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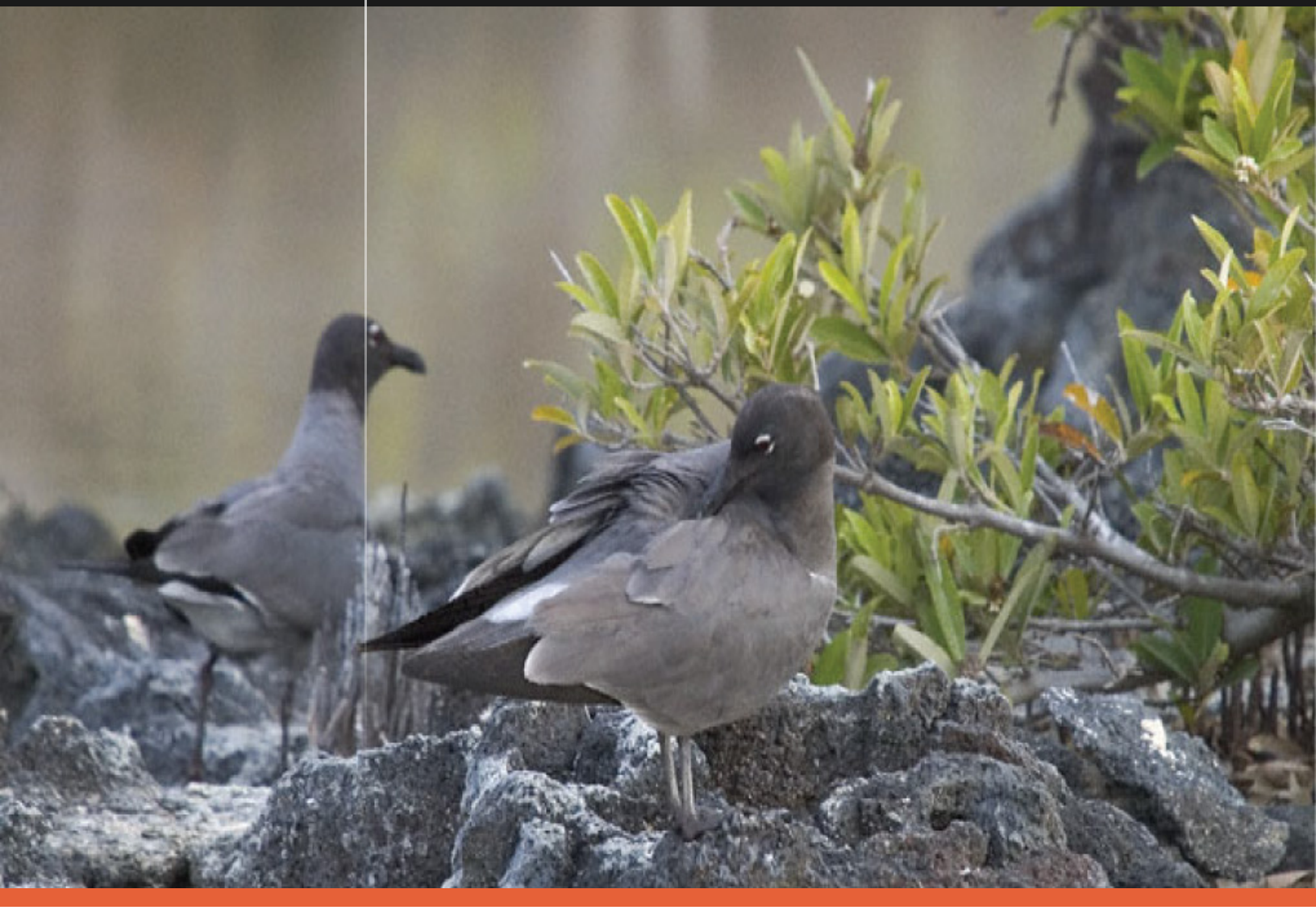

March 5, 2008

# Restoring Globally-threatened Seabirds

## Strategy for Removal of Invasive Animals

Packard Marine Bird Program

**Redstone Strategy Group** is a leading advisor to private foundations and non-profits worldwide. We help clients identify their highest-return investments, track and learn from results, and continually improve their efforts to solve urgent social issues. Our approach combines substantial experience across all sectors of philanthropy with deep appreciation of our clients' knowledge and expertise. This allows us to collaborate effectively with clients as they improve their ability to achieve social good and learn from their results.

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# Summary

Seabirds are among the most threatened animals on earth, with 37 percent of seabird species included on the IUCN red list


Seabirds are among the most threatened animals on earth, with 37 percent of seabird species included on the IUCN red list (Figure 1). Their primary menace comes from invasive animals that prey on seabirds and their young, compete for food and habitat, and destroy seabird breeding sites.

Given the severity of this threat, removing invasive animals from important seabird breeding islands can provide substantial return on investment (ROI) for the Packard Foundation's Marine Bird Program, which aims to restore globally-threatened seabird species.

This paper describes a 10-year, $30 million strategy for Packard that can restore 10 to 15 globally-threatened seabird species, increase populations of 10 to 15 other threatened and near-threatened species, and restore locally-threatened seabird populations in the Caribbean. Developed using interviews, analysis, and ROI modeling, this plan provides actionable strategies through which the Foundation can achieve these important goals.

The paper's four sections explain why Packard should focus on invasive species removal, where Packard should work, what the foundation can expect to spend, and what an additional $10 million can accomplish:

**1. Removing invasive animals eliminates a major threat to seabirds:** Perhaps the highest ROI activity available for seabird conservation, invasive animal removal successfully addresses the single greatest threat to seabirds.

**2. Packard's program can restore 10-15 of the 87 globally-threatened seabird species and increase populations of 10 to 15 threatened and near-threatened species:** Spending $30 million over 10 years to remove invasives from 30-high-ROI islands can achieve this outcome. These islands emerged from an analysis of known breeding sites for 90 percent of the globally-threatened seabirds.

Restoration is defined as increasing the species' population to where it is considered healthy and where the risk of extinction is greatly reduced.

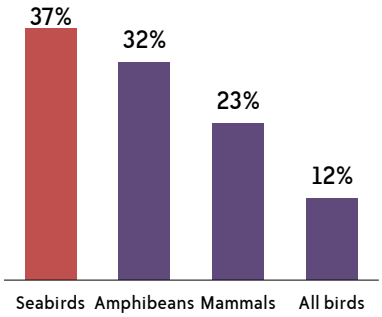
**3. Removing invasives in three regions can help prevent seabird extinction:** Packard should focus its effort on three regions where most high-ROI islands are clustered. Additional opportunistic investments outside these regions should also be included; these investments will restore several further globally-threatened species in other regions, and will restore near-extirpated seabirds to the Caribbean.

**4. With $30M, Packard can achieve its outcome; with $40M, the program can do much more:** An additional $10 million can restore seabirds in the Aleutian Islands and conduct a series of additional invasive animal removals to better buffer threatened species against extinction.

The proposed seabird strategy for the Marine Bird Program is relatively straightforward. To date, most invasive island removals have been done by governments and NGOs working in their respective regions. As a result, most projects have had local or regional importance, but were not organized into a larger strategy.

By contrast, Packard's program will aim to restore seabird species throughout the world on a variety of islands. This global perspective will result in a comprehensive, unified effort, and will be a major contribution to the field of seabird conservation.

**Figure 1.** Percentage of species threatened on IUCN red list




Yet Packard will benefit from partnering with other groups and governments to accomplish this outcome. Given the expenses associated with invasive species removal, Packard will need co-funders to provide at least a 100 percent match over the 10-year life of its program.

Generally, these other funders will have existing interest in the regions, as well as in seabird restoration and/or island restoration. Already, potential partners have collectively pledged or provided about $15 million on invasive animal removal, signaling their likely willingness to continue to contribute to the cause.

In all, implementing this strategy over the next 10 years can restore almost 30 percent of the 87 globally-threatened seabird species. Additionally, a project of this scope reaches far beyond the seabird nest; endemic plants, animals, and entire ecosystems will all improve following invasive animal removal.

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# 1. Removing invasive animals eliminates a major threat to seabirds

Removing invasive animals from seabird breeding islands may offer the highest return on investment in seabird conservation

Invasive animals destroy seabird populations. They eat seabirds and their eggs, compete for food, and destroy important seabird habitat, contributing to seabird population declines and causing extinctions. Given this menace severity, removing invasive animals from seabird breeding islands may offer the highest return on investment (ROI) in seabird conservation.

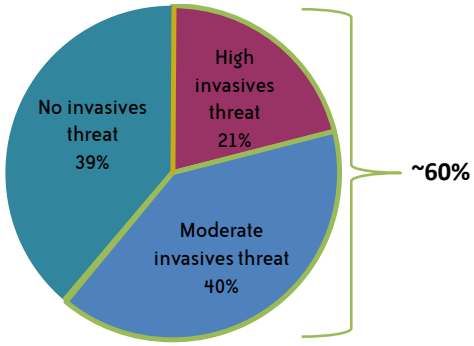
Evidence shows that removing invasive animals leads to successful breeding and restoration of many seabird species, and investing in invasive removals may be the most cost-effective method of achieving this goal.

The following sections explain in more detail why the Foundation should focus on removing invasive animals:

## Invasive species threats

Of the seabird species on the IUCN red list, roughly 60 percent face threats from invasive animals (Figure 2). Introduced on many of the world's islands by sailors, merchants, and tourists, these invasives (e.g. rats, house mice, cats, ungulates, pigs, goats, and monkeys) prey on seabirds eggs and young, destroy habitat, and alter island ecosystems.

**Figure 2.** % of globally-threatened seabirds with invasives threat



The subsequent predation and competition for resources has broad consequences. Beyond eradicating seabird populations, invasive species can also destroy entire island ecosystems, causing the extinction of endemic plants and animals.

## Benefits of invasive animal removal

To date, more than 800 invasive animal removals have transformed islands like the North Pacific's Clipperton Island into major breeding sites. Only 50 years ago, Clipperton's flailing seabird populations (150 Masked Boobies and 500 Brown Boobies) struggled to survive due to disturbance and trampling by the island's 57 pigs. But visiting biologists shot the swine, and today a pig-free Clipperton is home to roughly 112,000 Masked Boobies and 25,000 Brown Boobies. Clipperton's example has been replicated throughout the world, demonstrating the efficacy of invasive removal as a conservation tool.

Additionally, entire ecosystems rebound with the removal of invasive species. Endemic plant and animal species rebound. The food chain reaches a more natural balance. And the ground receives an influx of nutrients, the byproducts of higher levels of guano that accompany concentrated seabird populations.

These benefits may take years to observe following invasive species removal because seabird populations will grow at different levels, depending on the species. Quick-reproducing species like cormorants show considerable growth within five years of the removal. However, slower-reproducing species like albatross, petrels, and penguins take more time to demonstrate population rebounds.

Although teams have undertaken 800 removals on islands throughout the world, many high-priority islands remain for Packard's program. Many of the previous removal efforts were incomplete, or they occurred on islands where seabirds don't breed.

Fortunately, biologists know where 90 percent of globally-threatened seabird species breed. Of those, 30 percent of the species breed in New Zealand, where the proactive government has emerged as a leader in invasive animal removals. Beyond New Zealand, breeding sites have been identified for almost all of the remaining globally-threatened species.  These additional sites are the geographic base upon which the strategy described in the pages that follow is built.

More specifically, invasive animals exist on many of these islands. Using the detailed analysis described in the next chapter, we modeled potential islands where Packard can work to have the greatest impact for the least amount of cost. These high-ROI islands are home to a diverse representation of globally-threatened seabirds, and removing invasives is likely the best investment to restore those species.

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# 2. Packard can restore 10-15 globally-threatened seabird species

Focusing on high-priority islands can improve conditions for roughly 30 percent of the 87 globally-threatened seabird species

Focusing on high-priority islands identified through an ROI analysis and expert consultation can improve conditions for roughly 30 percent of the 87 globally-threatened seabird species, assuming a $30 million Packard contribution over 10 years and at least a 100% match from potential partners.

This chapter describes Packard's program outcome, its structure and benefits, and the island selection process in the following sections:

## Program outcome and logic model

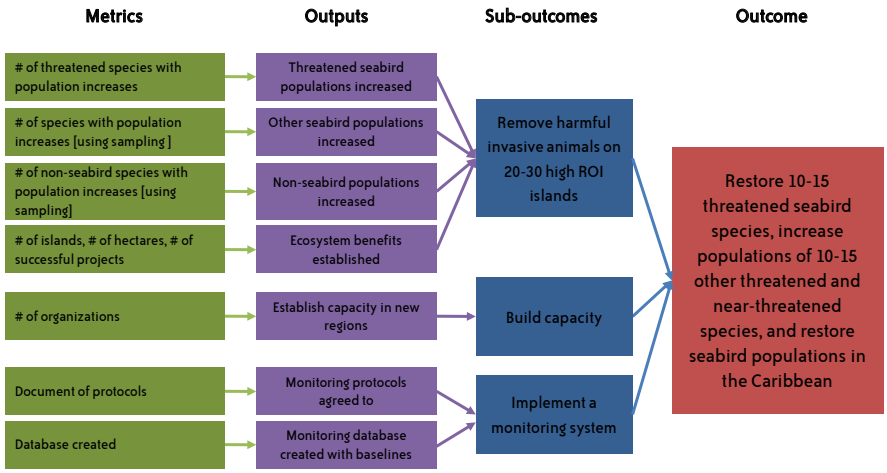
The program can restore 10 to 15 of the 87 globally-threatened seabird species to healthy levels, increase populations of 10 to 15 other threatened and near-threatened species, and restore seabird populations in the Caribbean. This outcome will require a $30 million Packard contribution and 100 percent co-funding match from others (Figure 3).

Packard's outcome would be supported by the following three strategies:

- **Remove harmful invasive animals on 20 to 30 high-ROI islands**: As outlined in Chapter 1, invasive animals pose a severe menace to seabirds, along with other endemic island inhabitants.
- **Build capacity:** In regions with numerous breeding sites but minimal eradication experience (e.g., the Tropical Pacific and the South American Pacific), increasing capacity will facilitate successful projects. Providing regional grants as well as funding eradication projects within a region to build skills will greatly improve capacity.
- **Implement a monitoring system:** A thorough monitoring system will confirm whether or not the Foundation achieves its outcome, quantify the benefits to

seabirds, and determine if the removal efforts succeed. Creating this system requires establishing monitoring protocols and developing a monitoring database with baselines.

**Figure 3.** Packard seabird restoration logic model




## Program benefits

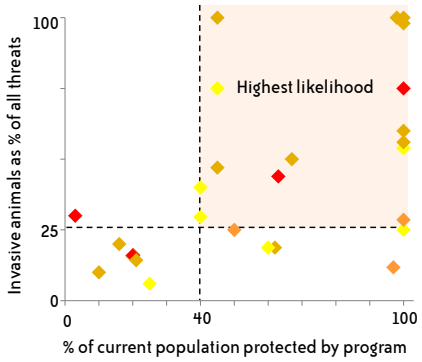
Removing invasive animals could improve conditions for approximately 30 of the 87 globally-threatened species, potentially restoring 10 to 15 species, and improving conditions for 10 to 15 threatened and near-threatened species (Figure 4).

Seabird species like the Townsend's Shearwater, for example, which breeds only on Mexico's Socorro Island, could flourish with the removal of feral cats and house mice. (See the appendix for a comprehensive list of the species that could benefit from Packard's investment).

Benefits to other plants, mammals, and amphibians will also accrue as a result of the removal. Generally islands that host globally-threatened species also host non-threatened breeding species of seabirds whose habitat conditions improve and whose populations increase following removals.

**Figure 4.** Estimated likelihood of restoration

One diamond = 1 seabird species; Red = CR; Orange = EN/VU; Yellow = NT/LC



Despite these proven benefits, some seabird species may not rebound following invasive removal projects. Other threats like human development or changes in seabird breeding patterns could prevent restoration.

Consequently, removal projects must be well-planned, and island selection must consider additional risks. A return on investment (ROI) model accounts for those risks and suggests the top islands that are most likely to deliver the greatest return on investment.

## Island selection process

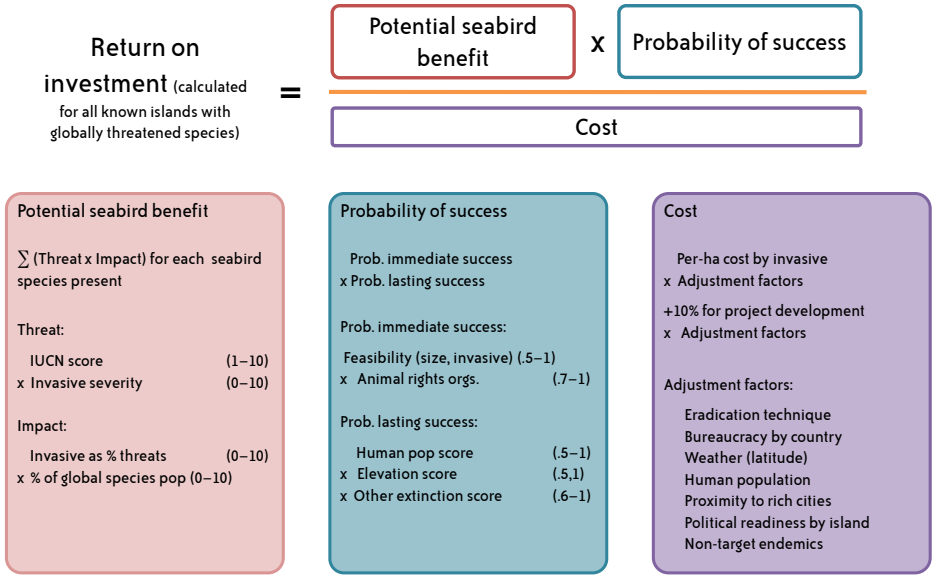
Globally-threatened seabirds only breed on a small percentage of the hundreds of thousands of islands in the world

Globally-threatened seabirds only breed on a small percentage of the hundreds of thousands of islands in the world. Analysis, research, and interviews covering 90% of all globally-threatened seabird species covers only 220 islands where seabirds breed, and ROI analysis narrowed that list down to 35 potential high-priority islands.

This ROI calculation applies weights and values to different conservation components to identify the best opportunities to remove invasive animals and restore globally-threatened seabirds at the lowest cost (Figure 5). Specifically, the calculation quantifies:

- **Potential seabird benefit:** How much will a project contribute to restoring threatened seabird populations?
- **Probability of success:** Will the removal project succeed, and will seabird populations increase as a result in the long run?
- **Cost:** What are the full costs of developing, implementing, and monitoring a project?

**Figure 5.** Return on Investion (ROI) Calculation



**Potential seabird benefits** are estimated by identifying and quantifying the links between the threat to a seabird species and the impact of an invasive removal project. Specifically, this calculation measures four elements:

- How endangered is the seabird species?
- How severe is the threat from invasive animals?
- Of all the threats posed to that seabird population, what percentage comes from invasive animals?
- What percentage of the global seabird species population will benefit from the removal?

For instance, Chile's Alejandro Selkirk Island provides the only breeding habitat for two highly-threatened seabird species, the Juan Fernandez Petrel and the Stejneger's Petrel. ROI analysis quantified high threats from invasives (both invasive severity and the percentage of overall threat attributable to invasives) for both species, resulting in a high potential seabird benefit.

**Probability of success** reflects the likelihood that removing invasive animals will restore seabirds. Specifically, it accounts for variables that can affect both short-term and long-term success. Short-term success considers an island's size, which invasives are present, and the potential for opposition from animal rights groups. Long-term success considers the potential threats from humans, impact of rising sea levels due to climate change, and the risk from other causes of seabird extinction.

In the example of Alejandro Selkirk, strong political support, low estimated sea level rise, and a lack of known animal rights opposition translated into a medium-high probability of success.

**Costs** reflect the total amount needed to develop, implement, and monitor a program. A variety of factors can affect costs, such as which removal techniques are used, a country's bureaucracy, weather and latitude, and more.

For instance, since Alejandro Selkirk is of medium size, is uninhabited, is located close to the Chilean coast, and has a supportive government, removing four species of invasive animals would cost about $4 million.

## Examples of high-priority islands

The analysis narrowed down the initial list of 220 islands to 35 where removing invasives can most likely restore a set of globally-threatened seabirds at the least cost.

Certain patterns emerged from the analysis, given the history of eradication efforts in various regions. Specifically, high-priority islands included the following:

- Remaining small, uninhabited islands with threatened seabirds
- Easy islands in regions requiring new capacity (e.g. South America)
- Difficult islands located in regions with experienced practitioners (e.g. North America, islands off New Zealand and Australia)

Of the remaining islands, about 70 were middle priority, and 115 were ruled out as lower priorities.

It is important to remember that this initial list serves as a starting point, and the following dynamics will affect the Packard program's removal work:

- **Development of more data on individual islands within island groups:** The BirdLife database, the most comprehensive dataset available, has substantial information gaps on seabird breeding sites at the individual island level for small, remote islands, particularly in the Tropical Pacific region. In fact, local experts, if anyone, know the most about these small islands. Packard should therefore continue conversations, and potentially fund research in a few target areas (e.g., the Tropical Pacific, Peru) to identify additional priority islands.
- **Resolving potential differences in priorities:** Packard's focus on seabird conservation defines a niche within the field, as most other groups are motivated by benefits to diverse taxonomic groups. These potential differences in priorities could pose conflicts with potential partners regarding island choices.
- **Creating consensus on priority regions:** Some practitioners suggested a workshop to identify global targets. While it may be unnecessary for Packard's program, such a workshop could benefit the field of island restoration by providing a venue for exchange of information on eradication techniques.
- **Identifying other high-ROI conservation strategies:** While removing invasives is the highest return on investment for many threatened seabird species, some species may require additional or different activities for restoration. In the future, such activities may be candidates for inclusion in the Packard program's investments.

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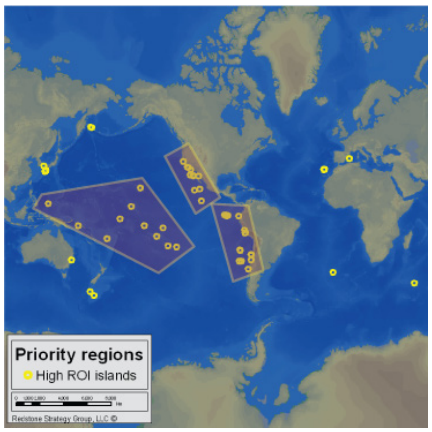
# 3. Removing invasives in three regions can help prevent extinctions

Packard should focus its effort on three regions where most of the high-ROI islands are clustered (Figure 6). Additional opportunistic investments outside these regions can also contribute importantly to seabird restorations.

Most of the high-ROI islands from the analysis of known breeding sites are clustered within three selected regions. Working on a regional scale provides cost efficiencies, potential for capacity expansion, and ability to increase political support.

Packard should focus its effort on three regions where most of the high-ROI islands are clustered

**Figure 6.** Regions with clusters of high ROI islands




This chapter presents each of the three regions as well as other opportunistic investments, and describes a rough action plan in the following sections:

- South American Pacific
- Tropical Pacific
- North American Pacific

- Opportunistic investments
- Restoration of regionally-threatened species
- 10-year comprehensive action plan
- Funding partners

## South American Pacific

Home to the Galapagos, and many other islands rich in biodiversity, the South American Pacific contains a relatively high number of globally-threatened seabird breeding islands in three countries: Ecuador, Chile, and Peru.

Packard could restore 5 to 7 globally-threatened seabird species in this region by focusing on specific island groups (Figure 7).

The region varies widely in its existing capacity; the Ecuadorian government and partners have completed several high-profile removals on many of the islands in its archipeligo and capacity is secure, whereas fewer removals are known to have taken place in Chile and Peru. Given that, investments in capacity building will be an important first order of work in some parts of the region.

**Figure 7.** Potential South American porfolio


As Packard commences work in this region, focusing initially in the Galapagos could capitalize on existing momentum. Following that, Packard could progress to Chile, where the government has expressed interest in seabird conservation and invasive species removal, and then continue to Peru, where data about the breeding sites of globally-threatened seabirds is less readily available and further research is needed.

More specifically, Packard could proceed as follows:

- Having successfully removed invasive animals from some of the easier islands in the Galapagos, Ecuador is ready to confront more challenging projects in the archipelago, such as the 17,000-hectare Floreana Island. Home to three species of globally-threatened seabird species, this large, craggy island can be

an important breeding site once invasive species are removed. The island's large size contributes to its high $8 million estimated cost.

- Following success in the Galapagos, Packard could proceed to Chile, where the government has expressed interest in removing invasive animals, but lacks Ecuador's history of removals. Island Conservation has already explored some potential islands, and we recommend initially executing two relatively straightforward removals in the Des Venturadas island group. These early experiences will likely facilitate work on more complicated islands in Chile, including Juan Fernandez island.
- Less specific data exists for Peruvian islands, however, scientists agree that both San Gallan and La Vieha are important breeding sites for the globally-threatened Peruvian diving-petrel. Initial investments in exploration of these islands to determine removal feasibility will likely provide additional information to help structure Packard's work in Peru.

Removing invasive animals from the high-ROI islands in the region provides opportunities to restore 5 to 7 seabird species for about $10 to $15 million. Packard would likely contribute approximately $5 million, and could pursue co-funding from the Global Environmental Facility (GEF), the Charles Darwin Foundation (CDF), and the Dutch government, along with local governments.

## Tropical Pacific

The Tropical Pacific is an enormous region with many small, remote islands. Packard's work in the region could restore between 5 and 10 globally-threatened species (Figure 8).

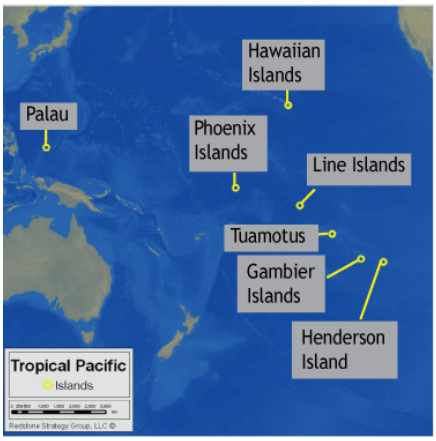
At least 15 globally-threatened seabirds breed here. Additionally, the region contains many small, uninhabited islands, which are ideal for invasive animal removal.

However, logistical challenges have diminished the ability of researchers to map breeding sites, with the result that limited data exists regarding seabird breeding sites. Filling the holes in the data gap by investing in research and capacity building will allow Packard to identify islands with the highest ROI and to develop a strategy for invasive animal removal.

Concurrently, Packard can invest in invasive removals on the few known breeding islands for globally-threatened species. These investments will likely be high-profile and could facilitate future capacity building by serving as a demonstration project. Despite limited data, certain islands, such as Henderson Island, home to the threatened Henderson Petrel, have emerged as high-priority candidates for such projects.

Additional breeding sites in the Phoenix islands have been identified through a New Zealand-sponsored program known as the Pacific Invasives Initiative (PII), and could serve as early projects for the Tropical Pacific program.

**Figure 8.** Sample island groups in the tropical Pacific




Overall, Tropical Pacific costs could range from $10 to $15 million, with a $6 million Packard contribution. Co-funding can likely come from the GEF, the Critical Ecosystem Partnership Fund (CEPF), New Zealand, the U.S. Fish and Wildlife Service, and the Royal Society for the Protection of Birds (RSPB). To date, most of these partners have collectively pledged (or have already provided) about $15 million to conservation projects in the region.

## North American Pacific

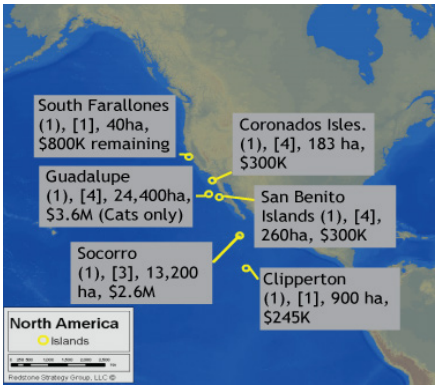
Tremendous existing capacity in the North American Pacific results from extensive work by Island Conservation (IC), which provides a solid foundation for Packard to work in the region.

For a relatively small investment, Packard can provide the impetus to other groups to "finish the job" and capitalize on existing funding commitments (e.g. $2 million of already-committed government and private funds for the Farallones off the coast of California).

At least six remaining high-priority islands in the region provide opportunities to restore at least three globally-threatened seabird species (Figure 9). For instance, the critically-endangered Guadalupe Storm Petrel breeds only on Guadalupe Island, a 24,400 hectare behemoth off the coast of Mexico, and removing invasive animals could prevent the species' extinction.

However, given the wide-ranging success of I.C. in the region, the task of prioritizing the sequence in which to work may best be left up to the conservation group given that organization's success. Specifically, by making strategic grants to IC, Packard could supply the necessary means to complete ongoing projects.

**Figure 9.** Potential North American portfolio




Costs in this region would total about $8 million, including a $5 million Packard contribution. Co-funders could include I.C and the USFWS, which would likely provide in-kind services as well as funding.

## Opportunistic investments

Packard should also pursue targeted one-off investments to remove invasive animals from high-ROI islands outside of the three regions detailed above. This will capitalize on additional opportunities to recover globally-threatened species and increase the program's global reach, given the promising islands in the South Atlantic, Northwestern Pacific, and the Southern Ocean.

Analysis identified potential smaller investments, such as Green Island in the Falklands, or higher-profile projects on islands that play a major role in seabird ecology, such as Gough Island (see appendix for an initial list of potential islands and seabirds).

A 6,500 ha invasive-infested island in the South Atlantic, Gough Island supports five globally-threatened seabird species with high IUCN scores. Removing these animals could create a pivotal conservation achievement and would cost about $4 million. Given the profound restoration impact and Gough's high profile, the high price tag is justified because removing invasives there would provide a high return on investment and attract potential co-funders.

Additionally, other excellent removal opportunities will likely emerge as Packard's program evolves. As this occurs, the program can continue to calculate the islands' ROIs and adjust priorities accordingly.

Initial estimates for all opportunistic investments range from $5 to $15 million, assuming a $5 million Packard contribution. The costs for one-off investments will vary depending on an island's politics, geography, and the type of invasive animals on the island. Potential co-funders could include countries that own the islands, conservation groups, and multilaterals.

## Restoration of regionally-threatened species

Historically, the Caribbean's lush forests and cliffs provided breeding grounds for scores of seabird species. Today, human development has introduced a suite of invasive animals, which have depleted all but a few of those species, rendering them "regionally-threatened." Although these species breed elsewhere, their extirpation from the Caribbean reveals a dismantled ecosystem.

For a $4 million investment, Packard can restore 10 to 20 regionally-threatened species, many of which reproduce quickly (e.g. the Brown Booby; see appendix for a list of species that would benefit). Doing so would have two immediate benefits: the creation of a positive demonstration project, and important contributions to ecosystem restoration.

Given the quick reproduction rates of many Caribbean species, these projects would show increased populations in a two to five year period. Swift success in the Caribbean could also show the program's benefits and build support for future projects, specifically by creating evidence of success for future co-funders.

Ecologically, investments in the Caribbean can restore a major component of the food chain. Seabirds eat a variety of fish and other ocean creatures that live near shore lines and in tidal pools. The long-term absence of seabirds likely affects the balance of these ecosystems, which restoration can amend. Further, concentrations of seabirds produce prodigious amounts of guano, which adds nutrients to the area.

## 10-year comprehensive action plan

Given the disparities in the needs of particular regions, the program will have different initial tasks in each area

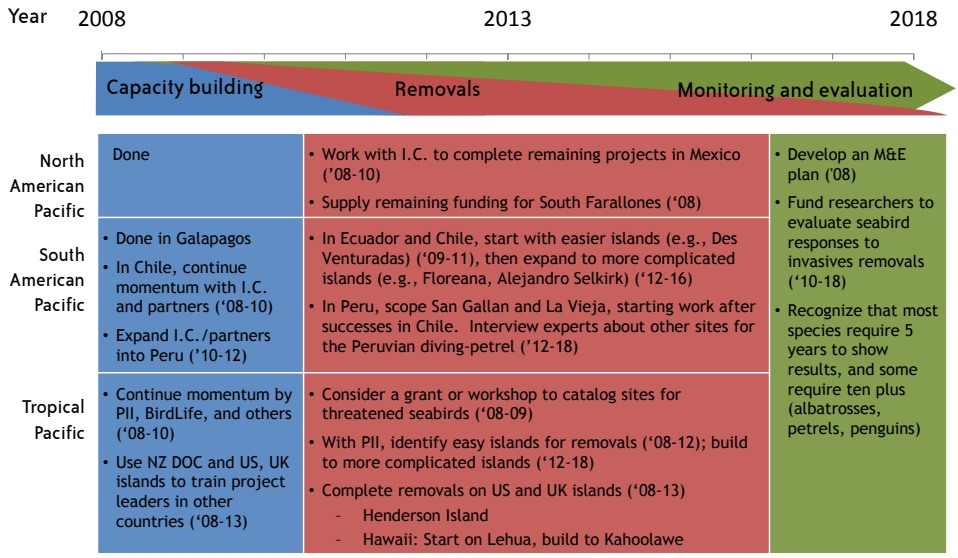
Given the disparities in the needs of particular regions, the program will have different initial tasks in each area. Building capacity and doing more research will be necessary in South America and the tropical Pacific, but removals in North America can begin immediately (Figure 10).

Capacity building will involve developing partnerships with governments and NGOs, educating communities, and training practitioners. Working with partners established in the regions can facilitate this outreach.

Following capacity building, Packard can focus on invasive removals, the majority of which will generally occur between the second and eighth years of the program. The scope of these projects will vary depending on an island's geography and on which invasives are present.

Finally, to gauge the program's success, Packard will establish clear monitoring and evaluation criteria based on the program's logic model. Waiting for approximately five years following invasive animal removals will likely produce the best results, as most seabird species do not show significant population gains until then.

**Figure 10.** Packard seabird restoration 10-year plan




## Funding partners

This program assumes a 100 percent co-funding match ($30 million), and initial estimates suggest partners could provide up to $15 million of additional funds over the course of the 10-year program. Generally, these other funders have existing interest in the regions, as well as in seabird restoration and/or island restoration. Already, these potential partners have collectively pledged or provided about $15 million on invasive animal removal, signaling their likely willingness to continue to contribute to the cause.

The potential partners range from governments to conservation groups and multilaterals. Some, like New Zealand, have emerged as leaders in the field of invasive species removal. Others may have less experience in these projects and may require more encouragement or incentives.

Naturally, potential partners will each have objectives that may differ in some respects from those at Packard. Most notably, many may prefer to fund projects that protect diverse taxonomic groups. Given that Packard plans to focus exclusively on seabird restoration, challenges may arise in coordinating priorities. At the same time, the overlap of interests should be sufficiently great to warrant efforts by the Foundation to secure co-funding.

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# 4. With $30M-$40M Packard can exceed its outcomes

Choosing how much to invest in this program can be challenging, given the different outcomes each funding package produces

Cost modeling resulted in a $30M funding estimate for Packard's seabird initiative. Beyond $30M, Packard could fund other additional removal efforts to further seabird restoration. In addition, increasing the program's funding by $10 million could also restore seabirds in the Aleutians and protect additional colonies of threatened seabirds to reduce the risk of extinction.

Choosing how much to invest in this program can be challenging, given the different outcomes each funding package produces. This chapter outlines two funding packages, showing the difference between the $30 million package described in the previous chapters and a $40 million package, by explaining how the funds will be distributed over the life of the program, and recommending next steps in the following sections:

- Funding packages
- Program funding needs
- Next steps

## Funding packages

A $30 million program could achieve Packard's outcome of restoring 10-15 globally-threatened seabird species, increasing populations of 10-15 other threatened and near-threatened seabird species, and restoring seabird populations in the Caribbean. In addition, the program would build capacity in the Tropical Pacific and parts of the South American Pacific, while reserving 10 to 15 percent of the funds for accurately monitoring and evaluating the benefits throughout the process.

Increasing Packard's contribution to $40 million can expand the program's reach and protect approximately 50 seabird species from invasive animals (Figure 11). These include both globally-threatened and regionally-threatened species. Specifically, increasing the program by $10 million can accomplish the following:

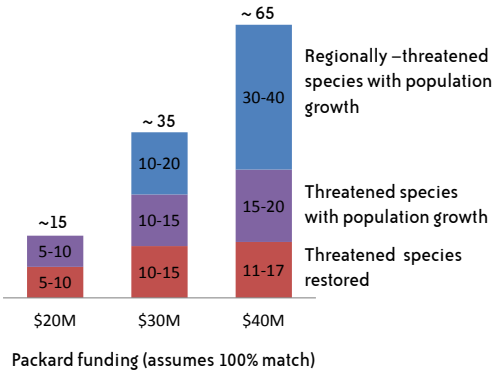
- **Restore regionally-threatened seabirds in the Aleutian Islands.** Like the

Caribbean, the Aleutians' seabird populations have been drastically depleted due to the presence of invasive animals. Efforts in the Aleutians can restore 5 to 6 regionally-threatened species, as well as prevent the spread of invasive animals to other nearby islands.

- **Further reduce potential for extinctions by protecting colonies where less than 10 percent of a species population breeds.** Ideally, invasive removal projects occur on islands with a high percentage of the global species population. Yet in instances where a population disperses among several islands, removing invasives from those islands can provide safe harbor for the species. It can also encourage those populations to increase.
- **Reduce the risk of extinction by protecting small islands near larger ones where invasives have already been removed.** Following invasive removal projects that protect major seabird colonies, Packard can remove invasives from nearby, smaller islands as insurance against extinction. That way, if the original project fails, and invasives return to the island, or something else threatens their breeding grounds, the seabirds can relocate to the nearby, uninfested islands.
- **Conduct conservation activities beyond invasive removal.** Despite their efficacy, invasive removals are not always the most effective restoration tool. Seabird populations are also threatened by some fishing techniques and by habitat loss. Under a $40 million package, Packard could also budget resources to reduce bycatch from fisheries, create reserves to protect seabird breeding habitat, and reintroduce seabirds to islands with safe habitat.

**Figure 11.** Seabird gains and funding package

# of seabird species protected from invasives




## Program funding needs

Funding needs are likely to shift over time as capacity expands into new regions and the program transitions from capacity building to removals and monitoring (Figure 12). The needs will also range by region, depending on capacity levels, ongoing projects that have momentum, and more. Packard can generally plan on the following funding needs:

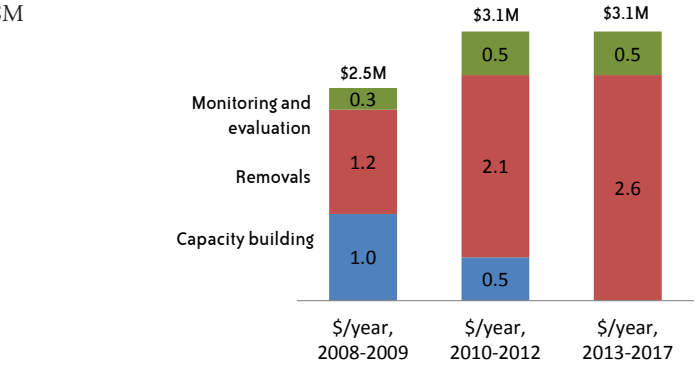
- **Years 1 – 2:** Packard can finish most islands in North America and complete

small island while building capacity elsewhere; annual costs: $2.5 million

- **Years 3 - 5:** Packard can complete easy islands in South America and the tropical Pacific and finish islands in North America; annual costs: $3.1 million
- **Years 5 – 10:** Packard can move to complicated islands as capacity expands, and fund opportunistic islands outside priority regions; annual costs: $3.1 million

As island readiness varies, annual funding will change from the annual average. Additionally, these costs assume at least 100 percent co-funding.

**Figure 12.** Spending patterns over 10 years




## Next steps

The strategy described in this paper depends on selecting specific islands and creating project plans, addressing logistical questions about how to implement the plans, and persuading partners to share the costs of invasive animal removal. Undertaking the following next steps will prepare Packard to begin work immediately:

- Begin sharing the draft strategy outside the Foundation, beginning with Island Conservation, which provided substantial content to the project team.
- Develop an action plan for the Tropical Pacific, where more island-specific research is needed to complete ROI analysis.
- Determine whether program officers or grantees will be responsible for generating co-funding. If it is program officers, begin arranging meetings with potential co-funders, such as New Zealand agencies, to identify potential overlaps in strategy.

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Interviews: Karl Campbell; Bernie Tershy; Don Croll; Gregg Howald; Josh Donlan; Dave Algar; Alan Saunders; Bradd Keitt; Sarah Sanders