Evaluation of the National Fish and Wildlife Foundation Pacific Seabird Program

Final Report

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by

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EXECUTIVE SUMMARY

The National Fish and Wildlife Foundation's (NFWF) Pacific Seabird Program (PSP or the Program) represents a significant investment towards the goal of reversing population declines of some of the most imperiled seabird species through strategies to increase their survival and reproductive success. The Program focuses its efforts across four Pacific geographies: Alaska, Hawaii, Chile, and the California Current System. The Program's investments fund planning, research, implementation, outreach and education, monitoring, and other activities across six core strategies:

- Removal of non-native, invasive animals
- Removal of non-native, invasive plants (habitat restoration)
- Reduce seabird bycatch
- Capacity building (disturbance management and education)
- Fill information gaps
- Protect seabird foraging locations and forage prey base

The Program's investments focus on ten species: Ashy Storm-petrel, Black-footed Albatross, Hawaiian Petrel, Kittlitz's Murrelet, Laysan Albatross, Newell's Shearwater, Pink-footed Shearwater, Red-legged Kittiwake, Townsend's Shearwater, and Xantus's Murrelet. Over 50 additional seabird species are expected to benefit as well.

Evaluation Questions and Findings

1. To what degree is the Program on track for achieving its goals? To what extent has the Program achieved on-the-ground implementation of its core objectives?

On the whole, the PSP is on track for achieving its goals. Of the 41 projects evaluated, nearly all projects are making steady progress towards near- and mid-term goals and benefits to focal species, with only three projects having experienced significant setbacks or delays. Given the mid-course timing of this evaluation along with the long time horizon associated with many of the conservation goals and outcomes, most anticipated impacts on focal and other species have yet to be realized. Project accomplishments achieved up to the point of this evaluation consist mostly of what can be considered pre-investment activities, such as information collection and analysis, research, and stakeholder engagement, which are steps to support and inform future conservation actions. Fewer projects have completed implementation activities, such as invasive animal eradication or invasive plant removal. However, given what has been accomplished thus far, the Program is on track and, in a few cases, on-the-ground benefits for focal species (e.g., Laysan Albatross, Pink-footed Shearwater, Townsend's Shearwater), as well as additional seabird species, are already or will soon be realized. For example, a multistage project to remove an invasive plant called *Verbesina* from two islands in the Midway Atoll National Wildlife Refuge is well on its way to achieving its

eradication goals for this invasive plant with over 500 combined acres on two islands already treated and an expected full island eradication on Eastern Island. Because the potential impact of *Verbesina* removal poses substantial benefits (e.g., 100% increase in breeding success) to Laysan Albatross, this project is an important investment that is expected to see immediate and dramatic increases in nesting performance. (See Appendix H for more information on this project and other Program highlights).

2. Were the initial scope and selection of focal species and strategies appropriate to the conservation need? Is NFWF addressing priority needs with the appropriate strategies?

NFWF's selection of focal species is appropriate and strategic with respect to maximizing overall seabird conservation gains. This assessment takes into account NFWF's institutional limits of focus on species and geographies of highest U.S. national concern. The appropriateness of NFWF's current portfolio of conservation strategies is supported by the results of our seabird expert survey, grantee and global seabird expert interviews, and the literature. Invasive animal removal and fisheries bycatch reduction are appropriate strategies for many of the PSP's focal species. Improving seabird-nesting habitat via plant restoration is an appropriate strategy for a small, but important, subset of PSP's focal species. Protecting seabird foraging locations and prey base is an appropriate strategy for a subset of PSP's focal species, though the ability to completely realize the conservation benefits of this strategy remains highly uncertain. Filling information gaps is an appropriate strategy for a subset of PSP's focal species, particularly those species that are data-deficient with respect to having adequate scientific information for conservation management and planning. Lastly, NFWF's investment in capacity building activities plays an appropriate—and in fact critical—role in a large portion of projects in the PSP portfolio.

3. What is the added value or contribution of the Program across the conservation landscape? What is the Program's greatest point of leverage and why?

The PSP is contributing to the conservation landscape by stimulating partnerships and increasing organizational capacity. These developments facilitate grantees' ability to scope and initiate new projects, as well as pursue and secure additional funding to implement new projects. One of the PSP's greatest points of leverage is its diversified portfolio – a portfolio that includes multiple strategies that balance pre- and post-investment activities with on-the-ground conservation actions focused on both short-term *and* long-term benefits to seabirds. As one of two major funders of seabird conservation in the philanthropic sector (along with the David and Lucile Packard Foundation), NFWF plays a leadership role, thus these investments significantly influence the conservation landscape. NFWF is distinct in that the PSP is able to leverage its investment more than twofold with matching fund requirements.

RECOMMENDATIONS

Recommendations are categorized into two priority areas: primary (i.e., recommendations to keep the Program on track for realizing its objectives in both the short and long terms), and secondary (i.e., recommendations to strengthen grantee projects and the Program's administrative processes). Primary recommendations are presented below.

Primary Recommendations

1. Maintain PSP focal species and geographies

We recommend maintaining current focal species and geographies, given that PSP investments must target seabirds that breed or forage in U.S. waters, and evaluation findings did not indicate obvious gaps in the PSP focal species selected. Given the suite of high-impact conservation projects that NFWF is already supporting and the funding gaps associated with many of those projects, expanding the Program's priority species or geographies puts at greater risk the successful completion of those projects. Program expansion may be warranted in the case of specific opportunities that are clearly high impact and low risk.

2. Maintain PSP core strategies

We recommend that the Program continue to support a diversified project portfolio of the six core strategies, using the present investment allocations as a guideline for PSP investments. The PSP should build upon the current achievements of projects in each core strategy by continuing investments in both conservation action and pre- and post-investment projects that collectively impact seabird conservation over the short and long terms. We recommend taking a risk-return perspective when making investment decisions:

a) Keep investments in *invasive animal eradication* high, allowing projects under this strategy to continue to play a dominant role in the PSP investment portfolio. The conservation returns of this strategy are high while operational and biosecurity risks are relatively low and manageable.

b) Continue to invest in *invasive plant eradication/habitat restoration* as a long-term strategy where the link to seabird benefits is strong and capacity and likelihood of success are also strong. The conservation returns of this strategy can be high. However, without long-term commitment to eliminate the seed bank and achieve full eradication, the risks are also high.

c) Continue to invest in *fisheries bycatch mitigation* with organizations and in regions where enabling conditions are in place and stakeholder engagement is high. The conservation returns of this strategy are potentially high; however, the operational risk is elevated if there is insufficient engagement of fisheries, risking low adoption of voluntary bycatch mitigation techniques.

d) Continue to invest in *capacity building* efforts with organizations that have, or are poised to develop, a robust local presence and technical capabilities for outreach, education, and conservation. The conservation returns of this strategy are high for paving the way for conservation actions and sustaining conservation gains. However, the risk of failing to achieve stakeholder buy-in—and subsequent conservation gains—is elevated when organizational capacity for conducting appropriate outreach, education, and conservation actions is weak.

e) Continue to fund projects to *fill information gaps*. The risk of not supporting basic research is high, not only for data deficient species (such as those currently funded by NFWF), but also for the field, which relies on empirical evidence to make informed decisions about conservation techniques.

f) Continue to fund the *protection of foraging locations and prey base* by supporting projects that have a concrete link to plans for conservation actions. The conservation returns of this strategy are high; however, the probability of achieving those returns is difficult to predict because benefits to seabirds rely on management and policy changes that are outside the scope of the Program.

3. Facilitate stakeholder engagement and strong partnerships

Successful stakeholder engagement can help to garner broad support for implementation as well as bolster sustainability of project activities and outcomes. We recommend that NFWF continue to foster effective stakeholder engagement and strong partnerships to strengthen PSP projects and maximize results.

a) Continue to fund projects with experienced staff and strong partnerships that have demonstrated expertise in and capacity to conduct effective outreach and engagement. Be selective with respect to funding applicants that have strong in-country leadership, capacity, interest, and relationships.

b) Continue to fund projects with explicit planning phases that support outreach and education activities to lay the foundation for effective implementation.

c) Given that stakeholder engagement and strong partnerships were key factors that strengthened project implementation, continue to provide sufficient time and resources for grantees to build relationships upfront and throughout the project.

4. Leverage PSP investments to further impact the conservation landscape

Facilitate cross-pollination and information sharing among grantees. Leverage the gains made by grantees in acquiring further funding outside of NFWF by partnering with funding entities to potentially have greater impact on seabird conservation. To maintain relationships with grantees, develop a systematic process for communication that is inclusive of all grantees. Develop strategies with the David and Lucile Packard Foundation's Marine Birds program to enhance the conservation landscape.

EVALUATION INTRODUCTION

This third-party evaluation for the National Fish and Wildlife Foundation's (NFWF or the Foundation) Pacific Seabird Program (PSP or the Program) falls in the fourth year of the on-going program. The timing of this evaluation means that findings presented here are formative rather than summative. Instead of reporting on end-of-cycle program accomplishments in relation to end goals, this evaluation takes an in-depth, mid-course look at where the PSP stands to date, where it is providing value, and how lessons learned from program activities can inform NFWF's planning and strategic investments. Internally, NFWF produces scorecards on an annual basis to gauge program progress against established goals (e.g., NFWF, 2014). This third-party evaluation builds upon that annual update by taking a deep dive into the Program's project portfolio.

Evaluation Goals

The overarching purpose of the PSP evaluation was to understand:

- What conservation outcomes the Program has accomplished to date;
- Where the Program has added value to seabird conservation that would not have been present without this investment; and
- How the Program can best be implemented in the future to maximize conservation goals.

To achieve these evaluation goals, we set out to address a set of evaluation questions (Appendix A) exploring the Program's status toward meeting project goals, its scope and selection of strategies and focal species, and the Program's added value and points of leverage. Together, answers to these questions help inform the primary future directions (presented in the Recommendations) the Program should pursue to continue to make its conservation impact:

1. To what degree is the Program on track for achieving its goals? To what extent has it achieved on-the-ground implementation of its core objectives?
2. Were the initial scope and selection of focal species and strategies appropriate to the conversation need? Is NFWF addressing priority needs with the appropriate strategies?
3. What is the added value or contribution of NFWF's PSP across the conservation landscape? What is the Program's greatest point of leverage and why?

This evaluation provides an opportunity for NFWF to gain an in-depth understanding of the successes, challenges, and opportunities afforded by the Program's significant investment in its funded projects portfolio so that the Foundation can ensure future planning is grounded in a robust examination of current investments.

Evaluation Methods

A utilization-focused approach guided our mixed-methods study. This approach engages program staff to ensure that evaluation findings will be useful for future program planning, improvement, and decision making (Patton, 2008). Findings presented here are based on an integrated qualitative and quantitative analysis of data from grantee documents, interviews, and an online survey. Appendix B provides additional details on data sources, data analysis, and study limitations.

Document Review The scope of the evaluation included 41 projects funded through August 2013, and included a comprehensive review of grantee documents received for those 41 projects (i.e., 41 projects with unique Easygrants ID numbers) through March 2014. These documents included project proposals, interim progress reports, and final reports covering project activities, outputs, and outcomes. Appendix C provides a complete list of PSP-funded projects, maps of the projects by focal geography, and an overview of project activities by core strategy.

Interviews We conducted 32 in-depth telephone interviews representing 40 of the 41 projects evaluated. Because a number of projects are related (e.g., multi-stage projects sometimes have two or more Easygrants ID numbers), these related projects were considered as one set of projects for the purpose of the interviews. In addition, we conducted interviews with four leading global seabird experts as well as a representative of the David and Lucile Packard Foundation's Marine Bird Program to provide additional context and perspective. Appendix D provides interview protocols used.

Online Survey We designed and conducted an online expert elicitation survey of the greater seabird biologist community to gather broader perspective on the Program's conservation approach and investments. The survey focused on NFWF's focal species, and asked seabird experts to score 42 seabird conservation and research actions with respect to each action's feasibility, scope, impact, and cost. Over 200 seabird experts answered the survey.[1] The survey protocol is provided in Appendix E, with details on survey analysis and results in Appendix F.

Return-on-Investment Analysis Our return-on-investment (ROI) analysis combines evidence-based literature with data from the document review and grantee interviews in order to provide a perspective on the long-term seabird benefits of NFWF's current investments and the risks to achieving those benefits. Each investment was analyzed and scored for its potential seabird conservation return and risk, providing a risk-return perspective across the entire PSP investment portfolio. ROI results are detailed in Appendix G.

Evaluation Context and Metrics Used

This third-party evaluation is part of a multi-tiered evaluation approach that NFWF uses to track and assess its projects and programs. At the program level, key activity output and outcome metrics associated with projects have been developed by grantees in

[1] Total number of respondents was 209. Since a 'snowball' sampling approach was used, where recipients of the survey were asked to forward it to others, a response rate was not calculated.

collaboration with NFWF. Also at the program level, NFWF and its partners work together to develop key strategies and intermediate and long-term conservation outcome goals and associated metrics. These output and outcome metrics are reported in the annual and final reports filed by project grantees. Across NFWF programs, a common conservation framework and scorecard are used to allow for comparison of progress on strategies and outcomes across diverse NFWF initiatives (NFWF, 2012, p. 60). These tools organize conservation goals into six main categories focusing primarily on habitat outcomes and threat reduction outcomes that are pre-requisites for achieving species-specific outcomes, with the species-specific outcomes making up the balance of these categories (NFWF, 2012, p. 60). In this report, we provide a review of PSP outputs, interim outcomes, and species outcomes in several formats. For each core strategy, we provide a summary of project outputs accomplished, as well as interim outcomes achieved, where reported. For each focal species, we provide a summary of reproductive and population-level outcomes, though in most cases, as we indicate, these outcomes remain 'expected' rather than achieved.

PROGRAM OVERVIEW

Background and Goals of the Pacific Seabird Program

The goal of the Program is to reverse population declines of a suite of the most imperiled seabird species, with a focus on species of national interest and priority, by increasing their survival and reproductive success. Enabled by a generous private donation in 2011, NFWF initiated the PSP as an expanded investment and commitment to the Pacific portion of its Seabird Keystone Initiative, which has been underway since 2009. Notably, the Keystone Initiative was established as "a structured means by which directed and cost-effective investments could be made towards conservation issues of high national significance" (NFWF, 2012, p. 2). Thus, it established a natural limit to the species of potential priority for NFWF to those seabirds that either nest or forage (at some point in their life cycle) in US waters, and by extension, to those focal geographies that may be used by seabirds of US national interest.[2] PSP investments focus on seabird species in four Pacific geographies: Alaska, Hawaii, Chile, and the California Current System (Figure 1). In particular, PSP investments aim to reverse population declines across ten prioritized focal species: Ashy Storm-petrel, Black-footed Albatross, Hawaiian Petrel, Kittlitz's Murrelet, Laysan Albatross, Newell's Shearwater, Pink-footed Shearwater, Red-legged Kittiwake, Townsend's Shearwater, and Xantus's Murrelet. Across the 41 projects included in this evaluation, investments represent over $9.6 million ($8.2M in seabird funds and $1.4M in other NFWF funds) in awards, with almost $15M in grantee match funding for a total budget exceeding $24 million.[3] This

[2]The Chilean Islands focal geography is included in the PSP because these islands are used by birds of national (US) interest (NFWF, 2012, p. 4).

[3]Included in this investment are three projects (out of the 41 evaluated) that are funded as part of NFWF's SBIRD strategy (Strategic Biologically Important Response and Development), which allows for

significant investment is expected to achieve substantial gains in the conservation status of the Program's ten focal species and improve population conditions for more than 50 additional seabird species across these Pacific focal geographies.

Figure 1. Focal geographies of the National Fish and Wildlife Foundation's Pacific Seabird Program

small, flexible, and rapid investments outside of NFWF's standard, bi-annual project funding cycle (up to $50,000 a year total).

NFWF Grant Making Approach and PSP Core Strategies

NFWF's PSP grant making aims to achieve clear outcomes that will benefit seabirds over the course of the Program. It also strives to ensure that seabird population gains and capacity building for seabird conservation will be sustained beyond the term of NFWF's support. Program grant making focuses, ultimately, on two key outcome indicators: increased breeding success and adult survival. The Program's approach to grant making is structured to enable NFWF's conservation partners to design and implement on-the-ground solutions to reduce, mitigate, and manage threats to seabirds. The Program's grant making includes six core strategies:

- Core Strategy 1 – Removal of non-native, invasive animals
- Core Strategy 2 – Removal of non-native, invasive plants (habitat restoration)
- Core Strategy 3 – Reduce seabird bycatch
- Core Strategy 4 – Capacity building (disturbance management and education)
- Core Strategy 5 – Fill information gaps
- Core Strategy 6 – Protect seabird foraging locations and forage prey base

These six core strategies account for the majority of the PSP investment. In addition, NFWF was able to take advantage of the opportunity to fund the purchase of 182 acres on Middleton Island, Alaska, to ensure conservation of prime seabird habitat.

Description of Funded Projects Portfolio

Overview of Projects by Geography, Core Strategies, and Focal Species

The 41 NFWF PSP projects included in this evaluation represent a total of 35 unique grantee projects located across the four focal geographies.[4] Some PSP grantee organizations have received multiple awards from NFWF for multi-year efforts. While most grantee awards are associated with projects based at a single geographic location, several awarded projects in the California Current System and Chile span across larger regions within that focal geography. In addition, a number of sites across the focal geographies are the subjects of more than one NFWF PSP award.

Many of the 41 projects evaluated include activities that apply to more than one core strategy (Table 1). For each core strategy in Table 1, the number of projects indicated equals the number of projects (of the 41 evaluated) that include activities relevant to that core strategy. Of the six core strategies, capacity building is the most common, with capacity building activities and related planning included in nearly half of the 41 projects evaluated. Removal of non-native, invasive animals is the most common core strategy in

[4] In this report, 'project' or 'projects' refers to distinct NFWF-funded projects with unique Easygrants project ID numbers, such as those indicated in the focal geography maps.

terms of implementation activities across the projects. Removal of non-native invasive plants, reduction of bycatch, research to fill information gaps, and forage prey base related projects represent the balance of the core strategies in the PSP approach.

Table 2. Number of PSP Projects Evaluated Pertaining to PSP Core Strategies

PSP Core Strategy	No. of Projects
CS 1: Removal of non-native, invasive animals	15
CS 2: Removal of non-native, invasive plants	6
CS 3: Reduce seabird bycatch	6
CS 4: Capacity building (disturbance management and education)	18
CS 5: Fill information gaps	11
CS 6: Protect seabird foraging locations and forage prey base	2
Habitat conservation (Middleton Island land purchase)	1

Most PSP projects target one or more of NFWF's focal species, although about half of funded projects include expected benefits for additional species of seabirds and other birds (Table 2).

Table 3. Numbers of PSP Projects by Focal and Other Species and Focal Geography

Focal Species	No. of Projects	Alaska	Hawaii	CCS	Chile
Ashy Storm-petrel	4			●	
Black-footed Albatross	9		●	●	●
Hawaiian Petrel	5		●		
Kittlitz's Murrelet	2	●			
Laysan Albatross	10		●	●	●
Newell's Shearwater	5		●		
Pink-footed	7			●	●
Red-legged Kittiwake	1	●			
Townsend's	2			●	
Xantus's Murrelet	4			●	
Non-focal species also	**11**	●	●	●	
Non-focal species only	**7**	●		●	

Description of Project Activities

The PSP projects include a wide range of research, planning, implementation, outreach and education, and monitoring activities across the six core strategies (see also Appendix C). Many of the current investments are focused on collecting and analyzing information, engaging stakeholders, building capacity, or navigating other processes that are expected to ultimately result in a specific conservation outcome for seabirds

but that do not usually result in immediate demographic benefits to seabird populations. Specific conservation actions such as invasive animal eradication, invasive plant removal and habitat restoration, or human behavioral change, often require extensive planning as well as implementation before on-the-ground seabird benefits (such as increased survival or reproduction) can be achieved. Additional description of project activities and accomplishments is provided in the Evaluation Findings where project outcomes and outcomes are discussed.

EVALUATION FINDINGS

Question 1: To what degree is the Program on track for achieving its goals? To what extent has it achieved on-the-ground implementation of its core objectives?

- **On the whole, the Pacific Seabird Program is on track for achieving its goals. Projects evaluated are largely on track and making good progress towards near- and mid-term goals as well as longer-term goals for seabird conservation.**
- **Of the 41 projects evaluated, seven are now complete with 34 in progress. Three projects have faced substantial barriers to accomplishing their project goals as originally planned.**
- **Overall, a variety of activities across each of the core strategies are underway, with many outputs produced and interim outcomes achieved. A few projects have reached or are close to reaching near-term species conservation outcomes.[5]**

The extent to which projects are achieving on-the-ground implementation of core objectives is described by core strategy in the sections that follow. These descriptions incorporate outcome metrics established as part of NFWF's common conservation framework where information was available, along with additional metrics that emerged from our review of project documentation.[6] Given the formative nature of this evaluation as part of the on-going Program, it was not yet possible to evaluate end-of-grant outcomes or longer-term outcomes for seabird conservation for most of the projects. While much progress is occurring across PSP projects, several factors explain the limited number of population or reproductive outcomes achieved to date:

[5] For our purposes here, species outcomes (see *Benefits to Focal Species and Other Species* and Appendix I) are limited to those conservation outcomes established as indicators of on-the-ground improvements to seabird populations, measured either by reproductive- or population-based metrics. Outputs and interim outcomes described here under each core strategy include any project outputs or outcomes that do not fit this species outcome definition.

[6] See NFWF PSP January 2014 Scorecard for more information on aggregated species and strategy metrics. Similar aggregation of these outcomes was not conducted as part of this evaluation.

1. A majority (34 out of 41) of projects are in the planning phase, or in the midst of implementation, of their seabird conservation activities and thus are not yet complete;
2. On-the-ground impact on seabird conservation (population or reproductive seabird outcomes) will not be realized within the project period due to the extended nature of seabird life history parameters (i.e., survival, reproduction); and
3. Some projects, such as those seeking to fill important information gaps, are not intended to have direct and immediate impact on biological outcomes for seabirds.

Findings we present here attempt to capture and interpret the range of project accomplishments reported, including highlights (see also Appendix H) as well as challenges, noting substantial setbacks where appropriate.[7]

In this light, three projects stand out as experiencing significant challenges to achieving project goals as originally intended at the outset. In one instance, a land tenure impasse required NFWF's partners to shift the project from one island to another to continue progress towards invasive animal eradication in the Hawaiian Islands. In another instance, in-country partners did not uphold a previous agreement, which has hampered the ability to move forward with native plant propagation and restoration on Santa Clara Island, Chile. In a third instance, though NFWF's expectations were met in terms of project outputs, a combination of challenges have prevented a project from moving forward as originally envisioned towards implementation of invasive animal removal. Challenges included substantial stakeholder concern for potential non-target impacts from the toxicant that would be used for the invasive animal eradication on southeast Farallon Island, California.

Despite these setbacks, the many projects outputs and interim outcomes already accomplished and highlighted in the following sections demonstrate that the PSP overall is well on its way to achieving on-the-ground implementation of its primary objectives for seabird conservation across its six core strategies. Also provided are summaries of the benefits to focal species (species outcomes)—achieved or expected. Discussion of the ways in which all of these accomplishments are contributing to seabird conservation, including new and developing partnerships, increased organizational capacity, and gains made in outreach and technical assistance, is provided in subsequent sections of this report.

[7] Individual projects (i.e., those with unique NFWF PSP Easygrant numbers) across the PSP portfolio include single-site, single-species, and/or single-strategy projects in some cases, while in other cases a grantee project may include one or more sites, species, or strategies, introducing additional complexity. With the large majority of projects still in progress, a triangulation of data sources and qualitative analysis (see Appendix B) was employed to develop an overall assessment of the Program's status, accomplishments, challenges, and outlook, rather than simply binning the Program's projects and categorize them as 'successful' or otherwise.

Implementation of core objectives: Outputs and interim outcomes by core strategy

Core Strategy 1: Removal of Non-Native, Invasive Animals

Removal of non-native, invasive animals makes up the largest portion of the PSP portfolio in terms of dollars of total investment and is a key component of 15 funded projects, three of which are now complete. Implementation activities are focused on the removal of invasive animals from smaller islands and the building of predator-proof fencing to protect seabird breeding areas and habitat on larger islands. Types of invasive animals being eradicated include cats, rats, mice, mink, and non-native sheep and goats. Related activities include planning, research, outreach/communication, and monitoring.

A number of interim outcomes have been accomplished as part of this core strategy, including most significantly:

- Eradication of house mice on San Benito Oeste Island, Mexico
- Eradication of sheep from Socorro Island, Mexico
- Eradication of rats on Murchison and Faraday Islands, Canada
- Completed planning for construction of a predator-proof fence at Kilauea Point National Wildlife Refuge[8]

Particularly noteworthy is the complete eradication of mice from San Benito Oeste Island, Mexico – one of the most important seabird sites in the world. This complete eradication—the first of its kind using an aerial bait application technique and the largest island from which rodents have been eradicated to date—is now confirmed. The eradication is considered one of the most important actions regarding marine birds in the last ten years. Environmental quality across the archipelago region is considered much improved and now benefits Xantus's Murrelet as well as twelve other seabird species.

Given the all or nothing nature of invasive animal eradication, many other interim accomplishments (e.g., additional invasive animals removed, yet not completed island-wide) are not listed here since eradications are not yet complete. Yet, incremental progress has been made across a number of invasive animal eradication projects. Conservation benefits of invasive animal eradication are expected for Ashy Storm-petrel, Black-footed Albatross, Hawaiian Petrel, Laysan Albatross, Newell's Shearwater, Pink-footed Shearwater, Red-legged Kittiwake, Townsend's Shearwater, and Xantus's Murrelet, as well as a variety of additional species.

Core Strategy 2: Removal of Non-Native, Invasive Plants (Habitat Restoration)

Removal of non-native, invasive plants and habitat restoration makes up the second largest portion of NFWF's PSP investment in terms of dollars funded and is a key component of six projects in three locations: Midway Atoll, Kure Atoll, and the Chilean Islands. Overall, primary activities aim to remove invasive plants and restore native

[8] Installation of the fence was completed in summer 2014.

plant communities. Related activities include herbicide applicator training, infrastructure development (e.g., greenhouses, herbicide mixing stations), plant propagation, and monitoring. Of the six projects, one project is now complete, though a significant setback occurred in that project when plans for a native plant nursery on Santa Clara Island experienced challenges.

A number of outputs and interim outcomes have been achieved across the projects. For example, a multistage project to remove an invasive plant called *Verbesina encleiodes* from two islands Midway Atoll National Wildlife Refuge is well on its way to achieving its eradication goals for this invasive plant with over 500 combined acres on two islands already treated and an expected full island eradication on Eastern Island. Because the potential impact of *Verbesina* removal poses substantial benefits (e.g., 100% increase in breeding success) to Laysan Albatross, this project is an important investment that is expected to see immediate and dramatic increases in nesting performance. (see Appendix H for more information on this project and other Program highlights). Other examples include:

Kure Atoll:

- On-going invasive plant eradication using mix of herbicides and manual removal
- On-going nursery maintenance, plant propagation, and out-planting
- Planning for seasonal facilities maintenance to support field camp personnel

Midway Atoll:

- Building and improving structures such as native plant shade houses, solar panel additions, herbicide mixing areas, roofing and sprinkler systems
- Installation of a greenhouse watering system to increase capacity of potted plants and native plant propagation
- Clearing and maintenance of trails
- Training of crews on herbicide spraying and herbicide treatment and monitoring of *Verbesina*, and other non-native plants
- Planting of Naupaka (*Scaevola taccada)* plants along unprotected shorelines to aid in sand dune formation and protection
- Census taken of Laysan Albatross and Black-footed Albatross nests

Chilean Islands:

- Erection of a cattle exclusion fence and planned electrification (Robinson Crusoe Island)
- Planting of native plants within cattle exclusion fence (Robinson Crusoe Island)
- Monitoring of survival success of native plantings within cattle exclusion fence (Robinson Crusoe Island)
- Transplanting of 7 species of native plants to two seabird colony sites (Santa Clara Island)
- Trials of two cultivation methods conducted (Santa Clara Island)

Conservation benefits of invasive plant removal and habitat restoration are expected for Pink-footed Shearwater, Black-footed Albatross, and Laysan Albatross, as well as additional non-focal species such as Short-tailed Albatross and others.

Core Strategy 3: Reduce Seabird Bycatch

Reducing seabird bycatch in fisheries is a central aim of six PSP projects evaluated, none yet completed. Project locations include the Russian Far East, the California Current System (West Coast Sablefish fisheries); and targeted fisheries in Chile, Ecuador, and Peru (three projects spanning these geographies). In addition, one project is focused on mapping the at-sea distribution of birds from Kure Atoll and assessing the overlay of threats to those birds with management jurisdictions. Bycatch reduction activities are primarily focused on outreach, training, and research to support the development and adoption of best practices and effective mitigation measures in fisheries where seabird bycatch has been documented.

Notably, in the Russian Far East, significant progress has been made towards an improved understanding of the effectiveness of streamer lines for reducing seabird bycatch in demersal longline fisheries (Pacific Cod and other fish). Four different bycatch mitigation strategies were studied, including on-board visual observations of bycatch techniques, along with engagement with commercial longline fisheries, with results showing significant reduction in seabird mortality with the use of streamer lines. Visual observations on the occurrence and distribution of Short-tailed Albatross and other seabird species near Kamchatka (Russia Far East) to determine key areas of occurrence were also made, and two papers were prepared for peer-review publication. These accomplishments represent significant progress towards a long term outcome goal of a 50% reduction in small seabird mortality in the Russian Far East by 2030.

A number of other important outputs and interim outcomes have also been accomplished including:

Chile – Ecuador –Peru:

- The identification of gillnet and purse-seine fisheries in Ecuador having high potential for seabird interactions and mortality, and implementation of observer monitoring
- Numerous outreach-related activities including meetings and coordination with:
    - Undersecretary of Marine and Coastal Management (Ecuador)
    - Pescadores Amigos de la Naturaleza (Fisherman Friends of the Environment) (Peru)
    - Fisheries Development Institute (Chile)
    - Development of a seabird field-ID guide for seabird species of northern Peru and related workshops (10), port visits (14) to help distribute and educate fishers

- Identification of driftnet and artisanal purse-seine fisheries as having high potential for mortality and interaction in Peru and a host of coordinated shore-based and at-sea activities

US West Coast:

- Completed inventory of vessels, owners, quota, and related findings
- Continued to make streamer lines available to the west coast longline fleet for free
- Visits to and distribution of outreach materials at 13 ports from Northern California to Washington and began recruitment of vessels for research at these ports
- Provided time-depth recorders to select fishery observers and fishing vessels to measure and learn more about groundline effects on sink rate and gear performance

Kure Atoll (and high-seas):

- Successfully tracked 20 Black-footed Albatross with fine-scale GPS to map foraging distribution at sea
- Assessed Black-footed Albatross overlap with longline fishing effort and illegal driftnet operations in the high-seas

Conservation benefits from bycatch reduction efforts are anticipated for Black-footed Albatross, Laysan Albatross, and Pink-footed Shearwater (PSP focal species) as well as Short-tailed Albatross (a non-focal species).

Core Strategy 4: Capacity-building

Capacity building is a central aim of nearly half (18) of the projects evaluated in the PSP portfolio, with just one completed project at the time of evaluation. Capacity building activities as defined in this evaluation include planning, research, and outreach and education-related activities that aim to increase and improve the capacity of organizations and communities to engage and be successful in seabird conservation. Many of the outputs and interim outcomes presented under the other five core strategies in this section are, or are the result of, capacity-building activities, thus capacity-building should be thought of as a cross-cutting strategy.

One important example of capacity building in this broader sense is the close collaboration between grantees, conservation partners, and the local community, demonstrated in the planning for a predator-proof fence at the Kilauea National Wildlife Refuge (Island of Kauai, Hawaii) (see also Appendix H). The success of the planning process can be credited to, among other factors, exceptional working relationships between partners, including an important local presence of one partner credited with 'knowledge, trust, and good communication,' each an important component of successful capacity building. The predator-proof fence, now erected, is the first fully enclosed fence in the national refuge system. It will enable the protection and

anticipated population growth of two PSP focal species: Hawaiian Petrel and Newell's Shearwater, with a new, translocated population for Newell's Shearwater anticipated within the fenced area by 2022.

Of the nearly half of total projects evaluated focused in some way on capacity building, six PSP projects are focused on capacity building in the context of issues not included in these other core strategies, namely, the management of human disturbance to seabirds due to traditional harvesting as well as increased human development (e.g., light at night). Some significant capacity-building outputs and interim outcomes specific to these projects include:

Alaska:

- Completion of year one of a two-year monitoring study on St. Paul and St. George Islands to understand reproductive success of Red-legged Kittiwake (Findings are being used by the local community in a population model for decision-making about sustainable harvest)

Chilean Islands:

- On-going monitoring investigations of the impact of lighting for Pink-footed Shearwater and other night-flying birds
- Five community education workshops on reducing harvest of Pink-footed Shearwater chicks and other related outreach activities (TV feature, local art/mural projects)
- Training of two individuals (park guard and island resident) on monitoring and GPS for patrols of Pink-footed Shearwater breeding areas on Isla Mocha and analysis of patrol logs for evidence of night harvesting

These capacity building activities aim to benefit Red-legged Kittiwake and the Pink-footed Shearwater and other night-flying seabirds. Across the entirety of PSP projects evaluated, capacity building activities, more broadly defined, ultimately aim to impact populations of Ashy Storm-petrel, Black-footed Albatross, Hawaiian Petrel, Laysan Albatross, Newell's Shearwater, Pink-footed Shearwater, Red-legged Kittiwake, and Xantus's Murrelet, as well as additional species.

Core Strategy 5: Fill Information Gaps

Research, or filling information gaps and producing knowledge to inform conservation planning and management, is a primary goal of eleven projects evaluated, with two projects now complete. Funded research projects aim to improve logistics, training, and pre- and post-investment monitoring, as well as to produce new knowledge about population modeling, genetics analysis, and other information useful for conservation planning and management.

Outputs produced and interim outcomes already accomplished under this core strategy include a number of monitoring efforts, analyses, research papers, database

development, mapping, and related activities. Of the two completed projects, outputs include:

- A genetic population analysis of Kittlitz's Murrelet that yielded two genetically distinct populations of Kittlitz's Murrelet, with implications for potentially distinct management strategies for the two groups (report and paper for peer-review publication)
- A population modeling analysis of potential benefits to murrelets from a reduction in predation by owls as well as potential resultant ecological interactions with mice, with emphasis on potential management actions for decreasing owl predation rates
- Research on murrelet conservation was disseminated to managers and agencies involved in murrelet restoration in California's Channel Islands

The importance of these information gap-filling efforts is exemplified by the role of Kittlitz's Murrelet research in developing new understanding about predation and nesting success rates for this candidate for federal listing under the Endangered Species Act (see also Appendix H). Basic research and long-term monitoring are both critical activities for informed, science-based conservation planning and management, yet funding for research and monitoring is increasingly scarce. The Kittlitz's Murrelet project illustrates how significant new knowledge can be brought to bear on conservation planning and can be leveraged to fill information gaps and improve decision making across the conservation landscape.

Over half of information gap-filling projects did not report interim outputs or outcomes, so data for projects in progress are sparse. Some reported outputs include:

- Mapping, monitoring and modeling of Pink-footed Shearwater populations in the Chilean Islands
- Identification and monitoring of Ashy Storm-petrel breeding populations to inform management decisions, specifically the 2013 *Endangered Species Act* (ESA) listing process[9]
- Greater protection of small breeding colonies of Ashy Storm-petrel due to the discovery of breeding and nesting locations and related outreach efforts
- Development of monitoring plans for Ashy Storm-petrel

Ashy Storm-petrel, Black-footed Albatross, Kittlitz's Murrelet, Laysan Albatross, Pink-footed Shearwater, Xantus's Murrelet, as well as other non-focal species are the foci of currently funded research and information gap filling activities.

[9] The final decision was made in 2013 by the US Fish and Wildlife Service not to list this species under the Endangered Species Act.

Core Strategy 6: Protect Seabird Foraging Locations and Forage Prey Base

Protection of seabird foraging locations and forage prey base is the focus of two projects still in progress, one of which is in the final stages of completion of related manuscripts. Activities pertaining to this core strategy are supporting development of sound science and management recommendations for better integrating seabird conservation into sustainable fisheries management.

Project outputs already accomplished include development of:

- A suite of state-of-the-science research articles for peer-review publication on the state of forage fish and predator dynamics;
- A workshop based on the state-of-the-science research and its applications to fisheries management and implementation of the 4-day workshop; and
- A database on the foraging prey base in the California Current System and database dissemination.

While notable, these findings should be considered in the context of the significant effort and challenges involved in connecting this state-of-the-science information to the policy and management decisions that will be needed to affect on-the-ground change in forage fish protection (see Appendix H). Ultimately, Ashy Storm-petrel, Laysan Albatross, Pink-footed Shearwater, and Xantus's Murrelet are the PSP focal species expected to benefit from these forage fish projects. Yet significant steps, political and otherwise, will need to be taken before seabird benefits will be realized from these efforts.

Additional Strategy – Habitat Conservation: Middleton Island Land Purchase

The PSP also contributed to NFWF's organization-wide habitat conservation goal with its purchase of just over 182 acres from private ownership on Middleton Island, Alaska, which now allows for the future conservation and management of thriving colonies of pelagic birds, waterfowl, passerines, shorebirds, and raptors. Conservation outputs accomplished include the land purchase itself, as well as the protection of approximately 15,000 nesting seabirds at the time of the purchase.

Benefits to focal species and other species

As already described, direct benefits to focal and other species are, in many cases, still farther off in terms of realizing on-the-ground conservation outcomes. Benefits to focal and other species reported here are based on data reported by PSP project grantees on what they have accomplished in the context of what they expect to accomplish over the near-term as well as the longer-term.[10] Of the 41 projects evaluated, a little more than half of grantee reports included outcome data compared to baseline metrics, likely a reflection of the long-term nature of achieving species outcomes. In many cases, the

[10] Outcome figures and associated anticipated completion dates reported in the sections here and in Appendix J are based on data reported by grantees. Ground-truthing of these figures was not part of this evaluation. In addition, NFWF no longer asks grantees to provide or report long-term goal values or associated year in which long-term goal values are anticipated.

figures reported were anticipated 'value at grant completion' figures, rather than actual on-the-ground outcomes already achieved.

In the sections that follow, we describe the status of species outcomes for each PSP focal species, including NFWF's short- and long-term outcome goals for the species based on the PSP business plan (NFWF, 2012, p. 20), as well as status of achievement of those goals and anticipated short- and long-term metric values (in a few cases already achieved or surpassed). A complete list of indicator metrics, baseline data and actual and expected species outcomes is included in Appendix I.

Ashy Storm-petrel

Four projects, all currently in progress, aim to benefit the Ashy Storm-petrel in the California Current system though none have yet reported outcomes for seabird reproduction or population.

- **Goals:** NFWF's PSP short-term (3 to 6 years) outcome goals for Ashy Storm-petrel are to reduce owl predation by 90% and increase the number of chicks produced per pair by 4% with a long-term outcome goal of increasing the global population by 5% after 1 to 2 generations.

In the near-term, one project anticipated reducing Ashy Storm-petrel mortality through reduced predation and protection of breeding areas from predators by 2015, though this project is currently experiencing significant delays in gaining approval for predator removal, thus achievement of these outcomes will likely be delayed beyond 2015. Similarly, achievement of the longer-term goal of an increase in Ashy Storm-petrel individuals by 2030 remains highly uncertain given these delays in predator removal, but perhaps more importantly, the extended time involved, regardless of project status.

Black-footed Albatross

Nine projects, all currently in progress, aim to benefit the Black-Footed Albatross though none have yet reported outcomes for seabird reproduction or population. The PSP-funded projects for this species are located in Hawaii, Chile, and the California Current System.

- **Goals:** NFWF's PSP short-term outcome goals for Black-footed Albatross are (1) increased breeding success in former *Verbesina* habitat by 100%, and (2) an increased number of fledglings produced per year by 2,000. The long-term outcome goal is an increase in the global Black-footed Albatross population of 7% after one to two generations.

In one project, the number of breeding Black-Footed Albatross reported is expected to increase by over 200 individuals by the end of the grant in 2014. Interim habitat improvement outcomes (e.g., available nesting space and predator-free areas) are expected by grantees in two projects to be met or surpassed in 2014, with total removal of invasive *Verbesina* and replacement with native plants expected by 2016 and 2020,

respectively. A nearly three-fold increase in population (from approximately 7,000 to possibly over 21,000 individuals) is anticipated by that project by 2030.

Hawaiian Petrel

Five projects, all currently in progress in Hawaii, aim to benefit the Hawaiian Petrel, though none have yet reported outcomes for seabird reproduction or population.

- **Goals:** NFWF's PSP short-term outcome goals are to (1) protect two breeding colonies, (2) increase the number of chicks produced per pair by 10%, and (3) develop translocation techniques. NFWF's long-term outcome goal is to increase the global population of Hawaiian Petrel by 2% after 1 to 2 generations.

Now that the predator-proof fence is complete in the Kilauea Point National Wildlife Refuge in Hawaii (completed summer 2014), six acres of nesting grounds are expected to have predation reduction goals met, pending confirmation. The establishment of a new Hawaiian Petrel colony of about 20 individuals is not anticipated until 2030.

Kittlitz's Murrelet

Two projects, one completed and one in progress, focus on the Kittlitz's Murrelet in Alaska, with neither reporting outcomes for seabird reproduction or population.

- **Goal:** Support two to four conservation research projects for Kittlitz's Murrelet.

Research has been completed on the population genetic structure of Kittlitz's Murrelet, while research on causes and rates of mortality continues, with anticipated completion in 2014. Since these activities consist of research rather than on-the-ground conservation actions, no short- or long-term species reproductive or population outcome metrics were established.

Laysan Albatross

Ten projects, all currently in progress, aim to benefit the Laysan Albatross in the Hawaiian Islands, California Current, and Chile, though none have yet reported outcomes for seabird reproduction or population.

- **Goals:** NFWF's PSP short-term outcome goals for Laysan Albatross include (1) increasing breeding success in former *Verbesina* habitat by 100%, and (2) increasing the number of fledglings produced per year by 19,000 to 47,000. NFWF's long-term outcome goal is to increase the global population of Laysan Albatross by 10% after one to two generations.

Populations are expected to improve reproductive success in the near term once invasive animals are removed from Laysan Albatross colonies. Other expected near-term outcomes for Laysan Albatross include an increase in and improvement of breeding habitat (due to removal of invasive species and planting of native species), implementation of bycatch mitigation techniques (monitoring has already been

completed), and the development of biosecurity and other management plans. Notably, one project on Kure Atoll, anticipates an increase in the Laysan Albatross population of over 4,000 individuals above a baseline of approximately 40,000 by the end of 2014 as the result of invasive plant removal with greater increases (up to 60,000 – 80,000 individuals) expected by 2030. If achieved, this eventual increase would reflect a 50%-100% increase relative to NFWF's goal of 10% increase in global population.

Newell's Shearwater

Five projects, one complete and four still in progress, aim to benefit the Newell's Shearwater in Hawaii, with no outcomes yet reported for seabird reproduction or population.

- **Goals:** NFWF's PSP short-term outcome goals include (1) protection of two breeding colonies and (2) the development of translocation techniques, with a long-term species outcome goal of an increase in global population of 2% after one to two generations.

The completed project's (interim) outcomes included creation of a plan for a predator-proof fence and the subsequent removal of predators. Predator removal is anticipated in 2014. Projects in progress have near-term goals of developing removal plans for invasive plants and animals, and in some cases these projects have begun removal activities. Two populations of Newell's Shearwater are expected to be established: 300 individuals at Kilauea Point in 15-20 years and 60 breeding pairs (up from one to two pairs currently and by grant completion) by 2030 on Lehua Island.

Pink-footed Shearwater

Seven projects, five in progress and two now complete, aim to benefit the Pink-footed Shearwater in Chile and the California Current System, with two projects reporting outcomes for seabird reproduction and population.

- **Goals:** NFWF's PSP short-term outcome goals for Pink-footed Shearwater are: (1) increase the number of chicks produced per pair by 10%; (2) increase adult survival by 5%; and (3) increase breeding habitat by 500 acres. NFWF's long-term outcome goal is an increase in the global population of Pink-footed Shearwater by 4%.

For one completed project in the Juan Fernandez Islands, grantees reported, as was expected, no increase in Pink-footed Shearwater breeding pairs or islands with colonies free of invasive animals at the time of grant completion. For Pink-footed Shearwater breeding elsewhere in the Chilean Islands, one completed project reported an increase in fledgling success from 60% (baseline) to 65% at grant completion, based on increased efforts to curb illegal harvesting of chicks. However, in this particular case this figure was qualified by project grantees as being an estimate since only several years' worth of data had been collected. Planting of woody vegetation over 50% of prime habitat was also reported by the grantee, though qualified by the grantee as too early to measure an

increase of woody vegetation. Across these Chilean projects, long-term goals include an increase from one to three Pink-footed Shearwater-colonized islands free of invasive mammals by 2020, achievement of 90-100% of the Pink-footed Shearwater population breeding on islands free of invasive animals, and an increase from 20,000 to 23,000 breeding pairs by 2020, though given the relatively long time horizon, these outcomes remain highly uncertain.

Red-legged Kittiwake

The Red-legged Kittiwake is the focus of one PSP-funded project in Alaska, currently in progress, with no outcomes yet reported for seabird reproduction or population.

- **Goals:** NFWF's PSP short-term outcome goal for Red-legged Kittiwake is a decrease in adult mortality by 1% or more over three to six years, with a long-term goal of an unspecified increase in the global population.

Outcomes anticipated by project completion in 2015 include reduced Red-Legged Kittiwake mortality achieved through education of island residents on sustainable harvesting of the bird, and over the longer term, by increasing the Red-Legged Kittiwake population overall.

Townsend's Shearwater

Two projects, one in progress and one now complete, are focused on protecting the Townsend's Shearwater on Socorro Island, Mexico, with one project reporting two completed project outcomes, namely, the establishment of baseline figures for cat predation and also Townsend's Shearwater breeding success.

- **Goals:** NFWF's PSP short-term outcome goals for Townsend's Shearwater are to: (1) reduce cat predation by 100%; and (2) increase the number of chicks produced per pair by 25%. NFWF's long-term outcome goal is to increase the global population of Townsend's Shearwater by 25%.

The completed project was successful in completing an island restoration plan and removing all 50 sheep and over 130 feral cats from Socorro Island. The second project, which is still in progress, reported an additional 81 cats eradicated from the island. With its baseline monitoring values now established and eradication activities in progress, the near-term goals for completely eliminating predation of Townsend's Shearwater by cats on Socorro Island and increasing the seabird's breeding success by 75% are expected to be met by 2016.

Xantus's Murrelet

Five projects, four in progress and one complete, are expected to benefit Xantus's Murrelet in the California Current System, though none have reported outcomes for species reproduction or population.

- **Goals:** NFWF's PSP short-term outcome goal for Xantus's Murrelet is an increase in the number of chicks produced per pair, with a longer-term goal of an unspecified increase in the global population.

The one project now completed provided an analysis of predation on Xantus's Murrelet by barn owls, and provided findings for use in Murrelet management and restoration in the Channel Islands National Marine Sanctuary. For another project, an increase from 2,000 to 2,100 known individuals is expected by the project grantee by grant completion in 2015, pending on-going systematic monitoring to increase accuracy of population estimates.

Additional seabird species

A number of additional species are also expected to benefit from the efforts of PSP-funded projects (Appendix J). Most of these additional species are expected to benefit from island restoration projects such as invasive animal eradication, native plant restoration, and the reduction of human disturbance.

Project reporting using existing metrics

Overall, grantees appreciate the point of having metrics and support NFWF's efforts to require (and improve) project metrics. Grantees expressed a desire to be accountable for project results. When asked whether the PSP metrics have been meaningful or applicable for reporting on project progress and outcomes, more than one-third (38%) of grantees noted that going through the process of selecting metrics for their projects helped them and their staff to clarify their project goals, to think through more carefully what it would take to successfully complete the activities of the grant, and to track progress toward their goals. In particular, grantees found reporting on project *outputs* (e.g., acres treated with herbicide) to be most appropriate and meaningful markers of project achievements during the grant period.

At the same time, many respondents do not perceive the metrics to be especially meaningful for capturing long-term species outcomes. For nearly half (44%) of the projects, grantees noted that long-term conservation goals could not be captured during the current grant project. The lack of data on conservation outcomes in review of grantee reports bore this out as well. Further, many pointed out that there are multiple factors that influence conservation outcomes besides the conservation actions that are being implemented as part of a PSP project. Therefore, to some, going through the exercise of trying to estimate impacts at the species level feels contrived and unhelpful. Some expressed concern that NFWF's approach to metrics is a business approach that does not align with science; others feared that NFWF might not choose to fund certain projects or types of projects that could make a real contribution to the conservation landscape if those projects did not align with NFWF metrics. These results also indicate there may be a general lack of understanding among grantees of how NFWF uses grantee metrics.

Grantee respondents had specific recommendations for improving NFWF metrics, ranging from continuing to let grantees customize metrics and not requiring grantees to report on biological metrics when those types of metrics do not align with the activities of their grant. Some recommendations were conflicting – whereas one grantee may find reporting on outputs more appropriate and meaningful, another would prefer to see more outcome-related metrics. Overall, grantees seem to expect metrics and to be willing to work with NFWF to improve them for the PSP.

Successes and challenges to project implementation

Individual projects, and hence the PSP as a whole, have been successful in getting off the ground and producing midcourse outputs. Supporting this assessment are grantee interviews that indicate that a majority of grantees (88%) have generated project outputs, and 59% of these grantees reported that the capacity and experience of project staff as well as strong partnerships have facilitated this success.

Based on grantee interviews, several themes emerged as strengths of the PSP: (1) having a project-specific approach to sustainability; and (2) effective grants administration on the part of NFWF, including both flexibility and specific seabird subject matter expertise.

Approach to Sustainability

Most PSP funded projects (75%) have a plan for sustainability and/or an approach to sustainability that is built into their current project. This is a strength of the PSP in helping to ensure lasting effects of its projects on the conservation landscape. Of the projects that have a pulse on sustainability, 38% have approached their work with a long-term commitment to continue the conservation work past the NFWF funding period. In mid-course, some projects are already gearing up to continue their conservation work beyond the PSP project by, for example, searching for funding opportunities to install and maintain a monitoring program. About another third (31%) of these projects are working with their respective, local communities to foster a greater sense of ownership regarding conservation efforts and to instill greater awareness of both threats to seabirds and ways to protect them. Further, a quarter of these projects have long-term monitoring programs in place so that the impact of project activities could be studied and managed after the project ends.

Grants administration: Program management, flexibility, and relationship with grantees

Grantees discussed factors pertaining to NFWF grants administration that have been important in facilitating the achievement of their PSP project goals and objectives. The most common response in this regard (50%) was an appreciation for the effectiveness of the PSP manager. These grantees emphasized the role that project managers can play in the success of a program like the PSP and the importance of having someone in that position who not only practices effective communication, relationship, and management skills, but who also possesses extensive knowledge of seabirds and

contributes on a substantive level to make the PSP projects stronger. For nearly a quarter (22%) of the projects, grantees also acknowledged flexibility on the part of NFWF as an important factor in helping to facilitate implementation of their PSP projects.

Several grantees mentioned their long history of receiving funding from NFWF, their role as advisor to NFWF on various aspects of shaping the PSP, and/or the fact that NFWF took the initiative to solicit proposals for the PSP directly from them or their organization. While it is easy to see how the close relationship enjoyed by these grantees may facilitate successful implementation of their projects, four grantees worried that others may perceive that it is difficult to receive PSP funding unless one is "part of the club." As they pointed out, this perception of exclusivity or "insider knowledge" could be a deterrent to organizations that may have important projects to propose. Despite efforts on the part of NFWF to announce PSP funding opportunities (e.g., by attending the annual Pacific Seabird Group meeting), there may be additional options that could be explored to expand the visibility of PSP funding opportunities.

Challenges

To be expected, challenges were reported for all projects. On the whole, most challenges experienced by grantees thus far have been typical of this type of conservation work. Common challenges include:

- **Funding.** For just over half of the projects, grantee respondents reported that funding was a challenge. For example, grantees frequently cited reductions in or limitations to government agency budgets as a challenge.

- **Risks to sustainability.** Although most projects are addressing sustainability for lasting project impact, a noteworthy percentage of projects (66%) reported challenges in terms of risks to the sustainability of project outputs and/or outcomes. The most common risk reported (47%) was having no guarantee of necessary ongoing follow-up work due to funding uncertainties, especially with federal funds. The follow-up work of monitoring, in particular, was voiced by grantees to be critical to sustainability. For projects focused on eradication of invasive animals and plants, biosecurity was the most frequently identified risk to sustainability.

- **Stakeholder and other relationships.** In approximately one-third of the projects, grantees experienced some degree of challenge in their relationships with local community stakeholders, project partners, and others. In projects that are not on track per the proposed activities and/or timeline, challenges with community engagement are identified as a significant factor.

- **Access.** In nearly a third of projects, grantees reported challenges with access, including problems accessing project sites for conservation work and/or

monitoring, as well as difficulty or delay obtaining access to necessary data for analysis.

- **Administration.** For nearly half (44%) of the projects, grantee interview respondents reported small challenges related to administration of their NFWF grant; however, no one challenge was shared across a particularly large group of grantees. The two most common difficulties, both of which were experienced in approximately 20% of the projects, were challenges with the one-year funding cycle and nuisances with the proposal and reporting processes. More specifically, these grantees reported that one-year funding cycles do not provide sufficient time for fieldwork and consume more resources for proposal writing and reporting. Relatedly, proposal and reporting processes, including uploading documents and generating/reporting metrics, were reported as burdensome.

As described above, two common challenges appear across the three PSP projects that have been stalled or significantly altered: stakeholder engagement and in-country leadership and capacity. Stakeholder engagement can be defined as the processes needed to understand and accommodate the needs and preferences of the people and organizations who will be impacted by the project or whose changes in behavior are desirable (Sorice et al., 2013). Where there are high-levels of on-site human capacity and infrastructure (e.g., an in-country office and/or local staff) and substantial resources directed toward stakeholder processes, programs are moving forward in a durable fashion. Where in-country or local human capacity and leadership are weaker, projects tend to face more serious challenges and delays due to insufficient stakeholder engagement and support.

Overcoming challenges

For 28% of the projects, grantees credited good relationships with partners and other key stakeholders, as well as high caliber and highly experienced staff teams (16%), as important factors for overcoming project challenges. Possessing the ability to recognize and step up outreach to the community, as well as the experience and foresight to complete contingency plans, were also described as effective strategies for managing project challenges.

Question 2: Were the initial scope and selection of species and strategies appropriate to the conservation need?

- **NFWF's selection of focal species is appropriate and strategic with respect to maximizing overall seabird conservation gains. This assessment takes into account NFWF's institutional limits of focus on species and geographies of highest US national concern.**
- **The appropriateness of NFWF's current portfolio of conservation strategies is supported by the results of our seabird expert survey, grantee and global seabird expert interviews, and the literature:**
    - **Invasive animal removal and fisheries bycatch reduction are appropriate strategies for many of the PSP's focal species.**
    - **Improving seabird-nesting habitat via plant restoration is an appropriate strategy for a small, but important, subset of PSP's focal species.**
    - **Protecting seabird foraging locations and prey base is an appropriate strategy for a subset of PSP's focal species, though the ability to completely realize the conservation benefits of this strategy remains highly uncertain.**
    - **Filling information gaps is an appropriate strategy for a subset of PSP's focal species, particularly those species that are data-deficient with respect to having adequate scientific information for conservation management and planning.**
    - **NFWF's investment in capacity building activities plays an appropriate—and in fact critical—role in a large portion of projects in the PSP portfolio.**

Appropriateness of NFWF's focal species and geographies

There is no shortage of endangered seabird species: seabirds account for 25% of all marine extinctions and are the most endangered marine taxon (Spatz et al. 2014). According to the International Union for the Conservation of Nature (IUCN), 101 seabird species are threatened worldwide. Similarly, there is no shortage of potential conservation investments to protect seabirds. For example, of the 968 islands with IUCN threatened seabird populations (extant or extirpated), a minimum of 83% have invasive species and 40% have invasive species and incomplete legal protection (Spatz et al., 2014). The majority of globally threatened seabirds breed on small islands (< 1km^2) that have few or no people, suggesting that many of those islands are high-impact conservation opportunities for seabirds (Spatz et al., 2014). Thus with limited resources and time, it is strategic to select focal species for investment in order to maximize conservation benefits and, thus, chances of species recovery. Focal geographies selected

by NFWF are a result of the collective distribution of the prioritized focal species. However, having clusters of focal species in certain geographies allows for the possibility of certain strategies (e.g., fisheries bycatch reduction) to benefit multiple focal species. These clusters of focal species in focal geographies provide the additional opportunity for investing in capacity building of organizations that focus on multiple focal species.

All of NFWF's priority species are considered threatened by IUCN with the exception of Laysan Albatross (IUCN category: Near Threatened) and Black-footed Albatross (IUCN category: Near Threatened; Table 3). Laysan Albatross nearly qualifies for listing as Threatened, and experienced major declines in the late 1990s and early 2000s (IUCN 2013c). The Black-footed Albatross was down-listed from Vulnerable to Near Threatened in 2013 (Birdlife International, 2014). Many of the IUCN Threatened seabird species in the Pacific do not breed or forage in US waters—making them ineligible for the NFWF PSP (Table 3).

In interviews, nearly one-third (31%) of grantees expressed that they would like to see an expansion of the PSP program beyond the current focal species and geographies. Yet grantees and survey respondents provided few specifics on potential additional species. One reason for this lack of specificity may be respondents' awareness of the institutional limitations of what NFWF currently funds. Only fifteen survey respondents recommended the addition of specific species into the PSP, and some fall outside of NFWF's current scope of national interest and priority.[11]

The selection of the PSP's ten focal species resulted in four focal geographies. Current PSP investments are relatively balanced with respect to priority focal geographies, with Hawaii and the California Current regions receiving the most funding (Table 4). These are also the regions with the most focal seabird species (Hawaii: 4, California Current: 4). All four geographies are important seabird areas in the Pacific. For example, all four geographies contain multiple proposed, candidate, or confirmed Important Bird Areas, as designated by Birdlife International (Birdlife International, 2014).

[11] Fifteen survey respondents provided fourteen unique species recommendations for PSP. Of these, only Tufted Puffin was mentioned by more than one (2) survey respondent: Aleutian Tern, Black-vented Shearwater, Bonin Petrel, Brown Pelican, Cassin's Auklet, Gould's Petrel, Japanese Murrelet, Marbled Murrelet, Parakeet Auklet, Short-tailed Albatross, Sooty Shearwater, Species breeding in New Caledonia, Tahiti's Petrel, and Tufted Puffin.

Table 3. IUCN Status and Number of Extant and Extirpated Island Breeding Populations of IUCN Threatened Species that Breed in the Pacific.[12]

Species	IUCN Status	No. Extant (Confirmed, Probable)	No. Extant (Potentially Extant)	No. Extirpated
Ashy Storm-petrel	EN	29	4	0
Buller's Shearwater	VU	7	0	0
Craveri's Murrelet	VU	11	12	0
Galapagos Penguin	EN	8	0	0
Galapagos Petrel	CR	0	1	0
Hawaiian Petrel	VU	6	1	1
Humboldt Penguin	VU	32	0	0
Kittlitz's Murrelet	CR	3	1	0
Marbled Murrelet	EN	11	12	0
Newell's Shearwater	EN	5	1	0
Peruvian Diving Petrel	EN	7	8	2
Phoenix Petrel	EN	14	2	1
Pink-footed Shearwater	VU	3	0	0
Polynesian Storm-petrel	EN	9	7	6
Red-legged Kittiwake	VU	15	0	0
Short-tailed Albatross	VU	6	1	10
Townsend's Shearwater	CR	1	0	2
Xantus's Murrelet	VU	25	1	2

Table 4. Current NFWF Investments and Matching Funds by Focal Geography

Focal Geography	NFWF	Match	Total Investment
Hawaii	$3,823,905	$7,020,084	$10,843,989
California Current	$2,568,286	$3,724,631	$6,292,918
Alaska	$1,799,599	$2,536,545	$4,336,144
Chile	$1,434,757	$1,525,156	$2,959,914
Other	$68,000	$69,500	$137,500

[12] Species in bold represent eight of the ten NFWF PSP focal species. Seabird island populations recognized as potentially extant were breeding on an island historically but lacked sufficient evidence to validate their status since 1990. Data from Spatz et al. 2014. IUCN Status: CR, Critically Endangered; EN, Endangered; VU, Vulnerable.

Appropriateness of NFWF's conservation strategies

Evaluation findings show that NFWF's current portfolio of conservation strategies is appropriate for the conservation needs of the selected PSP focal species. There was consensus among grantees that the Program's investments should consist of a portfolio of projects that balances pre- and post-investment activities with on-the-ground conservation actions, as well as embraces a short- and long-term perspective, and our own evaluation assessment found the current PSP portfolio includes this balance. More than half (59%) of grantees advised "Don't just fund the low-hanging fruit." While recognizing the importance of funding projects that have clear and measurable on-the-ground conservation benefits, grantees also see a need for greater investment, across the seabird conservation landscape, in basic research and other areas to fill important information gaps and address some of the most difficult challenges facing seabird conservation. Indeed, our evaluation found that NFWF is taking this kind of approach by supporting projects that provide fewer immediate returns, yet are building important foundational understanding for future Pacific seabird conservation management. Those who want to see NFWF invest in activities to fill information gaps and increase capacity believe that the PSP is in a good position to lead the field in addressing difficult and complex challenges to seabird conservation, such as climate change. PSP investments so far have resulted in a diversified portfolio, including multiple projects that are focused on filling information gaps and tackling longer-term and more complex issues related to seabird conservation, such as understanding the dynamics of seabird foraging areas and forage ecosystems.

Likewise, survey respondents, representing the broader community of seabird experts, supported NFWF's current PSP funding allocation across its primary core strategies. Survey respondents believe that a positive increase (1-20%) in the population growth rate of the PSP focal seabird species will occur over 10 years with the successful execution of five primary conservation actions (Figure 2): (1) Invasive animal eradication; (2) invasive plant removal and habitat restoration; (3) bycatch reduction; (4) new colony formation; and (5) research. Invasive animal eradication, bycatch reduction, and habitat restoration were viewed as having the greatest overall demographic impacts over ten years (Figure 2). These three strategies are where NFWF has invested the majority of its PSP dollars to date: $4.7 million in invasive animal removal, $697,000 in bycatch reduction, and $2.8 million in habitat restoration (not including matching funds). New colony formation was included in the survey to explore the potential benefit of this conservation strategy (NFWF currently has one investment relevant to this strategy). While establishing new colonies is likely to have significant long-term benefits, particularly in the face of climate change, the greater community of seabird experts expects the shorter-term benefits of this approach to be lower relative to other actions. Across all conservation actions included in the survey, respondents believe that current NFWF investments will have greater demographic impacts for seabirds than actions in which NFWF is not currently investing (i.e., the global mean impact score for

NFWF investments was higher than the global mean impact score for non-NFWF investments included in the survey).

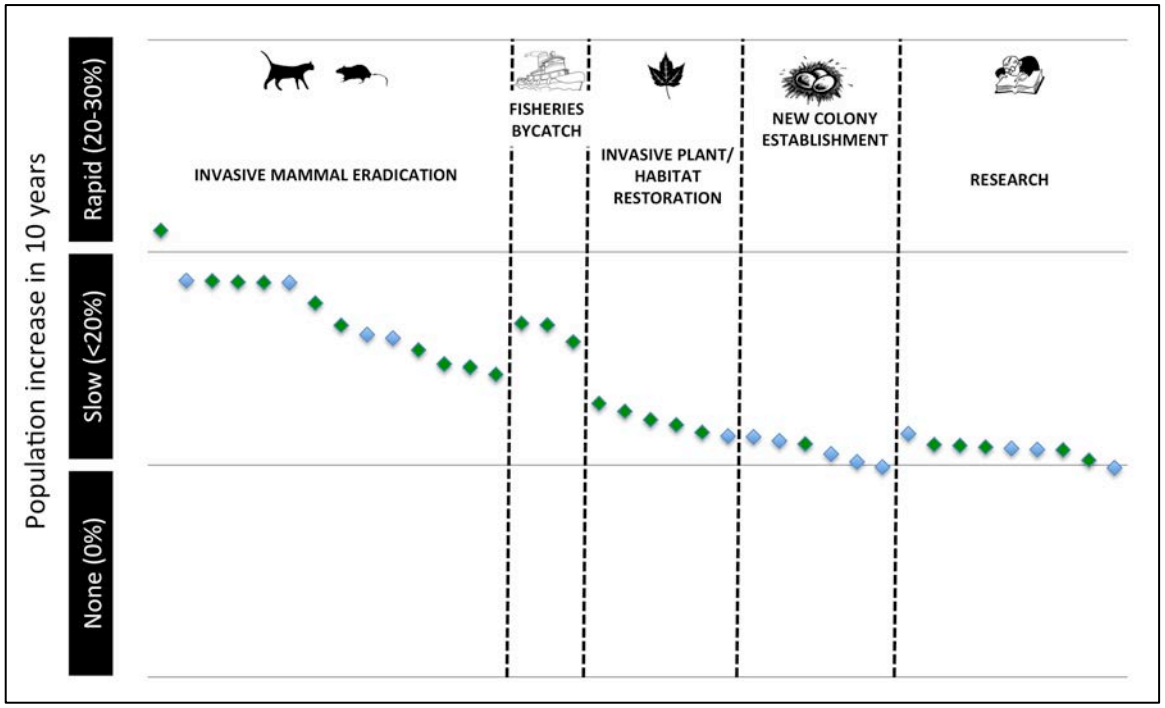

Figure 2. Survey results. Estimated population increase over a ten-year period for conservation actions across five broad strategies for NFWF's focal species (excluding Kittlitz's Murrelet): invasive animal eradication, fisheries bycatch reduction, invasive plant removal/habitat restoration, new colony establishment, and research. Each point represents the weighted mean of the estimated population increase for a NFWF focal species given a specific conservation action. Green data points represent actions in which NFWF is currently investing.

The Program's current strategies and investments are also generally supported from a project-risk/conservation-return (i.e., risk-return) perspective. Available information on a majority of the Program's focal seabird species was sufficient for our evaluation team to be able to identify priority conservation actions for investment and, thus, help assess the appropriateness of the Program's selection of current strategies. Such an understanding of the relative expected conservation benefit for possible investments is also useful for the purpose of strategic planning going forward. For example, results from the online survey suggest that investing in the eradication of invasive animals from Socorro Island is not only feasible, but also has the highest expected conservation benefit for Townsend's Shearwater over 10 years relative to other potential investments (Figure 3).

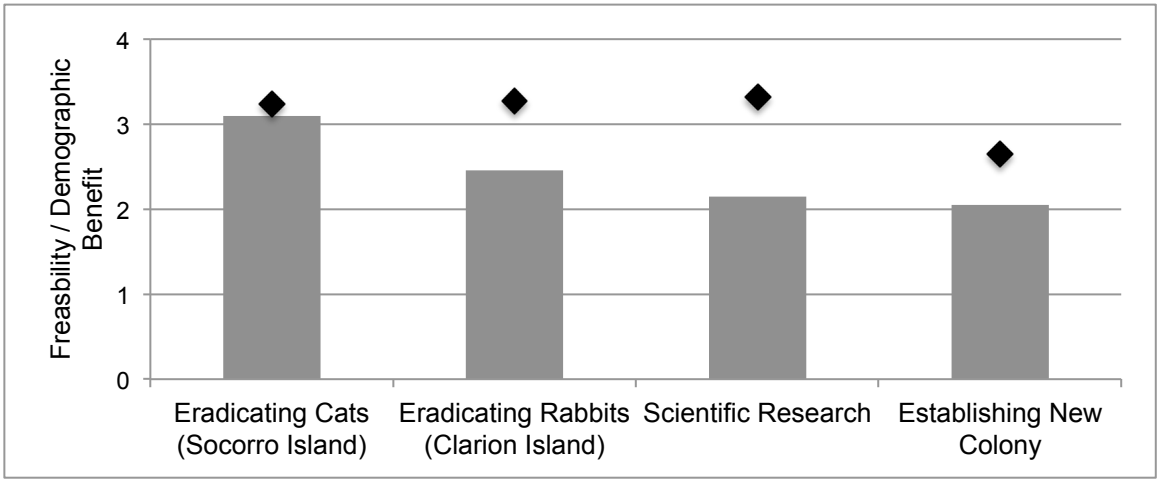

Figure 3. Relative feasibility (◆) and demographic benefits (bars) of four actions targeting the Townsend's Shearwater according to the greater seabird community. Eradicating cats from Socorro Island is viewed as both feasible and having the highest expected demographic benefit over the next ten years compared to other actions. In aggregate, the seabird community believes that removing cats from Socorro Island will result in a rapid (20-30%) increase in the Townsend's Shearwater population over the next decade. Feasibility is based on a 1-4 Likert Scale (1 = Not Feasible; 4 = Very Feasible), and demographic benefit is based on population increase over 10 years (1 = None, 2 = Slow but significant (<20%), 3 = Rapid (20-30%), 4 = Very Rapid (>30%)). See Appendix F (Survey Results) for more details.

In the sections that follow, we provide a risk-return perspective on NFWF's current investments for five of the six PSP core strategies. We do not include capacity building explicitly in this section since some level of capacity building is inherent in all of NFWF's investments, and capacity building is in many ways one or more steps removed from realizing actual population-level benefits for seabirds—the focus of the risk-return perspective.

Removal of non-native, invasive animals (Core Strategy 1)

The removal and control of invasive animals is an appropriate strategy for many of the PSP focal species. Based on available data, the finite nature of the conservation action, and the current state of best practices, eradicating invasive animals from seabird breeding islands is a strategy that is strongly linked to seabird benefits (see Appendix G, Table G1 ROI Analysis). NFWF has invested most heavily in this strategy ($4.7 million, including predator-proof fencing projects), with animal eradication projects in all priority geographies. Due to major advances over the past 20 years in the ability to remove invasive animals from islands (Veitch et al., 2011), NFWF investments in invasive animal eradications are not only high-return, but they also have relatively low and manageable risk (Table 5). Operational and biosecurity risks across these investments are relatively low given that current PSP projects are managed using current best practices. A major co-benefit of NFWF investing in invasive animal eradications on

islands is the latent conservation value of building capacity to successfully execute eradications, especially in light of the large number of feasible, high-impact conservation opportunities on islands around the world (Spatz et al., 2014).

Table 5. Conservation Return and Risk Scoring for the 20 NFWF Investments that Fall Under the Core Strategies of Invasive Animal Removal, Habitat Restoration, and Reducing Bycatch. Investments as defined here may include multiple PSP grants. See Appendix G for details on return and risk.

	Low Risk	Medium Risk	High Risk
Invasive Animal Removal (12 Investments)			
Low Return			
Medium Return			1
High Return	6	3	2
Habitat Restoration (3 Investments)			
Low Return			
Medium Return			
High Return		2	1
Reducing Bycatch (5 Investments)			
Low Return			
Medium Return	1		
High Return	1	2	1

For NFWF's invasive animal eradication investments, there is significant funding needed in order to complete many of the projects beyond the term of the current NFWF-funded grants. Based on communications with grantees and project documents, the current estimate is approximately $35 million (Figure 4; Appendix G), a significant figure that will almost certainly need to come from a variety of funding sources. Regardless of the funding source, the funding needs to take projects to completion represent a risk with respect to realizing seabird conservation benefits. For some projects, NFWF has worked with its grantee partners to develop funding roadmaps to help mitigate some of this risk.

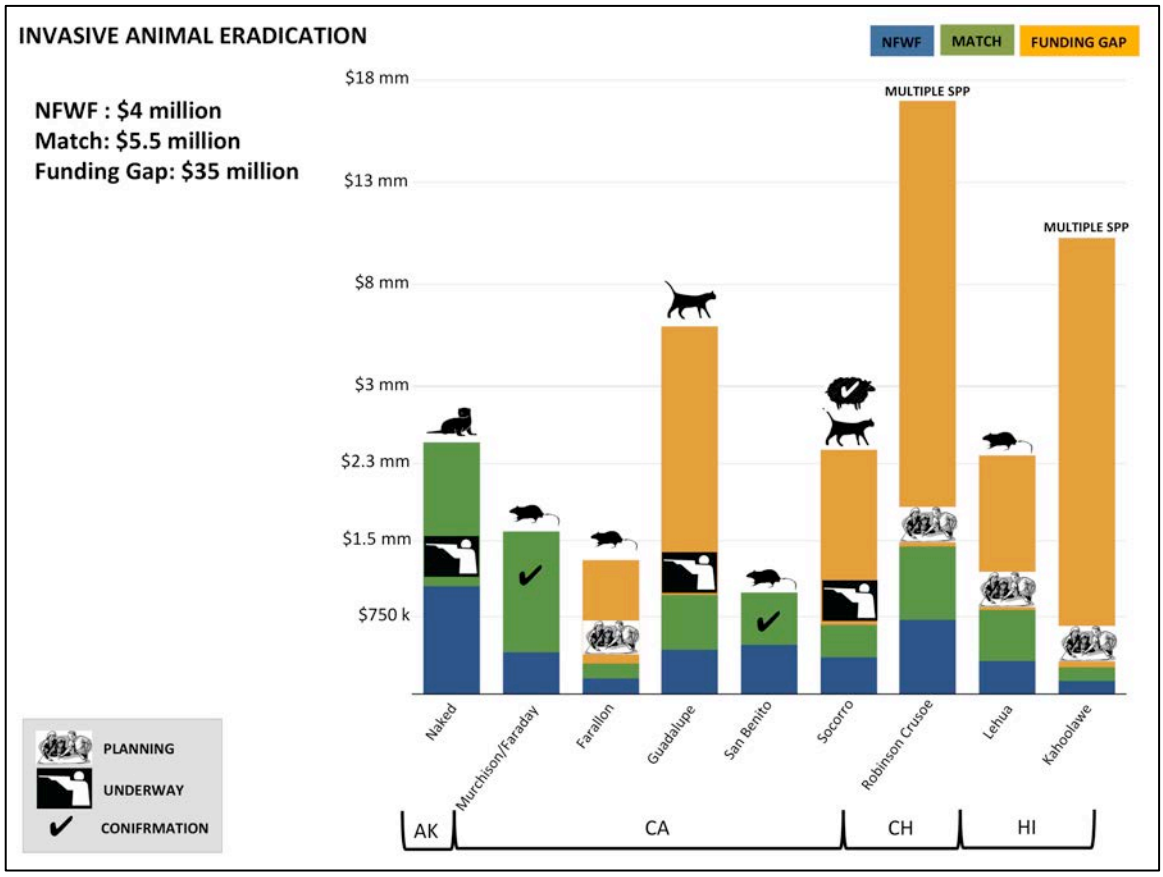

Figure 4. Investment, matching funds, and funding gap for NFWF's nine invasive animal eradication investments. Projects are in various stages and cover all four of NFWF's geographic regions.

The main risks to realizing seabird benefits from the strategy of invasive animal eradication are lack of stakeholder engagement and environmental non-compliance. These factors have proven challenging for some of NFWF's investments (i.e., Robinson Crusoe, Chile, and Southeast Farallon, USA), while other projects are more successfully navigating these factors (i.e., most projects in Hawaii). Since methods commonly used with invasive animal eradications often involve toxicants and the killing of animals, stakeholder engagement and environmental compliance in this context often become closely entwined. Managing and reducing the risks associated with stakeholder engagement, as well as environmental compliance, are important for the success of this strategy. For example, recent invasive rodent eradication work has revealed that there may be previously under-appreciated issues with brodifacoum—overwhelmingly the toxicant of choice for rodent eradications. Specifically, the rodenticide poses risks to high-risk non-target, endemic species on islands where these species occur (G. Howald, personal communication, K. Campbell, personal communication, Howald et al., 2007). Potential risks posed to non-target species by this rodenticide raise the biological and regulatory risk profile of using brodifacoum for eradications. Research is needed on new techniques and methodologies for invasive rodent eradications. While there has

been some research on alternative rodenticides with encouraging results (Donlan et al., 2003), there has been almost none over the past decade due to shifting priorities toward implementation and demonstrating that eradication is possible. In addition, there is little research exploring non-toxicant approaches to invasive rodent eradications. Recent advances in other fields (e.g., genetic engineering and gene drivers) offer the possibility of the horizontal transfer of new innovations to invasive animal management (Oye et al., in press; Campbell et al., in press). Global experts we interviewed agreed that invasive animal eradication would continue, for the foreseeable future, to be the most cost-effective strategy for seabird conservation. This type of applied research will help maintain the appropriateness (and safety) of invasive animal eradication as core strategy for seabird conservation.

Removal of non-native, invasive plants (habitat restoration) (Core Strategy 2)

Improving seabird-nesting habitat, via plant restoration, is an appropriate strategy for a small, but important, subset of PSP focal species. NFWF has made substantial investments ($2.8 million) in creating and improving seabird-breeding habitat, in particular the removal of invasive plants on two Hawaiian atolls. Based on available data, the two investments on Midway and Kure Atolls should result in significant demographic benefits for Laysan and Black-footed Albatross, with the benefits for the latter less certain (see Appendix G). While both species are classified Near Threatened by IUCN and populations are increasing or stable, the future negative impact of invasive plants on these two Atolls may have been catastrophic for the two species without the conservation interventions that NFWF is currently supporting. The main risks to NFWF's investments in this core strategy are twofold. In Hawaii, there is operational risk due to the long-term funding and capacity needed to extinguish the non-native plant seed bank. This need for long-term funding will likely extend beyond the timing of the PSP. There is also a risk of re-invasion of plants back into seabird nesting habitat if full eradication is not achieved. In Chile, native plant restoration efforts are facing major challenges in stakeholder engagement with respect to garnering support and buy-in from government agencies. There also is a gap with respect to hiring and building high-level leadership and capacity in Chile (see Appendix G for more details).

Reduce seabird bycatch (Core Strategy 3)

Reducing seabird bycatch is an appropriate strategy for many of the PSP focal species. Overall, NFWF's current bycatch investments are strategic both in terms of species and geography. Given the magnitude of fisheries bycatch and the potential for significant reductions in adult seabird mortality, the potential demographic benefits from reducing seabird bycatch in fisheries are significant. Since governance, regulation, and enforcement are often weak to non-existent in at-sea environments, successfully implementing effective bycatch reduction programs is challenging. Thus, targeting investments toward scenarios where the necessary enabling conditions and incentives are present or can be created is critical for realizing seabird benefits from bycatch reduction programs. Overall, NFWF's current investments in fisheries bycatch are targeted in areas where seabird interactions are high and enabling conditions are present or possible (Figure 5). The main risk to NFWF's fisheries bycatch investments is

insufficient stakeholder engagement (e.g., industry and government agencies), which raises the risk of low adoption rates of bycatch reduction programs. In some cases, there are additional risks due a lack of an explicit link between research and action (e.g., program design and execution).

Here we provide evidence that demonstrates the appropriateness of NFWF's current investments in fisheries bycatch reduction with respect to focal species and geographies, including the Russian Far East, US-Mexico Pacific Coast, South America, and Northwest Pacific.

NFWF is investing in fisheries bycatch reduction in the Russian Far East. Russia's driftnet seabird bycatch is responsible for killing more than 100,000 seabirds a year, and the Russian demersal longline fishery ranks 6th globally in seabird bycatch (approximately, 10,000 birds annually; Anderson et al., 2011). Seabird and fishing activity are both high in the Russian Far East. For example, Short-tail Albatross spend a significant amount of time (approximately 25%) in the economic exclusive zone of Russia, second only to Alaska's economic exclusive zone (Suryan et al., 2007). Unlike Alaska, however, information and bycatch mitigation programs in the region are scarce.

The US Pacific coast is also an area of overlap between fisheries and seabirds (Figure 5). The US west coast longline fishery is the only US longline fishery that is not required to use seabird bycatch deterrents when within range of Short-tailed Albatross. NFWF is investing in a program to design and implement a volunteer mitigation program for the fishery, which should reduce seabird interactions, including Short-tailed and Black-footed Albatross. The fishery kills approximately 40 Black-tailed Albatross annually (NOAA, 2008). NFWF is also investing in bycatch reduction activities in northwest Mexico. Bycatch of Laysan Albatross in the proximity of Mexico's Guadalupe Island colony has been documented in the longline shark fishery, and preliminary data analysis suggests relatively high levels of bycatch may be occurring (ACAP, 2010).

A major data gap regarding seabird bycatch is the magnitude and frequency of interactions with small-scale fisheries (Lewison et al., 2014). NFWF's investment in South America is assessing seabird bycatch of small-scale coastal fisheries in three countries: Chile, Peru, and Ecuador. The collaborative program involves three in-country NGOs, which is building capacity and standardizing data collection. Results should help inform a bycatch mitigation strategy for the Pink-footed Shearwater. The species is commonly caught in the demersal trawl fishery for common hake off south-central Chile (BirdLife International, 2013b). Interview-based research suggests that approximately 1,000 Pink-footed Shearwaters are killed annually from interactions with gillnet fisheries (Mangel et al., 2013). Bycatch has also been identified in Peru and Ecuador (Mangel et al., 2011). A driftnet fishery in central Peru is responsible for 500-1000 birds annually (Mangel et al., 2013).

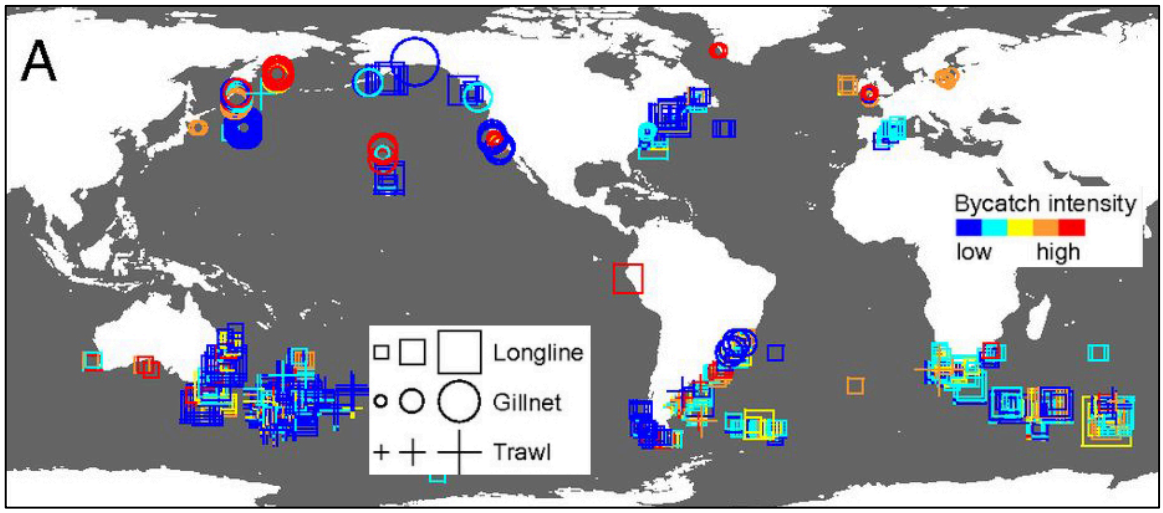

Figure 5. Global bycatch intensity of seabirds (for records from 1990 to 2008). Symbols represent three gear types and symbol size reflects the proportional amount of observed fishing effort. Areas of high seabird bycatch in the Pacific are where NFWF is currently investing funds into bycatch reduction programs and related research. Reproduced from Lewinson et al., 2014.

Pelagic longline fisheries in the North Pacific are considered the primary threat to Black-footed Albatross. The estimated bycatch rates for the species have fluctuated over the past 50 years, generally ranging from 5,000 and 15,000 Black-footed Albatross annually (Lewinson & Crowder, 2003, Arata et al., 2009). Demographic modeling supports the premise that industrial longline fishing is negatively impacting adult survival, explaining more than 40% of variation in survival rates over 11 years (Veran et al., 2007). NFWF is investing in spatial mapping (via satellite tagging) of the Black-footed Albatross, which should result in information to help assess and predict areas of high interactions with longline and driftnet fisheries in the Northwest Pacific.

Ultimately, reducing seabird bycatch in fisheries results from human behavioral change. That change can be driven by regulation or can be voluntary, the latter being induced by some type of incentive. All of the PSP investments in this core strategy are focused on generating the necessary information and building the capacity to design and implement voluntary bycatch reduction programs. Once the science is sufficient, the main challenge becomes one of program design. NFWF's investments that seem to be performing best are embracing a human-centered approach (e.g., Sorice & Abel, in press). Human-centered design focuses on designing solutions through the eyes of the "customer" (i.e., fishers)—often the "customer" plays an active role in the design process. Understanding the needs and preferences of the stakeholders whose behaviors are being targeted for change will ultimately result in a program with higher participation and adoption rates (Sorice et al., 2013). While the influence of program design and delivery of voluntary conservation programs is often overlooked, these

aspects are critical to achieving the necessary participation to attain landscape-scale outcomes. There is growing interest in adopting human-centered design methodologies from the private sector for programs in the environmental conservation and social sectors (Brown & Wyatt, 2010; Liedtka, 2011). This enhanced level of stakeholder engagement (i.e., co-designing solutions) would help manage the major risks to fisheries bycatch reduction with respect to voluntary programs.

Fill information gaps (Core Strategy 5)

Filling information gaps is an appropriate strategy for a subset PSP focal species, particularly those species that are data-deficient. NFWF's investments in this area can be broken down into two categories: (1) pre-investments that support research to generate information and science in order to develop strategies for conservation actions for priority species; and (2) post-investments that are research activities focused on documenting or forecasting seabird benefits from previous or current investments (Figures 6 and 7). The conservation returns on these investments rest heavily on subsequent activities and investments (by NFWF or others). Along with information-to-action gaps, other risks include the research investments failing to reveal feasible conservation opportunities for the species of concern. Results from the survey demonstrate that the greater seabird community believes that research to fill information gaps is playing an important conservation role for PSP focal species. While conservation benefits (e.g., increase in population growth rate over 10 years) are believed to be lower for research compared to other conservation activities, high feasibility, widespread applicability (i.e., applicable to a large proportion of the global population), and relatively low cost suggest that research to fill information gaps is an important strategy within the PSP portfolio.

FILLING INFORMATION GAPS (PRE-INVESTMENT)

NFWF Investment: $347,836
Match: $622,578

KITTLITZ'S MURRELET ($120,088)
Return: Information on nesting habitat, reproductive success, and mortality, including red fox predation and paralytic shellfish poisoning. Information on population genetic structure, including the identification of two two evolutionarily significant units for management purposes: the Western and Central Aleutian islands, versus Chukchi Sea south and east to the Alexander Archipelago. Documentation of recent migration between populations.
Risk: Information to action gap.

RED-LEGGED KITTIWAKE ($109,550)
Return: Demographic assessment and modeling of St. Paul and St. George breeding populations. Assessment and outreach focused on local harvesting.
Risk: Information to action gap; insufficient stakeholder engagement.

ASHY-STORM PETREL ($42,437)
Return: Species and nesting assessment to inform ESA listing decision. Establishment of a monitoring program for small breeding colonies, along with education outreach.
Risk: Stakeholder buy-in and information to action gap. Lack of a feasible conservation investments to address impact.

XANTUS'S MURRELET $35,820)
Return: Population modeling to assess dynamics between barn owls, deer mice, and the stability of the Scripp's Murrelet nesting population on Santa Barbara Island.
Risk: Information to action gap.

LAYSAN ALBATROSS ($39,940)
Return: Status and impacts of plastic ingestion by Laysan Albatross and other Hawaiian seabirds
Risk: Information to action gap. Lack of feasible conservation investment.

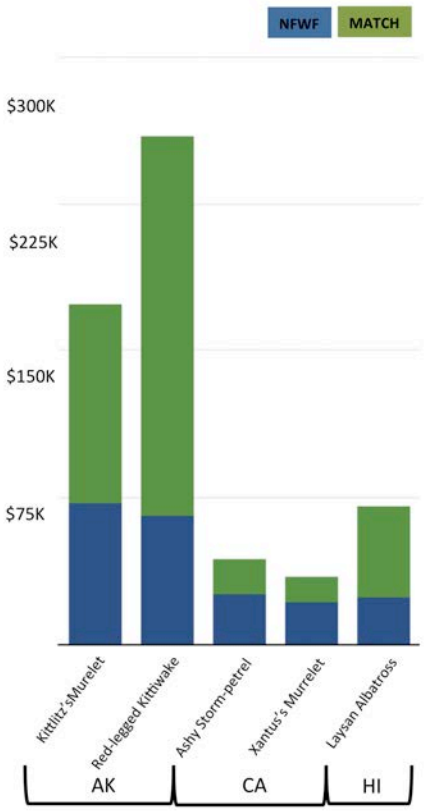

Figure 6. Characteristics of NFWF's five investments focused on filling information gaps from a pre-investment perspective. The main risks include insufficient stakeholder engagement, lack of feasible conservation investment, and "information to action gap." Lack of feasible conservation investment refers to the possibility that research results do not reveal any feasible conservation actions to invest in. "Information to action gap" refers to the possibility that research results are not tightly linked to actionable conservation interventions; rather, there are multiple known or unknown steps needed to connect research results with the actions to realize conservation benefits. For example, research may identify key seabird foraging areas, but the action of creating a seabird foraging sanctuary requires multiple policy instruments and buy-in from the industrial fishing sector. This gap represents a risk in realizing conservation benefits.

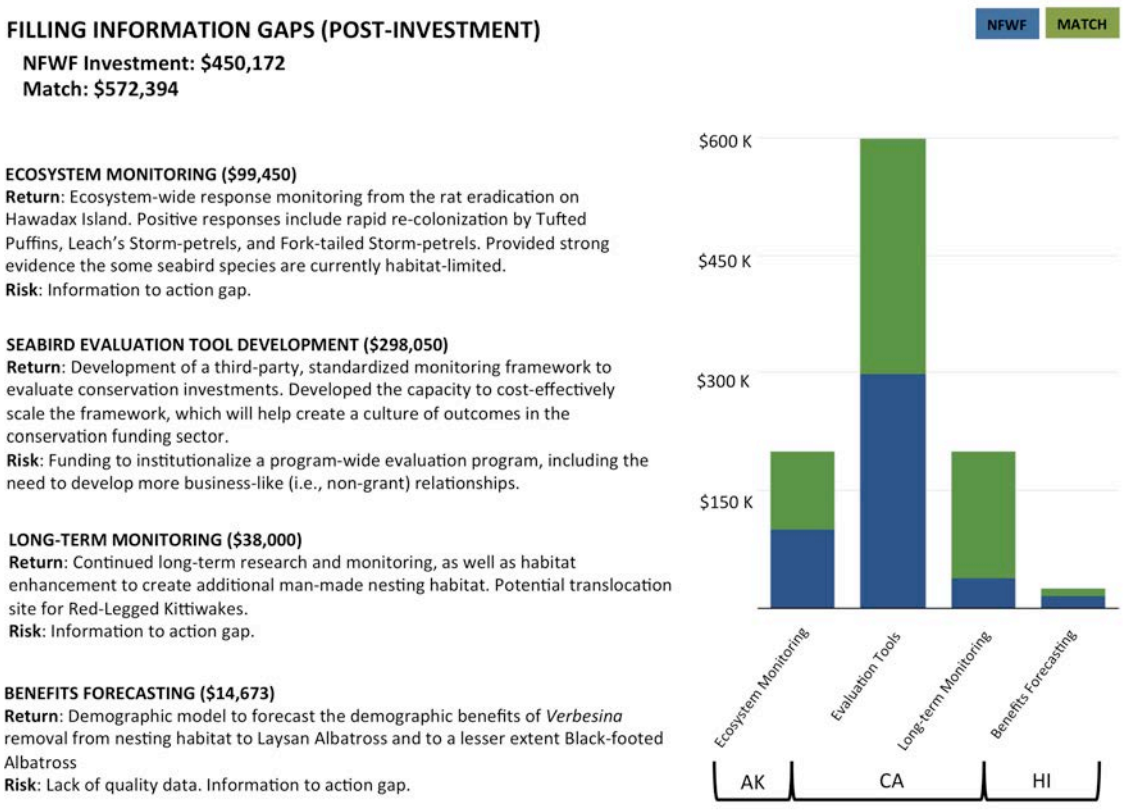

Figure 7. Characteristics of NFWF's four investments focused on filling information gaps from a post-investment perspective.

As one example, our survey results estimated the relative current state of knowledge of research topics for the Kittlitz's Murrelet, and the relative importance of those research topics for developing a conservation action plan for the species (Figure 8). While the current state of knowledge on environmental contamination (e.g., hydrocarbons) is perceived as low, it is also considered a relatively low priority with respect to developing a conservation action plan. In contrast, the greater seabird community views invasive animals, forage prey species, and climate change as research topics that have a low state of knowledge and are a high priority for developing a conservation action plan.

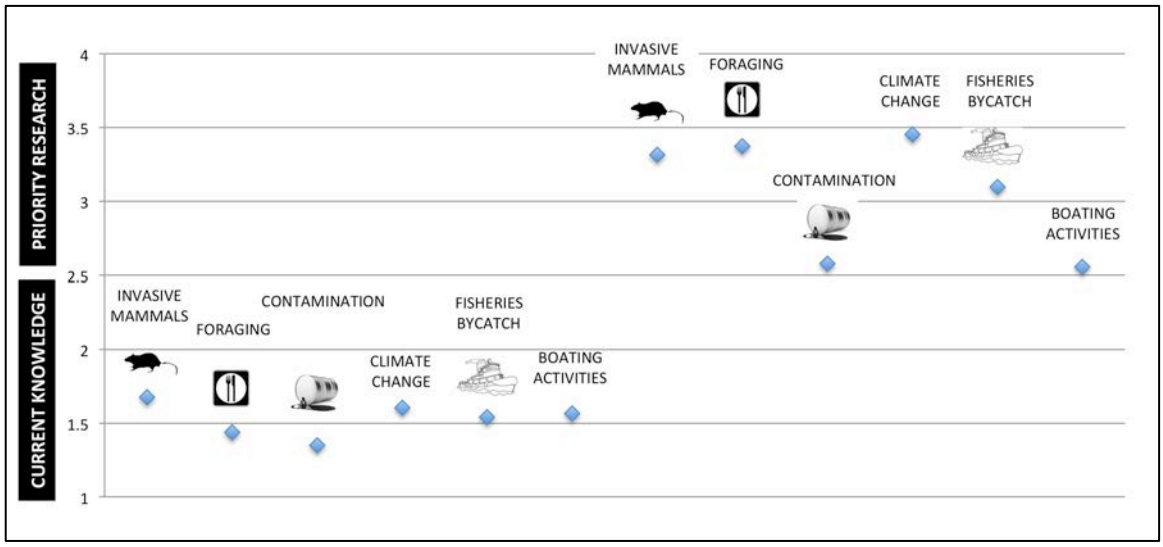

Figure 8. Survey results on the relative state of knowledge of research topics and their priorities for developing a conservation action plan for the Kittlitz's Murrelet. Research topics are invasive animals at breeding locations, foraging prey species, environmental contamination, climate change (and land use change), fisheries bycatch, and boating activities. The y-axis is a 1-4 Likert Scale for current knowledge (1=poor, 2=average, 3=good, 4=excellent), and importance for developing an action plan (1=not a priority, 2=low priority, 3=medium priority, and 4=high priority). See Appendix F for more details on the survey.

Protect seabird foraging locations and prey base (Core Strategy 6)

Protection of seabird foraging locations and prey base is an appropriate strategy for a subset of PSP focal species; however, the ability to completely realize the conservation benefits of this strategy is highly uncertain. The protection of foraging locations and prey base strategy consists of two investments in the California Current System. For this strategy, NFWF's primary goal is to integrate the needs of marine birds into existing fisheries management plans, marine protected area plans and into management plans of emerging fisheries to, over the longer term, improve foraging conditions for breeding, resident and migratory seabirds in the California Current (NFWF, 2012, p. 26). Towards this goal, PSP investments are focused on supporting the development of sound science and management recommendations that seek to integrate seabird conservation into practical and sustainable fisheries management. The NFWF PSP Business Plan states:

> A successful strategy for protecting seabird forage bases will bring together fisheries managers, marine protected area managers, the fishing industry, and seabird conservation experts to develop practical and measurable fisheries practices that benefit both seabirds (through availability of adequate prey) and the commercial fishing industry (through sustainable harvest). Social and economic factors will need to be integrated into any long-term solution.

NFWF appears on track to achieving its primary action of investing in support for development of sound science and management recommendations. However, a substantial portion of the larger strategy ultimately involves, by necessity, processes outside of NFWF's sphere of influence, including social, economic, and policy-related factors (including advocacy). NFWF is currently supporting natural science research on forage prey base, but research and support for social and economic processes will be needed as well.

While there is an increasing amount of research that is integrating seabird foraging and ecology needs into marine spatial planning, seabirds have played a minor role to-date with respect to the implementation of Marine Protected Areas (Ronconi et al. 2012). Further, the strategy of establishing Marine Protected Areas has had limited success: less than 2% of the world's oceans have any form of protected area designation, and the majority of MPAs are underperforming due to lack of enforcement, ill management, and lack of funding (Toropova et al. 2010, Gravestock et al. 2008). Integrating "the needs of marine birds into existing fisheries management plans, marine protected area plans and into management plans of emerging fisheries" (per NFWF's Business Plan goal, NFWF 2012, p. 26) is limited by socio-political processes rather than science. Currently NFWF investments have been focused on the latter. For the strategy to be successful, or at least reduce the uncertainty, NFWF will need to invest on both processes.

Therefore, while NFWF's investments are resulting in the creation and dissemination of new science-based knowledge, the ultimate conservation return is difficult to predict due to the fact that benefits to seabirds will ultimately need to rely on other activities outside the scope of the Program, such as policy reform. Without explicit links between NFWF's investments and the other necessary activities to realize seabird conservation benefits, there is risk the strategy may underperform with respect to the overall goals of the PSP.

Additional strategies

While NFWF is supporting one project in Hawaii that is creating the enabling conditions for a seabird translocation effort, it has invested relatively little to date in seabird restoration via translocation and social attraction methodologies. There are both advantages and disadvantages to investing in this strategy. Actively establishing new seabird breeding colonies could become increasingly important in order to mitigate impacts from climate change (e.g., sea level rise). However, as the survey results suggest, this is a long-term strategy with significant uncertainty. Active restoration of seabird colonies is becoming increasingly common (Jones & Kress, 2011). Chick translocation, acoustic vocalization playbacks, and decoys are now used widely to lure breeding seabirds to restoration sites. Some of these methodologies are cost-effective, and could be integrated into invasive animal eradications to improve conservation outcomes. For example, recent research suggests that natural re-colonization of extirpated seabirds from islands where invasive animals have been removed may be limited when nearby source populations are absent (e.g., less than 25 kilometers away,

Buxton et al., 2014). Based on our interviews, the funding and organizations researching and implementing the seabird restoration techniques are still small and idiosyncratic. Further, there appears to be little interaction or collaboration between researchers and practitioners working on active restoration with others who are working on other seabird conservation strategies such as invasive animal eradication.

Question 3: What is the added value or contribution of NFWF's PSP across the conservation landscape? What is the Program's greatest point of leverage and why?

- **The PSP is contributing to the conservation landscape by stimulating partnerships and increasing organizational capacity. These developments facilitate grantees' ability to scope and initiate new projects, as well as pursue and secure additional funding to implement new projects.**
- **One of the PSP's greatest points of leverage is its diversified portfolio – a portfolio that includes multiple strategies that balance indirect conservation activities with direct conservation actions focused on both short-term *and* long-term benefits to seabirds.**
- **As one of two major funders of seabird conservation in the philanthropic sector (along with the David and Lucile Packard Foundation), NFWF plays a leadership role, thus these investments significantly influence the conservation landscape.**
- **NFWF is distinct in that the PSP is able to leverage its investment more than twofold with matching fund requirements.**

NFWF's added value and contribution to seabird conservation

PSP projects are contributing to the conservation landscape by stimulating new as well as existing organizational partnerships and by increasing organizational capacity. In turn, grantees are leveraging these partnerships and their increased capacity in efforts to scope and initiate new conservation projects and pursue and secure additional funding to implement them. Furthermore, the Program continues to increase the visibility of seabird conservation efforts in many communities and has stimulated community buy-in and capacity to support those efforts. These types of impacts are important to take into account when considering the return provided by NFWF's PSP strategic investments in seabird conservation.

> *"For how small this grant was it leveraged a lot of partnership building. We now have a good relationship with…the key group of world experts on [the species]. So yes, it built partnerships very explicitly that way, which is very helpful."*

Partnership development

For most (91%) of the projects, grantees reported that meaningful partnership development has occurred as a result of the PSP funding they have received. More specifically, 69% of grantees reported that they have forged new partnerships and

shared many examples of these new partnerships with, for instance, funders, government agencies, fishing industry groups, and media. Partnership development has occurred within and across national boundaries and is inextricably linked with organizational capacity development, funding, and expansion of the work to conserve seabirds. Equally as many grantees (69%) described how the existing partnerships they had prior to their PSP grants have deepened or expanded specifically as a result of their experiences implementing their PSP projects. Because strong and healthy partnerships can be such an important facilitator of effective conservation work, this particular impact of the Program is considered to be an important overall contribution to the conservation landscape.

Grantees also reported finding opportunities to leverage off of one another's PSP projects. For approximately one-third (34%) of the projects, grantees provided examples of collaboration, cooperation, and information sharing with other PSP grantees. For example, there has been a synergistic relationship among grantees funded to work on *Verbesina* removal projects in the Northwest Hawaiian Islands, including two grantees that have been removing *Verbesina* and a third grantee that is doing research to model the impacts of *Verbesina* removal on these islands for Albatross. A fourth unrelated PSP research project tracking the foraging habits of Black-footed Albatross utilized workers on one of the *Verbesina* removal projects to help tag birds. Although these types of exchanges are happening to an extent, five grantees recommended that cross-pollination and information sharing among grantees, as well as helping grantees establish relationships with non-grantee entities that could help support their work, could be better facilitated by NFWF. For instance, one grantee said she "accidentally" finds out about the work of other grantees and is not aware of whether NFWF currently has a way of encouraging information exchange among its grantees. Another grantee added "I think it's important for the ones who are already involved in the work to conceive together how to develop strong relationships with other parties."

> *"Any funding where you are doing something new and you bring in a new person with a certain skillset that you didn't have before, that opens all kinds of doors and leads to the ability to go after various sorts of funding that are different from what you've done before. So if you get a project funded that takes bringing a new skillset into your [laboratory] or organization, it can have immense payback, and we're seeing that in lots of different ways."*

Organizational capacity to do conservation work

For a large majority of the projects (88%), grantees indicated that PSP funding has built or strengthened their organizational capacity to do conservation work. The most commonly reported area of growth in organizational capacity to do conservation work occurred in the area of acquiring new knowledge and skills in seabird conservation. As a

result of PSP funding support, several grantees have taken on and are learning about areas of conservation work new to their organizations (e.g., mink removal, invasive plant eradication). As part of this work, grantees are acquiring new tools and techniques. For instance, they report that the PSP project has allowed them to obtain new equipment such as acoustic monitoring tools; learn and execute new techniques like how to erect predator proof fencing; and research, test, and use effective herbicides and rodenticides. As well, PSP grants have resulted in hiring and training staff to carry out critical project activities. Positions vary from graduate students to project managers to field scientists, but they all serve crucial roles in providing technical support, as well as conducting outreach to build and maintain relationships in the community.

The organizational capacity that is being strengthened as a result of the PSP is paying dividends for grantees reporting that their reputation as leaders in conservation has improved. Further, organizational capacity in terms of conservation knowledge and skills, as well as reputation, is leading to more opportunities for PSP grantees to continue and expand their conservation work on behalf of seabirds.

Organizational capacity to scope and initiate new projects

A large majority (81%) of grantees have leveraged their NFWF projects to help inform, plan, and/or initiate new projects beyond NFWF funding. Nearly one-third of grantees have taken, or are poised to take, concrete steps to scope out, plan, and/or propose expanded conservation work. More importantly, one-third of the projects have already succeeded in leveraging their NFWF project(s) to secure additional seabird conservation work. For example, some grantees are expanding into different geographies to do the same type of work (e.g., island eradications and acoustic monitoring). Other grantees are building upon the research they have conducted by collaborating with scientists in different parts of the world in order to continue filling information gaps concerning, for example, plastic ingestion by Pacific seabirds. In still other instances, public/private partnerships have been strengthened or expanded, resulting in the development of additional projects to protect Pacific seabirds. One example of this is a newly formed collaboration to advance the use of ecosystem-based fisheries management in the CA current large marine ecosystem. Furthermore, there are examples of grantees using PSP dollars, in part, to open offices locally near where projects are based and parlay their local presence into funding for additional projects in the region.

> *"There's no doubt about it. The NFWF funding has allowed me to leverage other funding. The state [Hawaii] definitely is more interested in working together because we have NFWF funds to address larger issues than we had been able to previously. There's no question about that. The funding has significantly improved our ability to partner with people. People like to see multiple sources of funding."*

Stimulating additional funding

A quarter of grantees reported that they have already secured an undisclosed amount of additional funds for project work related to seabird conservation due, at least in part, to their PSP project. Nearly half (44%) of the grantees reported that they are currently attempting to leverage organizational capacity or partnership connections stemming from their PSP projects to acquire additional funding. In particular, grantees discussed the usefulness of the NFWF requirement for obtaining matching funds. Of the 41 projects evaluated, NFWF investment in the PSP has leveraged nearly $15 million in matching funds for Pacific seabird conservation.

> *"We are starting to have outreach and dialogue with people who are in a position to use the lessons we are learning and apply them to help the species elsewhere."*

Community capacity and increased visibility of seabird conservation

For a large majority of the projects (88%), grantees reported that PSP investments have helped to increase the visibility of or the community capacity for seabird conservation in ways beyond partnerships, funding, and increased organizational capacity. Communities that have been impacted in this manner include the wider conservation and scientific communities; decision makers, such as government agencies and conservation funding organizations; local community stakeholders; and other targeted communities, such as students and the general public. For example, grantees implementing invasive plant and animal control and eradication projects see themselves as "contributing to and learning from broader global efforts" because they help to shape and inform what happens in the future with other conservation projects through, for instance, dissemination of lessons learned in terms of technologies and efficiencies. Different modes of information sharing that have been used by grantees that can contribute to broader efforts include technical working groups, technical reports and how-to manuals, conference presentations, field visits, and journal publications.

> *"The best summary of the contributions [of my PSP project] is being able to inform conservation planning for threatened seabirds using the most scientifically valid information available."*

A number of PSP projects are not on-the-ground conservation projects but were funded to fill information gaps or build capacity of the conservation community through basic research or other means. These projects are described by interview respondents as making contributions to the conservation landscape in several ways, such as increasing the visibility of a species and its needs, increasing perception of the importance of specific species or specific conservation actions, and improving coordination and cooperation in the larger conservation community around a specific species or topic.

> *"This is a hearts and minds issue in a small community. It's not a question of regulation and enforcement as much as it is about changing what people think and how they behave. [The project site] has become a laboratory for community outreach. … There have been amazingly creative efforts – and relentless efforts – to sensitize the community to the natural heritage of their island and the importance of their stewardship and to put it in a global context. This work has been quite successful and we think that's been important [for the focal species]."*

For almost half (44%) of the projects, grantees stated that their projects had, or will have by the time the project is completed, the effect of increasing the capacity of policymakers and other decision makers, including funding organizations, to plan and invest in better informed conservation actions for the future. For example, information gleaned from two PSP projects has informed *Endangered Species Act* listing decisions. In addition, outreach materials targeted at the congressional level are being created to increase awareness of the value of invasive animal eradication as a tool for conservation action.

At the local community level, PSP projects are having an impact as well. For almost half (44%) of the projects, grantees perceived successes in building interest and capacity for current and future conservation vis-à-vis increasing public awareness, generating local pride and ownership in conservation actions and achievements, and fostering community advocates.

Greatest points of leverage

The two major private funders of seabird conservation are NFWF and the David and Lucile Packard Foundation's Marine Bird Program. Some components of their seabird programs overlap, namely, they share the goals of island restoration (i.e., removal of invasive animals on island) and bycatch mitigation. However, NFWF's PSP has a more diversified portfolio of strategies, which includes other conservation actions such as invasive plant eradication, as well as pre/post-investment efforts, including filling information gaps and community capacity building/outreach and education. Unlike the Packard Foundation's Marine Bird Program, the PSP also requires matching funds from grantees and is limited to certain focal species and geographies.

In light of these program similarities and differences, one of the PSP's greatest points of leverage is its diversified portfolio – a portfolio that includes multiple strategies that balance conservation action and pre/post-investments to achieve short-term benefits to seabirds while also working toward longer term conservation outcomes. In addition, the matching funds through grantee partners more than double NFWF's investment toward seabird conservation. These points of leverage, along with the PSP's many contributions to the conservation landscape, together bolster the ability of the PSP to achieve its goals.

RECOMMENDATIONS

Ultimately, the PSP is limited by a finite amount of funding to invest in seabird conservation. The Program has embraced an adaptive approach in the sense that future investment decisions will build upon progress made and lessons learned from previous investments. The purpose of the adaptive approach is to "allow us to learn from prior investments and more effectively direct available funding to those geographies and issues that will provide the greatest return on investment" (NFWF, 2012). In that spirit, the evaluation provided an analysis of Program progress, strengths, and areas for improvement, as well as a forward-looking analysis of NFWF's current investments to provide insights on the conservation returns and risks of the strategies and investments that make up the current PSP portfolio. Based on these integrated evaluation findings, we offer the following recommendations for the Program. The recommendations are categorized into two priority areas: primary (i.e., recommendations to keep the Program on track for realizing its objectives in both the short and long terms), and secondary (i.e., recommendations to strengthen grantee projects and the Program's administrative processes).

Primary Recommendations

1. Maintain PSP Focal Species and Geographies

Because of the current magnitude and state of PSP investments, we recommend maintaining current focal species and geographies. Given that PSP investments must target seabirds that breed or forage in U.S. waters, and evaluation findings did not indicate obvious gaps in the PSP focal species selected, there is no compelling case that additional species should be included. Further, given the suite of high-impact conservation projects that NFWF is already supporting and the funding gaps associated with many of those projects, expanding the Program's priority species or geographies puts at greater risk the successful completion of those projects. Program expansion may be warranted in the case of specific opportunities that are clearly high impact and low risk.

2. Maintain PSP Core Strategies

We recommend that the Program continue to support a diversified project portfolio of the six core strategies, using the present investment allocations as a guideline for PSP investments. The PSP should build upon the current achievements of projects in each core strategy by continuing investments in both conservation action and pre/post-investment projects that collectively impact seabird conservation over the short and long terms. We recommend taking a risk-return perspective when making investment decisions.

a) Keep investments in *invasive animal eradication* high, allowing projects under this strategy to continue to play a dominant role in the PSP investment portfolio.

The conservation returns of this strategy are high while operational and biosecurity risks are relatively low and manageable.

i. Prioritize projects in Guadalupe (Mexico), Socorro (Mexico), Lehua (Hawaii), and Kaho'olawe (Hawaii), as their performance to date indicate high return and low project risk.

b) Continue to invest in *invasive plant eradication/habitat restoration* as a long-term strategy where the link to seabird benefits is strong and capacity and likelihood of success are also strong. The conservation returns of this strategy can be high. However, without long-term commitment beyond the typical timeframes of PSP projects to eliminate the seed bank and achieve full eradication, the risks are also high.

i. Prioritize current projects in Hawaii, as stakeholder engagement and on-the-ground capacity and commitment are strong.
ii. Use caution when considering potential opportunities in locations where capacity or commitment may be unproven and likelihood for success may be lower.

c) Continue to invest in *fisheries bycatch mitigation* with organizations and in regions where enabling conditions are in place and stakeholder engagement is high. The conservation returns of this strategy are potentially high; however, the operational risk is elevated if there is insufficient engagement of fisheries, risking low adoption of voluntary bycatch mitigation techniques.

i. Prioritize projects in the Russian Far East and South America where seabird interactions with fisheries are high, local capacity is high, and stakeholder engagement is strong.

ii. Scope for organizations with capacity to design and implement a bycatch reduction program in the western Pacific for the Black-footed Albatross.

iii. Scope existing and emerging sustainable fisheries programs and ventures, such as seafood traceability, for potential partnerships that could result in reduced seabird bycatch.

iv. Consider integrating, encouraging, and supporting human-centered design methodologies that incentivize human behavioral change as a means to potentially increase voluntary adoption of bycatch mitigation methods and programs. For example, focusing on the needs of fishing communities, as opposed to the needs of seabirds, is likely to result in better bycatch reduction outcomes (Sorice et al. 2013). This would leverage social science methodologies to better understand stakeholder needs and preferences and facilitate stakeholder engagement.

d) Continue to invest in *capacity building* efforts with organizations that have, or are poised to develop, a robust local presence and technical capabilities for outreach, education, and conservation. The conservation returns of this strategy are high for paving the way for conservation actions and sustaining conservation gains. However, the risk of failing to achieve stakeholder buy-in—and subsequent conservation gains—is elevated when organizational capacity for conducting appropriate outreach, education, and conservation actions is weak.

    i. Prioritize current projects in Hawaii where organizations facilitating capacity building are strong.

e) Continue to fund projects to *fill information gaps*. The risk of not supporting basic research is high, not only for data deficient species (such as those currently funded by NFWF), but also for the field, which relies on empirical evidence to make informed decisions about conservation techniques.

    i. When choosing among projects to fill information gaps, we recommend prioritizing those that will fill information gaps explicitly linked to current or potential future investments of NFWF or other funders. In particular, research that improves the efficacy and reduces the risk of the PSP's core strategies would be strategic (e.g., research that focuses on reducing the risks associated with invasive animal eradications, such as developing new thinking and innovations for rodent eradications to reduce reliance on brodifacoum, as well as research to identify and understand successful processes for effecting change in fisheries management and policy).

    ii. Continue to prioritize research to fill information gaps about the Kittlitz's Murrelet. This focal species is IUCN listed as critically endangered, and data to inform conservation planning for this species are severely limited. Prioritize research on invasive animal impacts, foraging dynamics, and climate change impacts.

f) Continue to fund the *protection of foraging locations and prey base* by supporting projects that have a concrete link to plans for conservation actions. The conservation returns of this strategy are high; however, the probability of achieving those returns is difficult to predict because benefits to seabirds rely on management and policy changes that are outside the scope of the Program.

    i. Minimize risk to achieving little-to-no gains by prioritizing projects that have clear action steps to nurture relationships with stakeholders, including fisheries management and policy makers, for maximizing impact.

3. Facilitate stakeholder engagement and strong partnerships

Successful stakeholder engagement can help to garner broad support for implementation as well as bolster sustainability of project activities and outcomes. We

recommend that NFWF foster effective stakeholder engagement and strong partnerships to strengthen PSP projects and maximize results.

a) Continue to fund projects with experienced staff and strong partnerships that have demonstrated expertise in and capacity to conduct effective outreach and engagement. Be selective with respect to funding applicants that have strong in-country leadership, capacity, interest, and relationships.

b) Continue to fund projects with explicit planning phases that support outreach and education activities to lay the foundation for effective implementation.

    i. Pay particular attention to ensuring that there are sufficient capacity and resources dedicated to processes of stakeholder engagement and environmental compliance for the eradication programs currently supported by NFWF. While there are technical challenges with invasive animal removals, the majority of the risk for NFWF's current investments is conducting sufficient stakeholder engagement to gain broad support and successfully navigating environmental compliance.

    ii. Consider integrating, encouraging, and supporting human-centered design methodologies that incentivize human behavioral change (e.g., co-designing bycatch mitigations strategies with fishers) as a means to potentially increase voluntary adoption of bycatch mitigation methods and programs.

c) Given that stakeholder engagement and strong partnerships were key factors that strengthened project implementation, continue to provide sufficient time and resources for grantees to build relationships upfront and throughout the project.

    i. Identify problems with stakeholder engagement early in the project and exercise flexibility in supporting further engagement. Assess relationships with local community stakeholders, project partners, and others at frequent intervals as part of project monitoring.

4. Leverage PSP Investments to Further Impact the Conservation Landscape

To better leverage PSP investments to further impact the conservation landscape, we make the following recommendations.

a) Facilitate cross-pollination and information sharing among grantees. Continue to utilize current venues for gathering and sharing information about seabird conservation while developing other venues that are efficient and cost-effective. For example, create learning collaboratives for peer-to-peer sharing about conservation techniques, research findings, funding opportunities, and other topics. Cluster projects by core strategies to keep groups manageable. To avoid

travel costs, conduct webinars, and encourage leadership and collaboration by asking grantees to develop the agendas and run the webinars.

b) Leverage the gains made by grantees in acquiring further funding outside of NFWF by partnering with funding entities to potentially have greater impact on seabird conservation. To maintain relationships with grantees, develop a systematic process for communication that is inclusive of all grantees.

c) Develop strategies with the David and Lucile Packard Foundation's Marine Birds program to enhance the conservation landscape. NFWF and Packard share grantees and projects, creating an opportunity for joint projects. Both programs invest heavily in bycatch reduction and invasive animal removal. Utilize the knowledge (successes and challenges) from investments in both strategies to help develop and determine best practices. In addition, both foundations could leverage internal resources to design and implement programs that have the highest return on investment.

d) Consider the role of "connector" between researchers and practitioners working on active restoration with those working on invasive animal eradications. Historically and currently, there is little collaboration or exchange between the two groups. Such collaboration, both in research and conservation practice, could increase the seabird conservation benefits of a subset of NFWF current investments, particularly in situations where the conservation target(s) has been extirpated from breeding locations that are being restored (e.g., predator-proof fencing projects or invasive animal eradications).

Secondary Recommendations

5. Facilitate sustainability

Due to the long-term nature of seabird conservation, the benefits of many of NFWF's investments will not be realized during the timeframe of a particular grant, or even the overall PSP. In order to maximize the probability of benefits being realized, NFWF should continue to work with grantees on long-term sustainability planning.

a) During the project proposal stage, consider requiring applicants to explain how they will sustain project outputs and/or outcomes beyond the PSP project period.

b) Consider creating funding plans with all relevant project grantees. Ideally, this would include advanced commitments by additional funders once NFWF's investments end. Funding plans should be updated and re-assessed on a regular basis as projects progress; a clear NFWF exit strategy should be articulated to avoid multiple awards to projects that are likely to underperform in the long term. This could include project-specific performance measures to guide future funding.

6. Metrics, monitoring, and program evaluation

To improve upon metrics, monitoring, and program evaluation, we recommend the following.

a) Maintain the metrics reporting requirement, bearing in mind that what is most helpful for NFWF at the Program level is not necessarily what is helpful at the grantee project level. Communicate with grantees about how NFWF uses outcome metrics at the Program level. Maintain flexibility in the selection and reporting of metrics, continuing to provide grantees the option to customize metrics to their projects and to report qualitatively on project processes, outputs, and outcomes. NFWF needs valid and reliable outcome predictions. Requiring grantees to "make up" predictions about long-term conservation outcomes is not meaningful and cannot be helpful to NFWF in the long run.

b) Assess the programmatic role of monitoring for the PSP, including how it interacts with current Program metrics. Consider making an investment to convene leading thinkers in seabird monitoring and outcome-based approaches to review and suggest improvements to the Program's metrics and monitoring approach.

c) The current evaluation provided a formative, mid-course assessment of the PSP focusing largely on Program processes, project outputs, and forward-looking risk-return analysis. Ultimately, it is important to understand the outcomes of this major investment in seabird conservation not only for NFWF but also for the field at large. Consider commissioning a summative outcome evaluation of the PSP to understand the extent to which short-term (e.g., 3 to 6 years) biological conservation outcomes were achieved. Results from a summative outcome evaluation can be used to share lessons learned with the field about effective strategies and to influence future funding in seabird conservation.

7. PSP staffing

We recommend that NFWF continue to ensure that PSP managers have substantial scientific knowledge, expertise, and field experience in seabird conservation, in combination with strong management abilities, including relational and communication skills.

8. Grant funding period

We recommend that the PSP considers funding projects for longer than a one-year time frame. One-third of projects experienced challenges with accessing project sites and/or data. In a one-year project time frame, this can be a significant setback. In the proposal phase, require grantees to develop contingency plans for potential challenges but maintain flexibility.

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Appendix A

Pacific Seabird Program
Evaluation Questions

Table A1. Evaluation Questions Posed by NFWF and Adopted for Use in the PSP Evaluation

Evaluation Questions
Status toward achieving goals: To what degree is the program on track for achieving its goals? To what extent has it achieved on-the-ground implementation of its core objectives? ♦ Has the program benefitted focal species? Additional species? ♦ Has the program had an on-the-ground impact on seabird conservation? ♦ Is the program able to report on outcomes using existing metrics?
PSP contribution and added value: What is the added value or contribution of NFWF's Pacific Seabird Program across the conservation landscape? To what extent has the program stimulated ♦ Additional funding ♦ Partnership development ♦ Organizational capacity to scope and initiate new projects outside of NFWF funding, and ♦ Increased visibility of seabird conservation?
Scope and selection of focal species: Were the initial scope and selection of focal species and strategies appropriate to the conversation need? Is NFWF addressing priority needs with the appropriate strategies?
Points of leverage: What is the program's greatest point of leverage and why? ♦ Where should the program focus to maximize impact in the future? ♦ How is NFWF's program distinct from (and complimentary with) Packard's Marine Bird program? ♦ Are there opportunities for leveraging off each other's programs?
Future directions: What are the primary future directions the program should pursue to continue to have the desired impact or to expand its conservation impact? ♦ Are there strategies that we should consider as we move forward that we have not invested in? ♦ In what priority geographies should the program invest? ♦ Should the program expand or is consolidation of existing outcomes and successes the best future investment?

Appendix B

Evaluation Methods:

Data Sources, Data Analysis, and Study Limitations

EVALUATION METHODS

Data collection using the methods described below was implemented largely sequentially so that each subsequent data collection effort was informed and strengthened by ongoing analyses, although some activities ran concurrently.

Data Sources

Document review

Document review consisted of grantee proposals and interim and final project reports (see Appendix C for PSP projects included in the evaluation). Out of 41 funded projects, seven provided final reports and 29 provided interim reports. For the five projects where reports were not yet available, we relied on the project proposal for basic program data. For projects with both an interim and a final report, or multiple interim reports, we used the most recent document as the basis for analysis.

Interviews conducted

Grantee Interviews and Highlight Cases

Interviews were conducted with PSP grantees to fill critical information gaps from the document review. A qualitative interview protocol was drafted by the evaluation team and received input from NFWF (Appendix D).

In March 2014, the evaluation team contacted via e-mail and/or telephone a total of 30 Principal Investigators (PIs) for 41 PSP projects to request participation in a telephone interview. There were seven PIs with one or more PSP projects; therefore, the ratio of PIs to projects was not one-to-one. By early June 2014, 29 PIs had granted an interview, representing 40 PSP projects for a response rate of 97%. Only one PI (representing one PSP project) did not grant an interview. The PIs were invited to include their project partners in the interview. Two interviews for two separate projects included one or more project partners.

The interview time was approximately one hour per project. Two members of the evaluation team were on each interview call. One member had primary responsibility for asking questions, while the other member created a detailed transcript of the interview. After each interview call, both members of the evaluation team reviewed the interview transcript. In a few cases, PIs requested to see the transcripts, which were shared with them via e-mail. In addition, follow-up questions for clarification were e-mailed to the PIs by the evaluators if needed.

Global Experts interviews

In addition to interviews with grantees, we conducted phone interviews with four leading seabird biologists to gather additional, broader perspective on the PSP and seabird conservation. A 'global experts' interview protocol was developed (Appendix D) and included questions about emerging threats to seabirds, climate change, research priorities, bycatch reduction, cost-effectiveness of conservation actions, innovation and

interventions, perspective on NFWF's PSP, and leveraging investments and opportunities going forward.

Interview with the David and Lucile Packard Foundation Marine Birds Program

One interview was also conducted with a representative from the David and Lucile Packard Foundation Marine Birds Program to gain a better understanding of seabird conservation from that organization's perspective. The interview protocol followed a modified version of the protocol developed for the grantee interviews (Appendix D).

Online Expert Elicitation Survey

Expert elicitation, a technique used to synthesize the opinions of experts, while assessing the uncertainty around those views, has been in use for several decades in the social science and risk assessment sectors (Kerr 1996; Garthwaite et al. 2005; O'Hagan et al. 2006). Expert elicitation is being used increasingly in the conservation sector to guide decision-making and is particularly useful in data-poor scenarios (Martin et al. 2005; Halpern et al. 2007; Donlan et al. 2010).

In consultation with NFWF, the evaluation team designed and implemented an Internet-based expert elicitation survey (Appendix E) to complement document review and interviews and to provide insights into how the PSP can best be implemented in the future to maximize conservation goals.

The goal of the survey was to quantify expert opinion on the relative magnitude of the effects of specific conservation actions for nine of NFWF's focal species. Due to its data-deficient nature, we asked series of questions focused on the current state of knowledge of research topics and their importance for developing a conservation action for the tenth focal species: Kittlitz's Murrelet (see Figure 8). Some conservation actions were current NFWF investments, while others were not (see Figure 7). The number of conservation actions for each species varied and were determined in consultation with NFWF and a small panel of seabird experts, along with input from the literature and the NFWF PSP Business Plan. Respondents scored four criteria for each conservation action: feasibility, scope, impact, and cost. The survey also included a series of background questions to gauge the respondents' experience and expertise, in particular their relative expertise with each species, geographic region, and conservation actions. We also asked if respondents have or ever had a grant under the NFWF PSP.

We distributed the survey via three avenues. First, current NFWF PSP grantees were included in the distribution list (n = 31). Second, we identified experts through a literature search in Google Scholar in which we used a combination of seabird species, geographic region, and conservation action keywords. Emails were sent to the combined distribution list (n = 150) asking them to take the survey and pass the survey on to colleagues. Lastly, we distributed the survey to appropriate list-serves, including Aliens-L, Pacific Seabird Group, BirdBycatch, and the World Seabird Union. We sent two

reminder emails to the distribution list, as well as posting reminders on the list-serves. The survey was available on-line (both in English and Spanish) for three weeks.

In total, 209 people responded to the survey, and answered some portion of the survey. Answers to questions were not mandatory, and respondents were able to skip questions. The sample size for each conservation action survey question ranged from 57 to 87 responses. The survey data was analyzed using cumulative link models with respondent as a random effect. This allows for the control for individual respondent biases in the survey responses. Details on the analysis and results can be found in Appendix F. We present preliminary findings here in this evaluation, and are working with NFWF staff to further analyze the survey results for submission to a peer-reviewed scientific journal.

Data Analysis

Analysis of project documents

Documents were reviewed utilizing two primary structured review tools: a variables table, which enabled capture and analysis of data from grantee documents amenable to tabulation, and a document review template to capture larger narrative excerpts of document reports.

The variables table included fields capturing all project-specific information, such as basic project descriptor and reporting information as well as applicable focal species and additional species, funding levels, established conservation activities, outputs, and outcome goals at grant completion and long-term outcome goals, each with associated metric values, and other information. This table enabled the evaluation team throughout the project to quickly identify and assess projects and groups of projects in a variety of ways to answer different questions. It was also used extensively for quality control and consistency checks.

The document review template was developed to capture and organize information from grantee documents around the PSP core strategies as well as a variety of measures and metrics, both those already established by NFWF, as well as additional metrics that emerged from the data. Once compiled, these data were then further compiled into an internal working document review report, which provided the evaluation team with a second main tool for reviewing and assessing activities, outputs, and outcomes across the PSP core strategies.

To the extent that conservation goals and outcomes at grant completion, or longer term goals and outcomes information was available in grantee reports, we compiled this information both in the document review report as well as separately by focal species to evaluate impact of the PSP on focal species.

Analysis of grantee interview data

When separate projects led by the same PI were related (e.g., multi-staged projects), one transcript covering one or more related projects was generated. When projects led by the same PI were not related, separate transcripts were generated. Altogether, a total of 32 transcripts representing 40 projects were coded for analysis. There were four coders assigned to code the interview transcripts. In order to promote inter-rater reliability, a lead coder reviewed the codes applied to all 32 transcripts for coding consistency.

The foundation for the qualitative interview analysis is thematic analysis, a conventional method in qualitative research that involves reading transcripts to identify ideas and to categorize meaningful patterns in the data (Cresswell, 1994; Miles and Huberman, 1994). Evaluators also borrowed specific coding practices – open and axial coding – from the grounded theory approach to analysis developed by Strauss and Corbin (1998). Thematic analysis and grounded theory are similar analytic frameworks in that they both endeavor to represent a view of reality through systematically and progressively identifying and integrating concepts into higher level themes. Both analytical approaches are initially inductive, allowing concepts and patterns to emerge from the data; and later deductive, in the practice of going back to the data to verify patterns and themes. However, thematic analysis falls short of developing theoretical hypotheses, which is the convention in grounded theory analysis. Rather, thematic analysis produces a description and interpretation of individual subjective experiences and oftentimes is more fitting in the context of program evaluation.

Interview transcripts were uploaded into Dedoose, an online qualitative and mixed methods data analysis tool. Analysis began by systematically reducing the data from the transcripts during open coding procedures that fragment data into separate units. During this process, data are scrutinized line-by-line and individual excerpts are coded so that the excerpts, which become the source of the ultimate themes, remain rooted in the data. This first level of open coding involved the initial identification of concepts and was conducted by four members of the evaluation team who we referred to as “first-level coders.” The coders utilized both a small set of a priori codes based on the study questions of interest, as well as grounded codes that emerged from the data. All interview transcripts received a first level of coding and were then reviewed by a “second-level lead coder” who conducted a consistency check for coder consensus. The lead coder reviewed the coded transcripts and identified areas of disagreement where she would have applied more, fewer, or different codes than the first-level coders. Where discrepancies were found, the coders discussed and reconciled differences with one another until consensus was reached. This served as an important quality review process to reduce bias and increase the consistency of how codes were applied across interview transcripts.

Next, the team continued the open coding process, which involved grouping concepts into categories, clarifying dimensions of categories, and identifying patterns. Coded

excerpts were then clustered into initial themes that were refined and verified by returning to the data during the process of axial coding. Relationships between and among themes were studied; when warranted, themes were collapsed or merged and appropriate ordering was determined for presentation in the report.

Overall, interview data were analyzed to illuminate key patterns in the data related to program implementation factors and successes, leveraging opportunities, organizational and community capacity building, facing and overcoming project challenges, NFWF leadership in seabird conservation, strengths and limitations of metrics, sustainability of project outputs and outcomes, areas for program improvement, future directions, and others. Several key themes pertaining to these areas emerged across the interviews. Throughout the report, thematic content is summarized and illustrated using examples and experiences in the voice of respondents. Themes are further illuminated through a number of highlight cases featured throughout the findings section. These highlights help to demonstrate each of the six core strategies of the PSP.

Analysis of survey data

Analysis of survey data is presented in Appendix F.

Integrated mixed methods analyses

Multiple data sources from the evaluation were integrated to answer the study questions by looking at shared themes and relationships, as well as divergent information, across these sources. By incorporating multiple data collection methods and sources in this manner, we were able to triangulate across methods and sources to achieve greater confidence in the validity of study findings. The explanations below of our Return on Investment (ROI) analysis and highlight cases further describe our approach to integrative analysis.

Return on Investment (ROI) Analysis

Because many NFWF investments currently target more than one seabird species (and because there are not good data on the relative benefit from those investments), we analyzed current NFWF investments primarily from a core strategy perspective. We follow the strategies originally defined in the NFWF PSP Business Plan (NFWF, 2012); however, we modified them slightly to better provide a forward-looking strategy of currently active investments. The investment categories include,

1. Invasive mammal eradication,
2. Predator-proof fencing,
3. Habitat creation via plant restoration,
4. Fisheries bycatch,
5. Foraging location and prey base,
6. Filling information gaps (pre-investment), and
7. Filling information gaps (post-investment).

For the return on investment analysis, we focused on the first four strategies. Research on foraging ecology and filling information gaps is more challenging to assess the potential seabird conservation benefits, because research is one of many activities that have to be successfully executed for seabird benefits to be realized. Some of those additional activities are outside the scope of the PSP and have a high level of uncertainty connected to them (e.g., policy). When appropriate we pooled individual grants when they covered the same goal or program. Using the grant documentation, we also allocated budgets according to goal or program when a single grant covered multiple programs or projects. Financial information for NFWF investments and matching funds came from available grant documentation. The overall financing needed to realize the conservation benefits (referred to here as the *budget gap*) comes the grant documentation and personal communications with grantees and others intimately involved with the projects. For obvious reasons, these estimates have some uncertainty, and for many investments the budget gap is unknown.

For each investment, we estimated the conservation return for the seabirds being targeted and placed each investment into one of three categories: low, medium, and high conservation return, and for each investment, we also estimated project risk. We did so by analyzing and synthesizing grant documentation, interviews with grantees, interviews with non-grantees involved in projects, and the literature. Similarly, we placed each investment into one of three categories: low, medium, and high risk. We also identified the type of risk present for each investment. Criteria for assigning risk differed depending on the investment strategy. Those criteria and the detailed results of the return on investment analysis can be found in Appendix G.

Highlight Cases

The highlight cases were intended to showcase projects that exemplify the six core strategies of the PSP, as well as the major themes derived from the mixed methods analysis of data from the document review, grantee interviews, and survey. One project per core strategy was selected using several criteria. The criteria were applied across the projects so that, collectively, they would represent: (a) as many focal species as possible; (b) the primary geographic areas of interest to the PSP; (c) small, medium, and large investments; (d) and major cross-cutting themes derived from the evaluation data sources. Altogether, eight focal species were represented in the selected highlight cases (i.e., Scripp's/Xantus's Murrelet, Laysan Albatross, Black-footed Albatross, Pink-footed Shearwater, Newell's Shearwater, Hawaiian Petrel, Kittlitz's Murrelet, and Ashy Storm-Petrel); the primary geographic areas represented were Mexico, Hawaii, Chile, Alaska, and the California Current; investment (from NFWF and matching funders) in the projects ranged from $200,000 to over $5 million dollars; and each project exemplified at least one theme from the grantee interviews. The highlight cases were initially selected by the evaluation team using these criteria, and NFWF was given an opportunity to provide feedback on the selection. Feedback from NFWF did not change the initial selections.

STUDY LIMITATIONS

There are several limitations to the evaluation. First, findings stemming from the document review (outputs, outcomes, as well as ROI analysis and results) are limited in that the document review was based on self-reported data from NFWF grantees. Ground-truthing of outputs and outcomes was beyond the scope of this evaluation. In addition to focusing on the central evaluation questions, interviews with grantees sought to clarify information gaps left by the document review, yet obtaining complete information was not possible in many cases. In addition, while invitations for grantee interviews extended possible participation to grantee partners as well, only some partner organizations participated in the interviews, limiting the degree to which information could be triangulated with perspectives beyond those of the grantees. Since the ROI analysis conducted as part of this evaluation relies largely on the document review and grantee interview data, these limitations carry over to ROI analysis as well. ROI results are risk estimations based on probability of expected returns, which in many cases in the case of seabird conservation, may not be realized for years or even decades.

The results of the survey also have limitations. They represent a cumulative opinion of the greater seabird community and thus should be considered alongside all other available data, some of which may be more accurate, especially if that information is not widely available or is unique.

Appendix C

Pacific Seabird Program Projects Included in the Evaluation

Table C1. Projects Included in the PSP Evaluation by Focal Geography

Project Title	Project ID	Grantee Organization
Alaska		
Assessing Invasive Rat Impacts on Island Ecosystems in the Aleutians (AK)	32763	Island Conservation
Conservation and Enhancement of Middleton Island Seabird Habitat (AK)	30350	Institute for Seabird Research and Conservation
Genetic Study to Aid Conservation of Kittlitz's Murrelet	35748	Queen's University
Middleton Island seabird research and monitoring	32886	Institute for Seabird Research and Conservation
Nesting Ecology of Kittlitz's Murrelet on Kodiak Refuge (AK) - II	32871	U.S. Fish and Wildlife Service - Kodiak National Wildlife Refuge
Red-legged Kittiwake Population Modeling in the Pribilof Island (AK)	35745	Alaska Maritime National Wildlife Refuge
Reducing Bycatch of Seabirds in Russian Far East Fisheries	30730	World Wildlife Fund, Inc.
Seabird Restoration in Prince William Sound (AK)	28373	Northern Forum, Inc.
Standardized Low-Cost Monitoring Of Conservation Success Pilot Project	30733	Regents of the University of California
California Current System and Adjacent Mexican Islands		
Ashy Storm-Petrel Restoration on the Farallon Islands	30385	Island Conservation
California Current Forage Fish and Predator Dynamics (CA)	35755	Point Reyes Bird Observatory dba Point Blue Conservation Science
Comprehensive California Current Seabird Forage Reserves	36944	Farallon Institute
Enhance Key Databases to Protect Threatened Pacific Seabirds	35744	Island Conservation
Island Ecosystem Restoration in Haida Gwaii, Canada	36841	Parks Canada Agency - Gwaii Haanas National Park Reserve
Modeling Effects of Barn Owl Predation on Scripps's Murrelet (CA)	40602	Point Reyes Bird Observatory dba Point Blue Conservation Science
Mouse Eradication on San Benito Oeste Island, Mexico	35751	Grupo de Ecologia y Conservacion de Islas, A.C.
Protecting Townsend's Shearwaters on Socorro Island, Mexico	35754	American Bird Conservancy
Protecting Townsend's Shearwaters on Isla Socorro (MX) - II	27573	American Bird Conservancy
Seabird Bycatch Reduction in West Coast Sablefish Fisheries	35750	Oregon State University
Seabird conservation on Guadalupe Island	36688	Grupo de Ecologia y Conservacion de Islas, A.C.
Status of Ashy Storm-Petrels at the Northern Breeding Limit (CA)	31706	California Institute of Environmental Studies
Understanding and Protecting Ashy Storm-petrel (CA)	38651	National Audubon Society, Inc.

Project Title	Project ID	Grantee Organization
Chile		
Eliminating Threats to Priority Seabirds - III	25823	American Bird Conservancy
Eliminating Threats to Priority Seabirds - IV	30504	American Bird Conservancy
Eliminating Threats to Priority Seabirds - V	36662	American Bird Conservancy
Reducing Bycatch of Pink-footed Shearwaters in South America	35759	BirdLife International
Restoring Pink-footed Shearwater Populations in Chile	20835	Island Conservation
Restoring Pink-footed Shearwater Populations in Chile - II	30463	Island Conservation
Seabird Conservation Grants for Developing Countries	39283	The Pacific Seabird Group
Hawaii		
Assessing High-Seas Threats for Kure Atoll Black-Footed Albatross	30626	Oikonos - Ecosystem Knowledge
Benefits of Verbesina removal for albatross population health	40744	University of California
Bringing Back the Albatross to Midway Atoll (HI)	28739	U. S. Fish and Wildlife Service
Constructing a Predator-Proof Fence at Kilauea Point National Wildlife Refuge (HI)	30559	American Bird Conservancy
Constructing a predator-proof fence at Kilauea Point NWR-II	37007	American Bird Conservancy
Increasing Albatross on Sand Island by Controlling Verbesina	35761	U. S. Fish and Wildlife Service
Kaho'olawe Island Seabird Restoration	36838	Kaho'olawe Island Reserve Commission (A)
Lana'i Hawaiian Petrel & Newell's Shearwater Restoration	30732	Tri-Isle Resource Conservation & Development Council, Inc.
Lehua Island Restoration and Seabird Recovery (HI)	30578	Island Conservation
Plastic Ingestion by Tern Island Seabirds: Trends & Impacts (HI)	35765	Oikonos - Ecosystem Knowledge
Restoring Seabird Breeding Habitat on Kure Atoll	30565	State of Hawaii, Department of Land and Natural Resources
Subalpine Hawaiian Petrel Colony Cat-Proof Fencing (HI)	35764	Hawaii Volcanoes National Park

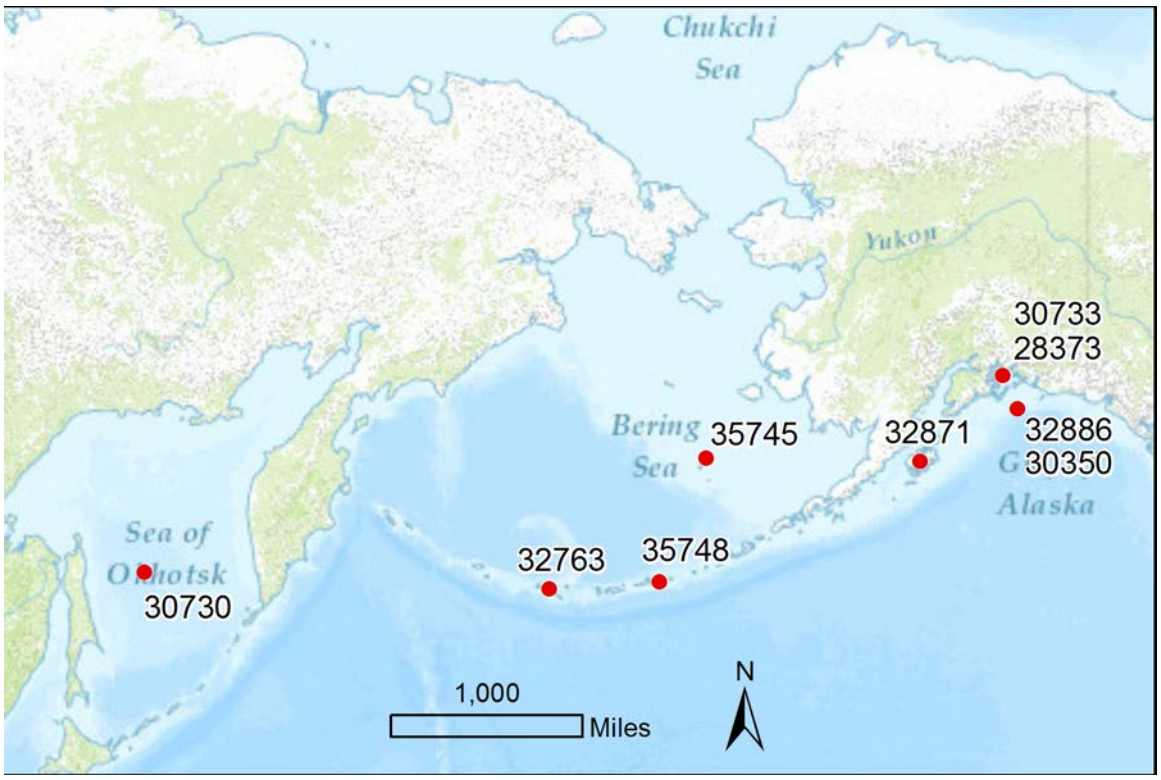


Figure C1. Funded projects of the PSP Alaska focal geography

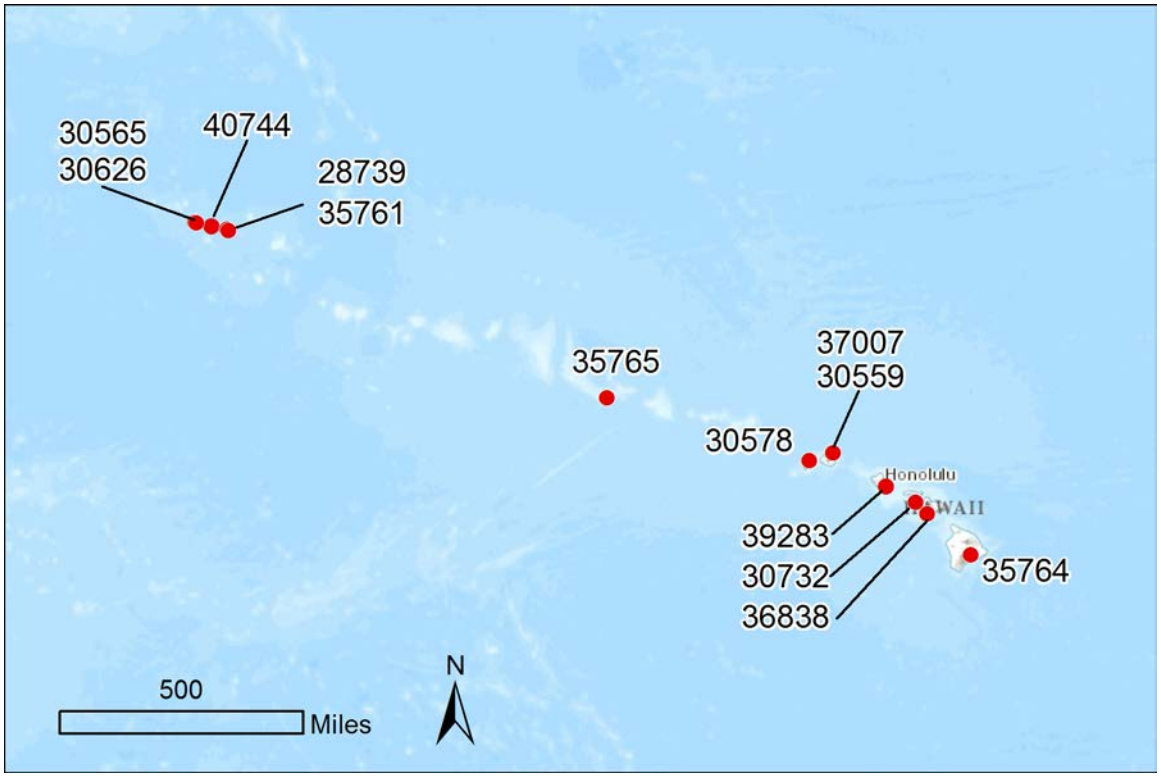


Figure C2. Funded projects of the PSP Hawaiian Islands focal geography

Figure C3. Funded projects of the PSP California Current System and Adjacent Mexican Islands focal geography

Figure C4. Funded projects of the PSP Chilean Islands focal geography

Table C2. Overview of Pacific Seabird Program Funded Activities by Core Strategy

	Planning	Research	Implementation	Outreach and Communication	Monitoring
Core Strategy 1: Removal of non-native, invasive animals	♦ Developing management plans ♦ Securing permits and approvals ♦ Acquiring equipment	♦ Assessing previous removals to inform present/future actions ♦ Developing tools (information-sharing databases and eradication methods) to inform decisions ♦ Standardizing data collection methodology ♦ Statistical power analysis	♦ Eradication through traps, bait box toxicants, or hunting ♦ Protection of seabird nesting colonies through construction of predator-proof fences	♦ Generating public and stakeholder support ♦ Providing information on eradication methods ♦ Preventing future infestations	♦ Baseline and post-eradication monitoring
Core Strategy 2: Removal of non-native, invasive plants	♦ Invasive plant eradication training ♦ Infrastructure development and trail maintenance ♦ Native plant propagation		♦ Invasive plants removal using chemical and manual techniques ♦ Native plants grown, out-planted, and protected		♦ Measuring invasive and native plant species cover ♦ Focal seabird species nests within improved habitat areas
Core Strategy 3: Reduce seabird bycatch	♦ Building working relationships with fishing communities ♦ Recruiting vessels for onboard research and monitoring	♦ Assessing bycatch mitigation techniques		♦ Distribution of materials on seabird conservation and bycatch mitigation in ports	♦ Bycatch levels and adoption of mitigation measures in various fleets
Core Strategy 4: Capacity building (disturbance management and education)	♦ Park guard training ♦ Establishing native plant propagation programs	♦ Assessing potential disturbances (light impacts during the fledging period, sources of predation)		♦ Educating local communities on seabird conservation	
Core Strategy 5: Fill information gaps	♦ Logistics planning ♦ Monitoring training	♦ Population modeling ♦ Population genetics analyses			♦ Seabird populations and status
Core Strategy 6: Protect seabird foraging locations and forage prey base		♦ State-of-the science research on forage fish and predator dynamics		♦ Workshop on forage fish and predator dynamics to inform fishery management and priority research needs	

Appendix D

Interview Questions

Grantee Interviews

Questions

1. We would like to give you an opportunity to describe – outside of the confines of those reporting structures and metrics you have been given by NFWF – what you think have been the most important contributions of your project in benefitting your focal species. Please describe.
2. Have any of the strategies or activities you chose to implement for the NFWF project stand out as particularly successful in facilitating your work to achieve the intended outcomes? Please explain.
3. Being as specific as possible, could you describe what the biggest challenges have been in implementing your project, and whether/how they have been overcome?
4. Have the NFWF metrics been meaningful or applicable for reporting project progress and outcomes? Please explain.
5. Could you describe how NFWF funding has positioned your organization in terms of partnerships? For example, has the grant money helped you to establish or further develop relationships with key partners and/or take existing relationships with partners in a new direction? Please describe.
6. Other than through partnerships, to what extent has NFWF's funding of this project helped increase your organization's capacity to develop or initiate new projects outside of NFWF funding? Please explain.
7. What would you like to see NFWF do in the future to support grantees' efforts to protect Pacific Seabirds?
8. Is your organization planning to expand into other geographic areas? If so, where and why?
9. To what extent do you expect the outcomes of your project to be sustained after the project ends?
10. Is there anything we have not asked you about that you think would be important for us to know as we evaluate NFWF's Pacific Seabirds Program?

Questions to Verify Data from the Document Review

As appropriate, the following questions will be tailored to each grantee and prepared in advance of each interview:

- If we have specific questions based on data from the document review, we will take a few minutes to verify or request information.
- We will ask the respondent to confirm the following information about project funding:
    - Total amount of additional funding raised
- We will ask the respondent whether they have additional quantitative data on the conservation benefits of the project.

Packard Marine Birds Initiative Interview

Questions

1. We have reviewed the Packard Foundation's Marine Birds Strategic Plan (October 2013), and we understand that the initiative is focused on three main strategies: 1) island restoration (invasive predator removal); 2) bycatch reduction, and 3) shorebird habitat conservation, the first two of which overlap to some degree with goals of NFWF's Pacific Seabird Program. We'd like to start by asking you about the Packard Foundation's reasons for focusing on these strategies and its objectives for the island restoration and bycatch strategies in particular, going into Phase 2 of Packard's funding effort. Specifically:
    - **Island restoration:**
        i. What are the Packard Foundations goals for island restoration in Phase 2?
        ii. How will the foundation's grant making for island restoration projects will be similar to or different from the Foundation's Phase one projects in this area?
    - **Bycatch reduction:**
        i. What are the Packard Foundation's goals for bycatch reduction in Phase 2?
        ii. How will the foundation's grant making for bycatch projects compare with the previous 5 years?
2. Based on what was accomplished in the first five years of Packard's Marine Birds initiative, what would you say has been the most successful strategy or strategies?
3. Again, based on the first five years of Packard's Marine Birds initiative, what would you say were the largest challenges faced by grantees in accomplishing their goals? And how is Packard working to overcome those challenges?
4. As you probably know, NFWF's Pacific Seabird Program is focused on ten focal species from priority geographies including:
    - Alaskan seabirds: **Red-legged Kittiwake, Kittlitz's Murrelt**
    - Seabirds of the California Current and Mexican Islands: **Ashy Storm-Petrel, Townsend's Shearwater, Xantus's Murrelet**
    - Chilean seabirds: specifically, **Pink-footed Shearwater,** and
    - Hawaiian seabirds: **Black-footed Albatross, Hawaiian Petrel, Laysan Albatross and Newell's Shearwater**

    How do you view Packard's Marine Birds program as distinct from and similar to NFWF's Pacific Seabirds Program? Please describe.
5. To what extent do you see opportunities for leveraging the investments of the Packard Marine Bird program with external partners and funding sources, such as NFWF's Pacific Seabird Program? (For Island restoration? Bycatch? Other?)
6. To what extent do you expect that the outcomes you have achieved so far with the Packard Marine Birds initiative will be sustained after the next funding cycle?
7. Could you describe the nature of the relationship between the Packard Marine Birds initiative and NFWF's Pacific Seabird Program?

8. From your perspective, what is the added value or contribution of NFWF's Pacific Seabird program to seabird conservation?
9. From your vantage point, are there important geographies, focal species, or strategies where the Packard Foundation isn't currently focusing that NFWF might be able to impact with its grant making?
10. Is there anything we have not asked you about that you think would be important for us to know as we evaluate NFWF's Pacific Seabird Program?

Global Seabird Expert Interviews

Questions

1. **TYPE OF WORK:** Could you start us off by telling us a bit about the work you do in seabird conservation?
2. **EMERGING THREATS:** In the geographies where you work on seabird conservation, what threats to seabirds do you see becoming predominant over the next five years?
3. **CLIMATE CHANGE:** How would you tackle climate change in a seabird conservation program?
4. **RESEARCH PRIORITIES:** In the geographies where you do seabird conservation, what are the research priorities for seabird conservation?
5. **ADDRESSING BYCATCH:** In your view what are the key challenges to addressing seabird bycatch globally?
6. **COST EFFECTIVENESS OF CONSERVATION ACTIONS:** In the geographies where you work on seabird conservation, what conservation action(s) do you consider to be the most cost-effective with respect to maximizing returns on investment (i.e., in other words, what actions do you see as providing the biggest 'bang for the buck')?
7. **NEED INNOVATION/INTERVENTIONS:** In the geographies where you do seabird conservation, where do you think innovation is needed?
8. **VALUE OF NFWF PSP:** From your perspective, what is the added value or contribution of NFWF's Pacific Seabird program to seabird conservation? Are there aspects of the program that you see as less valuable?
9. **CURRENT & FUTURE NFWF PSP:** From your vantage point, are there important geographies, focal species, or strategies where NFWF isn't currently focusing that NFWF might be able to impact with its grant making?
10. **LEVERAGING INVESTMENTS:** To what extent do you see opportunities for leveraging the investments of NFWF with external partners and funding sources?
11. Is there anything we have not asked you about that you think would be important for us to know as we evaluate NFWF's Pacific Seabird Program?

Appendix E

Online Survey Instrument

Pacific Seabird Survey

Hello.

We are conducting a survey to help the National Fish and Wildlife Foundation evaluate the effectiveness of its Pacific Seabird Program, as well as craft a forward-looking strategy. The overarching goal of the Program is to reverse population declines by increasing survival and reproduction of seabirds through mitigation of at-sea and colony-based threats. The program is focused on seabirds that spend a portion of their annual lifecycle in US waters or nest on US lands and territories. We are asking seabird experts, like you, about the impacts of potential conservation actions for ten seabird species that are a priority for the Program. Completion of this survey will take approximately 20 minutes.

We ask you to please answer all questions regardless of your familiarity with the subject matter of specific questions. Though your expertise and knowledge likely varies across species, geographies, and conservation actions, our expert elicitation approach is designed to take this variation into account. For each of your answers, you will be able to rate your certainty. Hence, instead skipping a question and leaving it blank, we ask you to answer it to your best ability and then score your uncertainty (e.g., very uncertain).

All of your responses will be confidential. No personally identifiable information will be associated with your responses in any reports of this data. Should you have any further questions or comments, please feel free to contact us at survey@advancedconservation.org or +1 (435) 200-3031.

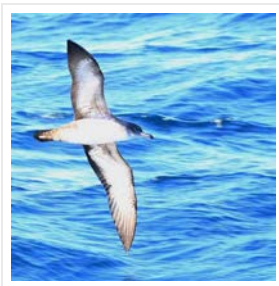
As a token of appreciation for completing the survey, your name will be entered into a raffle to win one of two new Apple iPod Nanos. Please enter your name and contact information so that we may contact you with the results of the survey (and with the winners of the raffle). The survey will be available for two weeks. It would help us out tremendously if you could complete the survey today.

Many thanks in advance,

Josh Donlan, Advanced Conservation Strategies
Heather Dantzker, Dantzker Consulting
Kristen Ward and Jane Yoo, Clarus Research

Next

If possible, please do no use Internet Explorer for the survey. If you are using Internet Explorer, please make sure you are using Version 10 or higher.



BACKGROUND QUESTIONS

Please answer the following ten background questions

0% 100%

1. Please enter your name and email contact. This is not required; however, you must do so if you wish to be entered into the iPod Nano raffle and would like us to send you the results of the survey.

Name:

Email:

2.* What type of institution best describes your current and primary workplace (choose only one)?

- ○ Government Agency
- ○ University
- ○ Non-governmental Organization
- ○ For-profit Enterprise
- ○ Other (please specify)

3.* How many years of experience do you have working with seabirds?

- ○ <5 years
- ○ 5-10 years
- ○ 11-15 years
- ○ 16-20 years
- ○ >20 years

4.* How much experience do you have working with the following activities with respect to seabirds? Rate your experience using the scale provided.

	No Experience	Little Experience	Some Experience	Much Experience
Conservation Action	○	○	○	○
Education and/or Outreach	○	○	○	○
Research	○	○	○	○
Training and/or Capacity Building	○	○	○	○

5.* How much experience do you have working with the following threats with respect to seabirds? Rate your

experience using the scale provided.

	No Experience	Little Experience	Some Experience	Much Experience
Climate change	○	○	○	○
Land-based light pollution	○	○	○	○
Non-native, invasive animals	○	○	○	○
Non-native, invasive plants	○	○	○	○
Industrial pollution, including oil spills	○	○	○	○
Reduction in seabird prey resources	○	○	○	○
Seabird fisheries bycatch	○	○	○	○

6.* How much experience do you have working with the following conservation actions with respect to seabirds? Rate your experience using the scale provided.

	No Experience	Little Experience	Some Experience	Much Experience
Active restoration (i.e., translocation and/or acoustic attraction)	○	○	○	○
Habitat restoration by planting native plants	○	○	○	○
Implementing fisheries bycatch reduction measures	○	○	○	○
Non-native mammal eradication (and/or control)	○	○	○	○
Non-native plant eradication (and/or control)	○	○	○	○

7.* How much experience do you have working with seabirds in the following geographies? Rate your experience using the scale provided.

	No Experience	Little Experience	Some Experience	Much Experience
Arctic, Subarctic, and north Pacific (United States and Russia)	○	○	○	○
California Current [British Columbia (Canada) south to the tip of Baja California (Mexico)]	○	○	○	○
Humboldt Current (e.g., Chile)	○	○	○	○
Hawaii and other central Pacific Islands	○	○	○	○

8.* How much experience do you have working with the following species? Rate your experience using the scale provided.

	No Experience	Little Experience	Some Experience	Much Experience
Ashy Storm-petrel (*Oceanodroma homochroa*)	○	○	○	○
Black-footed Albatross (*Phoebastria nigripes*)	○	○	○	○
Hawaiian Petrel (*Pterodroma sandwichensis*)	○	○	○	○
Kittlitz's Murrelet (*Brachyramphus brevirostris*)	○	○	○	○
Laysan Albatross (*Phoebastria immutabilis*)	○	○	○	○
Newell's Shearwater (*Puffinus newelli*)	○	○	○	○
Pink-footed Shearwater (*Puffinus creatopus*)	○	○	○	○
Red-legged Kittiwake (*Rissa brevirostris*)	○	○	○	○
Townsend's Shearwater (*Puffinus auricularis*)	○	○	○	○
Xantus's Murrelet (includes two species: Scripps's Murrelet *Synthliboramphus scrippsi* and/or Guadalupe Murrelet *Synthliboramphus hypoleucus*)	○	○	○	○

9.* Do you currently have an active grant from the NFWF Pacific Seabird Program?

○ Yes

- [ ] No

10.* **Have you ever received funding (in the form of a grant) from the NFWF Pacific Seabird Program in the past?**

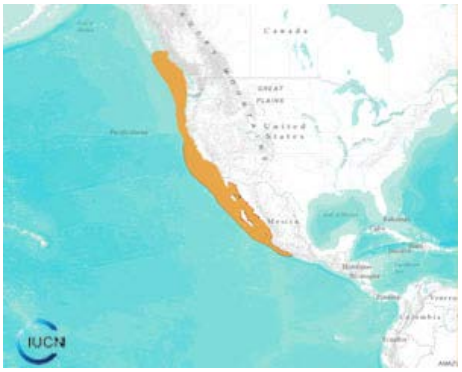
- [ ] Yes
- [ ] No

The next section consists of questions that will ask you to rate specific threats and conservation actions for the ten focal species of NFWF's Pacific Seabird Program.

Next

The Xantus's Murrelet

The Xantus's Murrelet was split into two species: Guadalupe Murrelet and Scripps's Murrelet. The two species overlap both at sea and breeding locations. The Guadalupe Murrelet ranges from Guadalupe Island (Mexico) south to the San Benito Islands (Mexico). The Scripps's Murrelet ranges from Channel Islands (California) south to the San Benito Islands. For the purpose of this survey, please treat the two species as a single conservation target.



Conservation Actions

0% 100%

Q11. Please rate the conservation actions below for the Xantus's Murrelet with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 11a-11d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)
2. Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)
3. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)
4. Fill information gaps with scientific research
5. Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant control and native plant restoration
6. Other Add

Q11a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant control and native plant restoration	○	○	○	○	

Q11b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	

2. Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant control and native plant restoration	○	○	○	○	

Q11c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 11b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant control and native plant restoration	○	○	○	○	

Q11d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	○	
2. Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)	○	○	○	○	○	
3. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	○	
5. Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant	○	○	○	○	○	

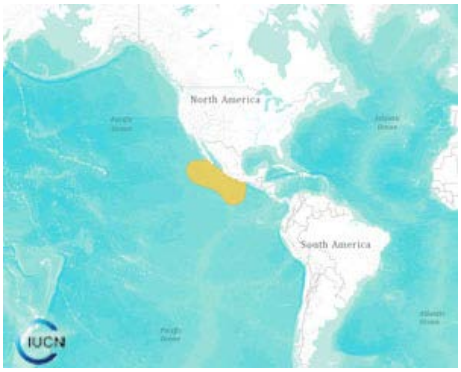
control and native plant
restoration

Q12. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Xantus's Murrelet?

Previous Next

The Townsend's Shearwater

The Townsend's Shearwater breeds on Socorro Island in the Revillagigedo Islands (Mexico). It formerly nested on Clarion and San Benedicto Islands (Revillagigedo Islands). At sea, Townsend Shearwaters range along the continental slope off the coasts of Mexico and Central America, from southern Baja California Sur south to El Salvador.



Conservation Actions

0% 100%

Q13. Please rate the conservation actions below for the Townsend's Shearwater with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 13a-13d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)
2. Eradicate non-native, invasive rabbits from Clarion Island (Mexico)
3. Eradicate non-native, invasive cats from Socorro Island (Mexico)
4. Fill information gaps with scientific research
5. Other Add

Q13a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rabbits from Clarion Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Socorro Island (Mexico)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	

Q13b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rabbits from Clarion Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Socorro Island (Mexico)	○	○	○	○	

4. Fill information gaps with scientific research	○	○	○	○	

Q13c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 13b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rabbits from Clarion Island (Mexico)	○	○	○	○	
3. Eradicate non-native, invasive cats from Socorro Island (Mexico)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	

Q13d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	○	
2. Eradicate non-native, invasive rabbits from Clarion Island (Mexico)	○	○	○	○	○	
3. Eradicate non-native, invasive cats from Socorro Island (Mexico)	○	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	○	

Q14. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Townsend's Shearwater?

Previous Next

The Red-legged Kittiwake

The Red-legged Kittiwake is endemic to the Bering Sea. They breed on the Pribilof (USA), Aleutian (USA), and Commander Islands (Russia). During the non-breeding season, they range widely across the northern Pacific. Their migration is substantial.

Conservation Actions

0% 100%

Q15. Please rate the conservation actions below for the Red-legged Kittiwake with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 15a-15d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)
2. Establish no-fishing buffer zones around key breeding locations
3. Establish and secure long-term funding for a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands
4. Fill information gaps with scientific research
5. Reduce human harvesting at breeding locations
6. Other Add

Q15a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)					
2. Establish no-fishing buffer zones around key breeding locations					
3. Establish and secure long-term funding for a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands					
4. Fill information gaps with scientific research					
5. Reduce human harvesting at breeding locations					

Q15b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)					
2. Establish no-fishing buffer zones around key breeding locations					
3. Establish and secure long-term funding for					

a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands					
4. Fill information gaps with scientific research					
5. Reduce human harvesting at breeding locations					

Q15c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 15b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

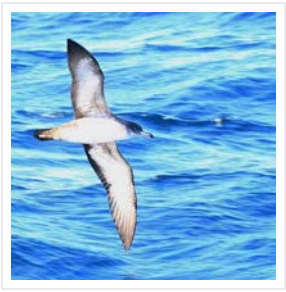
	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)					
2. Establish no-fishing buffer zones around key breeding locations					
3. Establish and secure long-term funding for a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands					
4. Fill information gaps with scientific research					
5. Reduce human harvesting at breeding locations					

Q15d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)						
2. Establish no-fishing buffer zones around key breeding locations						
3. Establish and secure long-term funding for a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands						
4. Fill information gaps with scientific research						
5. Reduce human harvesting at breeding locations						

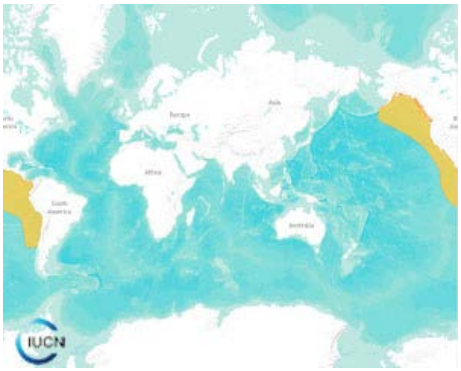
Q16. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Red-legged Kittiwake?

Previous Next



The Pink-footed Shearwater

The Pink-footed Shearwater breeds off the Chilean coast, including Robinson Crusoe and Santa Clara Islands in the Juan Fernandez Archipelago, and Mocha Island off mainland Chile. At sea, Pink-Footed Shearwaters disperse northward along the west coast of the Americas. Their migration is substantial.



Conservation Actions

0% 100%

Q17. Please rate the conservation actions below for the Pink-footed Shearwater with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 17a-17d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Reduce human harvesting on Mocha Island
2. Eradicate non-native, invasive mammals from Robinson Crusoe Island
3. Eradicate non-native, invasive mammals from Mocha Island
4. Fill information gaps with scientific research
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile
6. Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)
7. Other Add

Q17a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Reduce human harvesting on Mocha Island	○	○	○	○	
2. Eradicate non-native, invasive mammals from Robinson Crusoe Island	○	○	○	○	
3. Eradicate non-native, invasive mammals from Mocha Island	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile	○	○	○	○	
6. Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)	○	○	○	○	

Q17b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Reduce human harvesting on	○	○	○	○	

Mocha Island					
2. Eradicate non-native, invasive mammals from Robinson Crusoe Island	○	○	○	○	
3. Eradicate non-native, invasive mammals from Mocha Island	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile	○	○	○	○	
6. Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)	○	○	○	○	

Q17c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 17b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive mammals from Robinson Crusoe Island	○	○	○	○	
3. Eradicate non-native, invasive mammals from Mocha Island	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile	○	○	○	○	
6. Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)	○	○	○	○	

Q17d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Reduce human harvesting on Mocha Island	○	○	○	○	○	
2. Eradicate non-native, invasive mammals from Robinson Crusoe Island	○	○	○	○	○	
3. Eradicate non-native, invasive mammals from Mocha Island	○	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	○	
5. Increase the use of						

seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile	○	○	○	○	○	
6. Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)	○	○	○	○	○	

Q18. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Pink-footed Shearwater?

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The Laysan Albatross

The Laysan Albatross breeds across the North Pacific, from Mexico to Japan including the northwestern Hawaiian Islands (USA), Kauai and Oahu (USA), and Ogasawara Islands (Japan). In Mexico, it breeds on Guadalupe Island, the Revillagigedo Islands, and Alijos Rock. Historically, it bred on other Pacific islands. At sea, it ranges widely across the Pacific.

Conservation Actions

0% 100%

Q19. Please rate the conservation actions below for the Laysan Albatross with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 19a-19d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)
2. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)
4. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)
5. Fill information gaps with scientific research
6. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific
7. Other Add

Q19a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)	○	○	○	○	
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)	○	○	○	○	
4. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
5. Fill information gaps with scientific research	○	○	○	○	
6. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific	○	○	○	○	

Q19b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2.Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)	○	○	○	○	
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)	○	○	○	○	
4. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
5. Fill information gaps with scientific research	○	○	○	○	
6. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific	○	○	○	○	

Q19c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 19b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	None (0%)	Slow but significant (<20%)	Rapid (20-30%)	Very rapid (>30%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)	○	○	○	○	
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)	○	○	○	○	
4. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	
5. Fill information gaps with scientific research	○	○	○	○	
6. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific	○	○	○	○	

Q19d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	$100,000 - $499,000	$500,000 - $999,999	$1,000,000 - $5,000,000	>$5,000,000	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	○	

2. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)	○	○	○	○	○	
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)	○	○	○	○	○	
4. Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	○	○	○	○	○	
5. Fill information gaps with scientific research	○	○	○	○	○	
6. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific	○	○	○	○	○	

Q20. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Laysan Albatross?

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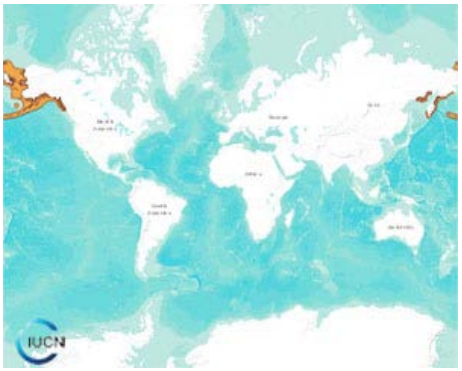
The Kittlitz's Murrelet

The Kittlitz's Murrelet breeds in Alaska (USA) and in the Russian Far East. In Alaska, the bird breeds in southeast Alaska, south-central Alaska, the Aleutian Islands, and the Alaska Peninsula. Information for Russia is scarce: nests have been documented on the Chukotka Peninsula, in northeastern Kamchatka, and on the coast of the Sea of Okhotsk. Kittlitz's Murrelets are found in nearshore waters during the breeding season; their winter range is not well known but it is probably pelagic.

Conservation Actions



0% 100%

Q21. Little detailed information is known regarding the Kittlitz's Murrelet, its threats, and its conservation needs. Please rate the research topics below for the Kittlitz's Murrelet with respect to the current state of knowledge and importance for developing a conservation action plan. If you are inclined, you may add one additional research topic that you believe is important in the "other" category below, and then rate that topic accordingly for questions 21a-21b with the topics below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Impacts from environmental contamination, including hydrocarbons
2. Impacts on breeding habitat from land-use change or climate change
3. Impacts on foraging prey species
4. Impacts from boating activities (i.e., recreational or commercial vessels)
5. Impacts from bycatch during fishing activities (i.e., commercial, recreational, or subsistence)
6. Impacts from non-native, invasive mammals at breeding locations
7. Other Add

Q21a. Rate the current state of knowledge for each research topic with respect to the Kittlitz's Murrelet using the scale provided.

	Poor	Average	Good	Excellent	How certain are you about your decision?
1. Impacts from environmental contamination, including hydrocarbons	○	○	○	○	
2. Impacts on breeding habitat from land-use change or climate change	○	○	○	○	
3. Impacts on foraging prey species	○	○	○	○	
4. Impacts from boating activities (i.e., recreational or commercial vessels)	○	○	○	○	
5. Impacts from bycatch during fishing activities (i.e., commercial, recreational, or subsistence)	○	○	○	○	
6. Impacts from non-native, invasive mammals at breeding locations	○	○	○	○	

Q21b. In your opinion, how important are the research topics below for developing a conservation action plan for the Kittlitz's Murrelet? Using the scale provided, rate the research topics with respect to priority.

How certain

	Not a priority	Low priority	Medium priority	High priority	are you about your decision?
1. Impacts from environmental contamination, including hydrocarbons	○	○	○	○	
2. Impacts on breeding habitat from land-use change or climate change	○	○	○	○	
3. Impacts on foraging prey species	○	○	○	○	
4. Impacts from boating activities (i.e., recreational or commercial vessels)	○	○	○	○	
5. Impacts from bycatch during fishing activities (i.e., commercial, recreational, or subsistence)	○	○	○	○	
6. Impacts from non-native, invasive mammals at breeding locations	○	○	○	○	

Q22. Are there any other research topics that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Kittlitz's Murrelet?

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The Hawaiian Petrel

The Hawaiian Petrel breeds on the Hawaiian Islands (USA) at higher elevations on Maui, Kauai, Lanai, Hawaii and Molokai Islands. It historically nested at lower elevations on many Hawaiian Islands. At sea, the species ranges in the vicinity of Hawaii, and throughout the eastern and western tropical Pacific.

Conservation Actions

0% 100%

Q23. Please rate the conservation actions below for the Hawaiian Petrel with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 23a-23d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)
2. Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)
3. Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)
4. Fill information gaps with scientific research
5. Other Add

Q23a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)	○	○	○	○	
3. Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	

Q23b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)	○	○	○	○	

3. Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	

Q23c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 23b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)	○	○	○	○	
3. Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	

Q23d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	○	
2. Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)	○	○	○	○	○	
3. Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)	○	○	○	○	○	
4. Fill information gaps with scientific research	○	○	○	○	○	

Q24. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Hawaiian Petrel?

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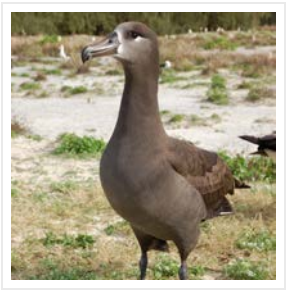
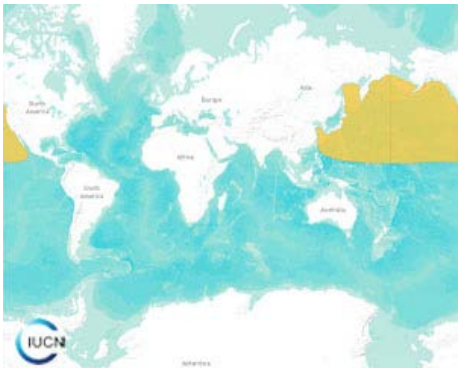


The Black-footed Albatross

The Black-footed Albatross breeds on the northwestern Hawaiian Islands (USA) and the Izu Islands (Japan). They formerly bred on other islands and atolls in the Pacific. At sea, the species disperses widely over the Pacific Ocean.



Conservation Actions

0% 100%

Q25. Please rate the conservation actions below for the Black-footed Albatross with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 25a-25d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)
2. Fill information gaps with scientific research
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)
4. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific
6. Other Add

Q25a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)	○	○	○	○	
2. Fill information gaps with scientific research	○	○	○	○	
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)	○	○	○	○	
4. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)	○	○	○	○	
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific	○	○	○	○	

Q25b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?

1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)					
2. Fill information gaps with scientific research					
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)					
4. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)					
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific					

Q25c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 25b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)					
2. Fill information gaps with scientific research					
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)					
4. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)					
5. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific					

Q25d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)						
2. Fill information gaps with scientific research						
3. Eradicate the non-native, invasive plant *Verbesina encelioides* from Midway Atoll (Hawaii, USA)						
4. Eradicate the non-native, invasive plant *Verbesina encelioides* from Kure Atoll (Hawaii, USA)						

5. Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific	○	○	○	○	○	

Q26. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Black-footed Albatross?

Previous Next

The Ashy Storm-petrel

The Ashy Storm-petrel breeds on islands off the coast of California (USA) and northern Baja California (Mexico). Confirmed breeding locations include small islets off Marin County, Southeast Farallon Islands, Channel Islands, Todos Santos Islands, and Coronados Islands. At sea, Ashy Storm-petrels remain within the central and southern California Current System year-round.

Conservation Actions

0% 100%

Q27. Please rate the conservation actions below for the Ashy Storm-petrel with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 27a-27d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)
2. Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)
3. Fill information gaps with scientific research
4. Other Add

Q27a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (51-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)	○	○	○	○	
2. Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	

Q27b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	How certain are you about your decision?
1. Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)	○	○	○	○	
2. Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	

Q27c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 27b above). On

the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)	○	○	○	○	
2. Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	

Q27d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

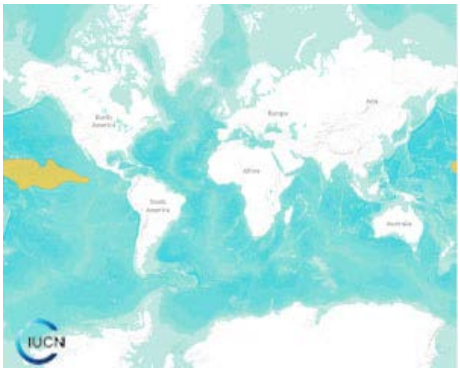
	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)	○	○	○	○	○	
2. Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)	○	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	○	

Q28. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Ashy Storm-petrel?

Previous Next

The Newell's Shearwater

The Newell's Shearwater breeds exclusively in Hawaii (USA), with nesting populations on Kauai, Molokai, Hawaii, Maui, and Lanai Islands. Historically, it nested on other Hawaiian Islands, and other breeding locations are suspected. At sea, it ranges near breeding locations, often among the Equatorial Counter Current.



Conservation Actions

0% 100%

Q29. Please rate the conservation actions below for the Newell's Shearwater with respect to feasibility, scope, impact, and implementation cost. If you are inclined, you may add one additional conservation action that you believe is important in the "other" category below, and then rate that conservation action accordingly for questions 29a-29d with the actions below. For each answer, rate your certainty with the pull-down menu on the right (i.e., very certain, certain, uncertain, very uncertain).

1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)
2. Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)
3. Fill information gaps with scientific research
4. Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)
5. Other Add

Q29a. Rate the conservation action with respect to feasibility (i.e., probability of successful execution):

	Not feasible (<10%)	Somewhat feasible (10-50%)	Feasible (50-90%)	Very feasible (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	
4. Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)	○	○	○	○	

Q29b. Rate the conservation action with respect to scope. What proportion of the global population will the conservation action affect?

Proportion of the population affected:	None (0%)	Minority (<50%)	Majority (51-90%)	Entire (>90%)	How certain are you about your decision?
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)	○	○	○	○	
3. Fill information gaps with scientific	○	○	○	○	

research					
4. Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)	○	○	○	○	

Q29c. Rate the conservation action with respect to its impact (i.e., the population increase caused by the action). Rate the impact within the scope of the particular conservation action (from question 29b above). On the proportion of the population affected by the conservation action, the action is likely to cause the following effect:

	Increase over 10yrs or 3 generations				
Likely to cause:	**None (0%)**	**Slow but significant (<20%)**	**Rapid (20-30%)**	**Very rapid (>30%)**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	
2. Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	
4. Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)	○	○	○	○	

Q29d. Rate the conservation action with respect to how much it would cost (in US dollars) to attempt to implement it.

	<$100,000	**$100,000 - $499,000**	**$500,000 - $999,999**	**$1,000,000 - $5,000,000**	**>$5,000,000**	**How certain are you about your decision?**
1. Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	○	○	○	○	○	
2. Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)	○	○	○	○	○	
3. Fill information gaps with scientific research	○	○	○	○	○	
4. Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)	○	○	○	○	○	

Q30. Are there any other conservation actions that you believe are equally or more important than the ones listed here with respect to potential conservation benefits for the Newell's Shearwater?

Previous Next

0% 100%

Thanks for completing the survey!

Below are some optional questions. We would like to have your input on additional Pacific seabirds that you believe would make strategic conservation targets for the NFWF Pacific Seabird Program. It is important to remember that the program is restricted to investing in conservation actions for seabird species that spend a portion of their annual lifecycle in US waters or nest on US lands and territories.

You can click the "Add Another Species" button below to provide us feedback for up to three additional species. Alternatively, you can provide any general comments and click the "Finish" button.

What additional species should be a priority for the NFWF Pacific Seabird Program?

What are the main threats for the species?

What are the priority conservation actions for the species? Please be specific with respect to the actions (e.g., location, specific fisheries, etc.).

Add Another Species

Lastly, If you have any additional thoughts or comments regarding any aspect the survey, please share them here.

Finish

Appendix F

Survey Data:

Analysis and Results

Analysis of Survey Data

Survey data represent the scores that respondents attributed to different conservation actions for nine species according to four criteria: feasibility, scope, impact, and cost. Scores ranged from 1 to 4 for feasibility, scope, and impact, and 1 to 5 for costs (Table F1). As recommended by external reviewers of a draft version of the survey, possible responses for scope and impact followed Birdlife International methodology. We also collected data on self-reported scores of expertise on the following topics: species experience, geographic experience, and conservation action experience (See Appendix E). Expertise scores ranged from 1 to 4. Finally, we asked whether respondents have or ever had a grant under the NFWF PSP.

Table F1. Survey Response Options for Each Conservation Action for Four Criteria: Feasibility, Scope, Impact, and Cost.

Criteria	1	2	3	4	5
Feasibility (probability of execution)	Not Feasible (<10%)	Somewhat Feasible (10-50%)	Feasible (51-90%)	Very Feasible (>90%)	
Scope (proportion of the global population affected)	None (0%)	Minority (<50%)	Majority (50-90%)	Entire (>90%)	
Impact (population increase over 10 years or 3 generations)	None (0%)	Slow, but significant (<20%)	Rapid (20-30%)	Very Rapid (>30%)	
Cost (US dollars to implement)	<$100,000	$100,000 - $499,000	$500,000 - $999,999	$1 million - $5 million	>$5 million

For the Kittlitz's Murrelet, the survey focused on research topics as opposed to conservation actions, due to the data deficiency of the species. Data represents the scores respondents attributed to six research topics, both for their current state of knowledge and their importance for developing a conservation action plan (ranging from 1 to 4).

Possible survey responses for each criterion are not equally spaced (Table F1). For example, the distance between a conservation action that is "not feasible" to another that is "somewhat feasible" can be different than the distance between a conservation action that is "feasible" and another that is "very feasible." This is also the case for scope, impact, and cost. Thus, we use used cumulative link models and cumulative mixed link models (i.e., ordinal regression) to analyze survey data (Agresti 2010).

First, we used cumulative link models to examine the effect of self-reported expertise on the scores given to the different criteria for conservation actions (i.e., feasibility, scope, impact, and cost). The dependent variable was scores given by respondents. Fixed factors included the type of conservation action (e.g., invasive animal eradication

or fisheries bycatch reduction) and self-reported experience scores. Thus, the following model structure was used to explore respondent biases with respect to experience type:

$Score_{Feasibility} = Conservation\ Action_A + Experience_B$
$Score_{Scope} = Conservation\ Action_A + Experience_B$
$Score_{Impact} = Conservation\ Action_A + Experience_B$
$Score_{Cost} = Conservation\ Action_A + Experience_B$

where,
A = research, invasive animal eradication, fisheries bycatch reduction, habitat improvement via plant restoration, and new colony establishment; and
B = species experience, geographic experience, or conservation action experience.

Second, we analyzed the survey data with cumulative link mixed models, using respondent as a random factor. These models control for a respondent answering multiple questions and parsimoniously incorporate the inherent covariance between expert observations (Pinheiro & Bates 2000). This approach allowed us to generate predictions of scores (i.e., feasibility, scope, impact, and cost) that are independent of any particular respondent. The following model structure controls and removes any respondent effect:

$Score_{Feasibility} = Conservation\ Action_A + Random\ Factor_{Respondent}$
$Score_{Scope} = Conservation\ Action_A + Random\ Factor_{Respondent}$
$Score_{Impact} = Conservation\ Action_A + Random\ Factor_{Respondent}$
$Score_{Cost} = Conservation\ Action_A + Random\ Factor_{Respondent}$

where,
A = research, invasive mammal eradication, fisheries bycatch reduction, habitat improvement via plant restoration, and new colony establishment; and
Respondent = respondent ID.

The model was fitted using the *clm* function and *clmm2* (models) in the *ordinal* package using the statistical language R (R Development Core Team 2010). We assessed statistical significance with F tests (α level of 0.05) (Pinheiro & Bates 2000).

Survey Results

Having or ever having a grant from the NFWF PSP did not have an effect on the feasibility, scope, or impact scores by respondents ($P > 0.08$ in all cases). However, having or ever having a grant had a significant negative effect on cost scores ($z = -9.19$; $P < 0.001$, $z = -9.60$; $P < 0.001$, respectively). That is, respondents that have or had a PSP grant scored the cost of conservation actions lower across all conservation actions compared to respondents that did not. This effect is controlled for in the analysis below.

We detected other biases in how respondents scored conservation actions. For example, a respondent's research experience had a significant negative impact on feasibility, scope, and impact scores, but a significant positive effect on cost scores. The more research experience a respondent self-reported, s/he tended to score feasibility, scope, and impact high and score cost low.

Using survey respondent as a random factor, a cumulative mixed link model controls for the above biases and others. Likelihood ratio tests demonstrate that mixed models that include respondent as random factor performed significantly better for all score criteria compared to models that do not control for respondent biases ($P < 0.001$ in all cases, Table F2). Thus, predicted mean scores for all criteria (for all conservation actions) were estimated using the cumulative link mixed model.

Table F2. Results of the Likelihood Ratio Tests Comparing Cumulative Link Models With and Without Respondents as Random Factor. (For all criteria, cumulative link models with respondent as a random factor performed significantly better.)

Criteria	Likelihood Ratio	P value
Feasibility (probability of execution)	1001.9	<.001
Scope (proportion of the global population affected)	757.1	<.001
Impact (population increase over 10 years or 3 generations)	994.5	<.001
Cost (US dollars to implement)	1228.9	<.001

There were clear differences between the type of conservation action and its feasibility, scope, impact, and cost scores (Table F3). Overall, research was viewed as the most feasible and least expensive action, with high scope but the lowest impact. The cumulative link model allows for the comparison of other actions compared to a base action type: we used research as the base action. Compared to research, establishing new colonies and habitat improvement (via plant restoration) were viewed as the least feasible. For example, the Z score for new colony establishment is 14 standard deviations less than Z score for research (Table F3). Compared to research, invasive animal eradication and fisheries bycatch reduction had the highest impact, while invasive animal eradication and habitat improvement (which included invasive plant eradication) were the most expensive. Table F4 shows the Z scores for each conservation action by species, which results from a cumulative link model comparing scores for each conservation action to the research scores for that species.

Table F3. Predicted Mean Scores and Z Scores [mean (Z)] for Conservation Actions Grouped by Overall Action Type Compared to Research (Z = 0). Z scores provide a test statistic that is standardized with a mean of 0 and standard deviation. The sign of the Z score shows the direction (greater or less) of the score relative to the baseline of research (Z=0), and the magnitude shows the number of deviations away from research mean score. For example, the Z score for the impact of invasive animal eradication is 18.97 standard deviations greater than the Z-score of research. Bold values are statistical significant ($p < 0.001$); that is, those values are statistically different compared to the research score. Possible ranges for mean scores are 1-4 for feasibility, scope, and impact, and 1-5 for cost (see Table F1)

Action Type	Feasibility	Scope	Impact	Cost
Research	3.35 (0)	2.97 (0)	2.07 (0)	2.62 (0)
Invasive Animal Eradication	**3.16** **(-5.27)**	**2.45** **(-14.74)**	**2.71** **(18.97)**	**3.22** **(15.60)**
Fisheries Bycatch Reduction	**3.03** **(-5.81)**	-0.30 (2.95)	**2.63** **(11.64)**	**3.01** **(6.07)**
Habitat Improvement via Plant Restoration	**2.86** **(-10.92)**	**2.34** **(-14.57)**	**2.21** **(4.01)**	**3.07** **(9.15)**
New Colony Establishment	**2.68** **(-14.42)**	**2.23** **(-17.52)**	2.07 (-0.29)	**2.72** **(2.13)**

Table F4. Z Scores for Conservation Actions Compared to Research for Each Focal Species (Z = 0). Z scores provide a test statistic that is standardized with a mean of 0 and standard deviation. The sign of the Z score shows the direction (greater or less) of the score relative to the baseline of research (Z=0), and the magnitude shows the number of deviations away from research mean score. For example, the Z score for the cost of eradicating house mice from Coronado South Island is 5.4 standard deviations greater than the Z-score of research for Ashy Storm-petrel. Bold values are statistical significant ($p < 0.001$); that is, those values are statistically different compared to the research score.

Species	Action	Feasibility	Scope	Impact	Cost
Ashy Storm-petrel	-Eradicate non-native house mice from Coronado South Island (Baja California, Mexico)	**-2.2**	**-7.1**	**3.9**	**5.4**
	-Eradicate non-native house mice from the Southeast Farallon Islands (California, USA)	-1.0	**-4.2**	**5.3**	**7.6**
Black-footed Albatross	-Active restoration to establish a new breeding location (e.g., chick translocation and/or acoustic attraction)	**-5.6**	**-6.5**	-0.4	1.1
	-Eradicate the non-native, invasive plant Verbesina encelioides from Midway Atoll (Hawaii, USA)	**-5.1**	**-4.1**	**3.2**	**4.6**
	-Eradicate the non-native, invasive plant Verbesina encelioides from Kure Atoll (Hawaii, USA)	**-5.0**	**-5.4**	**2.3**	3.6
	-Increase the use of seabird bycatch mitigation gear on fishing vessels in the northwestern Pacific	**-3.0**	0.3	**6.6**	**3.4**
Hawaiian Petrel	-Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	**-4.4**	**-5.8**	1.9	0.9
	-Install non-native predator-proof fencing at breeding locations on Lanai Island (Hawaii, USA)	0.8	**-4.4**	**7.7**	**5.1**
	-Install non-native, predator-proof fencing at breeding locations on Hawaii Island (Hawaii, USA)	1.3	-3.7	**7.7**	**6.1**
Laysan Albatross	-Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	**-6.2**	-8.7	-0.7	0.1
	-Eradicate the non-native, invasive plant Verbesina encelioides from Midway Atoll (Hawaii, USA)	**-5.4**	-3.8	1.6	**3.0**
	-Eradicate the non-native, invasive plant Verbesina encelioides from Kure Atoll (Hawaii, USA)	**-5.2**	**-7.8**	1.2	2.0
	-Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	-1.2	**-8.2**	**6.3**	**3.6**
	-Increase the use of seabird bycatch mitigation gear on fishing vessels in the northern Pacific	**-3.0**	0.3	**5.6**	1.8
Newell's Shearwater	-Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	**-4.6**	**-5.7**	0.4	1.1
	-Eradicate non-native, invasive rats from Lehua Island (Hawaii, USA)	-1.2	**-5.4**	**3.6**	**4.7**
	-Install non-native predator-proof fencing to protect breeding locations on Kauai Island (Hawaii, USA)	-1.9	-3.3	**5.4**	**5.4**
Pink-footed Shearwater	-Reduce human harvesting on Mocha Island	**-5.6**	**-5.9**	-0.5	**-4.1**
	-Eradicate non-native, invasive mammals from Robinson Crusoe Island	**-4.2**	**-5.4**	**7.1**	**6.9**
	-Eradicate non-native, invasive mammals from Mocha Island	**-4.1**	**-4.6**	**7.1**	**6.1**
	-Increase the use of seabird bycatch mitigation gear on fishing vessels in Ecuador, Peru, and Chile	**-4.0**	-0.9	**5.6**	2.3
	-Restore nesting habitat at breeding sites on the Juan Fernandez Islands (i.e., native plant restoration)	**-2.7**	**-6.2**	**2.1**	2.4
Red-legged Kittiwake	-Eradicate non-native, invasive rats from islands in the Commander Islands (Russia)	**-4.6**	**-5.5**	**4.7**	**6.1**
	-Establish no-fishing buffer zones around key breeding locations	**-6.5**	-1.0	0.2	0.0
	-Establish and secure long-term funding for a biosecurity program focused on preventing invasive mammal introductions to the Pribilof Islands	**-3.4**	-1.9	-0.2	**4.6**
	-Reduce human harvesting at breeding locations	**-6.5**	**-4.2**	**2.5**	**-3.3**
Townsend's Shearwater	-Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	**-5.0**	**-5.6**	-1.2	0.2
	-Eradicate non-native, invasive rabbits from Clarion Island (Mexico)	-0.2	**-4.6**	**3.0**	**3.6**
	-Eradicate non-native, invasive cats from Socorro Island (Mexico)	-0.6	-1.2	**7.4**	**4.5**
Xantus's Murrelet	-Active restoration to establish a new breeding location (e.g., translocation and/or acoustic attraction)	**-7.8**	**-7.9**	0.0	0.7
	-Eradicate non-native, invasive house mice from Coronado Sur Island (Mexico)	**-2.2**	**-6.5**	**4.9**	**3.7**
	-Eradicate non-native, invasive cats from Guadalupe Island (Mexico)	-0.7	**-4.4**	**7.5**	**4.6**
	-Restore breeding habitat on Santa Barbara Island (Channel Islands, California, USA) with non-native, invasive plant control and native plant restoration	**-4.5**	**-7.1**	0.5	**3.8**

Appendix G

Return on Investment Analysis: Results

Invasive Animal Eradication

NFWF has invested $4 million in nine invasive animal eradication projects (Figure G1). Global reviews now exist that synthesize island biodiversity impacts by invasive animals—the main threat to island ecosystems—and the current state of invasive animal eradications (Nogales et al., 2004; Campbell and Donlan, 2005; Howald et al., 2007). As important, pre-removal impact and post-removal recovery studies now support the alleged benefits of removing invasive animals from islands (Towns et al., 2006; Lavers et al., 2010). This includes both empirical data and modeling results that demonstrate substantial benefits of invasive animal eradications to seabirds (Lavers et al., 2010; Jones, 2010; Donlan et al., *in press*). For example, across 18 studies of three seabird genera that are of NFWF priority, the demographic responses of productivity, adult mortality, and overall population growth to invasive animal removal were overwhelmingly positive (Table G1).

Table G1. Empirical Evidence of the Benefits Resulting from Predator Eradication and Control to Seabirds. Mean productivity, adult mortality, and population growth rate increases with predator removal for three genera of seabirds. For *Puffinus*, productivity increased by 1528% (range -2% - 7,400%; n=5), adult mortality decreased by 94% (n =1), and demographic modeling suggest a 6% increase in overall population growth rate (n=1). For *Pterodroma*, productivity increased by 134% (range 40% - 575%; n=8). For *Diomedea*, demographic modeling suggests a 1.5% increase in overall population growth rate (range 0.7% - 3.0%, n=3). Productivity is defined as mean number of fledged chicks per pair per year. Source: Lavers et al. (2010).

Taxa	Productivity (Pre)	Productivity (Post)	Adult Mortality (Pre)	Adult Mortality (Post)	λ (Pre)	λ (Post)
Puffinus spp.	0.41 (n=5)	0.7	0.16 (n=1)	0.01	0.96 (n=1)	1.03
Pterodroma spp.	0.26 (n=8)	0.6				
Diomedea spp.					0.98 (n=3)	0.99

For invasive animal eradication investments, risk was broken down into three categories: operational risk, stakeholder engagement and compliance risk, and biosecurity. Each type of risk was scored 0-3 (higher the number, higher the risk) based on available information. Operational risk relates to the technical challenges of the eradication goal with respect to what has been accomplished globally and current best practices (Veitch et al., 2011). Stakeholder engagement and compliance risk relates to the best available information with respect to the success and challenges currently facing the eradication program. Biosecurity risk relates to the probability of reinvasion as it relates to the target species, geography, and capacity to implement a biosecurity plan. Risk scores were summed across all three types of risk to estimate overall risk (Low = 0-3, Medium = 4-6, High = 7-9).

We estimated conservation return for seabirds using available literature (peer-reviewed and grey), along with information from grant documentation and grantee interviews. We placed each investment into one of three categories: low, medium, and high conservation return. Here, we are focused solely on the expected seabird benefits after the actual conservation action takes place. In some cases, this could be years or even decades after the actual NFWF investment. We explicitly ignore any biodiversity co-benefits being realized with respect to the investment; rather, we are focused on the demographic benefits to the targeted seabird(s). These co-benefits, for example, might include the protection of endemic land birds or other species that will result from an eradication campaign. Each conservation return ranking is described below. We assigned each project a low, medium, high return based on the following criteria:

- The evidence that the action will increase seabird productivity or decrease mortality, and the relative magnitude of the increase or decrease respectively (*Latent Change)*,
- The link between the main on-site activities of the investment and the actual actions that will precipitate the changes in productivity and mortality *(Action)*, and
- The demographic importance of the location where the activities are occurring (*Site).*

Each criterion was scored 0-3 (higher the number-higher the return) based on available information. Scores were summed to arrive at an overall conservation return score (Low = 0-3, Medium = 4-6, High = 7-9).

Naked Island (Alaska)

Conservation Return: High (Change: 3, Action: 3, Site: 2)

The eradication of mink from Naked Island will restore 5,200 ha of seabird breeding habitat. Observations from other invasive animal eradications in the region suggest that seabirds are likely to rapidly colonize the island (Parakeet Auklets and other species; Whitworth et al., 2005; Regehr et al., 2007; Donlan et al., *in press*). The eradication will also likely benefit Pigeon Guillemots and Parakeet Auklets.

Risk: Low (Operational = 1, Stakeholder = 1, Biosecurity = 1)

Unlike other invasive animals, there have been relatively few successful mink eradications (n = 5). All eradications have taken place in the United Kingdom and Estonia (Keitt et al., 2011). However, Naked Island is well within the size range of successful mink eradications. There is a low risk of re-invasion (natural or anthropogenic), and a proper biosecurity plan will be critical. Little is known about the ability of mustelids to disperse and colonize islands. The island, however, is distant from potential mink sources.

Murchison and Faraday Islands (Canada)

Conservation Return: High (Change: 3, Action: 3, Site: 2)

The project is in the confirmation phase, and was the first invasive rodent eradication in Canada using an aerial broadcasting technique. The eradication of rats from Murchinson and Faraday Islands will restore 763 ha of seabird breeding habitat. Observations from other invasive animal eradication in the region suggest that seabirds are likely to rapidly colonize the islands (Ancient Murrelet and other species; Whitworth et al., 2005; Regehr et al., 2007; Donlan et al., *in press*).

Risk: Low (Operational = 1, Stakeholder = 1, Biosecurity = 1)

There have been over 350 successful invasive rodent eradications worldwide, including islands that are twenty times larger than Murchinson and Faraday Islands (Howald et al., 2009; Keitt et al., 2011). The chance of re-invasion from nearby islands exists but can be mitigated with a proper biosecurity plan. A regional government program for invasive species management is in place.

Southeast Farallon Island (California)

Conservation Return: Medium (Change: 2, Action: 2, Site: 2)

The eradication of house mice from Southeast Farallon Island could potentially reduce Ashy Storm-Petrel mortality from Burrowing Owls. Burrowing Owls are responsible for ~40% of on-island mortality (Bradley et al., 2011). It is suspected that the owl population is being subsidized by the house mice population, resulting in hyperpredation of Ashy Storm-petrels (Holt, 1977; Courchamp et al., 1999). There is uncertainty, however, around the strength of hyperpredation (i.e., the interactions between Burrowing Owls, house mice, and Ashy Storm-petrels), and, thus, the expected benefits of house mice eradication.

Risk: Medium (Operational = 3, Stakeholder = 3, Biosecurity = 1)

There have been over 350 successful invasive rodent eradications worldwide, including house mice eradications much larger than the Southeast Farallon Island (Howald et al., 2009; Keitt et al., 2011). However, there are unresolved issues surrounding potential non-target impacts on gulls, which increase operational risk. A leading institution recently withdrew from the environmental compliance process. There are significant challenges around stakeholder engagement with respect to the environmental compliance process.

Guadalupe Island (Mexico)

Conservation Return: High (Change: 3, Action: 3, Site: 3)

With targeted cat control, Laysan Albatross mortality has been greatly reduced. In 2003, cats killed 25 adult albatross at the main island colony (Keitt et al., 2005). It is estimated that ~450 individuals breed on the main island. If successful, the eradication of cats from Guadalupe will be second largest cat eradication in the world (Campbell et al., 2011) and will protect the largest breeding population of Laysan Albatross outside of the Hawaiian Islands. The breeding colony occurs at a high elevation, which could have significant benefits with respect to mitigating impacts from climate change. The eradication will also likely benefit the Guadalupe Murrelet, and perhaps the Scripps's Murrelet.

Risk: Medium (Operational = 2, Stakeholder = 1, Biosecurity = 1)
There have been over 85 successful invasive cat eradications worldwide (Campbell et al. 2011), as well as some recent advances in methodologies developed in Australia (Algar et al., 2011). The leading organization has strong in-country institutional relationships (e.g., Mexican government) and capacity. Operational risk can be managed by following best practices and maintaining an external advisory board. Given that there is a small human population on the island, an enhanced biosecurity plan will be needed.

San Benito West Island (Mexico)
Conservation Return: High (Change: 2, Action: 3, Site: 3)
The project is in confirmation phase. Non-native mice (*Peromyscus*) mortality on Xantus's Murrelet (of unknown magnitude) has been reduced to zero. On Santa Barbara Island, California, mouse predation is a major driver of nesting failure for Xantus's Murrelet (Wolf et al., 2005). With over two million breeding seabirds, the San Benito Islands are one of the most important seabird locations off the West coast of Mexico. Between 200 - 500 pairs of Xantus's Murrelets are suspected of breeding on the San Benito Islands, which includes both species (Guadalupe Murrelet and Scripps's Murrelet; BirdLife International, 2012).
Risk: Low (Operational = 1, Stakeholder = 1, Biosecurity = 1)
There have been over 350 successful invasive rodent eradications worldwide (Howald et al., 2009). Chance of re-invasion is low with a biosecurity plan in place; however, a seasonal fishing camp is present on the island, which is used by residents of Cedros Island—the source of the *Peromyscus* introduction.

Socorro Island (Mexico)
Conservation Return: High (Change: 3, Action: 3, Site: 3)
The entire known breeding population of Townsend's Shearwater resides on Socorro Island (350 - 1,050 individuals; BirdLife International, 2013a). The driver of habitat degradation (i.e., sheep) has been removed. Townsend Shearwater mortality by cats has been greatly reduced with targeted control (reduction in catch per effort from 4% to 0.57%). Demographic modeling suggests cat predation could be responsible for up to 350 birds a year, and the population could be extinct in less than 100 years (Martinez-Gomez and Jacobsen, 2004). If successful, the eradication of cats from Socorro Island will be the third largest cat eradication in the world, and would arguably save the Townsend's Shearwater from extinction.
Risk: Medium (Operational = 2, Stakeholder = 2, Biosecurity = 1)
There have been over 85 successful invasive cat eradications worldwide (Campbell et al., 2011), as well as some recent advances in methodologies developed in Australia (Algar et al., 2011). Operational risk can be managed by following best practices and maintaining an external advisory board. Because the Mexican Navy owns the island, island access during the dry season when intensified cat trapping is needed is a potential operational risk. The leading organization, however, has strong in-country institutional relationships.

Robinson Crusoe Island (Chile)

Conservation Return: High (Change: 3, Action: 3, Site: 3)

A multi-species eradication on Robinson Crusoe would protect one of three breeding locations of Pink-footed Shearwaters. A feasibility study for managing invasive species on the Juan Fernandez Archipelago has been conducted, along with initial due diligence and scoping for eradication at the local and national levels. Current funding provided momentum (and matching funds) for a $4 million Global Environment Facility (GEF) project focused on strengthening national frameworks for invasive animal species governance in the Juan Fernandez Archipelago.

Risk: High (Operational = 3, Stakeholder = 3, Biosecurity = 3)

Operationally, a multi-species eradication on the inhabited Robinson Crusoe Island would be at the upper limit in terms of what has been accomplished to-date globally (Keitt et al., 2011; Glen et al., 2013). There have been significant challenges in Chile, both at the national and local levels, with respect to garnering the necessary government support. There are significant challenges around stakeholder engagement with respect to the environmental compliance process. There is also a gap with respect to hiring and building high-level leadership and capacity in Chile. Given that the island is inhabited (~800 people), an enhanced biosecurity plan will be needed.

Lehua Island (Hawaii)

Conservation Return: High (Change: 3, Action: 3, Site: 3)

The eradication of rats from Lehua Island would restore breeding habitat for at least eight seabird species and provide the opportunity for re-colonization of up to eight additional species (Wood et al., 2004). It would increase breeding success and survival of several species, and establish a high-elevation breeding site for two species of albatross, Newell's Shearwater, and other seabirds. An in-depth feasibility and operational scoping is underway.

Risk: Low (Operational = 1 Stakeholder = 1, Biosecurity = 1)

There have been over 350 successful invasive rodent eradications worldwide (Howald et al., 2009; Keitt et al., 2011). While a previous rat eradication attempt on Lehua failed, current project leadership is more experienced in rat eradication planning and operations, as well as stakeholder engagement. Reasons for the eradication failure are being determined. Substantial resources are being invested in stakeholder engagement and operations planning. Chance of re-invasion is low with a biosecurity plan in place.

Kahoolawe Island (Hawaii)

Conservation Return: High (Change: 3, Action: 3, Site: 3)

A multi-species eradication from Kahoolawe Island would provide safe breeding habitat for at least three of NFWF Hawaii priority seabirds. The eradication would likely increase survival and productivity of the many seabird species breeding on the island, as well as create a high-elevation and predator-free breeding location. The multi-species eradication would be a major milestone in invasive animal eradications. Feasibility and operational scoping are underway.

Risk: Medium (Operational = 3, Stakeholder = 1, Biosecurity = 1)

Risk: Operationally, a multi-species eradication on Kahoolawe would be at the upper limit in terms of what has been accomplished to-date globally (Veitch et al., 2011; Glen et al., 2013). Substantial resources are being invested in stakeholder engagement and operations planning. Chance of re-invasion is low with a biosecurity plan in place.

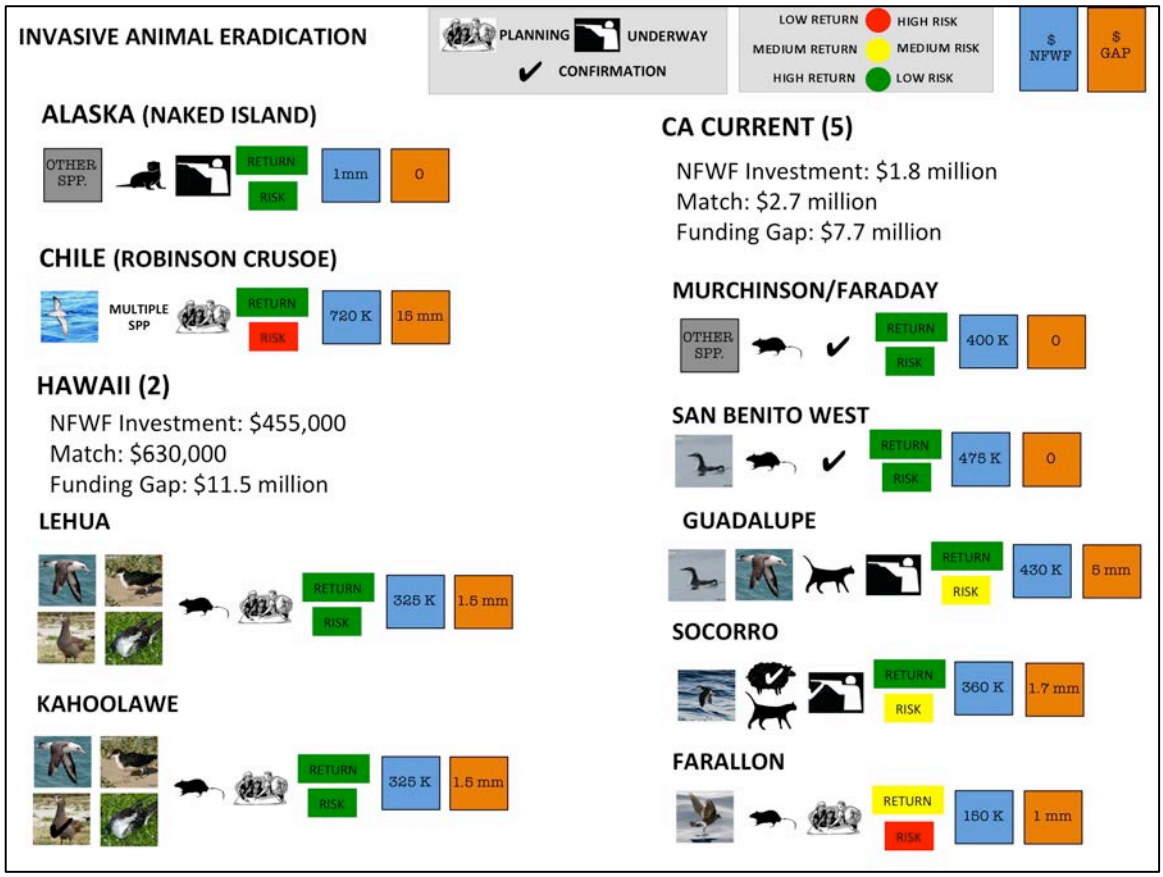


Figure G1. Characteristics of NFWF's nine invasive animal eradication projects. Icons represent conservation targets, invasive animal being eradicated, project stage, conservation return and risk ranking, NFWF investment, and estimated budget gap.

Predator-proof Fencing

We treat NFWF's three investments in predator-proof fencing separately from the projects focused on the eradication of invasive animals from an entire island (Figure G2). Risk and returns scores were derived using the same methodology for invasive animal eradication investments. For fencing projects, land tenure is related to stakeholder engagement, and funding and capacity for long-term maintenance of fences is related to biosecurity.

Kauai (Hawaii)

Conservation Return: High (Change: 3, Action: 3, Site: 3)

The planning, stakeholder engagement, research, and environmental compliance has been done to construct a predator-proof fence to provide safe nesting habitat for the

Hawaiian Petrel and Newell's Shearwater, the latter of which will be translocated from exiting colonies in Hawaii. The financing has been secured to construct the fence and conduct the invasive animal eradication. The financing for translocation efforts has not been secured.
Risk: Medium (Operational = 3, Stakeholder = 1, Biosecurity = 1)
The high operational risk relates only to the risk and uncertainty around translocation failure. Long-term funding and capacity for fence maintenance is related to biosecurity .

Lanai (Hawaii)
Conservation Return: High (Change: 3, Action: 3, Site: 3)
A predator-proof fence on Lanai would provide safe nesting habitat for the Hawaiian Petrel and Newell's Shearwater. The fence will be located at a site where nesting Hawaiian Petrels are confirmed and Newell's Shearwaters are suspected. Project was derailed due to issues with new landowners and inability to obtain access or collaboration. Efforts have been moved to Maui and the project is in the assessment phase.
Risk: High (Operational = 3, Stakeholder = 3, Biosecurity = 1)
Land tenure and lack of stakeholder buy-in are risks. The location change has required the development of a new conservation strategy. Uncertainty about long-term funding is also a risk.

Hawaii (Hawaii)
Conservation Return: High (Change: 3, Action: 3, Site: 3)
The predator-proof fence will protect the largest Hawaiian Petrel nesting location on Hawaii Island from cat and mongoose predation. The fence is located on federal property with established capacity. The financing for fence construction has been secured.
Risk: Low (Operational = 1, Stakeholder = 1, Biosecurity = 1)
Long-term funding for fence maintenance is related to biosecurity.

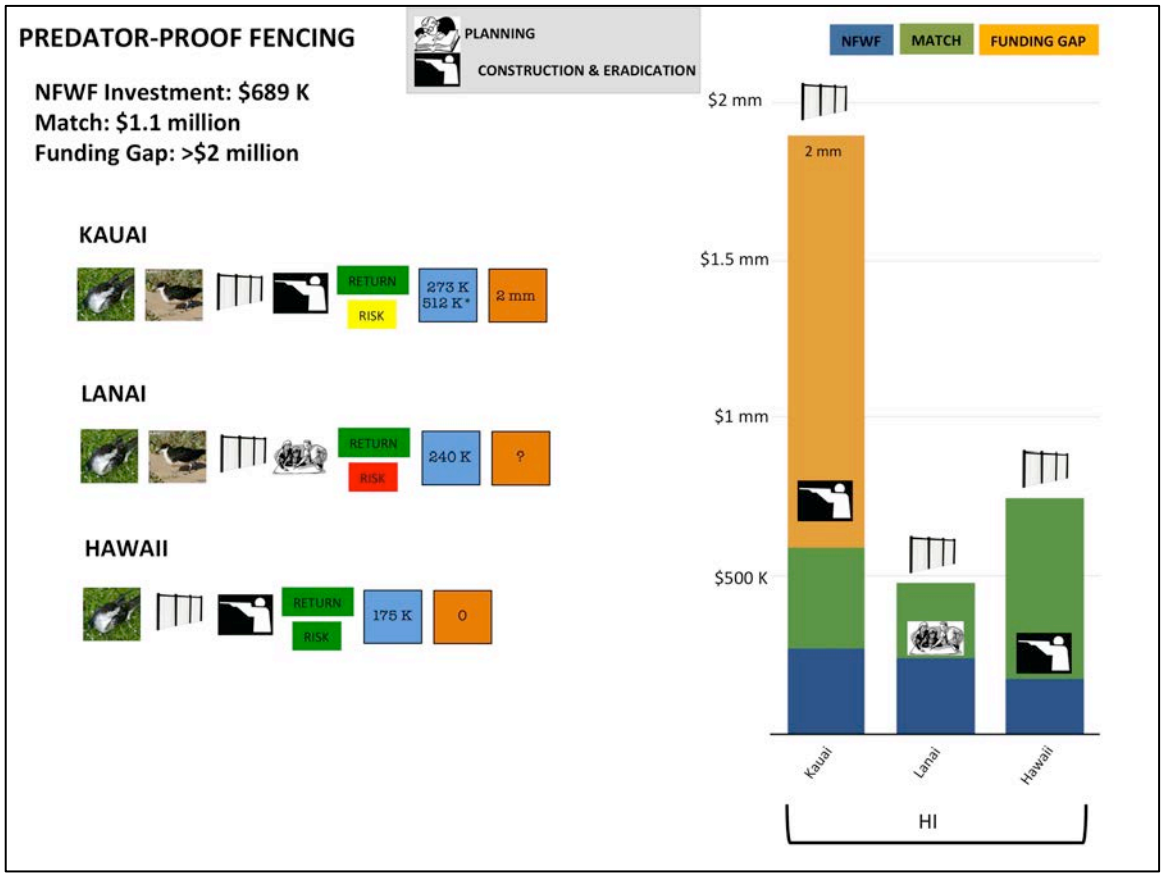


Figure G2. Characteristics of NFWF's three predator-proof fencing projects. Icons represent conservation targets, project stage, conservation return and risk ranking, NFWF investment, and estimated budget gap.

Habitat Creation via Plant Restoration

The three habitat restoration projects all have potentially high conservation returns (Figure G3). Santa Clara Island is the only Pink-footed Shearwater breeding island that is free of invasive animals. Successful plant restoration would improve breeding habitat for the species. Golden crownbeard (*Verbesina enceliodes*) has invaded Midway and Kure Atolls and available data suggest it is significantly depressing Laysan Albatross breeding performance (Klavitter et al., 2010; M. Finklestein unpublished data). Operational risk is present for the Midway and Kure Atoll projects because of the long-term sustained effort (and funding) needed to extinguish the seed bank to achieve eradication. However, capacity and methodologies are well developed because of previous plant eradication programs. There is significant stakeholder risk in Chile. Due to lack of support by key government agencies, plant restoration efforts on Santa Clara have stalled. Risk and returns scores were derived using the same methodology for invasive animal eradication investments.

Santa Clara (Chile)

Conservation Return: High (Change: 2, Action: 2, Site: 3)

The plant restoration activities would help restore breeding habitat for Pink-footed Shearwaters on the only breeding island for the species that is free of invasive animals (~3500 breeding pairs; ~12% of the global population; ACAP, 2013). The island is heavily disturbed due to the historical presence of rabbits. The methods being developed will be useful for future efforts needed on Robinson Crusoe if eradication campaigns are successful.

Risk: High (Operational = 3, Stakeholder = 3, Biosecurity = 0)

The restoration efforts require on-island infrastructure (e.g., greenhouse). These operational needs are not being met due to significant challenges around stakeholder engagement with respect to garnering support and buy-in from government agencies. There also is a gap with respect to hiring and building high-level leadership and capacity in Chile.

Midway Atoll (Hawaii)

Conservation Return: High (Change: 3, Action: 3, Site: 2)

With invasive plant eradication efforts, Laysan Albatross is likely to benefit significantly. Expected benefits include increases in breeding density (up to 375%), hatchling success (70 - 140%), and fledging success (0 - 220%) in areas invaded by golden crown beard. Efforts are likely to benefit Black-footed Albatross, but supporting data are lacking. Currently 241 ha (596 acres) are being treated.

Risk: Medium (Operational = 1, Stakeholder = 1, Biosecurity = 1)

Plant eradications are rare. Operational risk is present due to the long-term funding and capacity needed to extinguish the seed bank. There is also re-invasion risk if full eradication is not achieved.

Kure Atoll (Hawaii)

Conservation Return: High (Change: 3, Action: 3, Site: 2)

With invasive plant eradication efforts, Laysan albatross is likely to benefit significantly. Expected benefits include increases in breeding density (up to 375%), hatchling success (70 - 140%), and fledging success (0 - 220%) in areas invaded by golden crownbeard. Efforts are likely to benefit Black-footed Albatross but supporting data are lacking. Currently 65 ha (160 acres) are being treated.

Risk: Medium (Operational = 3, Stakeholder = 1, Biosecurity = 1)

Plant eradications are rare. Operational risk is present due to the long-term funding and capacity needed to extinguish the seed bank. There is also re-invasion risk if full eradication is not achieved.

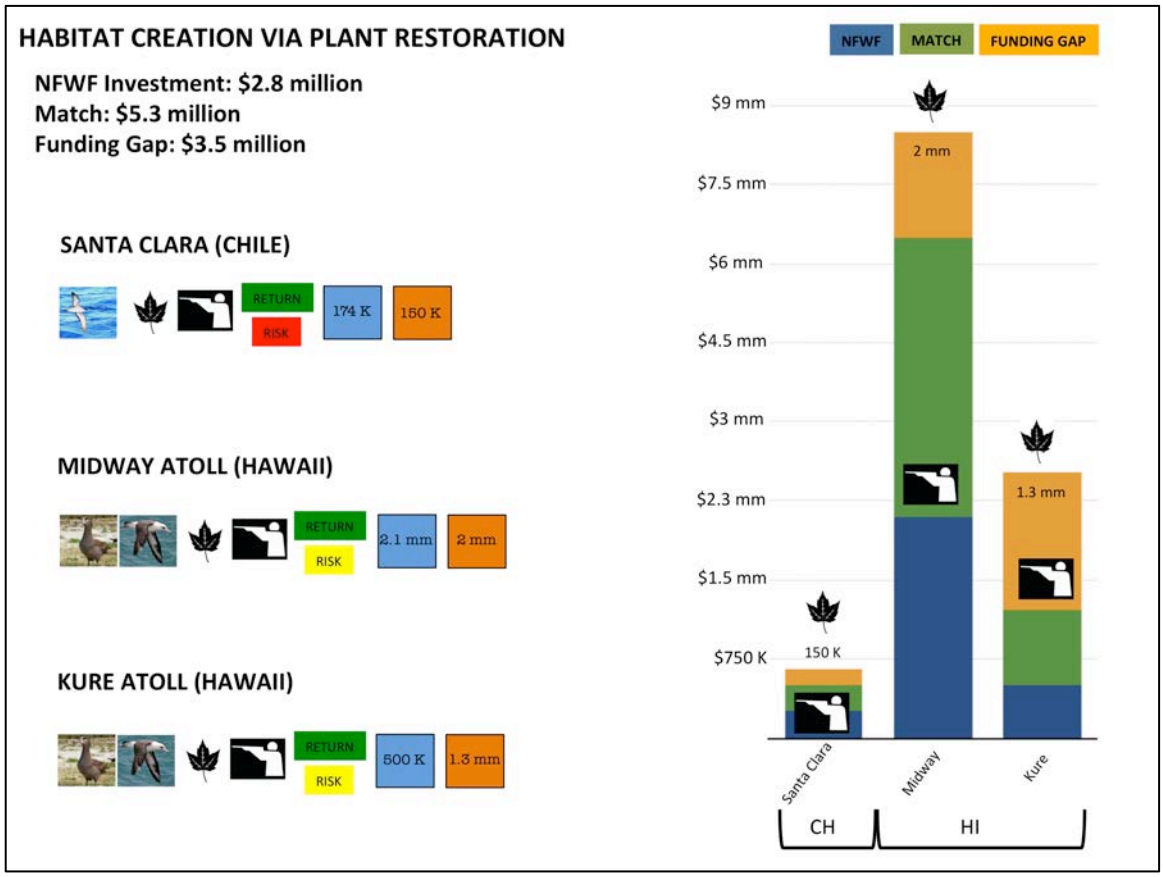


Figure G3. Characteristics of NFWF's three habitat creation projects. Icons represent conservation targets, project stage (all projects are being implemented on the ground), conservation return and risk ranking, NFWF investment, and estimated budget gap.

Fisheries Bycatch

Conservation return scores were derived for fisheries bycatch (Figure G4) using the same methodology for invasive animal eradication investments. Risk for fisheries bycatch investments were scored based on the following criteria: industry relationships, in-country capacity, and the presence of a clear connection between assessment/research with a design strategy for a mitigation program. Industry relationships refer to the degree that the program is collaborating with and approaching solutions through the lens of the fishing industry. In-country capacity refers to the degree of local organizations and individuals conducting the work and demonstrating leadership. Design strategy refers to the degree that there is a focus on an explicit connection to the design and implementation of a bycatch mitigation program.

Russian Far East

Conservation Return: High (Change: 3, Action: 3, Site: 3)

A multi-fisheries bycatch assessment is underway: driftnet, longline, pelagic trawl, Danish seine, and coastal gillnets and set nets. Collaborative research and bycatch mitigation trials with industry have documented over 80% reduction in interactions and mortalities of gulls and northern fulmars, and an increase in target catch. Some boats

are already using streamers, and work is moving forward on a non-regulatory adoption strategy.
Risk: Low (In-country Capacity: 1, Industry Relationships: 1, Link to Program Design: 1)
Low adoption rates due to insufficient stakeholder engagement during program design.

US West Coast Sablefish Fishery (California)
Conservation Return: Medium (Change: 1, Action: 3, Site: 2)
Research and program design to implement bycatch reduction measures for the only US longline fishery that is not required to implement bycatch mitigation measures and interacts with Short-tailed Albatross. Port-to-port workshops will take place, and mitigation gear (i.e., streamers) will be freely distributed.
Risk: Low (In-country Capacity: 1, Industry Relationships: 1, Link to Program Design: 1)
Low adoption rates due to insufficient stakeholder engagement during program design.

Northwest Mexico
Conservation Return: Medium (Change: 1, Action: 2, Site: 3)
Bycatch assessment of Ensenada-based long-line fishery that operates in the vicinity of Guadalupe Island where Laysan Albatross breed.
Risk: High (In-country Capacity: 3, Industry Relationships: 2, Link to Program Design: 2)
Insufficient stakeholder engagement (industry and government agencies). In-country leadership and capacity gap. Information to action gap.

Chile, Peru, and Ecuador
Conservation Return: High (Change: 2, Action: 2, Site: 3)
Bycatch assessment for small-scale gillnet and purse-seine fisheries in three countries. A coordinate effort between three in-country NGOs to conduct pilot studies to test bycatch mitigation measures.
Risk: Low (In-country Capacity: 1, Industry Relationships: 1, Link to Program Design: 1)
Low adoption rates due to insufficient stakeholder engagement during program design.

Northwest Pacific
Conservation Return: Medium (Change: 1, Action: 1, Site: 2)
Spatial mapping (via satellite tagging) of Black-footed Albatross with longline and driftnet fisheries in the Northwest Pacific.
Risk: *Medium (In-country Capacity: 1, Industry Relationships: 3, Link to Program Design: 2)* Insufficient stakeholder engagement (industry and government agencies). Information to action gap.

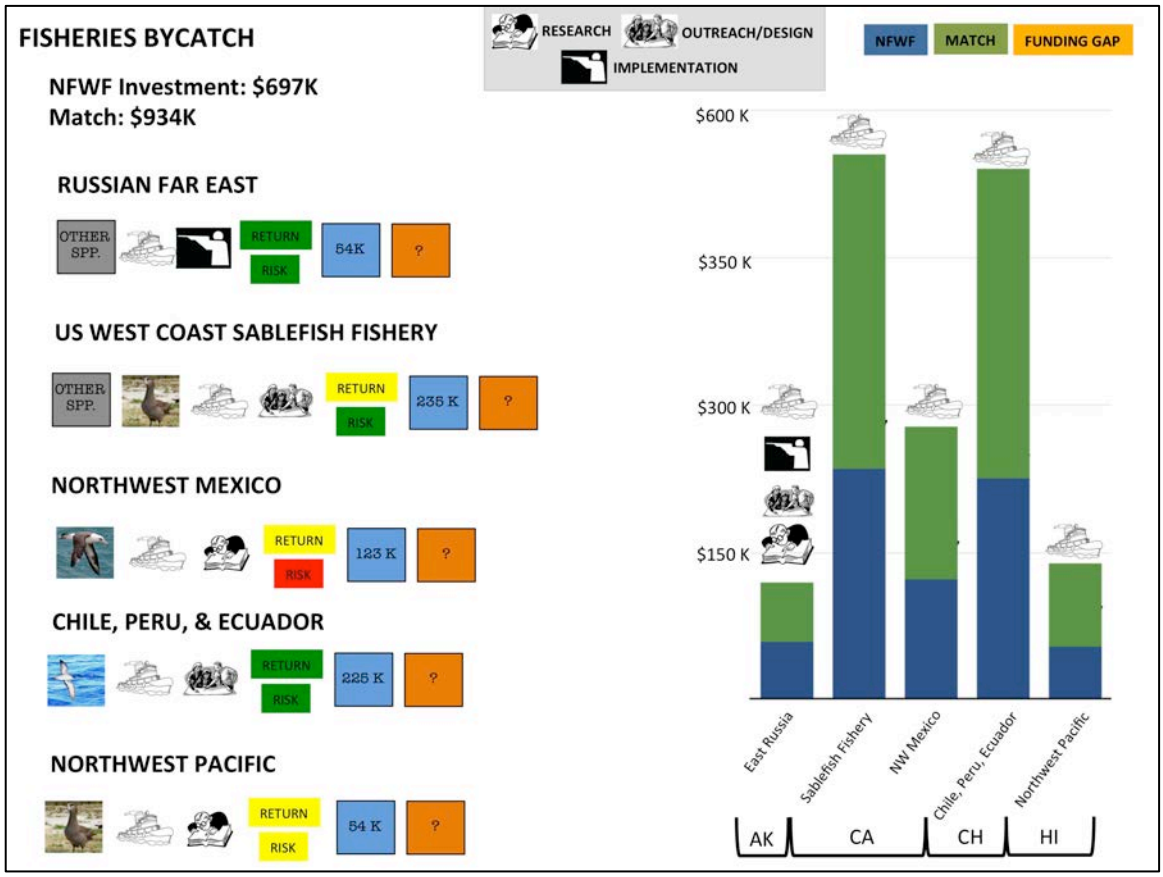


Figure G4. Characteristics of NFWF's five fisheries bycatch projects. Icons represent conservation targets, project stage, conservation return and risk ranking, NFWF investment, and estimated budget gap.

Appendix H

Highlights

Project Highlight: Invasive Animals

NFWF's core strategy of ***removal of non-native, invasive animals*** supports invasive animal removal efforts that engage key partners with a proven track record of conducting successful eradications to ensure the protection and recovery of seabird populations into the future.

Project Title: "Mouse Eradication on San Benito Oeste Island, Mexico"
Lead Organization: Grupo de Ecología y Conservación de Islas, A.C. (GECI)
Focal Species: Xantus's Murrelet (Scripps's Murrelet – IUCN red list status: vulnerable)
Geography: San Benito Oeste Island, Mexico
Project Status and Length: Active; 3 years
Funding: $475,000 from NFWF and $520,000 from matching funds

The San Benito Archipelago is the largest and most species-diverse seabird colony among all Mexico and U.S. Pacific islands, where each year more than a dozen species of marine seabirds, including two million individuals, breed or rest. San Benito Oeste Island (SBO), which hosts approximately 200-500 breeding pairs of Scripps's Murrelet and Guadalupe Murrelet, is the largest island in the archipelago and serves as a rare example of a recent invasion by non-native predators. Within the last 10 years, the Cactus Mouse was introduced to SBO. GECI, an in-country NGO with extensive experience implementing successful eradications, began monitoring the adverse effects of mice on SBO in 2009 and developed a detailed plan for the eradication, including a strategy for monitoring post-eradication recovery of the ecosystem.

NFWF's investment in the SBO project allowed GECI to move forward to implement the mouse eradication. According to Dr. Alfonso Aguirre-Muñoz, GECI's Executive Director, "Without NFWF, we would still be looking for the resources [to implement the eradication]." While several factors likely contributed to the successful eradication efforts on SBO, chief among them was the in-country capacity of GECI's experienced team, including their close working relationships with the Mexican government, Navy, and the local fishermen cooperative Pescadores Nacionales de Abulón (abalone and lobster). Dr. Aguirre-Muñoz credits NFWF funding for continuing to feed GECI's organizational capacity for this type of conservation work (e.g., resources to retain highly skilled scientists).

The SBO project exemplifies the long-term commitment needed for eradication work to be successful. Eradication of the invasive species is just one step. "Even more important and complicated," attests Dr. Aguirre-Muñoz, "are the environmental education and biosecurity measures" necessary to help ensure sustainable outcomes. Toward this end, GECI has maintained strong partnerships with the Mexican Navy and has developed an important local relationship with the most prominent fishing co-op in the area in order to ensure that boats that land on SBO are free of invasive animals. "This has to be done for the long run," says Dr. Aguirre-Muñoz. "We want to bring nature back to realistic conditions. That's not a matter of a two to three year project – that's work to do over the century."

This project has been an essential step toward seabird protection and conservation of an important ecosystem with the potential to result in what Dr. Aguirre-Muñoz calls "a new environmental quality that affects the entire international geographic region." While the conservation impact on seabirds of this eradication using metrics such as fledgling success can be measured only in the long term, a plan for confirming the eradication and monitoring the recovery of multiple seabird species on SBO, including the Scripps's and Guadalupe Murrelets, is now in place.

Figure H1. Highlight 1: Invasive Animals. Field staff from GECI celebrating the successful mice eradication on San Benito Oeste Island

(Photos courtesy of GECI)

Project Highlight: Plant Removal

NFWF's core strategy of ***removal of invasive plants*** is based on NFWF's three-tiered approach to invasive plant threats: (1) removal, (2) restoration of native plant communities, and (3) biosecurity planning to prevent reintroduction.

Project Title – "Bringing Back Historic Numbers of Albatross to Midway Atoll" and "Increasing Albatross on Sand Island by Controlling *Verbesina*"
Lead Organization – U.S. Fish and Wildlife Service (FWS), Midway Atoll National Wildlife Refuge
Focal Species – Laysan Albatross (IUCN red list status: near threatened) and Black-footed Albatross (vulnerable)
Geography – Midway Atoll, Hawai`i
Project Status and Length – Active; 5 years and 5 years (multi-staged projects)
Funding – $2.07 million from NFWF and $4.37 million from matching funds (both projects combined)

This multi-staged project exemplifies NFWF's approach to invasive plant threats with its three main activities: treating adult and seedling *Verbesina enceliodes* on Midway Atoll National Wildlife Refuge's Eastern and Sand Islands; restoring native plants on the islands; and reducing *Verbesina* in high traffic areas to lessen spread. Because the potential impact of *Verbesina* removal poses substantial benefits to Laysan Albatross in particular, this project is an important investment that could see immediate and dramatic increases in nesting performance. On Eastern Island, most of the island's 307 acres have already been treated with an herbicide, with the aim to fully eradicate *Verbesina* on the island. On Sand Island, where the project aims to control 262 acres, 280 acres have already received the first treatment.

These achievements have not come without challenges, including the difficulty of reaching the remote islands, equipment maintenance and failure, staff shortages, and a tsunami. Yet, these challenges have largely been overcome, thanks to a number of facilitating factors such as the ability of the on-the-ground FWS staff to both plan ahead and be flexible when needed; capable staff support on the islands to execute the labor-intensive work of spraying and planting; and strong partnerships resulting in essential resources such as the herbicide, Milestone, described as "a miracle worker [that] allows us to take out the target species without leaving a barren landscape." The collaborations/partnerships made possible by this project have contributed to the project's achievements to date and also have been leveraged to not only benefit this project but other PSP projects. Specifically, the PSP project to remove *Verbesina* from Kure Atoll is using this project's techniques, including the same herbicide; and a study on the effects of *Verbesina* removal on the population health of Laysan and Black-footed Albatross relies heavily on the results of this Midway Atoll project.

NFWF funding for Sand Island was allocated towards the goal of controlling *Verbesina* on a portion of the island rather than eradicating it from the island. Based on estimates derived from the current PSP evaluation, there is approximately a $2 million funding gap to eradicate *Verbesina* from Sand Island. Until *Verbesina* is eliminated, this represents a biosecurity risk, as people and equipment moving between Eastern and Sand Islands can inadvertently transport seed material. According to Dan Clark, Refuge Manager, "It would be meaningful, biologically, to do eradication on Sand. … [We] are hard pressed to commit without external funding to be able to do that." The Refuge has a larger, strategic vision to apply successful lessons learned to address this gap. John Klavitter, the former Refuge Manager, explains, "On Sand Island, we're removing *Verbesina* from about 20% of the island, but we are thinking bigger than that. Based on the progress and what we have learned on Eastern and Sand, we think there exists the possibility of complete eradication on Sand at some point in the future." However, for both islands, the uncertainty of long-term funding is a risk to achieving sustained outcomes, thus highlighting the question of how to best support efforts that have huge potential for realizing conservation benefits to albatross.

Project Highlight: Reducing Bycatch

NFWF's core strategy of ***reducing seabird bycatch*** is based on the Foundation's work to advance the development of specific fishery-appropriate mitigation gear, increase voluntary adoption rates amongst the fleets, and improve understanding of threats to specific seabirds by increasing observer coverage.

Project Title – "Reducing Bycatch of Pink-footed Shearwaters in South America"
Lead Organization – BirdLife International (UK and Chile)
Partner Organization(s) – Pro-Delphinus (Peru); Aves y Conservacion (Ecuador)
Focal Species – Pink-footed Shearwater (IUCN red list status: vulnerable)
Geography – Chile, Ecuador, Peru
Project Status and Length – Active; 2 years
Funding – $224,874 from NFWF and $316,000 from matching funds

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The Humboldt Current Large Marine Ecosystem (LME) boasts 17% more seabird species than any other LME in the world. Small-scale gillnet and purse seine fisheries in the region are extensive and continue to grow in number. However, the impact of these fisheries on seabird mortality due to bycatch – and ways to effectively mitigate it – remains largely unknown. Together, these factors make the current project focused on reducing seabird bycatch in the Humboldt Current a strategic one. In year one of this effort, project coordinator Oliver Yates and his team have observed six small-scale fisheries, making more than 68 trips and totaling over 150 days at-sea, in Chile, Ecuador, and Peru to identify those with the greatest amount of interaction between fishing gear and seabirds and to characterize these interactions in order to develop effective mitigation measures.

This project was designed to leverage the experience of several on-the-ground partner organizations in the three countries. In part, this was accomplished using the established network of BirdLife International's Albatross Task Force, which previously has been focused on addressing seabird bycatch in longline and trawl fisheries in the region and elsewhere. Utilizing in-country leadership and capacity in a project that is ultimately reliant upon stakeholder engagement and buy-in at multiple levels in order to be successful has been an important strategy. "We are quite well known in the ports, so we didn't have trouble getting access [onboard boats]" explained Yates. "If we didn't have the system and structures in place beforehand, we would probably still be trying to set those up." Another successful strategy, given the thousands of fishing vessels that could potentially be monitored, has been to target "hot-spot" interaction areas for monitoring. Doing so created a greater chance of observing seabird/gear interactions in order to develop technical mitigation measures to test during the project's next phase. By focusing on hot-spots, Yates noted, "We feel quite confident about what we are able to say about our outcomes. I think other grantees should pay an awful lot of attention to that because it has huge bearing on what your results may or may not indicate at the end of the project."

Devising and testing mitigation solutions that will be effective are the next steps for the project, but the team is aware that their biggest challenge lies in getting the industry to use them once they are developed. Indeed, a main risk to conservation investment in fisheries bycatch is low adoption rates of bycatch reduction programs. "Implementing is a big word when it comes to fishery-related bycatch," notes Yates. "The captain on each [vessel] is the king, so encouraging adoption of regulations in those fisheries and then monitoring to ensure there is compliance…is critical." To this end, the project has taken initial steps to develop mitigation measures that have an economic/practical benefit for fisheries so that the industry will not push back against regulations. Yates and his colleagues know the importance of getting the measures they create into regulation and have been proactive in this regard, having already discussed with government officials the need for any eventual measures for small-scale fisheries to be included in national regulations for seabirds.

Figure H2. Highlight 3: Reducing Bycatch. Project team member measuring marine bycatch from gillnet fishery

(Photo courtesy of BirdLife International)

Project Highlight: Capacity Building

NFWF's core strategy of ***capacity building*** emphasizes close collaboration with conservation partners that have an on-the-ground presence in local communities and are already fostering pride and support for seabird conservation in those communities.

Project Title – "Constructing a Predator-Proof Fence at Kilauea Point National Wildlife Refuge"
Lead Organization – American Bird Conservancy (ABC)
Partner Organization(s) – U.S. Fish and Wildlife Service (FWS), Pacific Rim Conservation (PRC), and Kauai Endangered Seabird Recovery Project (KESRP)
Focal Species – Newell's Shearwater (IUCN red list status: endangered) and Hawaiian Petrel (vulnerable)
Geography – Island of Kauai, Hawaii
Project Status and Length – Active; 1 year and 1.5 years (multi-staged projects)
Funding – $272,923 from NFWF and $378,557 from matching funds (both projects combined)

Given significant budget cuts that have affected the Kilauea Point National Wildlife Refuge, the private investment from NFWF has provided critical support to help protect the vulnerable Hawaiian Petrel and endangered Newell's Shearwater – the latter of which almost exclusively breeds on the island of Kauai. Both of these species face tremendous predation pressure on their inland colonies. The highlighted project exemplifies NFWF's core strategy of capacity building in several ways, starting with close collaboration between ABC and its project partners, including FWS, which manages the refuge and has the main on-the-ground presence there. Important planning activities for the project have been completed, including working with project partners on identifying the fence site and fence specifications and conducting biological monitoring to identify predators and existing biological resources. Currently, the predator proof fence, which is the first fully enclosed fence in a national refuge system, is being erected. This has become a source of pride for the Refuge and is anticipated to retain and attract additional interest and support in seabird conservation from an already active conservation/volunteer community in Kauai.

These achievements have been facilitated by effective working relationships between the project partners. In particular, PRC, which has an important local presence and has provided technical expertise on predator proof fences, has enhanced the Refuge's capacity to execute project tasks. Shannon Smith, the Refuge Manager, underscored the value of PRC's "knowledge, trust, and good communication" in enabling success. She stated, "[The Refuge] probably would not have done this project in five-to-ten years, if at all, because of all the other priorities on our plate. It's something you dream about, talk about, and put on a paper. But to have the ground broken [in a two-year timeframe]… it's been a phenomenal success that we wouldn't have been able to accomplish without ABC and Pacific Rim."

The placement of the fence in the Refuge is strategic for sustainability, as the Refuge's mandate is to manage seabird (and other wildlife) habitat. According to Dr. George Wallace, the project's principal investigator, "The most important [aspects for sustainability] will be fence maintenance, predator control, and monitoring of the colony to make sure it's growing the way we'd like. We're in a strong position there. As a project team, we accomplished our main needs by placing the fence squarely in the middle of a national wildlife refuge." Erecting fences is generally not popular with the public, but there has been little public opposition to the fence in the Refuge. "We did our homework; we did outreach and held public meetings," noted Dr. Wallace. Effective public outreach by project partners to garner support from local residents for seabird conservation has helped to facilitate the project's implementation success to date and will be key to sustainability. Volunteers from the community will help with fence maintenance and bird monitoring. "I have a feeling [volunteers] will fall in love with the work around this fence because they will be able to see tangible results," Smith happily predicts.

Figure H3. Highlight 4: Capacity Building. Predator-proof fence erected in Kilauea Point National Wildlife Refuge

(Photo courtesy of American Bird Conservancy)

Project Highlight: Filling Information Gaps

For several imperiled species, lack of information is the primary and initial hurdle to effective conservation. NFWF's core strategy of ***filling information gaps*** is key to allowing for more effective, directed conservation outcomes, and actions in the future.

Project Title: "Nesting Ecology of Kittlitz's Murrelet on Kodiak Refuge, Alaska"
Lead Organization: U.S. Fish and Wildlife Services (FWS) Kodiak National Wildlife Refuge
Partner Organization(s): USGS Alaska Science Center; USFWS Endangered Species Program/Alaska Region; Oregon State University and Southern Illinois University
Focal Species: Kittlitz's Murrelet (IUCN red list status: critically endangered)
Geography: Kodiak Refuge, Alaska
Project Status and Length: Active; 2 years
Funding: $94,750 from NFWF and $102,624 from matching funds

The Kittlitz's Murrelet (KIMU) was a candidate for federal listing under the Endangered Species Act due to steep reductions in its population estimated to be between 70-85% over the past two decades. However, a formal determination on the listing had been postponed because so little is known about this elusive species and the reasons for its decline.

The study represents a considerable contribution of new knowledge to the conservation community. As of early 2014 the project had successfully monitored 91 active nests, representing about 40% of nests ever found for this species. To date, study data have resulted in, among other things, an enhanced understanding of the nest-site habitat for KIMU on Kodiak Island; identification of the sand lance as an important forage fish for the species; identification of predation by red fox as the leading cause of nest failure on the island; and an increasingly precise estimation of nest survival rate for the species. Dissemination of preliminary findings to the wider scientific and conservation communities has included presentations at professional meetings and submission of three manuscripts to peer-reviewed journals. In addition, the study has met its goal of contributing to conservation decision making. In 2013, based in part on early findings from the study, including a new population model that projected KIMU populations were stabilizing, the USFWS determined that a listing of the species was not warranted.

Two things have facilitated implementation of this project. The first is access: the relatively low and accessible habitat that attracts these birds also facilitates monitoring and research. The second factor is the motion-sensor, nest cam technique used to collect data. Camouflaged cameras record information every three minutes. According to Robin Corcoran, the project's principal investigator, "The cameras provide invaluable information… They really do so much of the work, and it's phenomenal to have them out here."

Efforts to fill information gaps, such as those that existed for the KIMU prior to this study, are an important contribution of the PSP to the conservation landscape. The study findings emphasize the importance of basic research and underscore the need for long-term monitoring to understand nesting success rates. And yet funding to support monitoring activities is no longer a sure thing for the Refuge, let alone monies to conduct this type of research. "Last year…our operating budget fell by about 80%," commented Corcoran. "We went from having money to do long term monitoring, which is the focus of the Refuge … to not being able to do any surveys last year. For projects like this, I am entirely dependent on outside funding." Corcoran intends to continue to leverage the important results from her project to secure additional funding in order to fill the many information gaps that remain for this critically endangered species. She contends, "This study is our first – and still remains our best – opportunity to study these birds systematically in their nesting grounds."

Project Highlight: Foraging

NFWF's core strategy to ***protect seabird foraging locations and forage prey base*** is based on the Foundation's premise that a successful strategy for protecting forage bases will bring together fisheries managers, marine protected area managers, and seabird conservation experts to develop practical and measurable fisheries practices that benefit both seabirds and the commercial fishing industry.

Project Title – "Comprehensive California Current Seabird Forage Reserves"
Lead Organization – Farallon Institute
Focal Species – Ashy Storm-Petrel (IUCN red list status: endangered) and Xantus's Murrelet (vulnerable)
Geography – California Current
Project Status and Length – Active; 2 years
Funding – $264,847 from NFWF and $265,000 from matching funds

Food abundance is known to influence seabird demographics, and human exploitation of seabird food resources threatens this abundance. Despite this risk to the primary food sources for seabirds and marine mammals, fisheries that catch forage fish (e.g., sardine, anchovy) are not managed with adequate regard to protecting critical food sources. This project's activities include an innovative approach to compiling, analyzing, and synthesizing data that has already resulted in a public database, which contains information on the types of forage that predators eat in the California Current System. The project is intended to inform fisheries management practices in order to benefit both seabirds and the fishing industry. Given the current period of unprecedented shortages in forage fish populations, project co-principal investigators, Drs. Julie Thayer and William Sydeman, are confident that their project is poised to provide invaluable information to fisheries management. Still, they do not underestimate the challenge of how to effect change in policy and, ultimately, practice for fisheries. As explained by Dr. Sydeman, "The huge challenge is to bring the information into the policy arena to effect change and to get people to pay attention to it. … The science is the easier part. We have control of that. We don't have control over effective change in management. …That's a big job."

The Pacific Seabird Program investments under this core strategy may not have immediate conservation returns. In fact, they carry a risk that policy will not change and that there will be no conservation benefits in the long run, regardless of how well the foundation has been laid for utilization of data by fisheries management. This project has taken key steps to mitigate this risk. With still almost a year's worth of work to be completed on the project, anticipation by fisheries managers is mounting. "They are already banging on the door," noted Dr. Thayer. Such early traction has been achieved thanks to strategic efforts in two regards. First, in a deliberate attempt to maximize the utility and influence of this project, the team utilized matching funds to include marine mammals and predator fishes in their study. Dr. Thayer explains, "We won't be able to effect change through seabirds alone. Managers wouldn't pay as much attention to the findings, because seabirds don't consume a sufficient biomass of forage fish to get their attention. We are trying to present an ecologically-based argument as well as a fisheries or economic argument. When we put all the predators together and say they consume 'x' tons of important species, then the managers are more likely to listen." Second, the project is leveraging its partnerships, including PEW's Forage Fish Campaign, which – along with other advocacy groups – has already used information from the predator diet database to compel the Pacific Fisheries Management Council to add three species of squids to its Unfished Forage Fish Protection Initiative. While working toward completion of the project, the team is building and strengthening relationships with Federal and state agencies, foundations, researchers, and others to set the stage for ensuring utilization of the resulting information by fisheries management.

Figure H4. Highlight 6: Foraging. A Common Murre with a northern anchovy in its bill

(Photo courtesy of Ron Le Valley)

Appendix I

Species Outcomes and Indicator Metrics

Table I1. Species-Specific Conservation Outcomes of PSP Projects Evaluated

Project	Conservation Outcome	Conservation Indicator Metric	Metric Baseline Value	Metric Value at Grant Completion	Long-term Goal Metric Value[1]	Year in Which Long-term Metric Value is Anticipated
Ashy Storm Petrel						
30385	Increased Ashy Storm-petrel population size on Farallon Islands	Number of Individuals	4,200	4,200	4,800	2030
	Reduced Ashy Storm-petrel predation	Number of Ashy Storm-petrel carcasses from burrowing owls per year	100-200	100-200	0-20	2015
	Increased Ashy Storm-petrel global population	Percentage of Ashy Storm-petrel populations breeding on islands free from predators	36-45%	36-45%	91-100%	2015
38651	Ashy Storm-Petrel - Population	Number of individuals	52	52	-	-
The following projects did not provide metrics for this particular species: 31706, 36944						
Black-footed Albatross						
30565	Increase seabird population abundance	Other Outcome Metric (# acres of quality nesting space available for ground and burrow nesting seabirds)	20	140	140	2014
	Increase seabird population abundance	Number of breeding Black-footed Albatross	6,972	7,181	18,972 – 22,972	2030
30578	Increased number of Black-footed Albatross breeding sites protected from projected sea level rise and predator free	Increase in predator free high elevation Black-footed Albatross breeding islands	0	0	1	2014
The following projects did not provide metrics for this particular species: 28739, 30504, 30626, 35750, 35761, 36838, 40744						
Hawaiian Petrel						
30578	Increased Hawaiian Petrel	Number of breeding pairs	0	0	20	2030

[1] NFWF PSP no longer requires grantees to report long-term goal metric values or year in which long-term metric value is anticipated.

Project	Conservation Outcome	Conservation Indicator Metric	Metric Baseline Value	Metric Value at Grant Completion	Long-term Goal Metric Value[1]	Year in Which Long-term Metric Value is Anticipated
	population size					
37007	Predator removal/ Fencing nests from predators	Number of acres with predation reduction goals met	0	6	-	-
The following projects did not provide metrics for this particular species: 30732, 35764, 36838						
Kittlitz's Murrelet						
The following projects did not provide metrics for this particular species: 32871, 35748						
Laysan Albatross						
30565	Increase seabird population abundance	Number of acres of quality nesting space available for ground and burrow nesting seabirds	20	140	140	2014
	Increase seabird population abundance	Number of breeding Laysan Albatross	40,510	44,201	60,510 – 80,510	2030
36688	Laysan Albatross - Population	Number of individuals	900	1,500	-	-
	Laysan Albatross - Reproductive success	Number of young per breeding pair	45	70	-	-
The following projects did not provide metrics for this particular species: 28739, 30504, 35750, 35755, 35761, 35765, 36662, 40744						
Newell's Shearwater						
30559	Seabird populations increased in fenced area	Number of seabirds of each species	Unknown	Number of seabirds known*	Increased numbers of seabirds	2022
	New population of Newell's Shearwater created in fenced area	Other (Newell's Shearwater population)	0 populations	0 populations	1 population	2022
30578	Increased Newell's Shearwater population size	Number of breeding pairs	1-2	1-2	60	2030
37007	Newell's Shearwater - Population	Number of individuals	0	0	300	15-20 years
The following projects did not provide metrics for this particular species: 30732, 36838						
Pink-footed Shearwater						
20835	Increase in global population of Pink-footed Shearwaters	Numbers of Pink-footed Shearwater breeding pairs	20,000	20,000	23,000	2020

Project	Conservation Outcome	Conservation Indicator Metric	Metric Baseline Value	Metric Value at Grant Completion	Long-term Goal Metric Value[1]	Year in Which Long-term Metric Value is Anticipated
	Increase in global population of Pink-footed Shearwaters	Islands with Pink-footed Shearwater colonies free of invasive mammals	1	1	3	2020
	Increase in global population of Pink-footed Shearwaters	Percentage of Pink-footed Shearwater population breeding on islands free of invasive mammals	0.15	0.15	90-100%	2020
25823	Increased PFSH breeding success at 2 main colonies (80% of breeding population)	Increased fledging success due to reduced predation, and improved breeding habitat	60% on Mocha, 0% woody vegetation on Santa Clara	**65% fledging success*/50% prime habitat planted***	75% fledging success, complete island restoration	2020
30463	Increase in global population of Pink-footed Shearwaters	Number of Pink-footed Shearwater breeding pairs	20,000	20,000	23,000	2020
	Increase in global population of Pink-footed Shearwaters	Number of islands with Pink-footed Shearwater colonies free from invasive mammals	1	1	3	2020
	Increase in global population of Pink-footed Shearwaters	Percentage of Pink-footed Shearwater population breeding on islands free from invasive mammals	0	0	90-100%	2020
30504	Increased PFSH breeding success on Isla Mocha	Increased fledging success due to reduced predation	60% fledging success	65% fledging success	75% fledging success	2015
	Increased prime habitat for PFSH breeding on Santa Clara	Improved breeding habitat due to additional woody vegetation	Minimal woody vegetation	750-1,500 native shrubs planted	Increased PFSH breeding success	2013
The following projects did not provide metrics for this particular species: 35755, 35759, 3662						
Red-legged Kittiwake						
The following projects did not provide metrics for this particular species: 35745						
Townsend's Shearwater						
27573	Decreased predation of	Percentage of predation by cats	unknown	**baseline value**	0	2016

Project	Conservation Outcome	Conservation Indicator Metric	Metric Baseline Value	Metric Value at Grant Completion	Long-term Goal Metric Value[1]	Year in Which Long-term Metric Value is Anticipated
	Townsend's Shearwaters by cats			**known***		
	Increased breeding success of TOSH	Breeding success very low; population in steep decline	unknown	**known baseline***	75% breeding success	2016
The following projects did not provide metrics for this particular species: 35754						
Xantus's Murrelet						
36688	Xantus's Murrelet - Population	Number of individuals	2,000	2,100	-	-
40602	Xantus's Murrelet - Reproductive success	Number of young per breeding pair	1	1	-	-
	Xantus's Murrelet - Population	Number of individuals	1	1	-	-
The following projects did not provide metrics for this particular species: 35751, 35755, 36944						

* Bolded items with asterisks denote outcomes already achieved.

Appendix J

Additional Bird Species Expected to Benefit from NFWF Investments

Table J1. Additional Bird Species Expected to Benefit from PSP Investments

Additional Bird Species by Focal Geography		
Alaska		
Aleutian Tern	Glaucous-winged Gull	Rhinoceros Auklet
Ancient Murrelet	Grey-crowned Rosy Finch	Rock Ptarmigan
Arctic Tern	Lapland Longspur	Rock Sandpiper
Bald Eagle	Leach's Storm-petrel	Short-tailed Albatross
Black Oystercatcher	Least Auklet	Snow Bunting
Black-legged Kittiwake	Parakeet Auklet	Song Sparrow
Cassin's Auklet	Pelagic Cormorant	Thick-Billed Burre
Common Murre	Peregrine Falcon	Tufted Puffins
Crested Auklet	Pigeon Guillemot	Whiskered Auklet
Fork-tailed Storm Petrel	Red-faced Cormorant	Winter Wren
California Current System and Adjacent Mexican Islands		
Ancient Murrelet	Pigeon Guillemot	Socorro Mockingbird
Black Storm-petrel	Rhinoceros Auklet	Socorro Parakeet
Cassin's Auklet	Savannah Sparrow	Socorro Parula
Craveri's Murrelet	Short-tailed Albatross	Socorro Red-tailed Hawk
Leach's Storm-petrel	Socorro Dove	Socorro Wren
Least Storm-petrel	Socorro Eastern-towhe	Socorro Yellow-crowned Night-heron
Marbled Murrelet	Socorro Elf Owl	Sooty Shearwater
Parakeet Auklet	Socorro Ground-dove	
Hawaii		
Band-rumped Storm-petrel	Christmas Shearwater	Short-tailed Albatross
Black Noddy	Grey-backed Tern	Sooty Tern
Brown Booby	Laysan Teal	Tristam's Storm-petrel
Brown Noddy	Masked Booby	White-tailed Tropicbird
Bulwer's Petrel	Red-tailed Tropicbird	
Chile		
DeFilippe's petrel	Kermadec Petrel	White-bellied storm petrel