



Honopū Seabird Conservation Initiative

Newell's shearwater, Hawaiian petrel, band-rumped storm-petrel

Implementation Plan

March 2019



Objective

The objective of this 5-year partnership supported with funding from the Department of Defense Readiness and Environmental Protection Integration (REPI) program is to improve the baseline ecological condition of three federally and State of Hawai'i listed endemic seabirds on the island of Kaua'i, specifically Newell's shearwater (NESH; *Puffinus auricularis newelli*), Hawaiian petrel (HAPE; *Pterodroma phaeopygia sandwichensis*) and the Hawai'i distinct population segment of the band-rumped storm petrel (BSTP; *Oceanodroma castro*).

Summary

Commander, Navy Region Hawai'i (CNRH), Pacific Missile Range Facility (PMRF); United States Fish and Wildlife Service (USFWS); Hawai'i Department of Land and Natural Resources (DLNR), Hawai'i Division of Forestry and Wildlife (DOFAW) and the National Fish and Wildlife Foundation (NFWF) are partnering on this important initiative to establish an effective predator control program in Honopū Valley to reduce impacts on listed seabirds thereby allowing for successful breeding and over the long-term, increased site use. The predator control program will focus on invasive species including rats, feral cats, feral pigs, additional ungulates and barn owls (*Tyto alba*). The predator control program will benefit listed bird species by reducing predator numbers and predation pressure on seabird populations through strategic fencing, removal, and sustained long-term control. Project activities will also include habitat restoration and social attraction. Program activities align with the goals and objectives of the Hawai'i State Wildlife Action Plan (2015) and the Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel Recovery: Five-year Action Plan (2015). This 5-year Implementation Plan identifies performance measures (i.e. monitoring and metrics) to ensure the effectiveness of the program.

Conservation need & conservation overview

Kaua'i is home to an estimated 90% of the world population of NESH and supports important local populations of HAPE and BSTP. Raine *et al* (2017) reported declines of 78% (6% annually for HAPE) and 94% (13% annually for NESH), respectively, from 1993 to 2013 radar survey data for HAPE and NESH on Kaua'i. Threats contributing to declines of these endemic seabirds include collisions with powerlines and other structures; light attraction and fallout; predation from feral cats, ungulates (e.g. feral pigs), barn owls, and rats (including black, Norway and Polynesian); and habitat modification within breeding colonies due to invasive plants and pigs. Variable marine productivity is a potential contributing factor in some years.

Ongoing conservation efforts to mitigate threats for these species include minimizing or shielding necessary artificial lights; technologies to minimize powerline collisions (using lasers and line reflectors); protection of colonies using ungulate and predator exclusion fencing, predator control, and habitat management; and creation of supplemental colonies within protected areas free from most threats (e.g. translocation of seabird chicks to a coastal predator free refuge). Monitoring is yielding critical information on predator impacts as well as bird breeding metrics, distribution and is assisting with

identification and assessment of new colony locations. Fencing assessment and prioritization projects are helping to develop a conservation planning roadmap for future site protection efforts. However, in addition to these efforts, funding is needed to protect existing colonies within fences, and should focus on existing colony locations with concentrations of birds in montane areas that are logistically feasible for construction. The creation of new colonies within predator enclosures using assisted-colonization techniques, such as social attraction will also be critical for long-term population sustainability and protection.

The proposed focal location (see below) aligns with site protection needs for these species and leverages existing project prioritization and planning efforts to explore and initiate implementation of conservation fencing options. This site implementation plan will address several key conservation actions identified in the Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel Recovery: Five-year Action Plan including efforts to protect and enhance existing colonies, reestablish extirpated colonies, create new colonies in suitable areas, and mitigate existing and new threats by implementing and monitoring prioritized management actions at the species level.

Geographic focus

The project location is within Honopū valley, on the northwest shore of Kaua'i and adjacent to Kalalau. This is one of the larger and more remarkable valleys of the famed Nā Pali Coast. With its lower reaches inaccessible except by boat, and the imposing, near vertical cliffs dropping precipitously from approximately 3,600 feet in elevation down to 400 feet, Honopū is a remarkable landscape feature of the iconic coastline. This project will focus management on the upland area above the valley rim, where there is a near pristine expanse of native forest and shrub land, bisected by four intermittent streams. The area, referred to generally as Honopū is defined on the ground by the ridge which separates Kalalau valley from Honopū on the northeast side, down to the ridge that separates Honopū valley from Awa'awapuhi valley on the southwest side. Bounded on the east by Koke'e Road around 4,100 feet in elevation, the area has a leeward northwest aspect that gradually decreases in elevation down to approximately 3,600 feet at the upper extent of the Honopū valley rim on the western side.

The project area within Honopū valley includes DLNR managed lands; Kōke'e State Park (Division of State Parks (DOSP)) and Nā Pali-Kona Forest Reserve (DOFAW). The 264-acre project area contains native forest and habitat important for the survival of many rare and endangered plants and birds. Initial surveys of the Honopū area located four burrows of the endangered NESH or 'A'o (Figure 1). Honopū represents the only known dry mesic forest colony of this species, which is otherwise known to utilize wet montane forests.

The goal of this seabird restoration program is to enhance the viability of target seabirds by increasing population size through improved survival and reproduction. The anticipated changes in productivity and survival will result in an increase in long-term viability of populations. Overall, two of three focal

species (HAPE and NESH) are at risk of extinction in the next 100 years¹; strategies and actions in this plan have the potential to reduce extinction risk.

Honopu Threatened and Endangered Seabirds

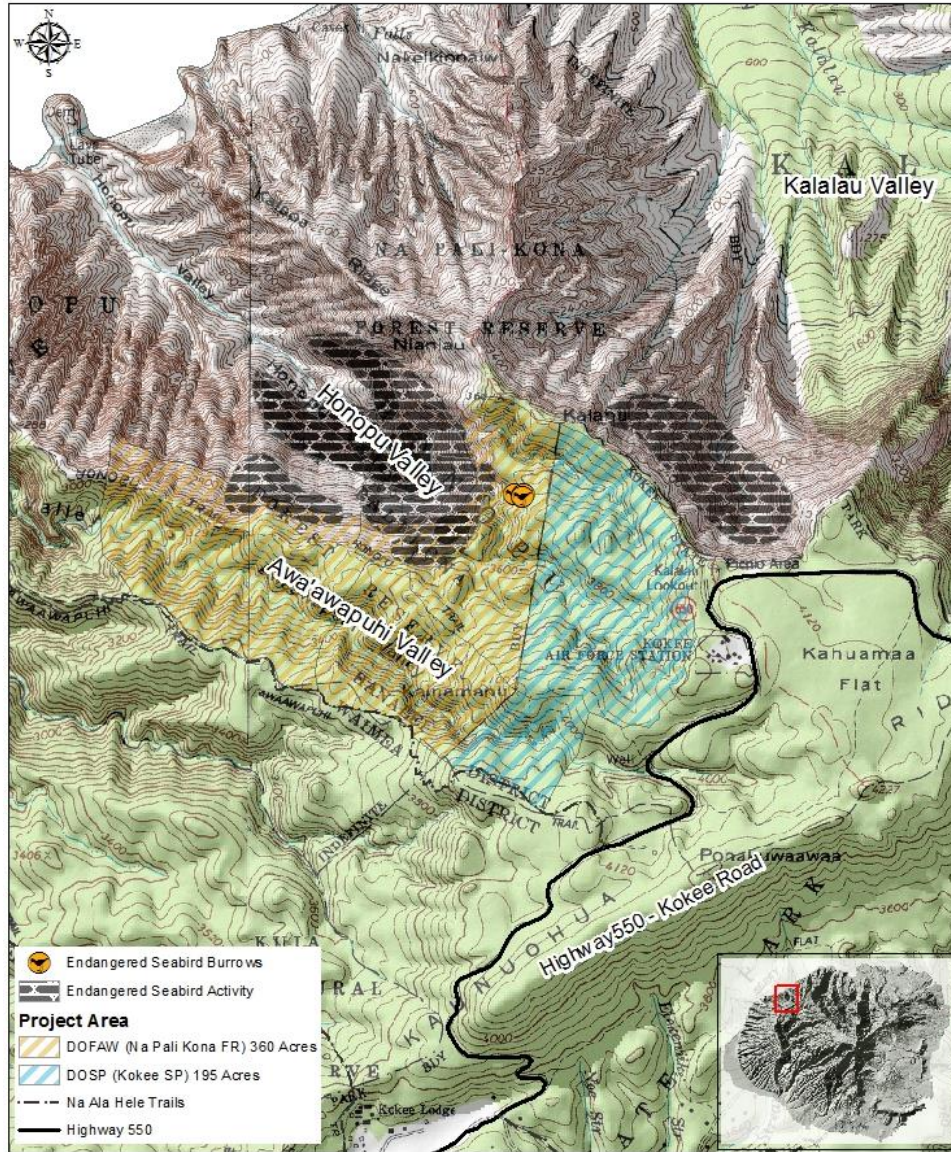


Figure 1. Seabird hotspot locations in Honopū valley

¹ Seabird conservation strategies, coastal conservation action lab, University of California Santa Cruz, March 2018. Unpublished report. 9pgs

Anticipated Goals/Outcomes:

The goals of this program are:

- i) **Goal:** Increase Newell's shearwater fledgling success 40% (from an estimated 0.5 to 0.7 chicks per pair)²
- ii) **Goal:** 264 acres with predator reduction goals met
 - (1) **Goal:** 100% removal of predators from within the completed predator fence;
 - (2) **Goal:** 100% cat and rat control across 264 acres of habitat within ungulate fencing
 - (3) **Goal:** 100% removal of ungulates from within the completed ungulate fence

Overall program investments will result in the following short and long-term gains for listed seabirds:

- i) Increased reproductive success (short-term demographic indicator)
- ii) Increased burrow density/occupancy (population proxy)
- iii) Increased call rates (population proxy)
- iv) Decreased egg/chick/adult predation (survival proxy)
- v) Improved seabird nesting habitat

Implementation plan

This program will focus investments on the three target seabirds and outlines strategies to improve baseline ecological conditions of listed seabirds on Kaua'i. Overall, the principal threats and types of conservation actions necessary to secure seabird populations in Hawai'i are well understood. Strategy level results chains for the management of non-native, invasive animals highlight the relationships between threats and the sequence of strategies-to-outcomes by which we intend to reach programmatic goals (Figure 3)³. Effectiveness of conservation actions and strategies will be measured through assessment and monitoring.

² Baseline and goal information summarized from Greismer and Holmes 2011 and Raine et al 2016a +b.

³ The included results chains is from NFWF's Pacific seabird program business plan. It is included as an illustration of the steps needed to develop/implement a predator strategy and the potential outputs/outcomes of supported actions

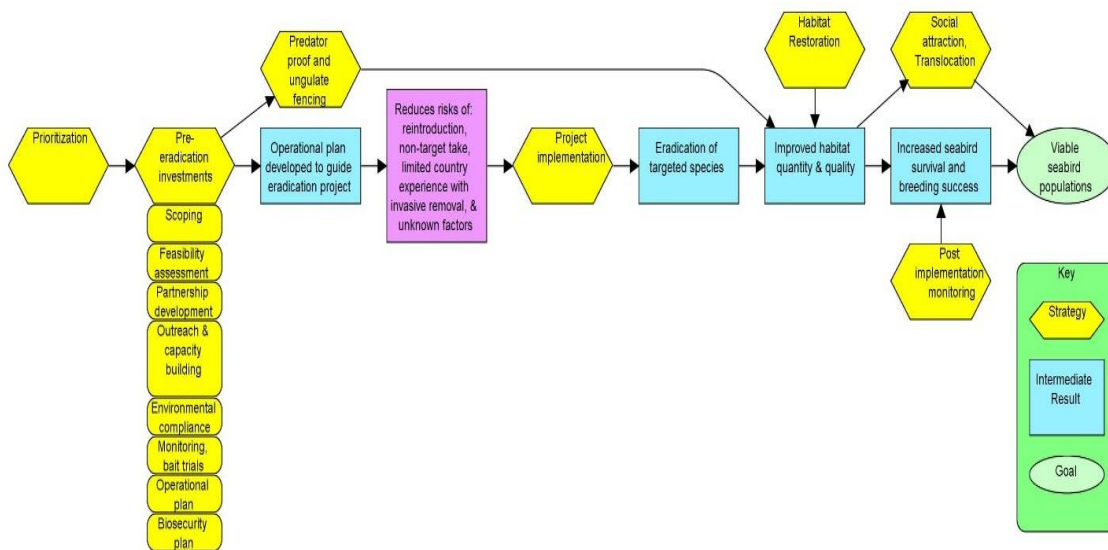


Figure 2. Results chain depicting the sequence of strategies-to-outcomes for invasive management strategies

Fencing/predator management

Control and removal of invasive animals typically offers a rapid and impressive return on seabird conservation investments. In more than 200 eradications of invasive predators worldwide where seabirds were the principal beneficiary, approximately 75% resulted in a rapid increase in reproductive success, survival of adults, or re-colonization by seabirds (Jones *et al.* 2016). This collaborative project will support the removal of non-native invasive animals (fencing) for focal species; this plan will support all phases of project development and will leverage ongoing and existing work where possible – the project life cycle includes 1) project *scoping*; 2) an *assessment*; 3) securing *partnership agreements* and developing a communication strategy including *outreach and capacity building*; 4) completion of *environmental compliance review*; 5) support for *pre-implementation ecological monitoring*; 5) development of an *operational plan*; 6) *project implementation* and 7) *post-implementation monitoring* to assess success/ecological benefits.



Along with four predator-proof fences that are in various stages of planning for Kaua’i (light HCP – 1; KIUC island wide HCP – 2; Pohakea fence), this project aims to provide refugia for endangered seabirds that will be bolstered by predator control, social attraction and habitat management.

Predator-proof fencing is a proven technology developed in New Zealand. To date more than 50 fences have been constructed (Young *et al.* 2012). These fences are capable of excluding non-native animals as small as a baby mouse and are designed to prevent animals from digging under or climbing over the fence. The use of predator-proof fencing is the best alternative in landscapes too large and complex to attempt an eradication; fences thus increase management efficiency by shifting the focus from control to local eradication. In Hawai’i, the use of predator-proof fencing is especially promising because it can protect an entire ecosystem, including native vegetation, and has value in locations where birds and

other native species are free from introduced predators (Young *et al.* 2012). Ungulate fencing in combination with predator control is a secondary and viable alternative to predator proof fencing for protecting seabirds in Hawaii – there are several notable control and fencing programs on Kaua’i and Maui (Raine et al 2019 a+b, Raine (*Upper Limahuli, Kauai*), Penniman (*Kahikinui, Maui*) and Bailey (*Haleakala NP, Maui*) pers comm) that are resulting in positive seabird response.

- 1) This project will construct two fences in Honopū Fencing materials would need to be delivered to the site by helicopter. There are two known NESH burrows in the proposed location and a third unidentified burrow. The site is adjacent to BRSP nesting areas. The identified NESH burrows represent the only known dry mesic forest colony of this species. The project area contains native forest and habitat important for the survival of many rare and endangered plants and birds.
 - a. Construction time is approximately 2-4 months for the predator proof fence.
 - b. Honopū ungulate fence (see draft Honopū Natural Resource Protection and Management Project plan for details unpublished document – an ungulate fence will provide reduced protection for listed seabirds without a corresponding long-term commitment to predator control efforts) but will provide strong protection for surrounding seabird habitat and endangered plants.
 - i. Construction time 2-4 months
 - c. Vandalism risk needs to be evaluated
 - d. **TOTAL ESTIMATED BUDGET (two HONOPŪ fences) = \$1,296,500**
 - i. Long-term funding for predator control costs & fence maintenance is contingent on state budgets (see Long-term maintenance section).
 - ii. **Additional leverage, and cost share with other funds will be important for ensuring success.**
- 2) Expected bird return based on current data from other managed sites (see monitoring and metric section - data assume that the site has no current or limited predator control - the boost in success is due to reduction/removal of predation threat via fence construction & predator control).

Honopu Proposed Fences

-  Predator Proof Fence
-  Honopu Ungulate Fence (264 ac)

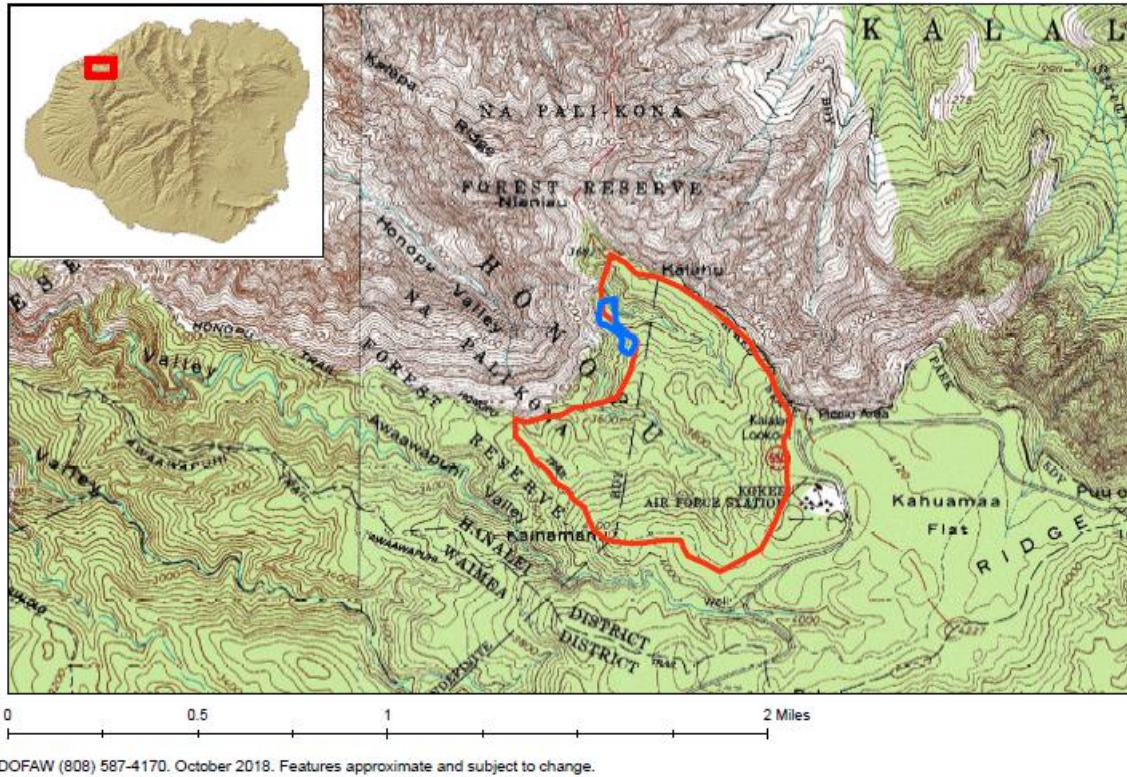


Figure 3: Proposed Honopū fence alignments

Restoration

In addition to fencing, predator control and social attraction, as funding permits, this project will support restoration that enhance seabird habitat. Restoration projects will be conducted in conjunction with or following the eradication of non-native invasive animals from within fences.

- 1) Habitat enhancement (invasive control)
 - a. Develop a strategy for incipient weeds within and adjacent to planned fences to improve nesting habitat
 - b. Implement strategy using approved methods (chemical, manual and/or biological control).
 - c. Monitor management efficacy to determine if weed control measures are effective
 - d. High priority habitat-modifying invasive weeds include:
 - (i) Kāhili ginger (*Hedychium gardnerianum*)
 - (ii) Australian tree fern (*Sphaeropteris cooperi*)
 - (iii) Blackberry (*Rubus argutus*)
 - (iv) Strawberry guava (*Psidium cattleianum*)
 - (v) Butterfly bush (*Buddleia asiatica*)

- (vi) Bushy beard grass (*Schizachyrium condensatum*),
- (vii) Lantana (*Lantana camara*)
- (viii) Fire tree (*Morella faya*)

Budget

HONOPŪ	Cost	TOTAL	REPI	Other ⁴
1. Predator proof fence (~3 acres)		\$506,500⁵	\$340,000	\$166,500
1.1 Pre-site seabird monitoring	\$12,500		\$12,500	
1.2 Pre-construction planning (compliance)	\$10,000			\$10,000 (DOFAW)
1.3 Fence materials	\$146,000		\$121,000	\$25,000 (NFWF)
1.4 Fence construction (labor)	\$117,000		\$67,000	\$50,000 (NFWF)
1.5 Fence construction (helicopter transport))	\$129,000		\$79,000	\$50,000 (NFWF)
1.6 Predator removal	\$35,000		\$29,500	\$5,500 (NFWF)
1.7 Social attraction/artificial burrows	\$6,000		\$6,000	
1.8 Post-construction habitat restoration	\$20,000			\$20,000 (DOFAW)
1.9 Post construction seabird monitoring (annual)	\$12,500		\$25,000 ⁶	
1.10 Fence maintenance (annual \$)	\$6,000		-	\$6,000 (DOFAW)
2. Ungulate fence (~264 acres)		\$765,000⁷	\$560,000	\$215,000⁴
2.1 Pre-site seabird monitoring	\$20,000		\$20,000	
2.2 Pre-construction planning (compliance)	\$10,000			\$10,000 (DOFAW)
2.3 Fence materials	\$110,000		\$110,000	
2.4 Fence construction (labor)	\$200,000		\$150,000	\$50,000 (DOFAW)
2.5 Fence construction (helicopter transport)	\$180,000		\$160,000	\$20,000 (DOFAW)
2.6 Ungulate removal/predator control (traps)	\$120,000		\$80,000	\$40,000 (DOFAW)
2.7 Post-construction habitat restoration (2-year costs)	\$80,000			\$80,000 (DOFAW)
2.8 Post construction seabird monitoring (annual)	\$20,000		\$40,000 ⁸	

⁴ Funding categories and amounts are estimates for non-REPI support

⁵ Includes two years of post-construction monitoring

⁶ Two years of post-construction monitoring

⁷ Includes two years of post-construction monitoring

⁸ Two years of post-construction monitoring

2.9 Annual fence maintenance	\$15,000			\$15,000 (DOFAW)
3. Barn owl control (annual)	\$12,500	\$25,000⁹		\$25,000¹⁰
TOTAL BUDGET		\$1,296,500	\$900,000	\$396,500

Long-Term Maintenance

The Hawaii division of forestry and wildlife (DOFAW) is committed to the long-term maintenance of all aspects associated with this project including but not limited to: all fences, seabird attraction devices (burrows, call sound devices, decoys, etc.), predator traps, weed control, etc. While all activities are dependent on continued funding that inevitably fluctuates, DOFAW is permanently including the above work into its ongoing work plan for this area and the work will be primarily performed by Kauai’s Natural Ecosystems & Protection Management Program. As funding and staff allow, all work completed on this project will be maintained in perpetuity.

Permits

The following permits/approvals are expected to be required related to the work that would be conducted at Honopū Valley.

Permits/Authorities needed by project applicants/contractors:

Permit	Statute	Approval Authority	Time required to obtain (weeks/months)	Submitted by:	Awarded to:
Conservation District Use Permit	HRS Ch. 13-5	DLNR/OCCL	1 month	DOFAW	DOFAW
Hawaii Environmental Review*	HRS Ch. 343 & HAR section 11-200-8	BLNR (Exemption)	2 weeks	DOFAW	DOFAW
Historic Preservation**	HRS Ch. 6E-42 & HAR 13-284	?		DOFAW	DOFAW or Contractor
Special Use Permit		DOFAW	2 weeks	DOFAW	DOFAW
Endangered bird handling authority		DOFAW	2 weeks	DOFAW	DOFAW or Contractor
Fence line delineation approval (to avoid listed plants)		DOFAW	1 month	DOFAW	DOFAW
Special Use Permit		Division of Parks	2 weeks	DOFAW	DOFAW
Recovery permit for handling T&E species (seabirds)***		USFWS	Up to 135 days (see below)	Project lead	Project lead

⁹ Two years of barn owl control are included in the budget

¹⁰ Current NFWF funding to the state of Hawaii is supporting two years of Barn Owl control – sites include Honopū

Need to add in BLNR for approval to go out for Invitation for Bid to contract ungulate and predator fence building, predator control and seabird monitoring

* This project requires compliance with the State of Hawai'i environmental review process (Hawai'i Revised Statutes [HRS] Chapter 343), which requires consideration of a proposed Project's effect on cultural practices and resources. The project is anticipated to have minimal or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment under the above exemption classes. The Department is anticipating filing a Declaration of Exemption regarding the preparation of an environmental assessment under the authority of Chapter 343, HRS and Section 11-200-8, HAR under Exemption Classes 1,2,3,4, 5, 6, and 10, which were reviewed and concurred by the Environmental Council on July 18, 2011 and June 12, 2008.

** Historic preservation review under HRS Chapter 6E-42 and Hawai'i Administrative Rules (HAR) Chapter 13-284 will also be completed. Due to the remote nature of the project, the Department anticipates requesting the State Historic Preservation Division concur with a determination that the proposed project will have "no adverse effect to historic properties."

*** Recovery Permit for handling T&E species (Seabirds)

Time required to obtain:

- A new permit or an existing permit but need to be amended to add this project
 - Both will have to be analyzed under the Section 7 process. Formal consultation will take up to 135 days after all the information required to do the consultation is submitted. Some time may be needed before and after for routing through the regional office.³

Submitted by: Entity doing the work for seabirds

- If the entity doing the work is already permitted, then will need to get their permit amended to add this project to the permit.
- If the entity is not currently permitted and requesting to obtain a recovery permit, then they will have to apply for a new recovery permit.
- If entity such as KESRP working under a Section 6 agreement, then will not need to get permit and there will be no time required to do the work.

Monitoring plan & evaluating performance

This program will support monitoring of proxy population parameters including reproductive success (also burrow occupancy, burrow density and call rates) to assess response to conservation actions. While we ultimately expect longer-term population scale responses for focal species, those outcomes will not be realized until after the 5-year time-frame covered by this plan.¹¹ Reproductive success data expressed as the number of chicks fledged per pair provides an accurate indicator of within season breeding performance and an index of potential future recruitment class strength.¹²

In addition, this project will support collection of data reporting on intermediate outcomes of threat reduction activities (i.e. predators removed, acres with predator reductions goals met). At the finest scale, individual projects will be required to develop metrics and monitoring to assess implementation of the work and whether the goals were achieved. Monitoring will be conducted by grantees and where appropriate will follow published best practice guidelines or standardized methods. Contracting to independent monitoring programs or review of monitoring plans is an option for specific projects. Collection of pre-construction baseline predator and seabird data is critical for gauging program success.

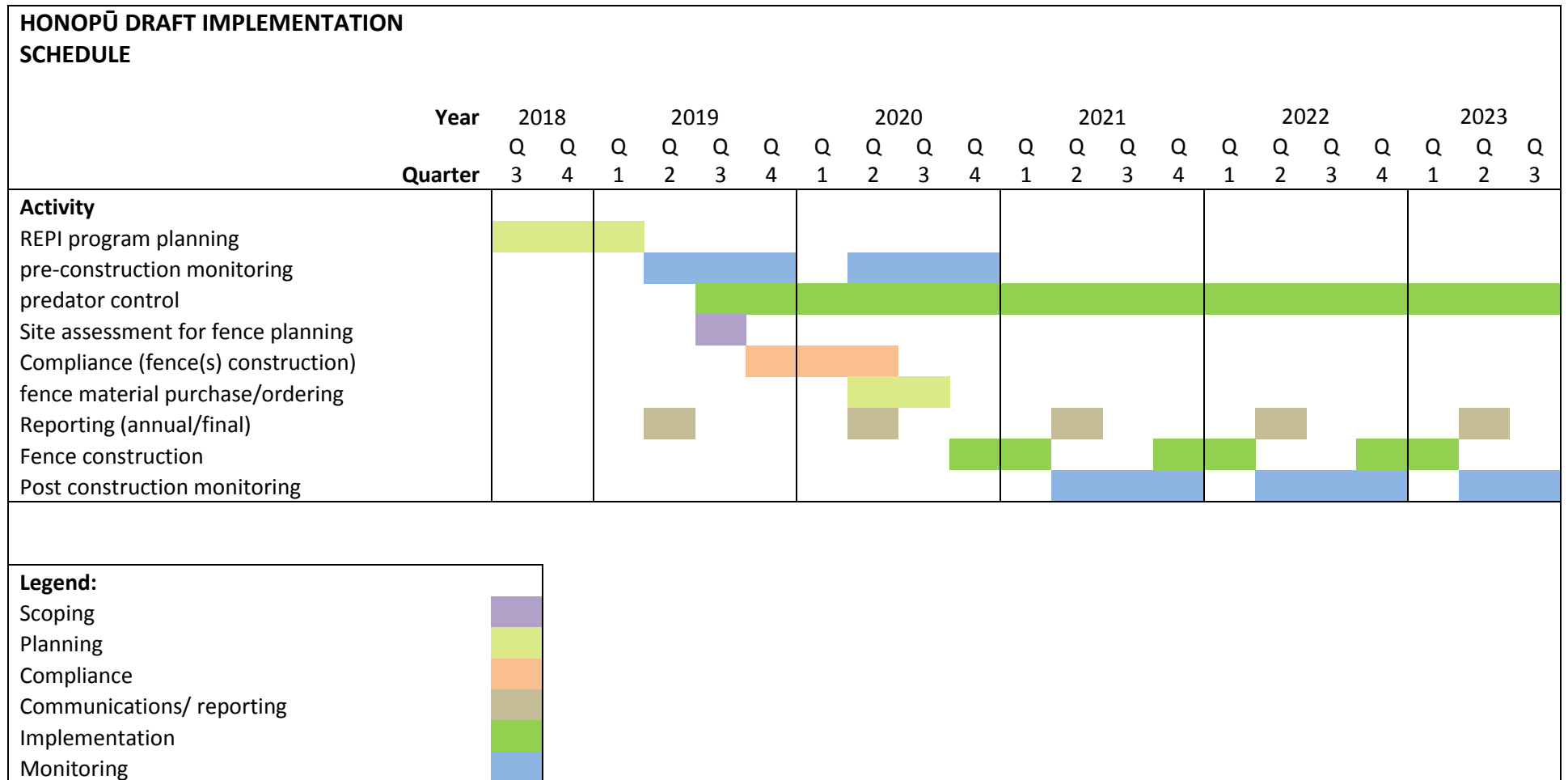
¹¹ Collecting species-specific population data for focal seabirds in a 5-year business plan (investment strategy) is not feasible due to life history constraints (delayed age of first breeding) and lag-times between treatment and response for restoration activities.

¹²While PVA (population viability analysis) sensitivity analyses show that adult and juvenile survival rates are the most sensitive parameters influencing seabird population demographics (Cuthbert et al 2001), collecting these data requires long-term mark-recapture studies.

Proposed Metrics

- a. Predator reduction
 - i. # predators removed
 - ii. # ungulates removed
 - iii. # acres with predator reductions goals met
- b. Seabird metrics
 - i. Average # chicks fledged
 - ii. Average call rate
 - iii. # of active burrows
- c. Habitat restoration
 - i. # acres restored (invasive plants removed and/or native species established)

Proposed timeline



Literature cited

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Young, L.C. & E. Dittmar. 2018. Feasibility assessment of predator exclusion fencing to protect Newell's Shearwater and Hawaiian Petrel nesting locations on Kaua'i: Pacific Rim Conservation. Unpublished report. 30 pp.

Potential timeline (details)

- b) Year 1 (7/2018 to 7/2019)
 - a. RFP/Implementation plan
 - b. Awards
 - c. Site visit/scoping planning (as needed)
 - d. Initiate pre construction bird/predator monitoring (Camera traps/songmeter/ site visits)
 - e. Initiate predator control
 - f. Initiate fencing compliance (**Honopū predator fence**)
 - g. Complete annual reporting
- c) Year 2 (7/2019 to 7/2020)
 - a. Complete fencing compliance (**Honopū predator fence**)
 - b. Order fencing material (**Honopū predator fence**)
 - c. Continue pre-implementation monitoring
 - d. Continue predator control
 - e. Initiate fencing compliance (**Honopū ungulate fence**)
 - f. Complete annual reporting
- d) Year 3 (7/2020 to 7/2021)
 - a. Initiate/complete fence construction (**Honopū predator fence**)
 - b. Predator removal from completed fence(s)
 - c. Install artificial burrows
 - d. Initiate social attraction
 - e. Continue predator control
 - f. Initiate post implementation monitoring (fencing, plants control, predators/ungulates, seabirds)
 - g. Complete fencing compliance (Honopū ungulate fence)
 - h. Develop invasive plant control plan (target species/strategies/locations to improve seabird habitat)
 - i. Complete annual reporting
- e) Year 4 (7/2021 to 7/2022)

- a. Initiate/complete fence construction (**Honopū ungulate fence**)
 - b. Ungulate removal from completed fence
 - c. Continue predator control
 - d. Initiate habitat restoration
 - e. Continue post implementation monitoring (fencing, plants control, predators/ungulates, seabirds)
 - f. Complete annual reporting
- f) Year 5
- a. Continue predator control
 - b. Continue habitat restoration
 - c. Continue post implementation monitoring (fencing, plants control, predators/ungulates, seabirds)
 - d. Complete final report