their burrows during the day during this period as well. Many non-breeders are young birds seeking mates and prospecting for nest sites, but some proportion is thought to be mature adults that will not breed.

The mean date of egg-laying recorded on Haleakala in 1980 and 1981 was May 8 (Simons 1985 p. 234). The percentage of years in which adult females laid eggs was estimated to be 89 percent (Simons 1985 p. 234). Fecundity (fledglings produced per egg laid) appears to be primarily dependent on rate of predation. Moderate predation is likely to depress fecundity to 0.49 (Simons 1985 p. 237). Although Hawaiian petrel nests may fail when they abandon and crush eggs during incubation, higher fecundity (0.72 (Simons 1984 p. 1068)) occurs when predators are absent. Annual survival for juveniles at sea is 0.834 (Simons 1984 p. 1070).

Cooper and Day found that Hawaiian petrels flew inland to their nesting areas primarily between sunset and the point of complete darkness. In the morning hours, Hawaiian petrels first move to sea while it was completely dark, starting 60 minutes prior to sunrise, and movement rates increased rapidly until they peaked just after the point of complete darkness had been crossed and movement continued at a decreasing rate until sunrise (Day and Cooper 1995, pp. 32-34). Peak fledging, when young seabirds make their first flight to sea, occurs between September 1 and December 1 (Penniman, 2011 pers. comm).

Habitat Description

On Hawaii and Maui, Hawaiian petrels nest in the cold, xeric environment above 8,000 ft primarily in national parks. On Kauai, there is evidence that Hawaiian petrels nest at lower elevations in densely vegetated rainy environments (Ainley et al. 1997a, p. 24). Hawaiian petrels are colonial and nest in burrows, crevices in lava, or under ferns. Burrows detected on Haleakala occur almost exclusively on lava substrates; burrows are located within existing crevasses or excavated in softer material adjacent to rock to boulder-sized lava fragments. Their burrows are generally 3- to 6-ft (1- to 1.8-m) long (from entrance to nest chamber), although some may be as long as 30 ft (9.1 m) (Simons and Hodges 1998, p. 14).

Threats, Recovery Strategies, and Ongoing Conservation Measures
Hawaiian petrels were abundant and at one time, widely distributed; their bones have been found in archaeological sites throughout the archipelago (Olson and James 1982a, p. 32). This species has no natural terrestrial predators other than the Hawaiian short-eared owl, (*Asio flammeus sandwichensis*). Early Polynesian hunting; predation by introduced mammals such as Polynesian rats (*Rattus exulans*), dogs, and pigs; and habitat alteration caused initial decline of the Hawaiian petrel population and probably its extirpation from Oahu (Olson and James 1982b, p. 634). The introduction of cats, mongoose, and two additional species of rats (*R. rattus* and *R. norvegiceus*) since Euro-American contact along with accelerating habitat loss has led to small relict colonies of Hawaiian petrels in high-elevation, remote locations. The primary reason for the relatively large numbers of petrels and their successful breeding around Haleakala summit today is the fencing and intensive predator control maintained by Haleakala National Park since about 1982. If current elevated levels cat of predation continue, significant declines in even the Park's relatively protected Hawaiian petrel population are likely (Bailey pers. comm., 2011b). Elsewhere on Maui and in Hawaii, the Hawaiian petrel faces severe threats from non-native predators including rats, cats, mongoose, and introduced barn owls (*Tyto alba*). Ainley (SWCA 2011, Appendix 25, p. 2) modeled the declining population of 600 breeding pairs of Hawaiian petrels in the West Maui Mountains and predation impacts may render this relatively large population functionally extinct in 27 years (SWCA 2011, Appendix 24, p. 8). Other significant anthropogenic sources of Hawaiian petrel mortality are light attraction and collision with communications towers, power transmission lines and poles, fences, and other structures (Simons and Hodges 1998, pp. 21-22). Fallout of fledglings, making their first flight to the open ocean, is greatest during the week prior to and following the new moon between September 1 and December 1 (Penniman pers. comm. 2011). These problems are likely to be exacerbated by continuing development and urbanization throughout Hawaii. Predator control in key habitat areas, the establishment of bird salvage-aid stations, and light attraction studies have been initiated to help conserve the Hawaiian petrel.

The recovery goals for the Hawaiian petrel include: 1) protect and enhance existing colonies; 2) create new colonies; 3) mitigate new and existing threats by a) implementing prioritized management actions, and b) undertaking research and outreach to support those actions. Actions identified to accomplish these goals for Hawaiian petrel include conducting surveys for existing colonies, controlling threats at the highest priority colonies, and minimizing and monitoring terrestrial threats away from the colonies (light attraction, power line collisions).

The KSHCP is being prepared to address adverse human impacts to seabirds on that island. In addition, DOFAW has been conducting auditory surveys for new areas containing nesting Hawaiian petrels through the Kauai Endangered Species Recovery Program and will use colony ranking criteria to identify areas where recovery actions can be most successful. The State has developed a management plan for the Hono o Na Pali NAR that includes feral ungulate control, but little work has been implemented due to the lack of funding. A 400-ac portion of the privately-owned Upper Limahuli Preserve has been fenced to create an ungulate free area known to contain nesting Hawaiian petrels. Efforts to control feral cats within the Preserve has begun, but the landowner does not have funds to sustain the efforts (Standley, pers. comm. 2011).

Several of these Hawaiian petrel nesting colonies will be protected from predators pursuant to the KIUC HCP. Efforts to conserve nesting colonies of Newell's shearwater also benefit Hawaiian petrel, but they have been primarily limited to constructing ungulate fencing around remaining areas of relatively intact habitat (Wainiha Valley, Upper Limahuli Valley, etc.). The only active control of cats and/or rats within an area occupied by nesting Hawaiian petrels on Kauai (on private property in Upper Limahuli Valley) started in 2009, but the program has no secure funding source to continue the efforts beyond that which will be available through a the KIUC HCP.

Efforts to recover and release downed, but still living, seabirds through the SOS program also apply to Hawaiian petrels. Efforts underway to reduce the level of light attraction and power line collisions described for Newell's shearwater also reduce these threats to Hawaiian petrel.

Band-rumped storm-petrel

Taxonomy and Species Description

The band-rumped storm-petrel is a small seabird about 8 inches long. It is an overall blackish-brown bird with a white rump. Sexes are alike in size and appearance. The species is long-lived (15-20 years) and age of first breeding varies by locations and ranges between 5 and 7 years (Slotterback 2002, p. 16). Although the Hawaiian population was previously recognized as a distinct subspecies, taxonomists today generally combine the various Pacific populations into a single taxon. Austin (1952, pp. 395-396) examined 11 museum skins from the Hawaii population and studied the taxonomy of the band-rumped storm-petrel and concluded that, although the various populations exhibited minor size differences, these differences were not significant and the populations were best considered as belonging to a single species with no separable subspecies. The American Ornithologists' Union (AOU) currently regards the band-rumped storm-petrel as monotypic with no recognized subspecies (AOU 2010).

Historic and Current Distribution

The band-rumped storm-petrel probably was common on all of the main Hawaiian Islands when aboriginal Polynesians arrived about 1,500 years ago (Berger 1972, pp. 25-26; Harrison et al. 1990, p. 47). As evidenced by abundant storm-petrel bones found in middens on the island of Hawaii (Harrison et al. 1990, p. 47) and in excavation sites on Oahu and Molokai (Olson and James 1982b, p. 33), band-rumped storm-petrels once were very numerous and nested in sufficiently accessible sites, including coastal areas, to be used as a source of food and possibly feathers (Harrison et al. 1990, p. 48). They were also known from French Frigate Shoals (Henshaw 1902, p. 118).

The band-rumped storm-petrel is found in several areas of the subtropical Pacific and Atlantic oceans (Slotterback 2002, p. 1). In the Pacific, there are three widely separated breeding populations consisting of one in Japan, one in Hawaii, and one in the Galapagos (Slotterback 2002, p. 1).

In Hawaii, band-rumped storm-petrels are currently known to nest only in remote cliff locations on Kauai and Lehua Islet, and in high-elevation lava fields on Hawaii (Wood et al. 2002, Hu,

pers. comm. 2005, VanderWerf et al. 2007). Given the current scarcity of breeding colonies in Hawaii and their remote, inaccessible locations compared to prehistoric population levels, the band-rumped storm-petrel was significantly reduced in numbers and range following settlement of the Hawaiian Islands by aboriginal Polynesians. This likely was the beginning of a decline in the band-rumped storm-petrel population that has continued to the low numbers found today in the Hawaiian Islands. Wood et al. (2002) estimated that there were 171-221 nesting pairs of band-rumped storm petrel on Kauai in 2002.

Life History
Band-rumped storm-petrels nests are placed in crevices, holes, and protected ledges along cliff faces, where a single egg is laid (Slotterback 2002, pp. 12-14). Adults visit the nest site after dark, where they can be detected by their distinctive calls. In Hawaii, the nesting season occurs during the summer months, with adults establishing nesting sites in April or May. The incubation period averages 42 days (Slotterback 2002, p. 14) and the young reach fledging stage in 64 to 70 days (Slotterback 2002, p. 15).

Habitat Description
When not at nesting sites, adults spend their time foraging on the open ocean. In the Hawaiian Islands, this species nests in remote cliff locations on Kauai and Lehua Islet and in high-elevation lava fields on Hawaii. An active nest has yet to be discovered and only three inactive nests have been found in the Hawaiian Islands, one in a small lava tube at 8,500 feet elevation on the southeastern slope of Mauna Loa volcano on Hawaii (Hu, pers. comm. 2008), one on a sheer cliff in remote Pohakuao Valley on the Na Pali coast of Kauai (Wood et al. 2002), and one in a small cave on Lehua Islet (VanderWerf et al. 2007, p. 47), which is located 0.6 mi. north of Niihau. All nests were located in small caves or crevices, and were confirmed to be nests of this species by skeletal remains found in the nest. No other nests have been found despite intensive searching (Slotterback 2002).

Threats, Recovery Strategies and Ongoing Conservation Measures
Introduced predators are believed to be the most serious terrestrial threats facing the band-rumped storm-petrel in Hawaii. Rats, cats, dogs, mongoose, and barn-owls are likely culprits. The band-rumped storm-petrel, like the other seabirds discussed above, 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 Pohakuao. These observations included consistent detection of the Hawaiian short-eared owl during the day and the screeching of barn owls in the evening. 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 band-rumped storm-petrel fledglings, resulting in "fall-out" (Harrison et al. 1990) and collisions with buildings and other objects (Banko et al. 1991).

The band-rumped storm-petrel (Hawaii Distinct Population Segment) is a candidate for listing under the ESA. The species' status is a continuing candidate, with listing petitions received by

the Service on May 8, 1989, and May 11, 2004. The definition of "species" in section 3(15) of the ESA includes any distinct population segment(s) of any species of vertebrate fish or wildlife that interbreed when mature. For a population to be listed under the ESA as a distinct vertebrate population segment, three elements are considered: (1) the discreteness of the population segment in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the populations segment's conservation status in relation to the ESA's standards for listing (Service 1996). The available information indicates that distinct populations of band-rumped storm-petrels are definable and that the distinct population segment of band-rumped storm-petrel in the Hawaiian Islands is discrete in relation to the remainder of the species as a whole. The population segment is distinct based on geographic and distributional isolation from other band-rumped storm-petrel populations in Japan, the Galapagos Islands, and the Atlantic Ocean. A population also can be considered "discrete" if it is delimited by international boundaries across which exist differences in management control of the species. The Hawaiian Islands population of the band-rumped storm-petrel is the only population within U.S. borders or under U.S. jurisdiction.

A population segment is considered "significant" if its loss would constitute a significant gap in the range of the taxon. The Hawaiian Islands population constitutes the Central Pacific distribution of band-rumped storm-petrels between the Galapagos and Japan populations. The loss of this population would cause a significant gap in the distribution of the band-rumped storm-petrel in the Pacific, and could result in the complete isolation of the Galapagos and Japan populations without even occasional genetic exchanges. Based on the discreteness and significance of the Hawaiian Islands population, the Service considers it to be a distinct vertebrate population segment which warrants review for listing under the ESA (Service 1989).

There have not been recovery goals established for the band-rumped storm-petrel, but the Service's Regional Seabird Conservation Plan (Service 2005b, p. 200) contains recommended actions for the species that include controlling predators in nesting areas, assessing status of the population, locating and describing nesting areas, and identifying limiting factors and developing a recovery strategy.

Auditory surveys conducted by the State DLNR for new areas containing nesting Newell's shearwater and Hawaiian petrels are also able to detect the presence of band-rumped storm-petrels and the ranking criteria to identify where management efforts should be implemented include the presence of this species as an important criteria. Of the two known nesting colonies occupied by Newell's shearwater and Hawaiian petrel currently suitable for immediate implementation of management actions focused on increasing seabird survival and reproduction, only one (Hono O Na Pali NAR) is known to be occupied by band-rumped storm-petrels.

The efforts to protect existing nesting colonies of Newell's shearwater and Hawaiian petrel also benefit band-rumped storm-petrels, but as discussed above, they have been limited to constructing ungulate fencing around remaining areas of relatively intact habitat (Wainiha Valley, Upper Limahuli Valley, etc.).

As described above, the efforts to recover and release downed, but still living, seabirds through the SOS program also apply to band-rumped storm-petrels. Because the number of individual band-rumped storm-petrels impacted by light attraction and line collisions is so much lower that the number of Newell's shearwaters impacted, and the nesting sites of the two species overlap, the colony management efforts developed to offset impacts to Newell's shearwaters are expected to more than compensate for the band-rumped storm-petrel impacts. Efforts underway to reduce the level of light attraction and power line collisions described for Newell's shearwater also reduce these threats to band-rumped storm-petrel.

Environmental Baseline

The environmental baseline describes the status of the species or critical habitat and the past and present factors (adverse and beneficial) affecting the species or critical habitat in the action area for the proposed action at the time of consultation. Unrelated Federal actions within the action area that have already undergone formal or informal consultation are also a part of the environmental baseline.

Hawaiian Goose

Hawaiian geese have been present at KL property since the late 1990's. The population and nesting activity has increased on the property significantly in the ensuing 10 years. Five nests were recorded on the property in 1999. Ten years later, 66 nests were documented on the property, which produced 103 goslings (see Table 1). Hawaiian geese are site tenacious; therefore, adults and goslings reared at KL return each year to breed. By 2010, numbers had grown to 90 nests and over 400 Hawaiian geese (DOFAW 2012). The high productivity of KL is due to ongoing predator control efforts, specific habitat enhancement efforts for nene, abundant food resources, and low-elevation prime breeding habitat. The KL Hawaiian goose population is now the most abundant and prolific in the state, representing approximately 22 percent of the species population (DOFAW 2012).

KL is located immediately adjacent to Lihue Airport, the primary airport for the island of Kauai. The close proximity of nesting and roosting Hawaiian geese poses a threat to human safety due to the increased risk of collision between the geese and aircraft. The presence of the large numbers of Hawaiian geese at KL is considered to be a risk to aviation safety because of their large body size, flocking behavior, and low, slow flight pattern. Although no collisions between Hawaiian geese and aircrafts have occurred, the birds are frequently observed near the runways and flying across the runways as they transit to foraging and breeding sites (Ebbin Moser & Skaggs, LLP. 2012, p. 21-22).

Due to human safety concerns over potential aircraft-bird collisions, the Service and DOFAW have been working on several approaches to reduce the number of nene at KL. Translocations of goslings and/or small family groups have been ongoing for several years; however, to date, most translocations remained on Kauai. The long-term plan to reduce the Hawaiian goose population on KL has been under discussion for two years. Parties involved include the Federal Aviation Administration (FAA), DOFAW, KL, Hawaii Department of Transportation-Airports Division (HDOT), U.S. Department of Agriculture - Wildlife Services (WS) and the Service. The issue as

to which agency was responsible was never resolved, and hence, who wound fund and implement a translocation program. Currently, hazing of Hawaiian geese is conducted at Lihue Airport via a Letter of Agent between the Service and WS.

To resolve the dispute, the Governor of the State of Hawaii signed a proclamation on April 14, 2011, that exempts Hawaiian geese at KL from State endangered species laws so that DOFAW may quickly reduce the Hawaiian goose population at KL. Per the Governor's Proclamation, all Hawaiian geese at KL will be translocated to other islands over a five year period (April 2011 through April 2016). The Proclamation directed DOFAW, to develop a five-year Hawaiian goose Action Plan which will, to the extent practicable, translocate nene to suitable or protected habitat on other islands in addition to Kauai. In May 2011, 10 Hawaiian geese were moved from KL to the slopes of Haleakala, Maui, as the first phase of implementing the Proclamation. Several large-scale translocation efforts have occurred since that time, and will continue to occur in the immediate future (DOFAW 2012).

DOFAW is conducting the translocation under 50 C.F.R. §17.21(c)(3)(iv), which allows State employees to take listed species which 'constitute a demonstrable but non-immediate threat to human safety.' However, it is anticipated that some actions, such as hazing, will be needed after the completion of the Governor's Proclamation (2016) to prevent the recurrence of a resident Hawaiian goose population at KL. At that time, FAA or HDOT will be required to address ongoing levels of take associated with hazing and/or translocating Hawaiian geese.

Role of the Action Area in the Conservation of the Hawaiian Goose

Over the past ten years, KL has provided habitat for the largest and most prolific Hawaiian goose population in Hawaii. The high productivity of KL is due to ongoing predator control efforts, specific habitat enhancement efforts for Hawaiian geese, abundant food resources, and low-elevation prime breeding habitat. However, given the proximity of the Lihue Airport and human safety concerns, the Service has determined that KL is not a suitable site for Hawaiian goose recovery. Additionally, as DOFAW is working to translocate all Hawaiian geese from KL to other islands, it would be inconsistent with these actions to continue to promote breeding at KL. Therefore, KL will continue to maintain Hawaiian goose habitat and predator control only so long as the birds continue at the site. As they are moved to other islands, these efforts will phase out or be re-focused toward covered waterbird species. Additional mitigation funds will be provided to DOFAW for management and predator control at translocation sites to ensure long-term protection for translocated pairs.

Hawaiian Stilt

There is little usage of habitat present on the KL property by Hawaiian stilts. This is primarily due to the lack of suitable foraging and nesting habitat. Over the past three years, between one and three pairs of stilt have been documented on the site. In all three years one pair successfully nested in an abandoned golf course sand trap. During the 2008-2009 nesting season the one pair that nested produced four chicks, which all successfully fledged. Stilt have not usually been observed in areas that place them at risk from golf play.

Role of the Action Area in the Conservation of the Hawaiian Stilt
Hawaiian stilts are known to occur at KL in low numbers. Breeding and foraging behavior has been documented at the site, but in less abundance than other listed waterbird species. Due to on-going predator control efforts, KL does provide a predator-free habitat. However, due to the depth of the ponds and the low amount of potential breeding habitat, use of the site is likely to remain low.

Hawaiian Coot
The number of Hawaiian coots present on the property varies on a seasonal and annual basis, likely due to precipitation. In the past twenty years numbers have varied between fewer than a dozen birds to upwards of 350 birds. During the 2008-2009 nesting season KL documented a range of between two and 84 coots on the property. The low numbers recorded likely represent an inverse relationship to the amount of rain that fell on Kauai and other areas at the end of the year. Hawaiian coots loaf and forage on a number of the golf course holes, and are also regularly seen swimming in all lakes, ponds and water features within the property. At times when coot numbers are high, they are at risk from golf play.

Role of the Action Area in the Conservation of the Hawaiian Coot
Hawaiian coots have been documented in relatively high numbers at KL. While breeding at the site is relatively rare or undocumented, KL appears to provide important habitat at certain times of the year. Yearly observations indicate that the site may be of particular importance in dry years, when appropriate habitat in other locations is too dry to support Hawaiian coots.

Hawaiian Moorhen
Hawaiian moorhen are relatively abundant at KL. Determining exactly how many birds use resources on the property is challenging due to their innate secrecy. High numbers recorded on the property have approached approximately 50 birds. This species nests on the property in small numbers. It has been estimated that there may be up to 10 nests a year on the site. During the 2008-2009 season KL recorded four separate Hawaiian moorhen pairs with young chicks. Hawaiian moorhen are most often seen in or close to the main lagoon, the boat dock lagoon and the irrigation pond located on the northwest corner of the site. Nests are typically documented adjacent to the more remote ponds on the site that have dense shoreline vegetation such as the irrigation pond. Hawaiian moorhen have not been documented to nest in the water features within the golf course. Additionally, they are seldom seen on the golf holes themselves, so they are not often at risk from golf play.

Role of the Action Area in the Conservation of the Hawaiian Moorhen
Hawaiian moorhen are generally a cryptic species; therefore, it is difficult to ascertain to what level KL is important as breeding and foraging habitat. However, the continued predator control efforts and year-round water source has provided protection and habitat for numerous individuals. Hawaiian moorhen use of the site will likely remain the same or increase as pairs find suitable nest sites in the more secluded areas of the property.

Hawaiian Duck

Hawaiian ducks are relatively abundant at KL. During the course of the 2008-2009 season, KL recorded a range of 2 to 60 ducks on the property. During that season, KL observed three Hawaiian Duck nests. It is estimated that between two and 10 pair nest on the property per year. Hawaiian ducks have been recorded nesting at the irrigation pond, one of the lagoons, and in the "triangle" parcel between the runways. Survival of the ducklings appears to be very low (less than 10 percent). Potential causes of the relatively low survival rate of ducklings have not been identified, though predation by cattle egrets and fish are likely to be the principal non-metabolic threats that the young birds face. Since Hawaiian ducks are almost never seen on the golf holes, it is unlikely that golf play represents a significant threat to this species.

Role of the Action Area in the Conservation of the Hawaiian Moorhen

The KL property does support breeding and foraging Hawaiian ducks in relatively high numbers. Hawaiian ducks generally nest in higher elevations or mountainous habitats; however, the lack of mammalian predators and consistent water source has resulted in KL being a significant habitat for ducks in southeastern Kauai. Although duckling survival is poor, it is still higher than at other, un-protected locations on the island.

Newell's Shearwater

Although Newell's shearwaters do not nest on the KL property, they may fly over the project site when traversing between the ocean and mountainous breeding colonies. Fledgling seabirds may also fly over the project site and become disoriented by lights when attempting to reach the ocean. To date, there is very little nighttime activity on the KL property, as only two new buildings associated with the current and planned development projects are complete and occupied. The SOS Program did report that one downed Newell's shearwater was found on the property during the 2009 fledging season. Additionally, downed Newell's shearwaters have been recorded in relatively high numbers at the adjacent Marriott hotel property. As a result, it is possible that following build-out and occupation of the new buildings at KL, downed Newell's shearwaters could occur there. Although KL is not within a primary route used by Newell's shearwaters accessing nesting sites, seabird passage rates are high in the project area.

Role of the Action Area in the Conservation of the Hawaiian Petrel

Newell's shearwaters nest in the mountains and feed at sea. Survival and reproductive success depend on an unobstructed and unlighted flight between the breeding colony and the ocean. Although KL shall implement conversation measures designed to avoid and minimize impact to Newell's shearwaters flying overhead, lights from the property may still impact some birds' ability to successfully fly between the breeding colony and the ocean.

Hawaiian Petrel

As with Newell's shearwaters, Hawaiian petrels do not nest on the KL property, but they may fly over the project site when traversing between the ocean and mountainous breeding colonies. Fledgling seabirds may also fly over the project site and become disoriented by lights when attempting to reach the ocean. To date there have not been any downed Hawaiian petrels recorded on the Resort property. However, downed Hawaiian petrels have been recorded at the adjacent Marriott hotel property. As a result, it is possible that following build-out and

occupation of the new buildings at KL, downed Hawaiian petrels could occur there. Although KL is not within a primary route used by Hawaiian petrels accessing nesting sites, seabird passage rates are high in the project area.

Role of the Action Area in the Conservation of the Hawaiian Petrel
Hawaiian petrels nest in the mountains and feed at sea. Survival and reproductive success depend on an unobstructed and unlighted flight between the breeding colony and the ocean. Although KL shall implement conversation measures designed to avoid and minimize impacts to Hawaiian petrels flying overhead, lights from the property may still impact some birds ability to successfully fly between the breeding colony and the ocean.

Band-Rumped Storm-Petrel
Band-rumped storm-petrels follow the same nesting pattern as the aforementioned species. To date there have not been any downed band-rumped storm-petrels recorded at KL. It is possible that following build-out and occupation of the new buildings at KL, downed band-rumped storm-petrels could occur.

Role of the Action Area in the Conservation of the Hawaiian Petrel
Band-rumped storm-petrels nest in the mountains and feed at sea. Survival and reproductive success depend on an unobstructed and unlighted flight between the breeding colony and the ocean. Although KL shall implement conversation measures designed to avoid and minimize impacts to band-rumped storm-petrels flying overhead, lights from the property may still impact some birds ability to successfully fly between the breeding colony and the ocean.

3.0 EFFECTS OF THE ACTION

The KL HCP addresses impacts to Covered Species from ongoing operations at the property and specific new construction actions. Kauai Lagoons has provided habitat for listed species for the last 10 years, during which time ongoing monitoring efforts have provided the information to develop methods to effectively manage habitat, reduce predators, and incorporate avoidance and minimization measure, such as education and reduced lighting.

New construction may result in the direct impacts to Covered Species due to grading, site preparation, movement of construction materials and equipment, and other operations. An adult Covered Species could be adversely affected during the breeding season due to construction resulting in the loss of dependent eggs and young. Ongoing operations at KL may impact Covered Species due to interactions with golf balls, golf carts, cars, human interaction, pets, landscaping, and resort lighting.

The following three types of "take" are addressed in the HCP:

Direct take:	Individuals that are killed or injured by construction activities or ongoing operations and maintenance at KL.

Indirect take: The adult birds lost to direct take could have been tending eggs or dependent young. The loss of these adults will then also lead to the indirect loss of the eggs or dependent young attributable to the Project.

Estimated total take: Sum of the above types of take.

Estimating the potential take for each listed species due to construction and operations activities was accomplished incorporating the results of the onsite surveys, information from species biologists and long-term monitoring data from KL. Also incorporated into the fatality/injury estimates developed for KL include number of individual species present, effectiveness of avoidance and minimization measures and estimates of each species ability to avoid project components. Continuing monitoring will be used to estimate actual take.

Effects of the Action on the Hawaiian Goose

Activities that may affect the Hawaiian goose at KL include new construction and operations of the resort and golf courses. Hawaiian geese are prevalent at KL and are known to loaf, forage and breed throughout the property. In the near future (present through April 2016), DOFAW is conducting a translocation effort to move all Hawaiian geese at KL to sites on other islands, pursuant to the Governor's Proclamation. Although the goal of this effort is to eliminate Hawaiian geese at KL, take estimates and associate mitigation is based on the assumption that low levels of Hawaiian geese may persist at KL after the completion of the translocation. Mitigation for take of the Hawaiian goose will include habitat management and predator control while birds remain on the property, as well as funds to DOFAW for use in long-term management, monitoring, and predator control at translocation sites on other islands.

Take Impacts

The HCP indicates a total of 17 Hawaiian geese or dependent eggs and eggs are likely to be killed or injured, directly or indirectly, by construction activities and operation of KL over the 30-year term of the proposed action. This assessment of the HCP's fatality, injury, and indirect take estimates is based on the best available information regarding the expected take of the Hawaiian goose. Site-specific data gathered by KL supports the results presented in the HCP.

Impacts to Hawaiian Geese from New Construction at KL

During the period between 2007 and 2011, no take of Hawaiian geese was observed as a result of KL construction activities such as site clearing, mass grading, or infrastructure or building construction. However, one Hawaiian goose was hit and killed by a construction vehicle during this time. After that incident an MOU between the Service and KL was drafted incorporating avoidance and minimization measures to prevent additional take. Although KL has proposed additional conservation measures to avoid and minimize impacts to Hawaiian geese from construction activities, take cannot be totally eliminated.

Impacts to Hawaiian Geese from Ongoing Operations at KL
Based on the implementation of the avoidance and minimization measures described in this opinion, KL anticipates a minimal level of take occurring as a result of grounds management and maintenance. Hawaiian geese have been hit by golf balls on the golf course, and may be injured by golf carts. The likelihood of any such incidents will decrease as Hawaiian geese at KL are translocated to other islands pursuant to the Governor's Proclamation.

Total Direct Impacts from Construction and Operations at KL
The HCP estimates that direct incidental take of Hawaiian geese from new construction and golf operation activities combined will be one per year for the first four years of the HCP (early 2012 through early 2016). After the completion of the translocation effort pursuant to the Governor's Proclamation, it is estimated 0.33 per year (i.e., one every three years) from 2017 until the end of the permit.

Indirect Impacts – Loss of Dependent Eggs and Goslings
Indirect take (loss of dependent eggs and goslings) will be assumed for adult Hawaiian geese when a mortality occurs during the breeding season (observed on the Resort property to be from approximately September through March), which constitutes approximately 60 percent of the calendar year. An adult killed during the breeding season will be assumed to have had a 60 percent chance of having been actively breeding because approximately 60 percent of the population has been recorded to breed in any given year (Banko et al. 1999). Male and female Hawaiian geese care for their young fairly equally, so indirect take will be assessed equally to the direct lethal take of any male or female adult Hawaiian goose during the breeding season. It is assumed based on KL's monitoring data that each breeding pair produces an average of two goslings annually. Consequently, the amount of potential indirect take associated with each direct take is calculated as follows:

Fledglings per pair (2) x likelihood of mortality occurring during breeding season (0.6) x likelihood of breeding (0.6) x parental contribution (0.5) = 0.36.

Summary of Take Impacts
Years 1 through 4: Direct lethal take (maximum of 1.0 per year) + indirect take (1.0 x 0.36) = 1.36 Hawaiian geese per year, or a 4year total of 5.44.

Years 5 through 30: Direct lethal take (maximum of 0.33 per year) + indirect take (0.33 x 0.36) = 0.48 Hawaiian geese per year, or a 26 year total of 11.67.

Total direct and indirect take for 30 years: 17

Effects of Mitigation to the Hawaiian Goose
For the period of time between when the Permit is issued and the end of the Governor's Proclamation in April 2016, it is anticipated that some Hawaiian geese will continue to persist at Kauai Lagoons. Therefore, Kauai Lagoons will continue to manage habitat and conduct predator control for the benefit of breeding Hawaiian geese. These methods have proved very effective at promoting reproductive success. Although the number of breeding pairs at KL during this time is

unknown, it is expected that mitigation will result in 75 percent hatch success and 75 percent fledge success (average of 2 to 3 goslings fledged per nest).

After April 2016 it is anticipated that few or no Hawaiian geese will be present at Kauai Lagoons. Therefore, predator control efforts will be re-focused to protect listed waterbird species. After this time, Kauai Lagoons will stop enhancing or promoting Hawaiian goose breeding at the site.

The Service and DOFAW have determined that it is no longer appropriate to conduct onsite mitigation for Hawaiian geese due to airport safety concerns. Therefore, Kauai Lagoons will conduct off-site mitigation to ensure the long-term survival of the Hawaiian geese that are translocated off of Kauai. Kauai Lagoons shall contribute $85,000 to DOFAW for five years of predator control, monitoring, and management of translocated geese at sites across the Hawaiian Islands. Hawaiian geese are particularly vulnerable to predation during nesting and before the goslings fledge. The translocated Hawaiian geese will be subject to high predation of eggs and goslings by cats, rats, and mongoose. Mitigation for project-related take will be provided through increased Hawaiian goose reproductive success and survival at managed pen sites. The mitigation is expected to result in the hatching success of up to 20 nests per year that would be unsuccessful outside of a managed pen, resulting in an average of 50 to 75 goslings fledged per year of pen management. This management activity will increase the survival and reproductive success of the Hawaiian goose population, and therefore will help offset Kauai Lagoons' take of 17 Hawaiian geese.

Effects of the Action on Range-Wide Distribution of the Hawaiian Goose

The most current statewide population estimate for the Hawaiian goose is between 1,888-1,938 individuals, with 850-900 individuals on Kauai. KL's requested take of 17 individuals over the 30-year Permit term represents approximately 0.9 percent of the range-wide population and 1.9 percent of the current Kauai population. If DOFAW succeeds in translocating the KL Hawaiian goose population to other islands, the take of 17 birds will be 3.4 percent of the remaining Kauai population. Because the Hawaiian goose has a high rate of fecundity and birds are long-lived, this loss of 17 birds over the 30-year Permit period is not expected to result in a decline in the Kauai population, separate from the decline due to translocation efforts.

Proposed mitigation will offset all take to compensate for project impacts by increasing the survival and reproductive success of Hawaiian geese at translocation sites. Therefore, the State's Hawaiian goose population will not be reduced as a result of project implementation, than it would have been in the absence of the project.

Effects of the Action on Hawaiian Waterbirds

As the four covered waterbird species (Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, and Hawaiian duck) will be similarly impacted by the action, and the proposed mitigation was designed to provide benefits for all of the four species, so for the purposes of this opinion they are analyzed together. Hawaiian waterbirds are present at KL (see discussion in the Environmental Baseline) and are known to loaf, forage, and breed on the property. Current levels of Hawaiian waterbird populations are anticipated to persist at KL throughout the life of the 30-year permit

term. Due to the incorporation of avoidance and minimization measures, no take of Hawaiian waterbirds from construction activities is anticipated. Ongoing operations of the resort and golf courses will adversely affect Hawaiian waterbirds at KL. Mitigation for take of Hawaiian waterbirds will include onsite habitat management and predator control.

Take Impacts

The HCP indicates a total of 38 Hawaiian stilts (mortality or non-lethal injury), 70 Hawaiian moorhen (40 mortality, 30 non-lethal injury), 290 Hawaiian coots (110 mortality, 180 non-lethal injury), and 36 Hawaiian ducks (mortality or non-lethal injury) are likely to be taken, directly or indirectly, by operations at KL over the 30-year term of the proposed action. The Service concurs with this assessment of impact because the HCP's fatality, injury, and indirect take estimates are based on the best available information regarding the expected take of Hawaiian waterbirds. Site-specific data gathered by KL biologists supports the results presented in the HCP.

Impacts to Hawaiian waterbirds from New Construction at KL

In contrast to Hawaiian geese, monitoring data indicates waterbird species do not loaf, forage, or breed in the vicinity of construction operations at KL. Long term monitoring at KL indicates the incorporation of avoidance and minimization measures, including those developed in an MOU between KL and the Service and those listed in the HCP, are likely to be adequate to ensure Hawaiian waterbirds are unlikely to be taken as a result of construction activities including site clearing, mass grading, or infrastructure or building construction. As the avoidance and minimization measures will continue to be implemented, pursuant to the HCP and Permit, it is not anticipated that any take of the waterbird species will occur as a result of new construction activities during the life of the 30-year permit term. This assessment is due to the incorporation of avoidance and minimization measures that have been effective at Kauai Lagoons and other project locations, as evidenced by long-standing monitoring programs.

Impacts to Hawaiian waterbirds from Ongoing Operations at KL

Hawaiian Coots have been known to seasonally congregate, especially in dry years, on portions of the golf course, occasionally in large numbers. There is information indicating that coots have been hit by golf balls on the golf course, but there is no data as to how many times or how frequently this has occurred. The HCP estimates that direct take of coots from golf operations may occur at the average rate of up to three mortality and six non-lethal injuries per year. There is no information indicating how many Hawaiian moorhen, Hawaiian ducks or Hawaiian stilt having been injured on the golf course. Based on implementation of the avoidance and minimization measures, the HCP estimates that the potential for direct take from golf operations may occur at an average rate for Hawaiian moorhen of up to one mortality and one non-lethal injury per year, and for Hawaiian duck and Hawaiian stilt of up to one mortality or non-lethal injury per year. Covered Species that are found to be injured will be transferred to an approved veterinarian or rehabilitation facility, as outlined in Appendix 1 of the HCP. Take estimates are based on the best available information, including KL's observation and monitoring of Hawaiian waterbirds onsite. The implementation of a comprehensive golf course monitoring plan will produce future data regarding impacts of golf operations on Hawaiian coots, and the appropriateness of the take level requested authorized

in the KL incidental take permit. If new information reveals effects of the action that may affect listed species to an extent not considered in this Opinion, those impacts would be addressed in an updated HCP.

Indirect Impacts – Loss of Dependent Eggs and Young (chicks and ducklings)

- **Hawaiian Stilt:** Studies indicate that average number of fledglings produced per pair per year is 0.9. The nesting season (February to August) constitutes approximately 60 percent of the calendar year. An adult killed during the breeding season is assumed to have been breeding. Males and females care for their young fairly equally. Consequently, the amount of potential indirect take is calculated as follows:

  Fledglings per pair (0.9) x likelihood of mortality occurring during breeding season (0.60) x likelihood of breeding (1.0) x parental contribution (0.5) = 0.27.

- **Hawaiian Moorhen:** Studies indicate that average number of fledglings produced per pair is 1.3 per year. The nesting season (March to August) constitutes 50 percent of the calendar year. An adult killed during the breeding season is assumed to have been breeding. Males and females care for their young fairly equally. Consequently, the amount of potential indirect take is calculated as follows:

  Fledglings per pair (1.3) x likelihood of mortality during breeding season (0.5) x likelihood of breeding (1.0) x parental contribution (0.5) = 0.325.

- **Hawaiian Coot:** Studies indicate that average number of fledglings produced per pair per year is 0.9. The nesting season (concentrated from March to August, though can occur other times of the year) constitutes 50 percent of the calendar year. An adult killed during the breeding season is assumed to have been breeding. Males and females care for their young fairly equally. Consequently, the amount of potential indirect take is calculated as follows:

  Fledglings per pair (0.9) x likelihood of mortality during breeding season (0.5) x likelihood of breeding (1.0) x parental contribution (0.5) = 0.225

- **Hawaiian Duck:** Studies indicate that average number of fledglings produced per pair per year is 1.225. The nesting season (March to June) constitutes 33 percent of the calendar year. An adult killed during the breeding season will be assumed to have been breeding. Since males do not provide any parental care for eggs or ducklings, the "parental contribution" factor for males would be zero, while the factor for females would be 1.0, so the average parental contribution value is 0.5. Consequently, the amount of potential indirect take is calculated as follows:

  Fledglings per pair (1.225) x likelihood of mortality during breeding season (0.33) x likelihood of breeding (1.0) = 0.40; 50 percent of that value (to account for males providing no parental care, thus an indirect effect would only occur if a female is

killed during the breeding season, and for calculation purposes the onsite population is assumed to be equally divided between males and females) results in an indirect take factor of 0.20.

Summary of Take Impacts

- **Hawaiian Stilt:** Direct lethal take (1.0 per year) + indirect take (1.0 x 0.27) = lethal take of 1.27 Hawaiian stilt per year, or 1.0 non-lethal injuries per year (based on 5-year running average).

- **Hawaiian Moorhen:** Direct lethal take (1.0 per year) + indirect take (1.0 x 0.325) = lethal take of 1.325 Hawaiian moorhen per year, plus 1.0 non-lethal injury per year (based on 5-year running average).

- **Hawaiian Coot:** Direct lethal take (3.0 per year) + indirect take (3.0 x 0.225) = lethal take of 3.675 Hawaiian coots per year, plus 6.0 non-lethal injuries per year (based on 5-year running average).

- **Hawaiian Duck:** Direct lethal take (1.0 per year) + indirect take (1.0 x 0.20) = lethal take of 1.20 Hawaiian ducks per year, or 1.0 non-lethal injuries per year (based on 5-year running average).

Effects of Mitigation to Hawaiian Waterbirds

KL will continue to manage habitat and conduct predator control for the benefit of breeding Hawaiian waterbirds. These methods have proved very effective at protecting Hawaiian waterbirds and promoting foraging and reproductive success. In addition to previously utilized techniques, they will also control cattle egrets (*Bubulcus ibis*), which are known to prey on eggs and young chicks/ducklings. After April 2016, it is anticipated that few or no Hawaiian geese will be present at KL. If no Hawaiian geese are present at KL, predator control efforts at KL will be focused only on areas where Hawaiian waterbirds are known to occur and nest. Kauai Lagoons will continue to provide habitat that has a permanent water source and predator control, which will support birds that would otherwise have little or no reproductive success.

- **Hawaiian Stilt:** These mitigation actions are anticipated to result in the hatchling success of up to one Hawaiian stilt nest per year that would otherwise be unsuccessful, resulting in an average of two to three chicks fledged annually. These management activities will increase the survival and reproductive success of the Hawaiian stilt population throughout the life of the 30-year permit term, and therefore offset Kauai Lagoons' take of Hawaiian stilt.

- **Hawaiian Moorhen:** Mitigation is expected to result in the hatching success of up to 10 nests per year that would otherwise be unsuccessful, resulting in an average of 20 to 30 chicks fledged annually. These management activities will increase the survival and reproductive success of the Hawaiian moorhen population throughout the life of

the 30-year permit term, and therefore offset Kauai Lagoons' take of Hawaiian moorhen.

- **Hawaiian Coot:** Mitigation is expected to result in the hatching success of up to 4 nests per year that would otherwise be unsuccessful, resulting in an average of 8 chicks fledged annually. Additionally, mitigation will protect Hawaiian coot habitat for loafing and foraging. These management activities will increase the survival and reproductive success of the Hawaiian coot population throughout the life of the 30-year permit term, and therefore offset Kauai Lagoons' take of Hawaiian coots.

- **Hawaiian Duck:** Mitigation is expected to result in the hatching success of up to 10 nests that would otherwise be unsuccessful, resulting in an average of 1 to 2 ducklings fledged annually. These management activities will increase the survival and reproductive success of the Hawaiian duck population throughout the life of the 30-year permit term, and therefore offset Kauai Lagoons' take of Hawaiian ducks.

Effects of the Action on Range-Wide Distribution of Hawaiian Waterbirds

- **Hawaiian Stilt:** Based on biannual Hawaiian waterbird surveys from 1998, through 2007, the Hawaiian stilt population averaged 1,484 birds, but fluctuated between approximately 1,100 and 2,100 birds (Service 2011, p. 47). The Kauai population has fluctuated between 125 and 350 individuals. Fluctuations in population size (at both the State and island level) are dependent on rainfall and ephemeral wetlands as nesting sites. KL's average annual take of 1.27 individuals (mortality or non-lethal injury) represents approximately 0.09 percent of the range-wide population. KL is providing habitat that has a permanent water source and predator control, which may support birds that would otherwise have little or no reproductive success. Therefore, the management of habitat and predator control over the life of the 30-year permit term is anticipated to more than compensate for the level of take.

- **Hawaiian Moorhen:** Based on biannual Hawaiian waterbird surveys from 1998 through 2007, observations of Hawaiian moorhen individuals averaged 287 birds; however, this number is considered a poor indicator of the total population due to inherent difficulties in detecting this species (Service 2011, p. 37). There are no current estimates of the Kauai population, but it is thought that more than 50 percent of the species population is found on that island. It is therefore difficult to determine what proportion of the population may be affected by KL's construction and operation. In a worst case situation, the average annual take of 2.325 Hawaiian moorhen (1.325 mortality, 1 injury) may represent as much as 0.81 percent of the range-wide population. The habitat management and predator control proposed by KL will provide a long-term protected site for Hawaiian moorhen to forage and breed. Over the course of the 30-year permit term, this will result in increased productivity of Hawaiian moorhen on Kauai. Therefore, the State's Hawaiian moorhen population will not be lower as a result of project implementation, than it would have been in the absence of the project.

- **Hawaiian Coot:** Based on biannual Hawaiian waterbird surveys from 1998 through 2007, the Hawaiian coot population averaged 2,000 birds, but fluctuated between approximately 1,500 and 2,800 birds (Service 2011, p. 21). Over the same period, counts of Hawaiian coots on Kauai average approximately 500 birds, fluctuating between 50 and 1,500 birds. This fluctuation in population is due primarily to dispersal of Hawaiian coots in wet years, when appropriate habitat is more readily available. KL's average annual take of 9.675 individuals (3.675 mortality and 6 non-lethal injury) represents approximately 0.48 percent of the range-wide population. KL is providing habitat that has a permanent water source and predator control, which may support birds that would otherwise have little or no reproductive success. Therefore, the management of habitat and predator control over the life of the 30-year permit term is anticipated to more than compensate for the level of take.

- **Hawaiian Duck:** Engilis et al. (2002) estimated the statewide population of pure Hawaiian ducks to be approximately 2,200 individuals, with 2,000 occurring on Kauai (Service 2011, p. 7). Biannual Hawaiian waterbird surveys between 1998 and 2007 have found lower numbers, due to the lack of surveys in high montane streams where Hawaiian ducks are known to occur. KL's average annual take of 1.2 individuals (mortality or non-lethal injury) represents approximately 0.06 percent of the range-wide population. As KL is providing habitat that has a permanent water source and predator control, which may support birds that would otherwise have little or no reproductive success, it is anticipated that the mitigation measures over the life of the 30-year permit term will more than compensate for the level of take.

Effects of the Action on Hawaiian Seabirds

As the three covered seabird species (Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel) are similarly impacted by the action, and the proposed mitigation is intended to provide benefits for all three species, for the purposes of this document they are analyzed together. While Hawaiian seabirds do not nest at KL, they fly over the property when traversing between breeding colonies and the ocean. Activities that may affect Hawaiian seabirds at KL include nighttime operations of the resort and lighting illumination. Due to the incorporation of avoidance and minimization measures, no take of Hawaiian seabirds from construction activities is anticipated. Mitigation for take of Hawaiian seabirds will be payment into the KSHCP, which will pool funds to conduct management, predator control, and other recovery actions at seabird colonies.

Take Impacts

The HCP indicates a maximum of 27 Newell's shearwaters (mortality or non-lethal injury), one Hawaiian petrel (mortality or non-lethal injury), and one band-rumped storm-petrel (mortality or non-lethal injury) are likely to be taken, directly or indirectly, by operations of KL over the 30-year term of the proposed action. No take is anticipated to occur prior to the construction of new facilities; therefore, take is not expected until at least 2015 (year three of the incidental take permit). The Service concurs with this assessment of impact because the KL HCP's fatality, injury, and indirect take estimates are based on the best available information regarding the

expected take of Hawaiian seabirds. Data gathered by other nearby resorts with similar infrastructure supports the results presented in the KL HCP.

Impacts to Hawaiian Seabirds from New Construction at KL
As take of covered seabird species is associated with nighttime illumination which may disorient birds flying through the airspace above KL, resulting in fallout, and since no nighttime construction will occur within this development, it is not expected that new construction will result in any direct impacts to any of the three seabird species.

Impacts to Hawaiian Waterbirds from Ongoing Operations at KL
Currently there has been only one observed take of a seabird at KL. However, as new buildings are constructed and become occupied, the potential that lighting associated with the increased build-out could attract and disorient flying seabirds, resulting in fallout. Despite the implementation of lighting avoidance and minimization measures, some take of seabirds is anticipated to occur. The KL HCP estimates that upon completion of the additional planned new construction (Marriott Vacation Club complex of seven buildings in three phases, with the first phase of three buildings comprising approximately 75 units currently projected to be completed in 2015), take of seabirds in the form of light-attraction fallout may occur at the average rate of one Newell's Shearwaters per year. Based on the low frequency of Hawaiian petrel and band-rumped storm-petrel fallout, as documented by SOS, the KL HCP anticipates the take of one Hawaiian petrel and one band-rumped storm petrel over the life of the 30-year permit term.

Indirect Impacts – Loss of Dependent Eggs and Chicks
Approximately 97 percent of these seabirds which fallout on Kauai due to light attraction and are retrieved by the SOS program are fledglings, which do not have dependent young. It is therefore assumed that any light-attraction take of seabirds which might occur at KL would be fledgling fallout, and there would be no indirect impact in the form of loss of dependent eggs or chicks.

Summary of Take Impacts

- Newell's shearwater: 1.0 per year (based on 5-year running average).
- Hawaiian petrel and band-rumped storm petrel: <1.0 each per year (based on 5-year running average); total of 1.0 over the 30-year permit term.

Effects of Mitigation to Hawaiian seabirds
To mitigate for unavoidable take of Hawaiian seabirds, Kauai Lagoons will provide funds to KSHCP, a joint effort between the Service and DOFAW to address ongoing take of seabirds across the island of Kauai. The intent of this HCP is to combine mitigation funds to conduct effective recovery actions at seabird colonies, such as habitat management and predator control. The colonies where management will be implemented are known to be used by Newell's shearwater and the Hawaiian petrel for nesting, and band-rumped storm-petrels have been heard calling. Therefore, implementation of the colony management under KSHCP is anticipated to

reduce predation on all three Covered Species and, and thus reduce adult and chick mortality due to cat and rat predation and increase reproductive success. Habitat improvements, such as invasive plant species control, will increase habitat availability for future nesting opportunities. The benefit of the mitigation measures proposed to be implemented in KSHCP cannot be estimated accurately due to uncertainty in the effectiveness of proposed measures. Therefore, the program will rely on adaptive management to ensure that all authorized take is adequately outset through increasing survival and reproductive success of the three covered seabird species.

Although the KSHCP is still in development, it is planned to be finalized in advance of Kauai Lagoons' construction projects, which will initiate the need to mitigate for their anticipated take. Because KSHCP is still in development, it is currently unknown what cost per bird will be required. The cost per bird will be determined by the cost of implementing the necessary recovery actions that will adequately offset the take of all KSHCP applicants.

Effects of the Action on Range-Wide Distribution of Hawaiian waterbirds

- **Newell's shearwater:** The authorization of the death or injury to one fledgling annually represents 0.05 percent of the 2,173 Newell's shearwater that are estimated to fledge annually on Kauai. Based on the estimated survival rate of Newell's shearwater from fledgling to breeding age of 0.333 (Ainley et al. 2001; p. 116), approximately 8.99 of the 27 fledglings taken over the 30-year Permit term would have survived until adulthood if not impacted by lighting at KL. Mitigation via KSHCP colony management will completely offset the take associated will all KSHCP applicants, including KL. The number of Newell's shearwater on Kauai at the end of the 30-year Permit term will be no fewer than the number that would have been on Kauai in the absence of the proposed construction, operation, and maintenance of the KL project.

- **Hawaiian petrel:** The authorization of the death or injury to one Hawaiian petrel over the 30-year Permit term represents 0.01 percent of the 20,000 birds estimated in the population. While the number and distribution of Hawaiian petrels on Kauai is not known, because Newell's shearwater mitigation actions will increase the reproductive success and survival of co-located Hawaiian petrels, the management actions proposed under the KSHCP to be conducted within the seabird nesting colonies is expected to produce similar benefits to Hawaiian petrels.

- **Band-rumped storm-petrel:** The authorization of the death or injury to one band-rumped storm-petrel over the 30-year Permit term represents as high as 5.8 percent of the total population estimate of 171-221 breeding pairs on the island (Wood et al. 2002). While the number and distribution of band-rumped storm-petrels on Kauai is not known, based on the overlap in habitat used for nesting by Newell's shearwater and Hawaiian petrel, the management actions proposed under the KSHCP to be conducted within the seabird nesting colonies is expected to produce similar benefits to band-rumped storm-petrels.

4.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur within the area of action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the ESA and, therefore, are not considered cumulative for the proposed action.

Kauai Lagoons is situated on private lands in Lihue, Kauai, and is adjacent to the Lihue Airport. Hawaiian geese at the site are being translocated to other islands pursuant to the Governor's Proclamation. DOFAW will continue to translocate Hawaiian geese away from the site until the end of the Proclamation in April 2016. As the KL population is moved, new birds from other areas on Kauai may be attracted to the site. After 2016, HDOT will address long-term concerns regarding the hazing of Hawaiian geese away from sensitive areas where they could pose a threat to the safe operation of the airport. Pursuant to the ESA, these impacts would be assessed in biological opinions and mitigated to the maximum extent practicable via development and implementation of Habitat Conservation Plans.

Although there are no proposed development projects, it is reasonable to assume that development on Kauai will continue to increase. Increased development may increase the density of mammalian predators adversely affecting the Covered Species. Development may also increase lighting levels and transmission/communication lines in the area, resulting in additional impacts to seabird species. Areas of mowed grass and standing water maintained in association with new development are likely to attract the Hawaiian goose to areas where it will be exposed to vehicle strike and increased predation. Pursuant to the ESA, these impacts would be assessed in biological opinions and mitigated to the maximum extent practicable via development and implementation of Habitat Conservation Plans.

5.0 CONCLUSION

Analytical Framework for the Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this Biological Opinion relies on four components: (1) the Status of the Species, which evaluates the range-wide Condition of the eight Covered Species, the factors responsible for those conditions, and the species' survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the Covered Species in the action area, the factors responsible for those conditions, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the Covered Species; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the Covered Species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the Covered Species' current status, taking

into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the Covered Species in the wild.

The jeopardy analysis in this Biological Opinion places an emphasis on consideration of the range-wide survival and recovery needs of the Covered Species and the role of the action area in the survival and recovery of the Covered Species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Jeopardy Determination

After reviewing the current status of the Covered Species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological opinion that implementation of the proposed action is not likely to jeopardize the continued existence of the Hawaiian goose, Hawaiian stilt, Hawaiian coot, Hawaiian moorhen, Hawaiian duck, Newell's shearwater, and Hawaiian petrel. The Service reached this conclusion because, as described in the Effects of the Action section above, the proposed mitigation program for each Covered Species is likely to offset, and in some cases more than offset, the impacts of the proposed taking in a manner that is consistent with addressing the survival and recovery needs of these species in the affected area.

After reviewing the current status of the band-rumped storm-petrel, the environmental baseline of the species in the action area, the effects of the proposed HCP, and the cumulative effects, it is the Service's conference opinion that the action, as proposed, is not likely to jeopardize the continued existence of the band-rumped storm-petrel. Implementation of the HCP's conservation strategy is expected to adequately offset impacts by increasing survival and reproductive success and result in a net conservation benefit for the species.

6.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations promulgated pursuant to section 4(d) of the ESA prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The proposed Kauai Lagoons HCP and its associated documents clearly identify anticipated impacts to affected listed species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize and mitigate those impacts. All conservation measures described in the proposed HCP, together with the terms and conditions described in any associated Implementing Agreement and any section 10(a)(1)(B) permit or permits issued with respect to the proposed HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the ESA to apply. If Kauai Lagoons fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed Kauai Lagoons HCP is as described in the HCP and its accompanying section 10(a)(1)(B) permit. Associated reporting requirements and provisions for disposition of dead or injured animals are described in the section 10(a)(1)(B) Permit.

7.0 CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a) (1) of the ESA direct Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are Service suggestions regarding discretionary agency activities to promote the recovery of listed species.

The process of developing an HCP essentially necessitates the incorporation of this approach into the planning process. In the case of the Kauai Lagoons HCP, the Service intends to coordinate with Kauai Lagoons and DOFAW to maximize potentially mutually beneficial conservation actions with actions being undertaken within and around the project area.

8.0 RE-INITIATION NOTICE

This concludes formal consultation and conference on the proposed issuance of the section 10(a)(1)(B) incidental take permit to Kauai Lagoons, LLC. As required in 50 CFR §402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in these opinions; (3) the agency action is subsequently modified in a manner that causes an adverse effect on a listed species that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

The Service will confirm the conference opinion as a biological opinion issued through formal consultation if the band-rumped storm-petrel is listed during the 30-year Permit term. If the Service

reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

After listing of the band-rumped storm-petrel as threatened or endangered and any subsequent adoption of this conference opinion, the Service shall reinitiate consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in these opinions; (3) the agency action is subsequently modified in a manner that causes an adverse effect on a listed species that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the band-rumped storm-petrel has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the band-rumped storm-petrel may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

If you have any questions regarding any of the information contained in these Opinions, please contact Fish and Wildlife Biologist Michelle Bogardus, Consultation and Habitat Conservation Planning Program (phone: 808-792-9400).

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