Assessment of Seabird Restoration Priorities for the U.S. Pacific Islands

Prepared for the USFWS Migratory Bird Office by

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Executive Summary

This report presents an assessment of conservation priorities for **non-federally listed** seabirds breeding within the U.S. Pacific Islands (USPI), with a focus on seabird colony restoration using social attraction and translocation. It covers five distinct geographic regions: the Main Hawaiian Islands (MHI), the Northwestern Hawaiian Islands (NWHI) including Papahānaumokuākea Marine National Monument, the Commonwealth of the Northern Mariana Islands (CNMI), Guam, American Samoa, and the Pacific Remote Islands Marine National Monument (PRI). The document consists of two main sections. The first identifies which non-federally listed species are the most imperiled within the USPI through an independent species risk assessment process, including a component on climate change impacts. The second section utilizes data collected on potential colony restoration sites identified during **interviews with 74 seabird experts** undertaking seabird conservation work throughout the region. This wide-ranging collaborative approach presents a unique opportunity to gain a collective insight into the most appropriate sites for colony restoration projects in the USPI.

Seabird Risk Assessment

We conducted an independent risk assessment for all 27 non-federally listed seabird species with confirmed breeding populations in the USPI using 14 scoring criteria. These criteria included global population size and trends as well as criteria specific to the USPI – such as the importance of the USPI population to global conservation, the threats species face from sea-level rise within the region, and the number of existing seabird restoration projects focused on them. **The top five species identified by the Species Risk Assessment were (in order): (1) Polynesian Storm-Petrel** *Nesofregetta fuliginosa***, (2) Tahiti Petrel** *Pseudobulweria rostrata***, (3) Bonin Petrel** *Pterodroma hypoleuca***, (4) Black-footed Albatross** *Phoebastria nigripes* and **(5) Tristram's Storm-Petrel** *Hydrobates tristrami***.** These highest-ranking species should be considered priority targets for colony restoration efforts and funding opportunities within the USPI and perhaps even globally. High-ranking species typically fell into two categories: (i) globally threatened or endangered species with small, restricted breeding populations within the USPI (e.g., Polynesian Storm-Petrel and Tahiti Petrel) and (ii) species where the majority of the global breeding population is located within the USPI and on low-lying islands where they are thus threatened by climate change (e.g., Bonin Petrel and Black-footed Albatross).

Expert Interviews

A total of 74 seabird experts and land managers from 26 organizations were interviewed between 16th February and 27th July 2022. Respondents identified a total of 107 potential receptor sites for colony restoration projects. **It is important to note that these sites were identified by participants and are not final recommendations by ARC or USFWS Office of Migratory Birds**. The majority of receptor sites identified by participants were in the Main Hawaiian Islands (55 sites), followed by American Samoa (19 sites) and Guam (11 sites). Considering the Main Hawaiian Islands further, the three islands with the most potential colony restoration sites identified were (in order): Kaua'i (13 sites), O'ahu (10 sites), and Maui (10 sites). The top five sites mentioned by respondents were **Kaho'olawe (in its entirety), Lehua Islet (in**

its entirety), James Campbell NWR (Oʻahu), Kīlauea Point NWR (Kauaʻi), and Mokio Preserve (Molokaʻi). Each of these sites are considered in detail in this document and could be considered as high-value sites for seabird restoration projects.

Considering all the data collected from the interviews, several follow-up actions were identified to create a roadmap for future work. For high-priority sites identified by participants, **an independent site prioritization ranking exercise should be carried out** with sites ranked based on a smaller number of key criteria. **Follow-up site visits to the top five sites** would fill data gaps, corroborate data provided by participants, allow rapid assessments of key management needs, and include meetings with relevant stakeholders to assess willingness to engage in projects of this nature. Additionally, **a detailed budgetary assessment (both set up and long-term maintenance) should be undertaken for the top five sites**, considering different management scenarios and different species assemblages. The last step in the planning process would be the **creation of a strategic action plan**, focusing on specific projects and key actions identified and fully costed.

While this document identifies specific sites as highlighted by project participants, it should be stressed that the success of colony restoration projects will require on-the-ground, locally driven, and holistic approaches during future planning and implementation efforts. On inhabited islands in particular, seabird restoration projects require extensive engagement and support by local communities. Exchanging information with indigenous groups and incorporating traditional ecological knowledge (TEK) at the earliest stage in the planning and implementation process is essential for any colony restoration proposal, along with a commitment to addressing cultural sensitivities and accommodating cultural traditions. Furthermore, project infrastructure (such as predator-proof fences) and management activities (such as predator control and seabird monitoring) require management in perpetuity to protect restored seabird populations – again highlighting the need for community engagement and project support. However, with climate change models predicting the loss of significant breeding colonies in low-lying islands within the USPI and subsequent downward population trajectories, it is clear that colony creation projects on high islands are an increasingly important element of conservation throughout the region. By incorporating the expertise of a broad cross-section of seabird experts throughout the region and synthesizing the data gathered, this document represents a key step in this process.

Introduction

This report covers all US Pacific Islands (USPI) — a geographically non-contiguous area of more than 100 inhabited and uninhabited islands, islets, and atolls located within the western and central Pacific. This area consists of five distinct geographic regions: the Main Hawaiian Islands (MHI), the Northwestern Hawaiian Islands (NWHI) including Papahānaumokuākea Marine National Monument, the Commonwealth of the Northern Mariana Islands (CNMI), Guam, American Samoa (AS), and the Pacific Remote Islands Marine National Monument (PRI) (Figure 1). The USPI is also a globally significant region for at least 31 seabird species that are known to breed within this area, including four endangered species. These breeding sites are composed of tens of millions of individuals and include some of the largest and most diverse assemblages of tropical seabird species in the world (Papahānaumokuākea Marine National Monument 2008, Rose Atoll National Wildlife Refuge 2014, Marianas Trench Marine National Monument 2020, Young *et al.* 2022).

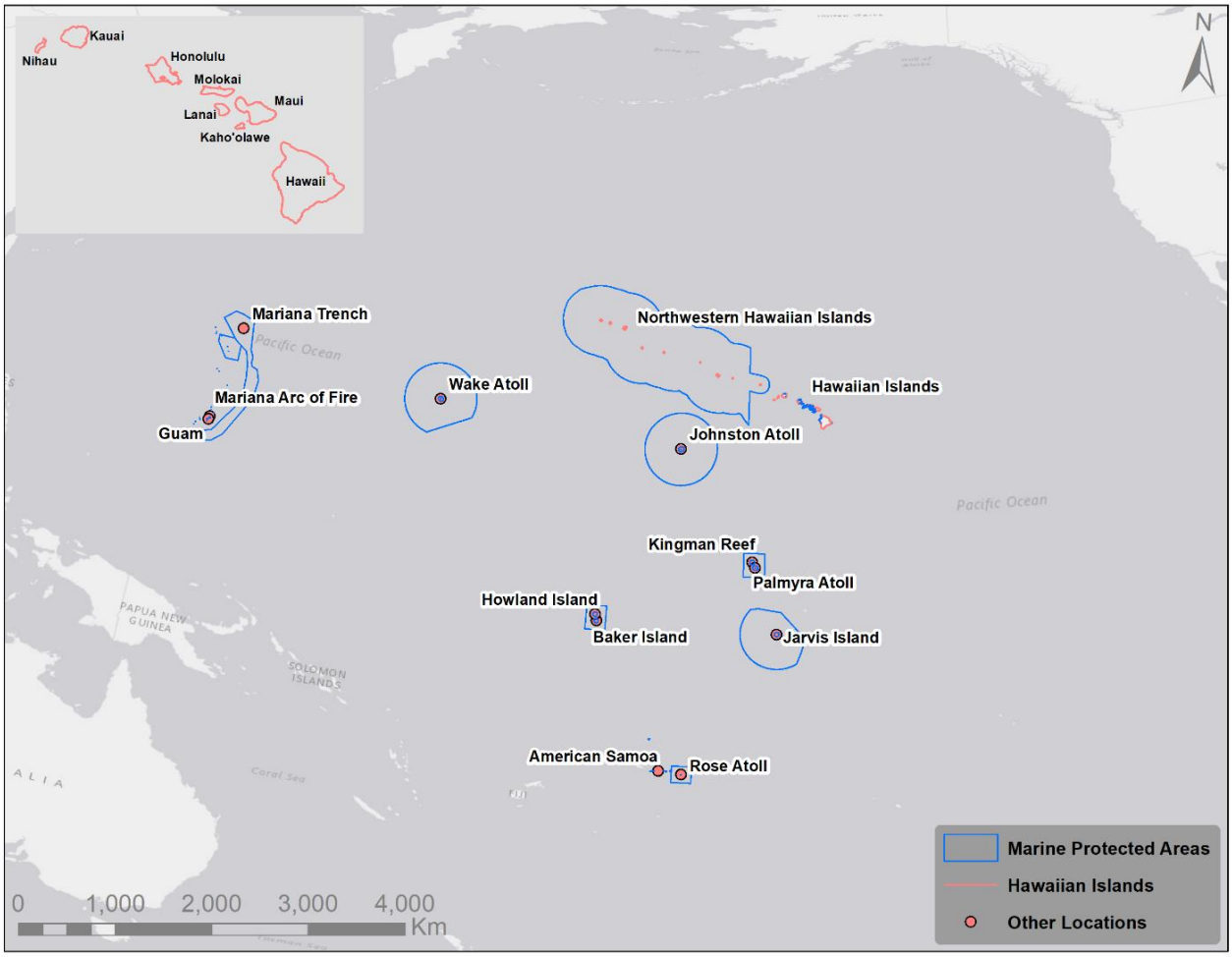

Figure 1. Map showing all islands located within the region and considered in this document.

Seabirds are important indicator species for marine environments at both local and large-scales and are an integral component of marine and terrestrial ecosystems (Boyd *et al.* 2006, Piatt *et al.* 2007, Parsons *et al.* 2008, Dearborn *et al.* 2001). Healthy seabird populations increase connectivity between marine and terrestrial environments through nutrient transfer from offshore marine environments to terrestrial and nearshore ecosystems (Anderson & Polis 1999, McCauley *et al.* 2012, Otero *et al.* 2018, Graham *et al.* 2018). Seabirds are also culturally significant to indigenous communities throughout the USPI. Cultures across this region have long been connected between islands via oceanic travel, which initially relied upon knowledge of the currents, winds, and local fauna (particularly seabirds) for navigation (Finney *et al.* 1986, Di Piazza & Pearthree 2001, Clark *et al.* 2014). Islands with a long history of established human habitation, including the MHI, CNMI, Guam, and American Samoa, have cultural records of seabirds in oral histories and traditions. In Hawai'i, seabirds appear in the *Kumulipo*, or Hawaiian Creation Chant, are recognized as physical manifestations of deities or ancestors, and are prominent in traditional knowledge including chants and prayers (Beckwith 1981, Kikiloi 2012, Kerr *et al.* 2016, Gon 2022). In American Samoa, feathers from seabirds were prized for their use as fishing lures and seabirds feature in a prominent proverb treasuring Samoan language and culture (Craig 2009, Ministry of Education 2009). Remote islands in this region with large seabird breeding colonies were also historically used by Polynesians as temporary shelters and waypoints during long oceanic voyages. In addition, these islands provided vital food resources and were also visited to acquire the bones of larger seabird species, which were used for tattooing (Bautista & Smith 2018, Villagomez & McGuire 2021).

Seabirds are one of the most threatened groups of birds on the planet, with 47% of species experiencing population declines and a further 84% at risk from at least one persistent threat (Dias *et al.* 2019). Ongoing threats to seabird populations across the globe and in the USPI include introduced predators, urbanization, bycatch, overfishing, marine pollution, and disturbance at colonies (Croxall *et al.* 2012, Dias *et al.* 2019, Rodríguez *et al.* 2019, Raine *et al.* 2020). Climate change represents an increasing threat across the USPI, particularly for seabird populations on low-lying islands. Seabird species differ in their vulnerability to climate-change-related impacts, depending on their sensitivity, colony exposure, and life-history traits (Gardali *et al.* 2012, Reynolds *et al.* 2015). However, predicted sea level rise in the USPI region suggests that many breeding locations of seabirds in the Pacific, on both low-lying remote atolls and coastal sites, will either be inundated, or experience frequent washover as a result (Reynolds *et al.* 2013, 2015, Li *et al.* 2018, Storlazzi *et al.* 2018). In high sea level rise scenarios, seawater inundation by the year 2100 is projected to displace over 600,000 breeding seabirds at Midway Atoll alone (Reynolds *et al.* 2015).

At monitored populations in the NWHI, loss of seabird breeding habitat from tsunamis, storm surges, and flooding has already occurred. High water events have resulted in the loss of nests, eggs, chicks, fledglings, and adults, foreshadowing the future impacts of climate change and rising sea levels (Baker *et al.* 2006, Young *et al.* 2012). In 2018, East Island in the French Frigate Shoals was almost entirely washed away by storm surges from Hurricane Walaka, and on Midway's Sand Island albatross nests are regularly lost due to flooding, especially for species such as Black-footed Albatross nesting closer to the beach (Reynolds *et al.* 2017, Houston & Birchard 2020). Current seabird breeding strongholds in low-lying areas could therefore become greatly reduced in size or completely displaced (Reynolds *et al.* 2015). It is anticipated

that the amount of seabird breeding habitat in the NWHI and Pacific Remote Islands Marine National Monument will be significantly diminished, with recent models projecting that seven low-lying islands in the NWHI will become completely submerged under high sea level rise scenarios (Hatfield *et al.* 2012, Reynolds *et al.* 2012, 2015).

Centuries of anthropogenic impacts on larger islands have resulted in the largest present-day seabird colonies being found mainly on uninhabited, remote islands that are predominantly at or below 3m of sea level and thus highly vulnerable to sea level rise and inundation. The creation of seabird colonies on high-elevation islands has been recognized as an important tool to mitigate the impact of climate change on these populations (Duffy 2010, Jones *et al.* 2016, Spatz *et al.* 2017, Kappes *et al.* 2021). Colony creation is an established management tool and utilizes two primary methods: (i) social attraction of birds with auditory signals and sometimes decoys and (ii) translocation of individuals to a location, to build colonies in areas that do not currently have active breeding colonies (Podolsky & Kress 1992, Gummer *et al.* 2003, 2014, Miskelly & Taylor 2004, Bell *et al.* 2005, Miskelly *et al.* 2009, Buxton & Jones 2012, Carlile *et al.* 2012). In the USPI, multiple projects to translocate and/or socially attract seabirds have now been completed or are ongoing, with the majority located in the Hawaiian archipelago (for examples, see the Seabird Restoration Database (http://www.seabirddatabase.org)). Some of these projects are being used specifically to mitigate the impacts of climate change on species whose breeding populations are concentrated in low-lying areas, such as recent efforts to translocate chicks of four species (Laysan (*Phoebastria immutabilis*) and Black-footed (*Phoebastria nigripes*) Albatross, Bonin Petrel (*Pterodroma hypoleuca*), and Tristram's Storm-Petrel (*Hydrobates tristrami*)) from Midway in the NWHI to James Campbell NWR on the island of O'ahu (VanderWerf *et al.* 2019). However, there are many species for which few if any projects have been initiated. Furthermore, the scale of many existing colony restoration projects is relatively small and combined are still not at the level needed to secure seabird species increasingly affected by climate change impacts in addition to existing threats.

Intended use of this report

The purpose of this report is to serve as a strategic tool for a broad range of stakeholders in the prioritization of conservation actions for 27 non-federally listed USPI seabird species, with a focus on site-specific seabird colony restoration projects using social attraction and translocation. **Seabirds protected under the Endangered Species Act (ESA) were not within the remit of this document**, and by their very nature, these species should be considered priority species for seabird conservation efforts. These species are the Short-tailed Albatross *Phoebastria albatrus*, Newell's Shearwater *Puffinus newelli*, Hawaiian Petrel *Pterodroma sandwichensis,* and Band-rumped Storm-Petrel *Oceanodroma castro.* Some of these species are already the focus of colony restoration projects (e.g. the Nihoku Ecosystem Restoration Project (Young *et al.* 2018)).

The report consists of two main sections. The first identifies which non-federally listed species are the most imperiled within the USPI through a species risk assessment process, with a particular focus on climate change impacts. Higher-ranking species should be considered priority targets for colony restoration efforts and funding opportunities. The second section utilizes data collected during interviews

with 74 seabird experts and land managers undertaking seabird conservation work throughout the region. This wide-ranging collaborative approach presents a unique opportunity to (i) gain a collective insight into those species most at risk within the USPI and why, (ii) the best strategies to use for colony restoration efforts, and (iii) the most appropriate source locations for translocation efforts as well as potential receptor sites for colony restoration projects. It is important to note that the results presented in this report are distilled from the expert opinions of this diverse group of professionals and should not be considered as direct recommendations by USFWS or ARC.

Conservation of seabirds in the USPI is undertaken by a diverse, growing network of organizations, agencies, and individuals, representing different approaches, skills, and funding sources. By surveying 74 experts from 26 organizations across the USPI, this report is intended to provide a combined voice to this wide range of perspectives. By identifying site-specific, implementable seabird restoration projects with species-specific targets, this report identifies potential conservation actions for seabird restoration in the USPI. It is hoped that interested parties can utilize the contents of this report as an aid to focusing seabird conservation efforts where they are most needed and that the report will support efforts to leverage funds for these projects. Furthermore, this report should be used as a roadmap for additional work needed to create a Strategic Action Plan for priority colony restoration projects in the USPI. The future implementation of some of the seabird restoration projects identified in this document will help to address past and present anthropogenic impacts on seabirds throughout the USPI, provide new refuge for seabird colonies facing the looming threat of climate change, and ultimately benefit the people and ecological communities of the region.

Offshore islets, such as Moku‘ae‘ae Islet off Kaua‘i’s north shore, provide opportunities for colony restoration projects in areas free of introduced predators.

Species Risk Assessment

Methods

The species risk assessment focused on all 27 non-federally listed seabird species with confirmed breeding populations in the USPI (Figure 2). Species strongly suspected of breeding within the USPI (such as Kermadec Petrel *Pterodroma neglecta* and Bryan's Shearwater *Puffinus bryani*) or those potentially breeding within the USPI (such as Phoenix Petrel *Pterodroma alba*) were not included in the assessment but could easily be incorporated in the future.

Species were scored using the following 14 criteria (Table 1): IUCN species status, USFWS Birds of Conservation Concern (BCC) designation, global population trend (increasing, stable, decreasing), global breeding population size (bp), global extent of occurrence (km^2), number of countries where species were confirmed breeding globally, USPI population size (bp), % global population in the USPI, number of islands within the USPI with breeding populations, % breeding population in the USPI on islands >3m ASL, % breeding population in the USPI on predator-free islands, % breeding population in the USPI on uninhabited islands, whether the species is data deficient, and the number of past seabird translocation and social attraction projects targeting that species in the USPI. The inclusion of USPI-specific criteria was designed to focus the ranking exercise on species conservation needs within the USPI. We also added x2 multipliers to several criteria that were deemed particularly important from a conservation perspective and the focal USPI region (IUCN species status, % population in the USPI, % breeding population in the USPI on islands >3m ASL).

To obtain species data, we used a wide range of sources including (i) the scientific literature, (ii) *The birds of the Hawaiian Islands: occurrence, history, distribution, and status* (Pyle & Pyle 2017), (iii) *Handbook of*

the Birds of the World (Lynx Editions), (iv) The Cornell Laboratory for Ornithology Birds of the World (https://birdsoftheworld.org/bow/home) and (v) the Birdlife Datazone (http://datazone.birdlife.org). Data related to a species' past inclusion in social attraction and translocation projects were obtained using the summary data from the Seabird Restoration Database (http://www.seabirddatabase.org).

Criteria	Ranking	Lowest Rank	Highest Rank	Multiplier
Global				
IUCN status	1-5	Least Concern	Critically Endangered	2
IUCN global popn. trend	1-3	Increasing	Decreasing	1
USFWS BCC 2021	0-1	No	Yes	1
Global popn. (bp)	1-5	1,000,000+	<25,000	1
Extent of occurrence (breeding/resident) (km^2)	1-4	200,000,000+	<50,000,000	1
# Countries breeding globally	1-3	11+	1-2	1
Data deficient	0-1	No	Yes	1
US Pacific Islands				
USPI popn. (bp)	1-5	500,000+	<5,000	1
% popn. in USPI	1-5	0-20%	80-100%	2
# Islands confirmed breeding USPI	1-4	20+	1	1
% USPI popn. on islands >3m ASL	1-5	80-100%	0-20%	2
% USPI popn. on pred free locations	1-5	80-100%	0-20%	1
% USPI popn. on uninhabited islands	1-5	80-100%	0-20%	1
# Social attraction or translocation projects in USPI	1-3	4+	0	1

Table 1. Ranking criteria utilized for Species Risk Assessment.

Results

The top five species identified by the Species Risk Assessment were (in order): (1) Polynesian Storm-Petrel *Nesofregetta fuliginosa*, (2) Tahiti Petrel *Pseudobulweria rostrata*, (3) Bonin Petrel *Pterodroma hypoleuca*, (4) Black-footed Albatross *Phoebastria nigripes* and (5) Tristram's Storm-Petrel *Hydrobates tristrami*. These were followed by (6) Red-tailed Tropicbird *Phaethon rubricauda*, (7) Laysan Albatross *Phoebastria immutabilis*, (the next three all tied in 8th place) Herald Petrel *Pterodroma heraldica*, Grey-backed Tern *Onychoprion lunatus,* and Least Tern *Sternula antillarum*. Based on this assessment, these species would benefit the most from colony restoration and creation projects in the USPI and should thus be considered priority species for funding. The ranking of all 27 species is presented in Figure 2.

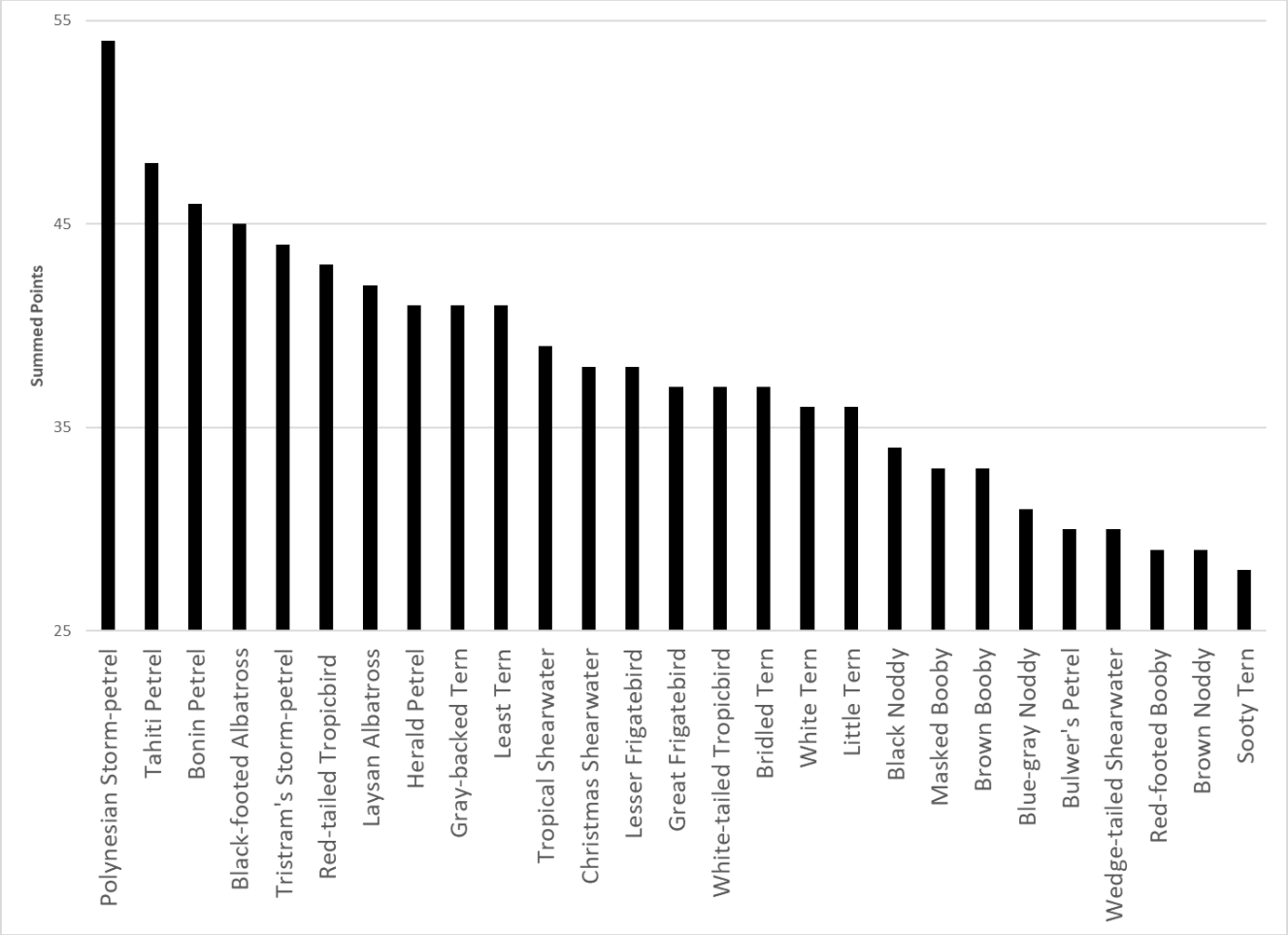

Figure 2. Species ranking for all species confirmed as breeding within the USPI.

Species ranked the highest fell into two categories. They were either globally threatened species with small, restricted breeding populations within the USPI (e.g., Polynesian Storm-Petrel and Tahiti Petrel) or species where the majority of the global breeding population is located within the USPI and on low-lying islands threatened by climate change (e.g., Bonin Petrel and Black-footed Albatross).

Participant Surveys

Methods

Survey participants were identified in cooperation with the USFWS Region 1 Office of Migratory Birds and included key professionals involved with seabird conservation, research, and management of species and important seabird breeding areas in the USPI. Additionally, we accepted referrals of individuals during sampling.

Surveys were conducted between 16th February and 27th July 2022. Surveys included 10 questions e-mailed as a digital Microsoft Word file and accompanying Microsoft Excel file to participants prior to interviews (the full list of questions is included in Appendix 1). Guided conversations were conducted by phone, Zoom, Skype, or Microsoft Teams and generally took ~30 minutes or longer. Conversations were recorded for transcription purposes and participants were then emailed a Microsoft Excel spreadsheet for additional suggested colony restoration sites and asked to send site details as a follow-up.

Questions were grouped according to subject. Questions 1-4 focused on what non-federally listed seabird species participants prioritized for conservation intervention, what their reasoning was for each species prioritization, and whether translocation and/or social attraction were appropriate techniques for those species prioritized by participants.

Questions 5-6 and 8-10 asked whether participants had direct experience with previous social attraction and/or translocation projects, whether participants had any contact recommendations for additional participants, what roles participants identified with regarding seabird restoration projects, and whether participants had any additional comments or feedback associated with the survey.

Question 7 represented the most detailed part of the interview and asked participants to recommend favorable locations for colony restoration or creation projects (referred to hereafter as colony restoration projects) for USPI seabird species. Participants were asked to address a range of factors to describe the sites they recommended including site suitability, seabird species targeted, land ownership and management, conservation management and infrastructure needs, anthropogenic threats, perceived impacts on local seabird populations, existing and recommended partnerships, and budget estimates. For each site recommendation, participants were asked to differentiate between recommending translocation with social attraction and social attraction only, due to the substantial differences in both project costs and logistical complexity associated with these two restoration methods. Sites which were recommended for both restoration methods were divided into two rows, with all other information inputted by the participant for that site copied into the new row.

The responses to Q 7 corresponded to a 35-column spreadsheet created for the purpose of collecting site-specific details. After going through a single site recommendation with each participant over the phone, an Excel file was emailed to each participant, and they were asked to fill in the file with any additional sites they wanted to recommend. Once participants finalized their site recommendations, cells were edited for the purpose of proofing, sorting, and analysis, and blank cells were labeled as 'unspecified'.

One of the goals of undertaking this assessment was to identify top priority colony restoration projects and assign budgets (start-up and annual) to these projects. However, budgetary information gathered from participants was often limited, or not provided at all. In other cases, budget estimates varied wildly, depending on the specifics of what a respondent was suggesting (i.e., translocating five species to an island that needed predator eradication first would be significantly more expensive than using social attraction systems to attract one species inside an already erected predator-proof fence). To simplify this aspect of the study, for the top five sites, we placed projects (both those focused on social attraction only and those reliant on translocation) into four budgetary categories corresponding to (i) <250,000 USD, (ii) 250,000 - 750,000 USD, (iii) 750,000 - $1,000,0000 USD, and (iv) $1,000,000+ USD, respectively. To do this we incorporated information provided by respondents and—when project budgets were unspecified by participants—we identified whether major budget items would be required for that site (such as predator eradications, predator-proof fencing, species translocation, and habitat restoration) as indicated by participants. For budget considerations associated with the translocation of seabirds, we incorporated information about costs associated with animal husbandry and animal transportation from participants. Because the top five sites were often mentioned by multiple participants, some cross-referencing of information was also possible to estimate budgets. Note that we have identified the need for a detailed budgetary assessment for specific colony restoration projects as being an important step-down product as a follow-up from this study (see Discussion).

Results

Participation

A total of 126 seabird experts and land managers from the USPI were contacted by email with a request to participate in the survey. Of these, 74 (58.7%) agreed to be interviewed, representing 26 organizations and agencies from all regions within the USPI (Appendix 2). The highest organizational representation was federal agency staff (36.1%), followed by non-profits (19.4%) and state agency staff (18.1%) (Figure 3). 42.9% of participants stated that they had direct experience with seabird colony restoration projects (social attraction, translocation, or both).

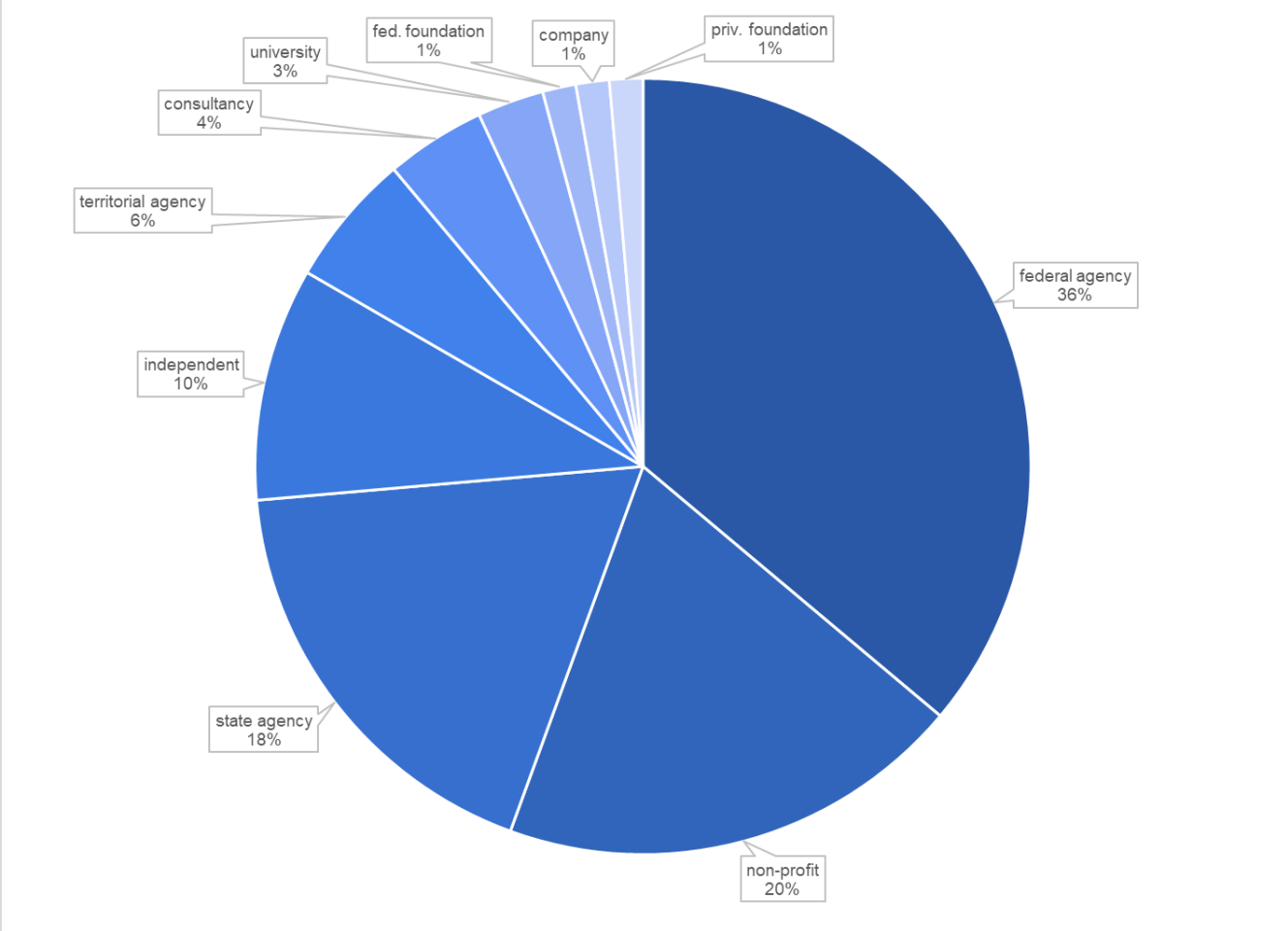

Figure 3. Organizational composition of respondents to survey questionnaire.

Participants were also asked what they perceived their roles to be within the framework of colony restoration projects. They were not restricted to a single role, so could include as many roles as they felt appropriate. A total of 23 roles were identified by participants, with the most common being Planning (17.5%), Securing Funding (15.9%), and Implementation (14.3%) (see Figure 4).

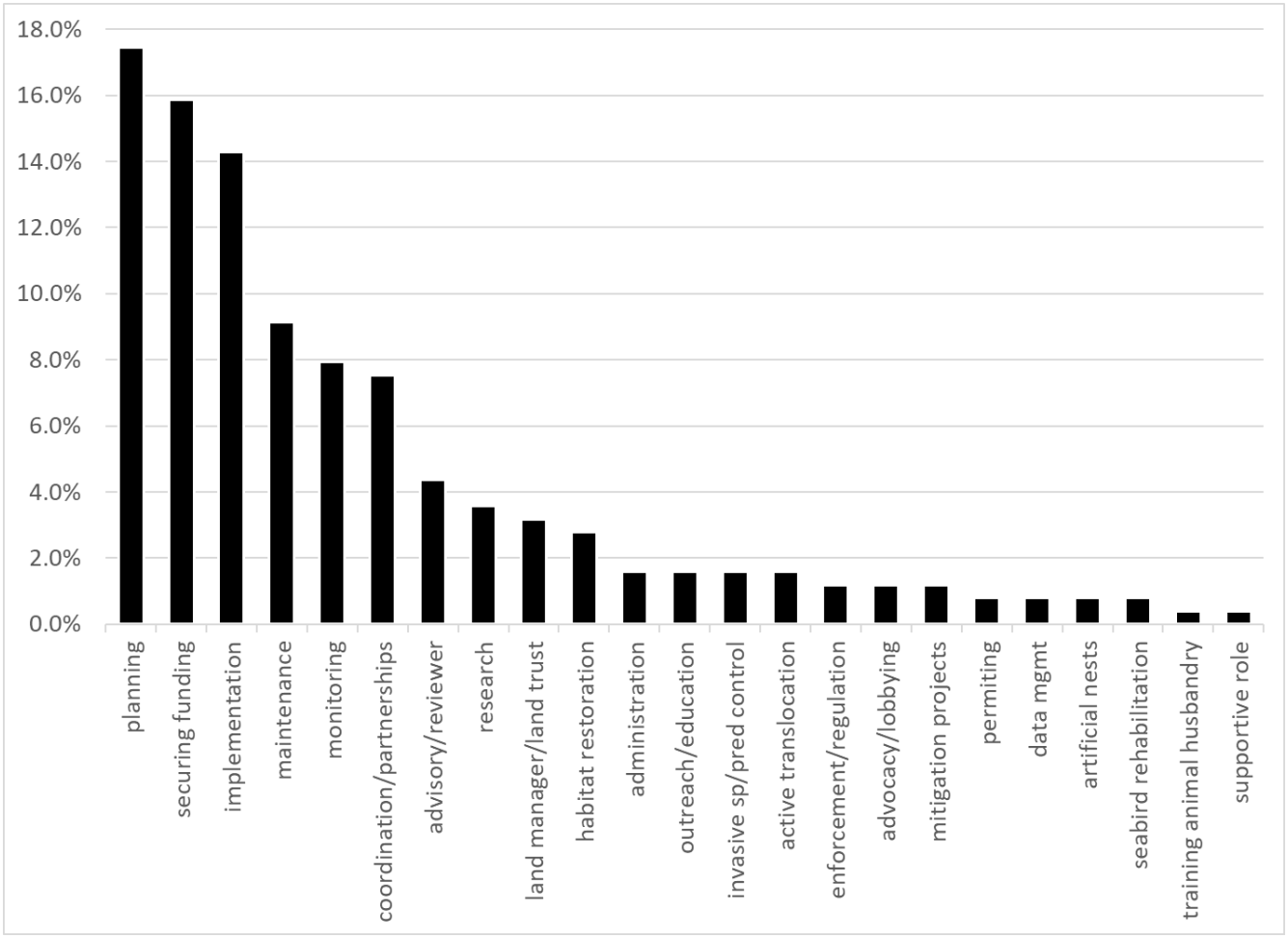

Figure 4. Participants' roles in proposed colony restoration projects.

Seabird species identified by respondents for colony restoration projects in the USPI

Respondents identified a total of 30 seabird species that they recommended for colony restoration projects. Of these, the top five were (in order): Black-footed Albatross, Laysan Albatross, Tristram's Storm-Petrel, Bonin Petrel, and Wedge-tailed Shearwater *Ardenna pacifica*. Three of these species (Black-footed Albatross, Tristram's Storm-Petrel, and Bonin Petrel) were also identified as priority species in the species ranking exercise (see pg. 7), while the Wedge-tailed Shearwater was ranked very low in the species ranking exercise (ranked 16 out of a total of 18). Two species — Little Tern and Bridled Tern — were not mentioned by respondents, despite breeding in the USPI. Conversely, four species — Bryan's Shearwater, Kermadec Petrel, Phoenix Petrel, Collared Petrel *Pterodroma brevipes*, and Black-naped Tern *Sterna sumatrana* — were mentioned by participants, despite not being confirmed breeders within the USPI. The ranking of all 31 species mentioned by respondents is presented in Figure 5.

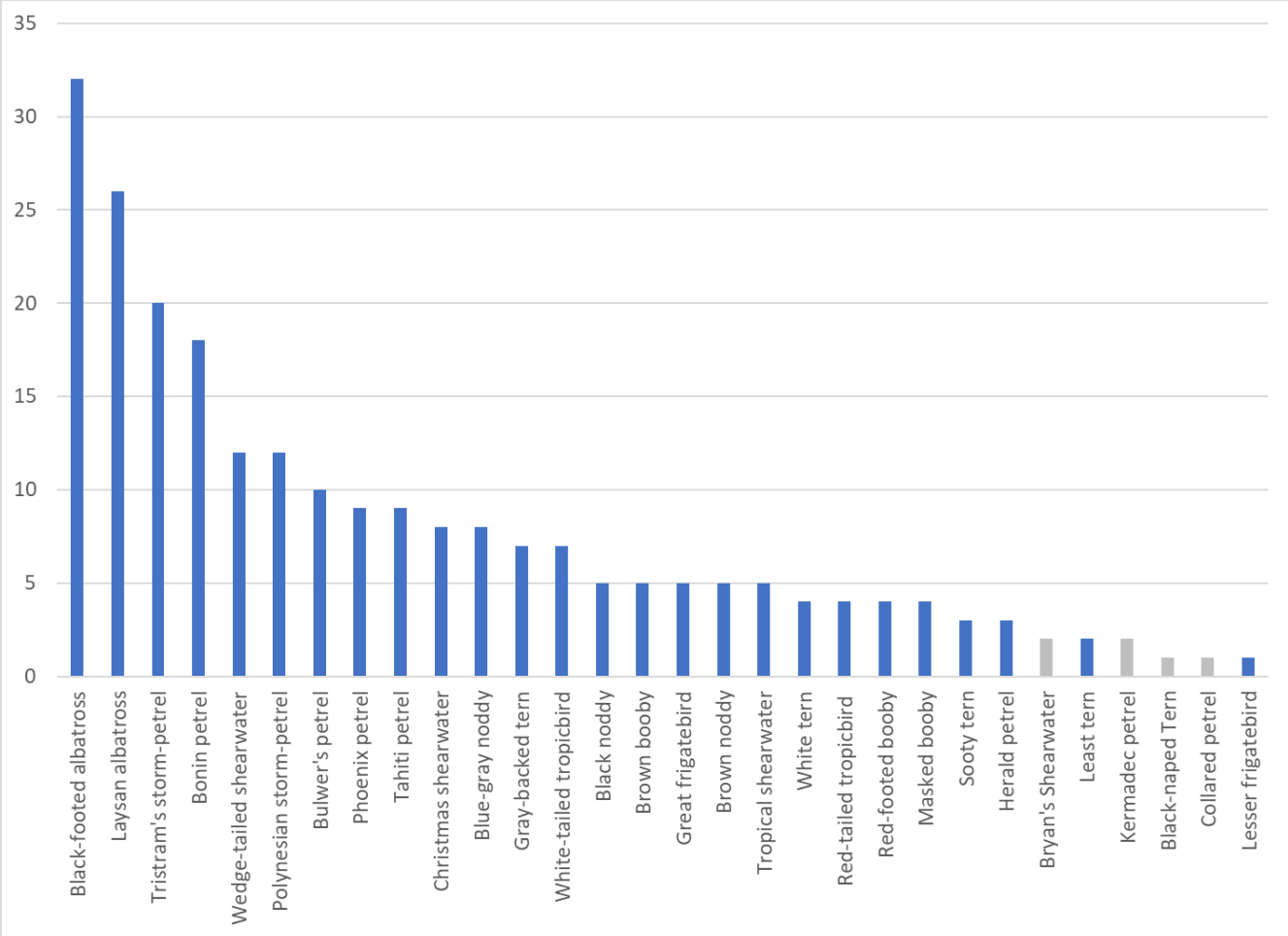

Figure 5. Number of times each species was mentioned by respondents for colony restoration projects. Species identified by participants that are not confirmed breeders in the USPI are presented in pale grey, although both Kermadec Petrel and Bryan's Shearwater are suspected of breeding in the region.

Rationale for ranking priority species

Respondents identified a total of 28 factors for their rationale in ranking priority seabird species for colony restoration projects, which are presented in Figure 6. The five most commonly mentioned factors were (in order): low island distribution (related to the threat of sea level rise from climate change; 22.2%), climate change vulnerability (related to impacts to both breeding grounds and foraging grounds; 13.8%), restricted distribution (10.5%), introduced predators (9.4%), and local populations in need of protection (6.8%). If one considers the first two factors together, climate-change-related factors were mentioned 36.0% of the time.

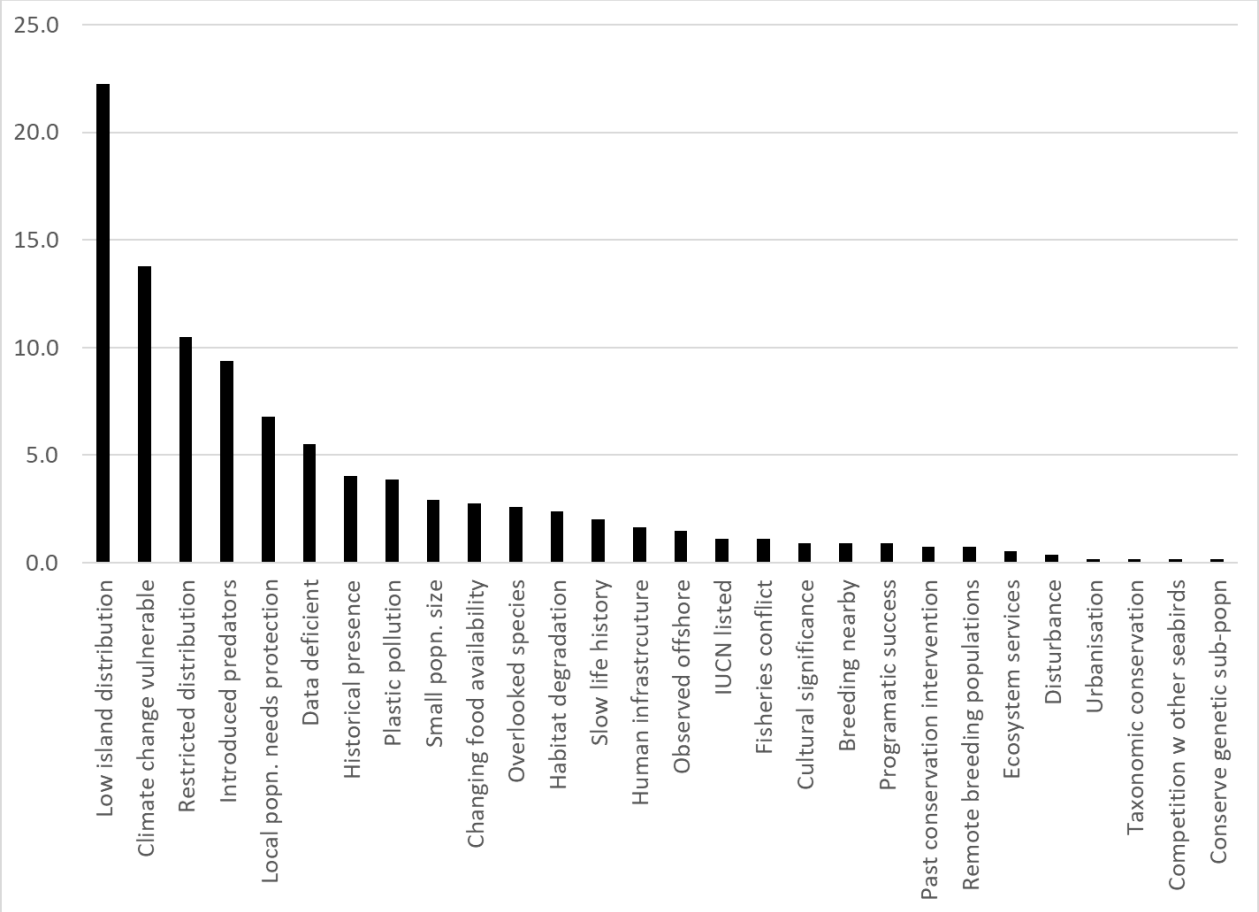

Figure 6. Factors identified by respondents as reasons for identifying seabird species for colony creation projects.

Site-specific data – Source colonies

When discussing source colonies suitable for translocation projects specifically, respondents identified 21 locations as being suitable (Figure 7). The majority of these were in the Northwestern Hawaiian Islands or Pacific Remote Islands Marine National Monument, which are locations most at risk from sea level rise and which currently have large existing seabird colonies present. The top five locations identified as source colonies (for multiple species) were Midway Atoll (32.6%), Kiribati (12.8%), Tern Island (8.1%), Laysan Island (8.1%), and (tied for 4th place) – Rota, Nihoa, Lehua, and the Pacific Missile Range Testing Facility (PMRF) on Kaua'i. A further 14 respondents identified the Northwestern Hawaiian Islands generally as suitable source colony locations.

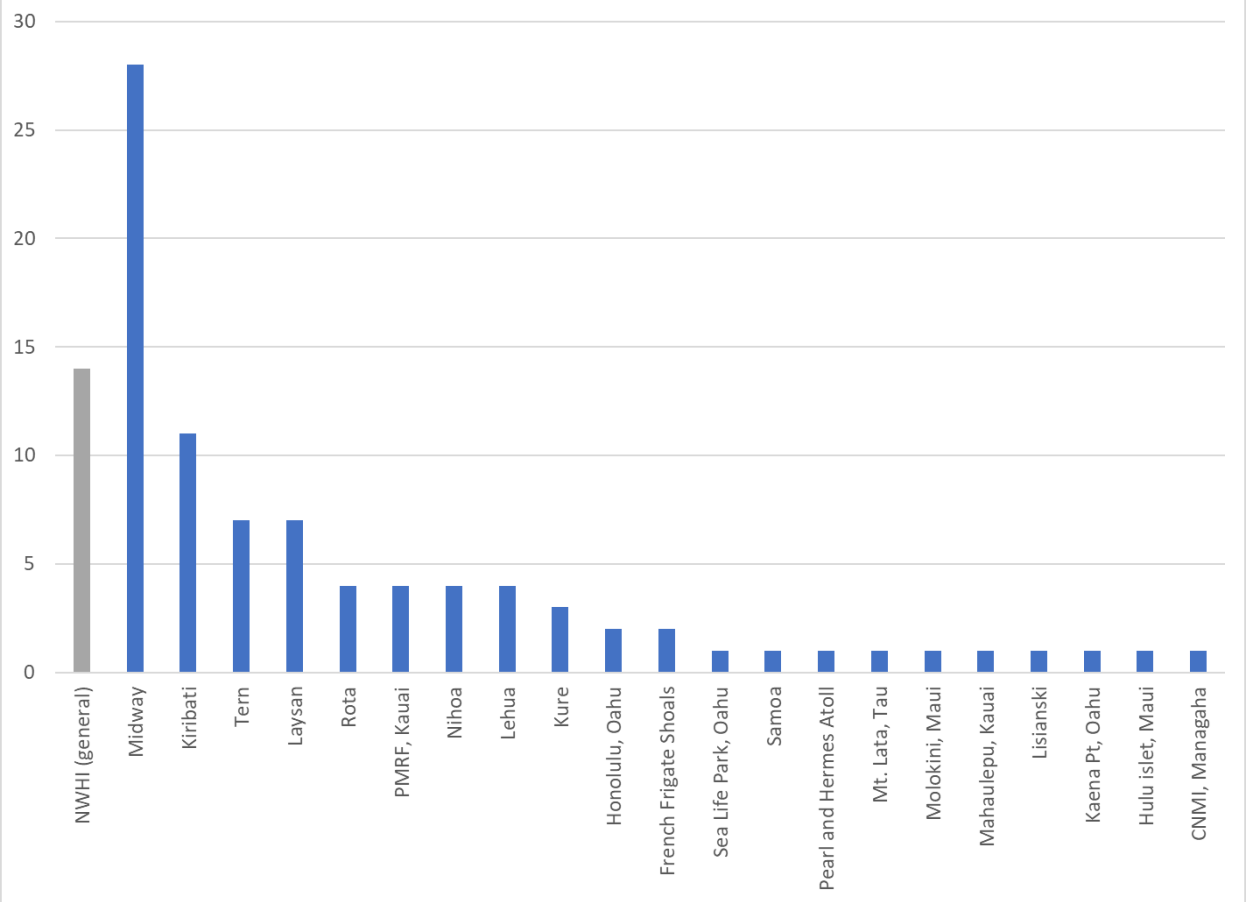

Figure 7. Source colonies for translocation projects, as identified by participants.

Considering the top three source locations only, Midway Atoll was considered a suitable source for four species (Black-footed Albatross, Laysan Albatross, Bonin Petrel, and Tristram's Storm-Petrel), Kiribati for two species (Phoenix Petrel and Polynesian Storm-Petrel) and Laysan Island for five species (Black-footed Albatross, Laysan Albatross, Bonin Petrel, Bulwer's Petrel, and Tristram's Storm-Petrel). Other locations were single species sources only, such as the Pacific Missile Range Testing Facility (PMRF) on Kaua'i (for

Laysan Albatross) and Honolulu in O‘ahu (for White Tern). One source identified was not a breeding island or location, but a rehabilitation facility (Sea Life Park in O‘ahu). This was suggested as being a potential source for Wedge-tailed Shearwaters (after rehabilitation), although it should be noted that this would only realistically be viable if the birds were unfledged chicks (i.e., brought in after their parents were killed by introduced predators and raised to fledging) due to the strong natal philopatry of shearwaters.

Considering the top three seabird species recommended by participants for translocation projects, participants identified four source colonies for Black-footed Albatross (Midway Atoll (n=11), Tern Island (n=1), Laysan Island (n=1), and Lehua Islet (n=1), three source colonies for Laysan Albatross (Midway Atoll (n=5), Tern Island (n=1), and Laysan Island (n=1)) and four source colonies for Tristram’s Storm-Petrel (Midway Atoll (n=3), Tern Island (n=3), Laysan Island (n=2), and Nihoa (n=1)). While multiple sources were identified for most species, for a small number of species there was only a single source location identified by participants. These were typically species that are rare or highly localized in the USPI, such as Polynesian Storm-Petrel and Phoenix Petrel, both of which were identified by multiple participants as being potentially available from Kiribati only which is outside the USPI.

Three source colonies were identified by respondents for Laysan Albatross - Midway Atoll, Tern Island and Laysan Island.

Site-specific data – Receptor Sites

Respondents identified a total of 107 potential receptor sites for colony restoration projects. Additionally, some participants mentioned entire islands (such as Kahoʻolawe or Lānaʻi), or general islet groupings (such as Oʻahu – offshore islets). Land ownership varied, with the highest category being federal ownership (42%) and state ownership (29%) (see Figure 8).

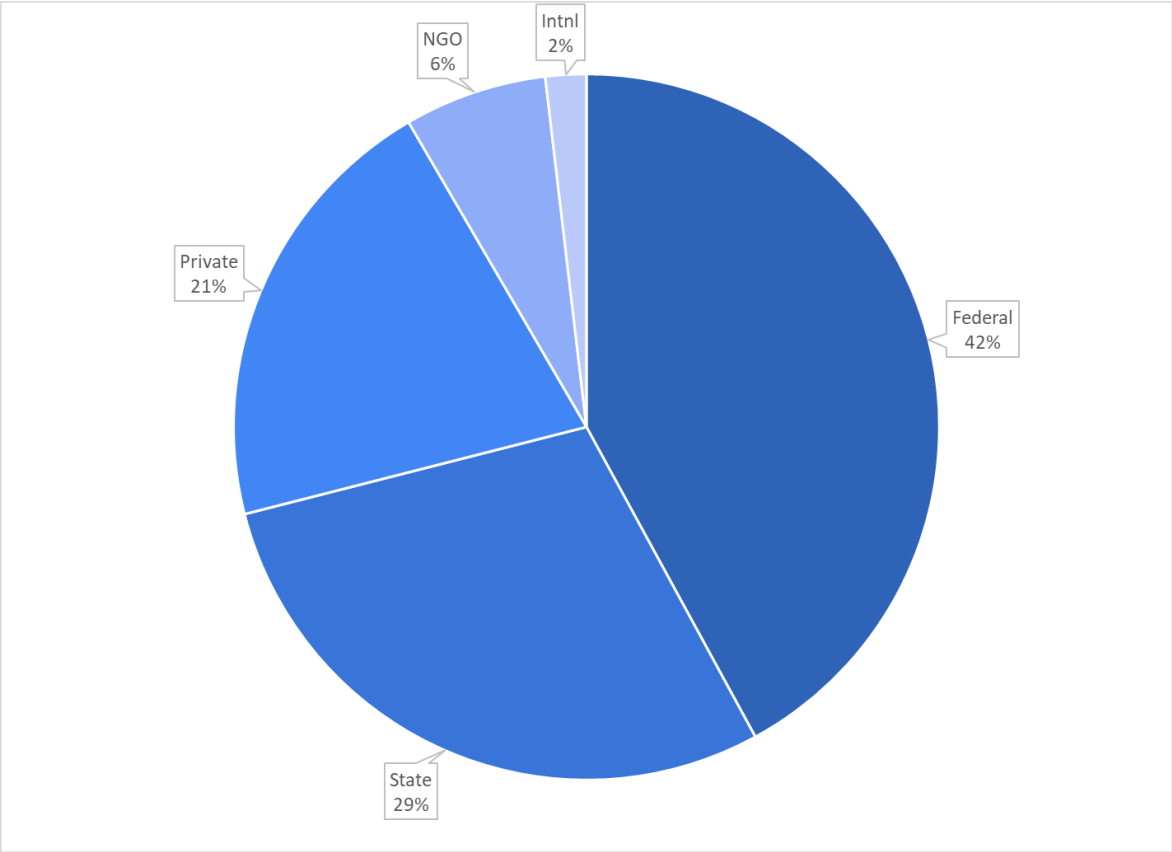

Figure 8. Land ownership of receptor sites identified by participants.

The majority of receptor sites identified by participants were located in the Main Hawaiian Islands (55 sites), followed by American Samoa (19 sites) and Guam (11 sites). Considering the Main Hawaiian Islands further, the three islands with the most potential colony restoration sites identified were (in order): Kauaʻi (13 sites), Oʻahu (10 sites), and Maui (10 sites). Figure 9 shows the geographical breakdown of all potential receptor sites identified by participants. Not all were in the USPI, with several locations mentioned in the Eastern Pacific (e.g., Channel Islands, specifically Anacapa and Santa Barbara) and two international sites (Guadalupe Island in Mexico, and the Micronesian island nation of Kiribati).

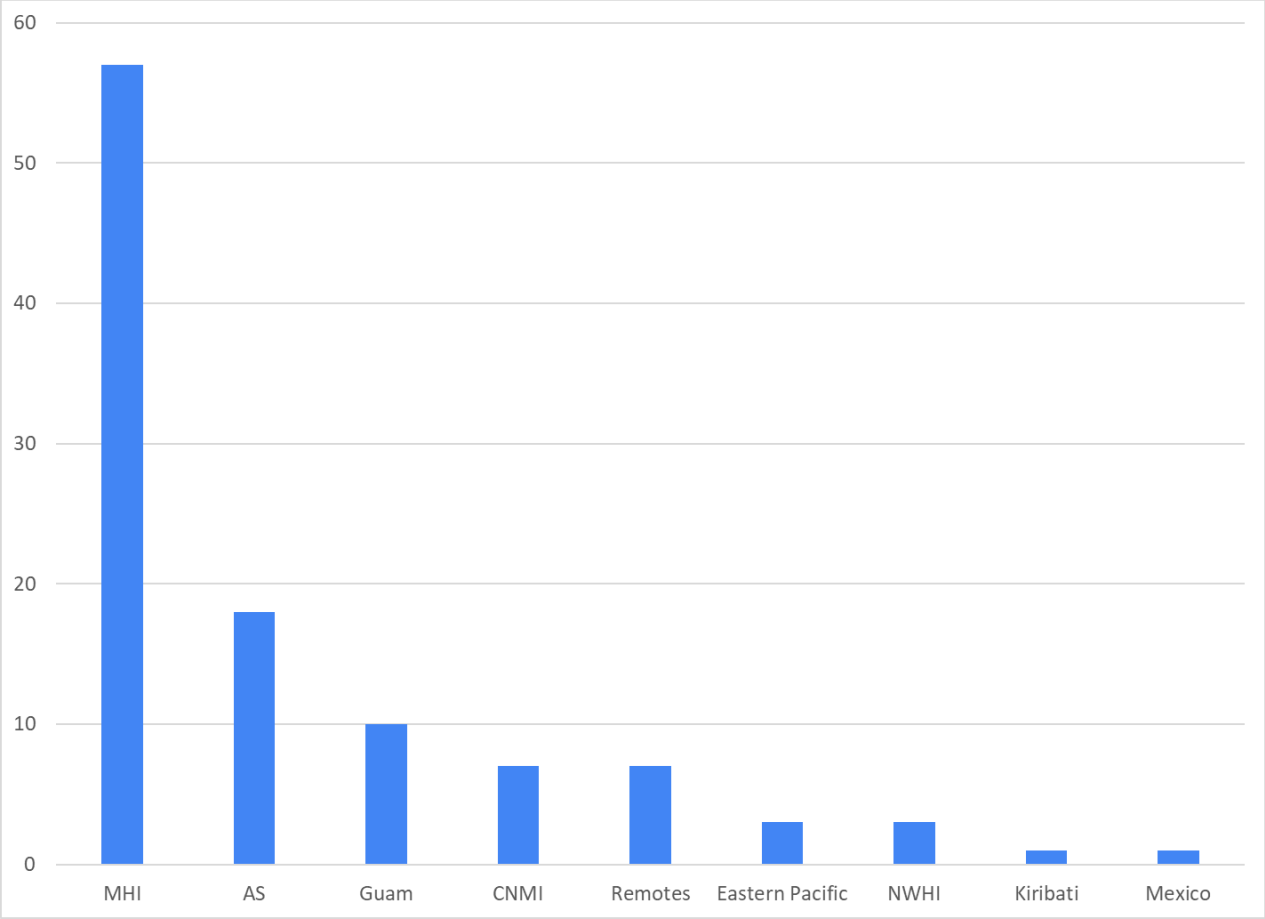

Figure 9. Geographical breakdown of all receptor sites identified by participants.

The top five sites mentioned by respondents were Kahoʻolawe (in its entirety), Lehua Islet, James Campbell NWR (Oʻahu), Kīlauea Point NWR (Kauaʻi), and Mokio Preserve (Molokaʻi) (Table 2, Figure 10). The following pages consider the receptor sites identified by participants in more detail. It should be noted that a large amount of data was collected on potential receptor sites during the interview process. However, participants varied in the amount of information that they provided (often related to the familiarity they had with the site) with some providing highly detailed reasons for suggested sites and others providing a broader overview. While it is not feasible to include all these data for all sites within the framework of this report, we have presented the data collected for the top five sites first as case studies (pg. 22-26) as a demonstration of the detail that can be synthesized from this study for sites mentioned in this report.

We split the remaining sites into broad geographic units and for each unit distilled the site data down to the key elements for initial consideration. These data are (i) the species considered for colony restoration at each site, (ii) restoration type(s) proposed, (iii) current landowners/managers, (iv) current protection level, (v) site size, and (vi) whether it is accessible or remote. Also included are the number of times the site was mentioned by participants (presented as a tally). For the purposes of data presentation, if a site

was mentioned by a participant for both social attraction and translocation (i.e., two different projects) it was allocated two tallies. To save space we utilize USGS Bird Banding Laboratory (BBL) 4 letter codes in place of seabird names. For a full list of these codes and the species they refer to, please see the BBL website (https://www.pwrc.usgs.gov/bbl/MANUAL/speclist.cfm). Note also that although our assessment was only focused on non-T&E seabird species, respondents often mentioned T&E species when discussing receptor site potential. For the sake of completeness, we have included T&E species when mentioned by participants in the five case studies below.

It is important to note that these sites were identified by participants and **are not final recommendations by ARC or USFWS**. Furthermore, initiating any colony restoration sites at any identified locations would require detailed advance discussions with landowners, land users, indigenous communities, and all relevant interest groups, include project dissemination to the general public, and take into account funding sources, long-term management costs, and all required permits. To protect private landowner information, we have not included any private lands identified by participants during this process (unless the landowner has already indicated a willingness for colony restoration projects on their property).

Tally	Grouping	Island	Site Name
21	MHI	Kahoʻolawe	Kahoʻolawe (entire island)
17	MHI	Lehua	Lehua Islet
12	MHI	Oʻahu	James Campbell NWR
9	MHI	Kauaʻi	Kīlauea Point NWR
8	MHI	Molokaʻi	Mokio Preserve
7	MHI	Hawaiʻi	Manukā
6	MHI	Kaʻula	Kaʻula Island
6	MHI	Oʻahu	Moku Manu Islet
5	MHI	Lānaʻi	Lānaʻi (entire island)
5	MHI	Molokaʻi	Moʻomomi Preserve
5	MHI	Oʻahu	Offshore islets (general)
5	MHI	Kauaʻi	Makauwahi Cave Reserve
5	American Samoa	Tau	Mt Lata
5	American Samoa	Tutuila	Mt Rainmaker

Table 2. Top potential seabird colony restoration sites suggested by participants.

The top five sites are presented on the following pages as Case Studies.

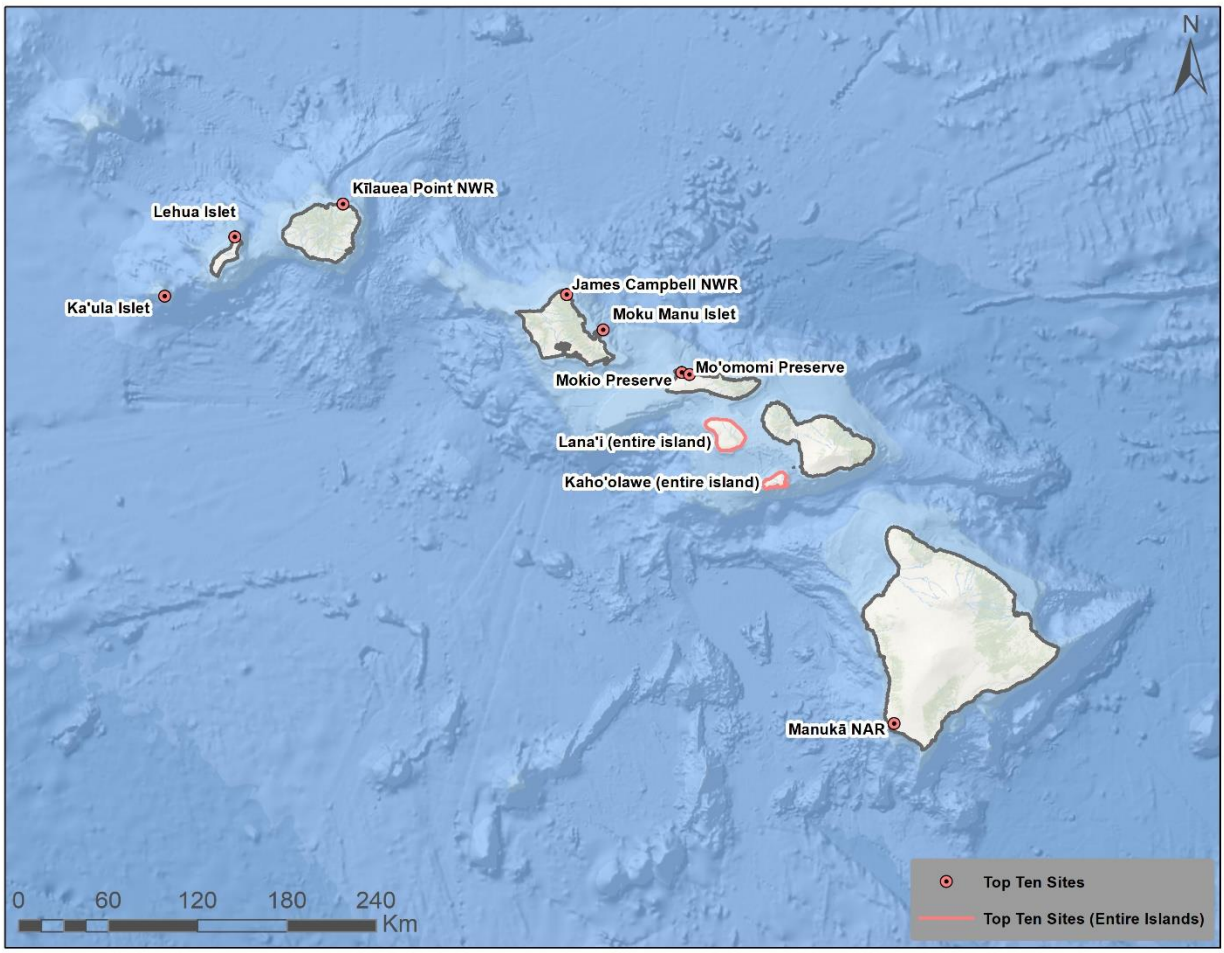

Figure 10. Location of the top ten potential colony restoration sites as indicated by respondents.

KAHO'OLAWE – Respondent Data

Participant Tally	28
SITE DETAILS	
Land owner(s)/managers	KIRC/State of Hawaii
Size (hectares)	11700
Current protection	Reserve
Additional land protection needed? (Y/N)	N
Accessibilty	remote (86.7%), accessible (13.3%)
PROPOSED SEABIRD RESTORATION PROJECTS	
Restoration type	S, T
Species targeted (N=16)*	HAPE, NESH, BANP, LAAL, BFAL, BUPE, WTSH, BOPE, SOTE, TRSP, WTTB, RTTB, RFBO, BRBO, MABO, GRFB
Seabirds present that could be positively impacted	WTSH? Other seabirds breeding on offshore islets
Seabirds present that could be negatively impacted	none
Seabirds present that could negatively impact restoration	WTSH (3)
CONSIDERATIONS	
Human disturbance	N
Light pollution (Y/N)	N
Power lines (Y/N)	N
Urban development	N
Non-native predators	Mice, rats, cats, BAOW
Other invasive species (plants, goats, etc.)	Non-native plants: pasture grasses, invasive alien trees (e.g kiawe), weeds. Invertebrates: ants
MANAGEMENT ACTIONS	
Studies needed to assess suitability?	(i) potentially for sp that are tied to high latitude foraging habitat, (ii) predator control and eradication, (iii) assesment plan needed.
Predator proof fencing	maybe (5), not needed (1), not if eradication carried out (2)
Predator eradication	needed/planned
Predator control	needed
Invasive plant control	needed
Ungulate control	not needed
Artificial burrows	maybe/probably/needed
Native out-planting	needed/ongoing
Other considerations	(i) Managed as a cultural restoration site, (ii) Securing long term funding, (iii) Presence of Hawaiian artifacts and remains, (iv) Unexploded ordinance, (v) Digging fences could be difficult, (vi) Access to fence materials difficult, (vii) Anthropogenic light on Maui close.
Will access bring vulnerability?	no (4), possible (2), biosecurity (2)
PROJECT PARTNERS	
Existing	KIRC, MNSRP, DLNR/DOFAW, HDOH, IC, indigenous organizations
Recommended	OHA, PRC, ARC, IC
BUDGET	
Set-up costs	Translocation: $1M+, Social Attraction: $1M
Annual maintenance costs	Translocation: $250,000 - $750,000. Social Attraction: <$250,000.
ADDITIONAL : Specific Sites Mentioned	
Kanapou	Bay on E. side. Sanddune community. Kiave covered area.
KauKau Kapapa	Seasonal wetland, with nice sand-dune community.
Partial fenced area	Large, above sea level, treat it like Guadalupe Isl, where they first setup a pred proof fence.
Puhianenue	Penninsula could be easily fenced off. Close to base operations, easy to maintain (non remote). Good seabird habitat. Small cliffs, above the ocean, windswept. Colonies nearby, on cliffs further east. Birds would probably recolonize on their own. Predated WTSH in this area. One of the only places we found seabirds on the main island.
Pu'u Koa'e	Detached islet
Ale'ale	Attached islet, little razorback ridge. Cats can use the ridge. Nesting birds there: BUPE, WTSH.
Hakioawa	Protect Kahoolawe Ohana base. Habitat restoration ongoing. Downed WTSH found at camp: Rehabbed and flew away next day.

LEHUA ISLET– Respondent Data

Participant Tally	17
SITE DETAILS	
Land owner(s)/managers	State of Hawaii, USCG-Owner, DLNR-Management
Size (hectares)	115
Current protection	Hawaii State Seabird Sanctuary
Additional land protection needed? (Y/N)	N
Accessibilty	remote
PROPOSED SEABIRD RESTORATION PROJECTS	
Restoration type	S, T
Species targeted (N=16)	SOTE, GBTE,CHSH, BRNO, BUPE, BANP, BOPE, TRSP, GRAT, BGNO, HAPE, NESH, TRSP
Seabirds present that could be positively impacted	LAAL, BFAL, WTSH, BUPE, RFBO, BRBO, RTTR, BLNO, BANP
Seabirds present that could be negatively impacted	none
Seabirds present that could negatively impact restoration	WTSH (for similar sized burrowing seabirds)
CONSIDERATIONS	
Human disturbance	fishers, tour boats
Light pollution (Y/N)	N
Power lines (Y/N)	N
Urban development	N
Non-native predators	BAOW
Other invasive species (plants, goats, etc.)	Non-native plants: weeds, Verbesinia enceloides
MANAGEMENT ACTIONS	
Studies needed to assess suitability?	none
Predator proof fencing	maybe (5), not needed (1), not if eradication carried out (2)
Predator eradication	not needed/completed - note BAOW control below
Predator control	BAOW - needed (3), ongoing (6)
Invasive plant control	needed (4), ongoing (6)
Ungulate control	not needed
Artificial burrows	possible (1), needed (2), ongoing (4)
Native out-planting	needed (2), ongoing (4)
Other considerations	funding, access
Will access bring vulnerability?	no (2), possible (2), biosecurity (2)
PROJECT PARTNERS	
Existing	DOFAW, KESRP, IC, Hallux, ARC, PCR, USFWS
Recommended	none
BUDGET	
Set-up costs	Translocation: $1M+, Social Attraction: <$250,000
Annual maintenance costs	Translocation and/or Social Attraction: <$250,000

JAMES CAMPBELL NWR (O'AHU) – Respondent Data

Participant Tally	12
SITE DETAILS	
Land owner(s)/managers	USFWS
Size (hectares)	64 (smaller 6ha area is protected by a predator proof fence)
Current protection	National Wildlife Refuge
Additional land protection needed? (Y/N)	N
Accessibilty	Accessible
PROPOSED SEABIRD RESTORATION PROJECTS	
Restoration type	S, T
Species targeted (N=6+)	BOPE, TRSP, LAAL, BFAL, RTTR, RFBO, tern species, any native seabirds
Seabirds present that could be positively impacted	LAAL, BFAL, TRSP, BOPE, WTSH
Seabirds present that could be negatively impacted	none
Seabirds present that could negatively impact restoration	none
CONSIDERATIONS	
Human disturbance	N
Light pollution (Y/N)	Y (4), N (1)
Power lines (Y/N)	Y (4), N (1)
Urban development	Y (3), N (2)
Non-native predators	BAOW, outside pred proof fence (feral cats, mongoose, pigs and dogs)
Other invasive species (plants, goats, etc.)	non-native weeds: kiave, haoli koa. Invertebrates: yellow crazy ants
MANAGEMENT ACTIONS	
Studies needed to assess suitability?	none
Predator proof fencing	area witin NWR already has a predator proof fence
Predator eradication	complete (1), not needed (3), needed (1), on-going (1)
Predator control	no needed (1), more needed (1), BAOW - ongoing (6)
Invasive plant control	in place (1), needed (2), not needed (1), ongoing (4)
Ungulate control	not needed
Artificial burrows	needed (1), completed (4)
Native out-planting	needed (1), ongoing (6)
Other considerations	wind turbines nearby, known to kill great frigatebirds, nearby vehicle traffic
Will access bring vulnerability?	no
PROJECT PARTNERS	
Existing	USFWS, DOFAW, PRC, NFWF, NWR, ABC
Recommended	none
BUDGET	
Set-up costs	Translocation: $1M+, Social Attraction: <$250,000
Annual maintenance costs	Translocation and/or Social Attraction: <$250,000

KĪLAUEA POINT NWR (KAUA'I) – Respondent Data

Participant Tally	9
SITE DETAILS	
Land owner(s)/managers	USFWS
Size (hectares)	68
Current protection	National Wildlife Refuge
Additional land protection needed? (Y/N)	N
Accessibilty	Accessible
PROPOSED SEABIRD RESTORATION PROJECTS	
Restoration type	S, T
Species targeted (N=3)	BFAL, BUPE, WTTR
Seabirds present that could be positively impacted	LAAL, NESH, WTSH, RFBO, RTTR, WTTR, GREF, BUPE
Seabirds present that could be negatively impacted	none
Seabirds present that could negatively impact restoration	WTSH
CONSIDERATIONS	
Human disturbance	tourists
Light pollution (Y/N)	Y (1), minimal (2)
Power lines (Y/N)	N
Urban development	N
Non-native predators	BAOW (6), cats, rats, mice, pigs, sometimes dogs
Other invasive species (plants, goats, etc.)	various non native plant species
MANAGEMENT ACTIONS	
Studies needed to assess suitability?	none, except possibly substrate suitability for burrow nesters
Predator proof fencing	Nihoku area complete, entire area under construction
Predator eradication	not needed (1), needed (2), on-going (2)
Predator control	not needed (1), needed (2), on-going (2)
Invasive plant control	needed (1), ongoing (3)
Ungulate control	not needed
Artificial burrows	not needed
Native out-planting	needed (1), ongoing (3)
Other considerations	funding, staffing
Will access bring vulnerability?	no
PROJECT PARTNERS	
Existing	USFWS, PRC, ARC, ABC, DLNR, DOFAW, NFWF
Recommended	PRC, ARC
BUDGET	
Set-up costs	Once predator proof fence completed - Translocation: $1M+, Social Attraction: <$250,000
Annual maintenance costs	<$250,000

MOKIO PRESERVE (MOLOKA‘I) – Respondent Data

Participant Tally	8
SITE DETAILS	
Land owner(s)/managers	Molokai Land Trust
Size (hectares)	24.3
Current protection	cliff section is conservation district, rest is owned by the land trust
Additional land protection needed? (Y/N)	N
Accessibilty	Accessible (4), Remote (4)
PROPOSED SEABIRD RESTORATION PROJECTS	
Restoration type	S, T
Species targeted (N=3)	HAPE, NESH, BANP, LAAL, BFAL, BUPE, WTSH, BOPE, TRSP
Seabirds present that could be positively impacted	WTSH, BLNO, WTTR, BRBO, RTTR, GRFR, RFBO, LAAL
Seabirds present that could be negatively impacted	none
Seabirds present that could negatively impact restoration	WTSH (5)
CONSIDERATIONS	
Human disturbance	Minor public access
Light pollution (Y/N)	N
Power lines (Y/N)	N
Urban development	N
Non-native predators	cats, mongoose, rats, mice, BAOW
Other invasive species (plants, goats, etc.)	Axis Deer, invasive plants (e.g. kiawe, lantana, verbecena, bristley foxtail)
MANAGEMENT ACTIONS	
Studies needed to assess suitability?	needed (1), not needed (5)
Predator proof fencing	Under construction (7), complete (1)
Predator eradication	needed (1), on-going (7)
Predator control	needed (1), on-going (7)
Invasive plant control	ongoing (8)
Ungulate control	ongoing (7)
Artificial burrows	needed (4), not needed (1), maybe (1)
Native out-planting	ongoing (8)
Other considerations	funding, remote and no water/electricity may be challenging for translocation
Will access bring vulnerability?	maintaining biosecurity protocols, minimize impact
PROJECT PARTNERS	
Existing	MLT, ABC, MNSRP, USFWS, DLNR/DOFAW, TNC, OHA, USDA, NPS, PRC, Hui Ho‘olana
Recommended	TNC, DOFAW, NPS, APHIS
BUDGET	
Set-up costs	Translocation: $1M+, Social Attraction: <$250,000
Annual maintenance costs	Translocation and/or Social Attraction: <$250,000

All other potential restoration sites

Main Hawaiian Islands

The Main Hawaiian Islands consist of eight large islands and scattered offshore islets. The majority of potential colony restoration sites identified by participants during this exercise were located within these islands. The islands with the most potential sites identified were Kaua‘i, O‘ahu, and Maui (Figure 11). Each island and major islet are discussed below, moving from the south-easternmost island (Hawai‘i) to the north-westernmost major islet, Ka‘ula Rock.

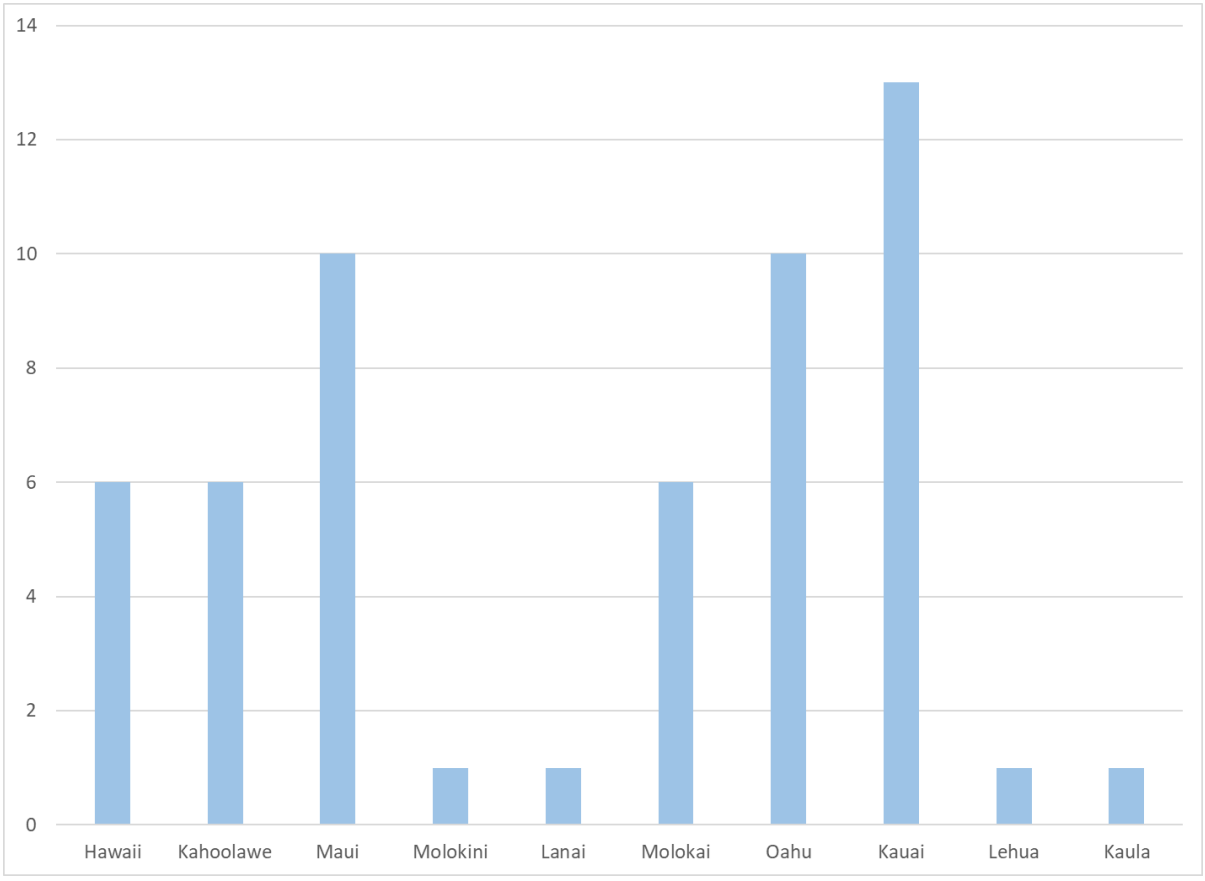

Figure 11. Number of individual potential receptor sites identified by participants on each island in the Main Hawaiian Island chain.

Hawai‘i

Hawai‘i Island was mentioned by participants 17 times, with a total of six sites identified, a further two describing an entire district or stretch of coastline, and one mention of all offshore islands generically. The site with the most mentions was Manukā Natural Area Reserve (NAR) (7), followed by Kipāhoehoe NAR and Pu‘u O ‘Umi NAR (2 respectively). Two sites are private property and not shown in the table below. Apart from the private properties, most sites had some level of land protection (either as Natural Area Reserves or Wildlife Sanctuaries). Participants mentioned 14 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: LAAL, BFAL, TRSP, BOPE, CHSH, BGNO, BRNO, MABO, BUPE, WTSH, RTTR, WTTR, BRBO, RFBO.

# mentions	Site Name	Restoration Type	Species targeted	Landowner(s)/ managers	Current protection	Size (ha)	Accessible/ remote
7	Manukā	S, T	LAAL, BFAL, TRSP, BOPE, CHSH, BGNO, BRNO, MABO, BUPE, WTSH, RTTR, WTTR	State of Hawai‘i	NAR	10,117	accessible
2	Kipahoehoe	S, T	LAAL, BFAL, TRSP, BOPE, CHSH, BGNO, BRNO, MABO, BUPE, RTTR, WTTR	State of Hawai‘i	NAR	202.3	remote
2	Pu‘u O ‘Umi	T	TRSP, BOPE, CHSH, BUPE, BRBO, RFBO, BRNO, BGNO	State of Hawai‘i	NAR	505.8	remote
1	Paokalani Islet	S	BUPE, WTSH, BGNO	State of Hawai‘i	Wildlife Sanctuary	1.7	remote
1	Pu‘u Ka‘iwi‘iwi	T	TRSP, BOPE, CHSH, BUPE	State of Hawai‘i	none	14.6	remote
1	Mauna Loa (Site 2)	T	TRSP, BOPE, CHSH, BUPE	NPS	NPS	97.9	accessible
1	Offshore islets (generic)	unspecified	any species	unspecified	unspecified	unspecified	unspecified

Kahoʻolawe

The 11,700-ha island of Kaho‘olawe was one of the islands most mentioned by participants, with 28 mentions in total. The majority of participants stated that the island as a whole would be a good area for colony restoration (i.e. exact locations were not specified), with projects ranging from island-wide restoration projects to discrete predator-proof fence enclosures. However, the presence of significant amounts of unexploded ordnance (the island was used as a bombing range by the US Navy for decades until 1993) was also highlighted as a serious challenge for conservation efforts. Six areas were mentioned by name as being potential areas for seabird colony restoration: Hakioawa, ‘Ale‘ale, Kanapou, KauKau Kapapapa, Pu‘u Koa‘e, and Puhianenue. Participants mentioned 20 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: LAAL, BFAL, WTSH, BUPE, CHSH, BOPE, TRSP, SOTE, GBTE, RFBO, BRBO, MABO, BLNO, HAPE, NESH, BANP, WTTB, RTTB, GRFB and BRNO. As this island ranked highest among participants, Kaho‘olawe is also considered in more detail on page 22 as an example of the level of detail available for many of the sites considered in this study.

Maui

Maui was mentioned by participants 21 times, with a total of 10 sites identified, a further two describing an entire district or stretch of coastline, and two mentions of all offshore islands generically. The site with the most mentions was Waiheʻe Refuge (3), followed by Līpoa Point, Pauwalu Point, Mokae and the combined ahupuaʻa of Nakula and Nuʻu (each with 2 mentions). One site was private property and therefore is not shown in the table below. Protection for sites mentioned varied from Seabird Sanctuaries and Natural Area Reserves to sites with no protection. Participants mentioned 12 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: WTSH, BUPE, LAAL, WHTE, BFAL, BLNO, HAPE, NESH, BANP, BOPE, RFBO, and BRBO.

# mentions	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
3	Waiheʻe refuge	S	WTSH, BUPE, LAAL,WHTE, BFAL, BLNO	HILT	Natural & Cultural Resource Commitment	112	accessible
2	Līpoa Point	S, T	HAPE, NESH, BANP, LAAL, BFAL, BUPE, WTSH, BOPE	State of Hawaiʻi	SMA	8.1	accessible
2	Pauwalu Point	S	HAPE, NESH, BANP, LAAL, BFAL, BUPE	State of Hawaiʻi	Hawaiʻi State Seabird Sanctuary	2.4	accessible
2	Mokae	S, T	LAAL, BFAL, WTSH	Ke Ao Haliʻi	Community Land Trust (HILT)	TBD	accessible
2	Nakula & Nuʻu	S, T	unspecified	NPS	NPS	2600	accessible
1	Hāwea Point	S	LAAL, BFAL	HILT	unspecified	unspecified	unspecified
1	Hoʻokipa Beach Park	S	LAAL, BFAL	State of Hawaiʻi	unspecified	unspecified	unspecified
1	Makamakaʻole	S	HAPE, NESH, BANP, BUPE	State of Hawaiʻi	NAR, FR	4	accessible
1	Nuʻu Refuge	S	BLNO	HILT	Refuge	33.2	accessible
2	offshore islets	unspecified	petrel and storm petrel and albatross	State of Hawaiʻi	unspecified	unspecified	remote

Molokini

The small volcanic islet of Molokini was mentioned twice by participants. Protected as a State Seabird Sanctuary, it was mentioned as a potential translocation or social attraction site for two species: BOPE and TRSP.

Lānaʻi

Lānaʻi was mentioned by participants nine times. While the majority of Lānaʻi is privately owned, the current landowner is actively engaged in multiple Hawaiian Petrel colony restoration projects, including the creation of a large predator-proof fence around one of the larger colonies and a long-term monitoring and predator control project throughout the core distribution of the island's petrel population, as well as colony protection at the island's largest Wedge-tailed Shearwater colony. In most cases, the island was

either mentioned as a whole or as an entire stretch of coastline. Only one site was specifically mentioned – the area encompassing Pu‘u Pehe Headlands and Manele Bay. For this area only, participants mentioned the following candidate species for colony restoration efforts: BOPE, TRSP, BUPE, and RTTR. The only other species mentioned for larger, more generic restoration projects were LAAL and BFAL.

Moloka‘i

Moloka‘i was mentioned by participants 21 times, with a total of six sites identified and one mention of all offshore islands generically. The site with the most mentions was Mokio Preserve (8, see pg. 26 for more detail on this site), followed by Mo‘omomi Preserve (5) and ‘Īlio Point (4). One site was private property and is not shown in the table below. Protection for sites mentioned included non-profit Preserves (Moloka‘i Land Trust and The Nature Conservancy), a proposed NAR and a National Park. Participants mentioned 11 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: HAPE, NESH, BANP, LAAL, BFAL, BUPE, WTSH, BOPE, TRSP, WTTR, and RTTR.

# mentions	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
8	Mokio Preserve	S	HAPE, NESH, BANP, LAAL, BFAL, BUPE, WTSH, BOPE, TRSP	MLT	Preserve	695	accessible
5	Mo‘omomi Preserve	S	LAAL, WTSH, BFAL, BOPE, BUPE, BANP, WTTR, RTTR	MLT, TNC	Preserve	372	accessible
4	‘Īlio point	S	LAAL, BFAL, all suitable species	State of Hawai‘i	none	105	accessible
1	Anapuka (within Mokio)	S	LAAL, WTSH, BFAL, BOPE, BUPE	MLT	Preserve	695	accessible
1	Kalaupapa	S	LAAL, BFAL, WTSH, TRSP, BOPE, BUPE	NPS	NPS	3,531	remote
1	offshore islets	unspecified	any species	unspecified	unspecified	unspecified	remote

O‘ahu

Out of all the Main Hawaiian Islands, O‘ahu was mentioned by participants the most – 43 times in total. A total of 10 sites were identified with a further five mentions of all offshore islands generically. The site with the most mentions was James Campbell National Wildlife Refuge (NWR) (12, see pg. 24 for more detail on this site), followed by Moku Manu Islet (6) and Ka‘ena Point NAR (4). All sites mentioned had some level of protection, varying from Wildlife Sanctuaries to Natural Area Reserves and National Wildlife Refuges. Participants mentioned 12 different seabird species as being candidate species for colony restoration efforts on O‘ahu. These were as follows: BOPE, TRSP, LAAL, BFAL, RTTR, RFBO, CHSH, MABO, GRFR, BUPE, PHPE, and POSP.

# mentions	Site Name	Restoration Type	Species targeted	Landowner(s)/ managers	Current protection	Size (ha)	Accessible/ remote
12	James Campbell NWR	S, T	BOPE, TRSP, LAAL, BFAL, RTTR, RFBO	Federal, USFWS	NWR	6.5	accessible
6	Moku Manu Islet	S, T	TRSP, BOPE, CHSH, RTTR, MABO, GRFR	State of Hawai'i	wildlife sanctuary	6.9	accessible
4	Ka'ena Point NAR	T	BFAL	State of Hawaii, USFWS	NAR, NWR	24	accessible
3	Manana Islet	S, T	LAAL, CHSH, RTTR, MABO, BFAL, BOPE, GRFR	State of Hawai'i	NAR, wildlife sanctuary	27.1	accessible
3	Mokulua Iki Islet	S, T	CHSH, RTTR, MABO, BOPE	State of Hawai'i	wildlife sanctuary	5.3	accessible
3	Mokulua Nui Islet	S, T	CHSH, RTTR, MABO, BOPE	State of Hawai'i	wildlife sanctuary	5.3	accessible
2	Kekepa Islet	S, T	TRSP, BOPE	State of Hawai'i	wildlife sanctuary	0.6	remote
2	Kuaokala	unspecified	albatross sp	State of Hawai'i	Forest reserve, fenced	2.4	accessible
2	Moku'auia Islet	S, T	LAAL, CHSH, BFAL, BUPE, TRSP, BOPE	State of Hawai'i	wildlife sanctuary	5.3	accessible
1	Kāohikaipu	S	LAAL, CHSH, BFAL, BUPE, TRSP, BOPE, GRFR	State of Hawai'i	wildlife sanctuary	4.5	accessible
5	offshore islets	S, T	PHPE, POSP, BOPE	State of Hawai'i	unspecified	unspecified	accessible

James Campbell NWR includes a predator proof fence and to date has been the site of four translocations (Bonin Petrel, Tristram's Storm-Petrel, Laysan Albatross and Black-footed Albatross)

Kauaʻi

Out of all the Main Hawaiian Islands, Kauaʻi was the second most mentioned island (after Oʻahu) by participants – 31 times in total. A total of 13 sites were identified. The site with the most mentions was Kīlauea Point NWR (9, see pg. 25 from more detail on this site), followed by the Makauwahi Cave Reserve and surrounding areas of Māhāʻulepū (5). Six sites were on private property and are not shown in the table below. Protection for sites mentioned included Reserves, Natural Area Reserves, and State Parks. Participants mentioned 11 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: LAAL, BFAL ,BUPE, BANP, NESH, WTTR, CHSH, WTSH, KEPE, RTTR, and RFBO.

# mentions	Site Name	Restoration Type	Species targeted	Landowner(s)/ managers	Current protection	Size (ha)	Accessible/ remote
9	Kīlauea Point NWR	S, T	BFAL, BUPE, WTTR, KEPE	USFWS	NWR	68	accessible
5	Makauwahi Cave Reserve/ Māhāʻulepū	S, T	LAAL, BFAL ,BUPE, BANP, NESH, WTTR, CHSH, WTSH, RFBO	Grove Farms	Reserve	TBD	accessible
2	Honopū Valley	S	WTSH, BUPE	State of Hawaiʻi	State Park	TBD	unspecified
2	Nihoku	S	BUPE, BFAL, WTTR, KEPE	USFWS	NWR	3.2	accessible
2	Nuʻalolo Kai	S	BUPE, WTSH, BANP, WTTR	State of Hawaiʻi	State Park	TBD	remote
1	Kuia	S	unspecified	State of Hawaiʻi	NAR	662	unspecified
1	Mokuʻaeʻae Islet	S	BUPE, WTSH, BANP	State of Hawaiʻi	Hawaiʻi State Seabird Sanctuary	1.3	accessible

Lehua Islet

Lehua Islet, protected as a Seabird Sanctuary, was mentioned 17 times by participants. This 117-ha islet was recently the focus of a successful rat eradication project and is now free of mammalian predators (although introduced Barn Owls *Tyto alba* and Cattle Egret *Bubulcus ibis* continue to be a significant conservation issue) (Raine *et al.* 2021). Participants mentioned 13 different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: SOTE, GBTE, CHSH, BRNO, BUPE, BANP, BOPE, TRSP, GRAT, BGNO, HAPE, NESH, and TRSP. As this islet ranked second highest among participants, Lehua is also considered in more detail on page 23 as an example of the level of detail available for many of the sites considered in this study.

Kaʻula Island

Kaʻula Island, protected as a Seabird Sanctuary in 1977, was used by the United States Navy as a bombing range for live and inert ordnance between 1981 and 2009. It was mentioned six times by participants as being a potential site for seabird restoration projects. However, the presence of significant amounts of unexploded ordnance was also highlighted as a serious challenge for conservation efforts. Participants

mentioned six different seabird species as being candidate species for colony restoration efforts on the island. These were as follows: LAAL, BFAL, BUPE, CHSH, BOPE, TRSP, and GBTE.

Pacific Remote Islands Marine National Monument

A total of six sites (islands and atolls) were identified within the Pacific Remote Islands Marine National Monument, with Palmyra Atoll mentioned most frequently (n=4). In most cases, participants suggested that all seabird species that are found within the area be targeted for colony restoration projects. The following species were mentioned by name as being suitable species to target for these projects: PHPE, POSP, SOTE, WTSH, and CHSH. Four of the six sites are protected as National Wildlife Reserves and Swain's Island has an ongoing rat eradication project.

# mentions	Island	Site Name	Restoration Type	Species targeted	Landowner(s)/ managers	Current protection	Size (ha)	Accessible/ remote
1	Jarvis	Jarvis	S	All species with range overlap	USFWS	NWR	450	remote
1	Johnston Atoll	Johnston Atoll	S	All species with range overlap	USFWS	NWR	267	remote
4	Palmyra Atoll	Palmyra Atoll	S, T	PHPE, POSP, all species with range overlap	USFWS	NWR	198	remote
2	Wake Atoll	Peale Island	S, T	SOTE, WTSH, CHSH	USAF, DOI	None	104	remote
1	Rose Atoll	Rose Island	S	Shearwaters and petrels	Gov't American Samoa	NWR	6.5	remote
3	Swain's Island	Swain's Island	S	All	Private	None	243	remote

American Samoa

For American Samoa, potential colony restoration sites were identified on three islands: Ofu, Tau, and Tutuila. The majority of these sites were on private and village-owned land and are thus not listed below. A total of 19 sites were identified within American Samoa, with Mt Lata on Ofu and Rainmaker, Matafao, and Pola Islet on Tutuila getting the most mentions. The following species were mentioned by name as being suitable species to target for these projects: POSP, BLNO, BRBO, LEFR, TRSH, TAPE, and HEPE. Five of the 19 sites are protected as part of the National Park System through a lease agreement with multiple villages, which retain access and rights to conduct certain activities on their lands within the Park.

# mentions	Island	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
5	Tau	Mt. Lata	S, T	POSP, TRSH, TAPE, HEPE	NPS	NP	varied	remote
5	Tutuila	Mt. Rainmaker	S, T	POSP, TRSH, TAPE, HEPE	Private	unknown	unspecified	accessible
3	Tutuila	Matafao	S, T	POSP, TRSH, TAPE, HEPE	Private	unknown	unspecified	accessible
3	Tutuila	Pola Islet	S, T	BLNO, BRBO, LEFR, TRSH, TAPE, POSP, HEPE	NPS	NP	101	remote
2	Tutuila	Agapie Cove	S, T	BLNO, BRBO, LEFR, TRSH, TAPE, POSP, HEPE	NPS	NP	unspecified	accessible
2	Tutuila	Pola Peninsula	S, T	BLNO, BRBO, LEFR, TRSH, TAPE, POSP, HEPE	NPS	NP	unspecified	accessible
1	Tutuila	Manofā Rock	S, T	BLNO, BRBO, LEFR	NPS	NP	TBD	remote

Commonwealth of the Northern Mariana Islands (CNMI)

Seven islands were identified within CNMI by participants as being potential colony restoration sites, with a further two participants recommending CNMI in general. The islands of Maug, Asuncion and Guguan received multiple mentions. Participants did not specify any particular seabird species, and for the most part did not identify recommended restoration types. Most of the locations mentioned are afforded protection either under the CNMI constitution or as Sanctuaries.

# mentions	Island	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
3	Maug	Maug	S, T	unspecified	CNMI	Wildlife sanctuary	214	remote
2	Asuncion	Asuncion	unspecified	unspecified	CNMI	Sanctuary	786	unspecified
2	Guguan	Guguan	predator control	unspecified	CNMI	Sanctuary	400	remote
1	Farallon de Medinilla	Farallon de Medinilla	predator control	unspecified	CNMI	CNMI constitution	91	remote
1	Farallón de Pájaros	Farallón de Pájaros	unspecified	unspecified	CNMI	CNMI	230	remote
1	Sarigan	Sarigan	unspecified	unspecified	CNMI	Sanctuary	430	remote
1	Rota	unspecified	unspecified	unspecified	CNMI	unknown	unspecified	accessible

Guam

For Guam, a total of 11 potential colony creation sites were identified by participants, with Cocos Islet and Anao getting multiple mentions. The following species were mentioned by name as being suitable species to target for these projects: BLNO, BRNO, WHTE, BRBO, WTTR. Five of the 11 sites had some level of existing protection.

# mentions	Island	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
3	Guam	Cocos Islet	S, T	BLNO, BRNO, WHTE, BRBO, WTTR	Various	Guam park	38.4	accessible
2	Guam	Anao	S	BRBO, WTTR, BRNO, BLNO	Gov't of Guam	Conservation area	309.2	remote
1	Guam	Agrigan	T	BRBO, WTTR, BLNO, BRNO, WHTE	Unknown	None	2	remote
1	Guam	Alupang	T	BRBO, WTTR, BLNO, BRNO, WHTE	Unknown	None	0.9	accessible
1	Guam	Anae	T	BRBO, WTTR	Unknown	None	2.7	remote
1	Guam	Facpi	T	BRBO, WTTR	Unknown	None	0.7	remote
1	Guam	Fofos	T	BRBO, WTTR, BLNO, BRNO, WHTE	Unknown	None	1.7	remote
1	Guam	Guam National Wildlife Refuge (Ritidian Unit)	unspecified	unspecified	DOI	Wildlife Refuge	36	accessible
1	Guam	Orote Point	S	BRBO	DOD	Ecological refuge	12	accessible
1	Guam	Togcha Bay Island	S	BRBO, WTTR	Unknown	None	0.25	remote

Eastern Pacific

Three islands from the Eastern Pacific were mentioned by participants. While these are not within the remit of this assessment (being outside the USPI), some participants thought it was important to highlight their potential. These were two islands from the Channel Islands (Anacapa Island and Santa Barbara) as well as the Channel Islands in general. The third island was outside of the USA - Guadalupe Island off the west coast of Mexico's Baja California Peninsula. For the most part, specific species were not mentioned for these areas, except in reference to recent translocations of Black-footed Albatross from the NWHI to Guadalupe Island and the potential translocation of North Pacific albatross species to the Channel Islands.

# mentions	Island	Site Name	Restoration Type	Species targeted	Landowner(s) / managers	Current protection	Size (ha)	Accessible/ remote
1	Channel Islands	Anacapa Island	unspecified	Any at risk species within foraging range	NPS	NPS	283	accessible
1	Channel Islands	Santa Barbara Island	unspecified	Any at risk species within foraging range	NPS	NPS	263	accessible
1	Channel Islands	unspecified	T	BFAL, LAAL	NPS	NPS	unspecified	unspecified
1	Guadalupe Island	Guadalupe Island	T	BFAL	State of Baja California	Biosphere reserve	24399	unspecified

Kiribati

The Micronesian Nation of Kiribati was mentioned once by a participant as a potential receptor site, although without any detail as to exact location or focal species. Kiribati was also mentioned multiple times as a potential source location for Polynesian Storm-Petrel and Phoenix Petrel.

Potential seabird conflict species

As part of the interview process, participants were asked whether there were any seabird species present at the sites they were suggesting that could negatively impact restoration efforts. This is one of the key issues that needs to be considered when initiating seabird restoration projects. Non-T&E native seabirds already breeding within a site are protected under the Migratory Bird Treaty Act and are themselves important components of the native ecosystem so their needs and vulnerabilities must be considered (unlike introduced species, some of which may need to be eradicated).

There were 36 instances where native seabird species were identified as potential conflict species for restoration projects. By far the most common species to be mentioned was Wedge-tailed Shearwater (Table 3). This species is known to be a vigorous nest competitor with other burrow-nesting seabirds and typically outcompetes same-sized or smaller seabirds in these scenarios (for example at Kīlauea Point NWR, where Wedge-tailed Shearwaters evict Newell's Shearwaters from their established burrows with regularity (Raine *et al.* 2019)).

The two tropicbird species were also mentioned; with their sharp serrated beaks, they are similarly known to outcompete other burrow nesters (e.g., White-tailed Tropicbirds and Bermuda Petrel *Pterodroma cahow* (Madeiros *et al.* 2012)). Bonin's Petrel, although a small species, was identified as a potential conflict species for smaller seabirds such as Tristram's Storm-Petrel and Bulwer's Petrel. The three endangered seabird species (Hawaiian Petrel, Newell's Shearwater, and Band-rumped Storm-Petrel) were identified as potential conflict species in that they could restrict the species that would be considered for a colony restoration project (i.e. if they were present, then it would not be advisable to attract similar sized non-listed seabirds due to the potential for competition, and visa versa). Lastly, Masked Booby and Sooty Tern were identified once each due to the large concentrations that these species can reach in their breeding colonies that could potentially exclude other species. This exercise underscores the fact that species already established in a recipient location must be considered for every colony restoration project.

Species	% of total
Wedge-tailed Shearwater	63.9
Hawaiian Petrel	8.3
Bonin Petrel	5.6
Red-tailed Tropicbird	5.6
White-tailed Tropicbird	5.6
Band-rumped Storm-Petrel	2.8
Masked Booby	2.8
Newell's Shearwater	2.8
Sooty Tern	2.8

Table 3. Native seabird species identified as potential conflict species for restoration projects.

Project Partners

Participants were asked to identify potential partners for their proposed colony creation projects. While responses were low for this question, a total of 41 potential partners were identified for projects in the Main Hawaiian Islands. These ranged from federal and state agencies to non-governmental organisations (NGOs), private landowners, and companies (Figure 12).

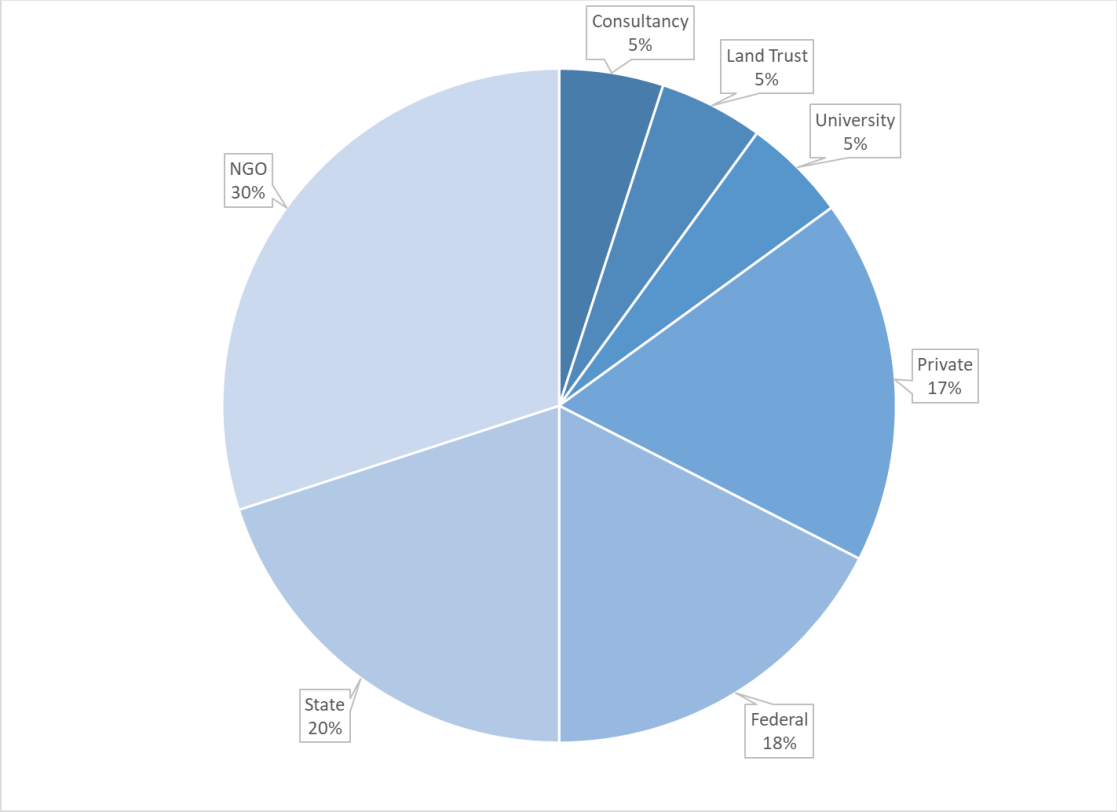

Figure 12. Breakdown of potential project partners for colony creation projects, as identified by participants.

The top five partners (in order of mentions) were: (1) the Department of Forestry & Wildlife (n=27), (2) Division of Land and Natural Resources (n=14, in which DOFAW is situated), (3) U.S. Fish & Wildlife Service and Pacific Rim Conservation (both at n=10), (4) Hawai'i Land Trust and Maui Nui Seabird Recovery Project (both at n=5), and (5) Archipelago Research & Conservation and The Nature Conservancy (both at n=4).

Discussion

Due to the threat of climate change and associated sea level rise, multiple species in the USPI are poised to lose large portions of their breeding range in the coming decades. While it is important not to stop working on global actions aimed at reducing climate change, it is also prudent to have plans in place to deal with its impacts. Coupled with other anthropogenic threats such as introduced predators, urbanization, and threats at sea, the modeled projections for many seabird species in the region show a downward trend, in some cases significantly[1]. Colony restoration projects focused on high islands are clearly an important tool in the long-term conservation goals of many of these species, particularly endangered seabirds and those that ranked highly in our risk assessment. These include species such as Polynesian Storm-Petrel, Tahiti Petrel, Bonin Petrel, Black-footed Albatross, and Tristram's Storm-Petrel. Through this participant-driven process, over 100 potential receptor sites have been identified, particularly sites such as Kahoʻolawe (in its entirety), Lehua Islet (in its entirety), James Campbell NWR (Oʻahu), Kīlauea Point NWR (Kauaʻi), and Mokio Preserve (Molokaʻi). Many of the sites identified by participants could be considered as high-value sites for seabird restoration projects.

A substantial amount of information was collected during this process on potential receptor sites and included basic site details (size, land ownership, etc.), proposed target seabird species, potential threats associated with the sites, management considerations, and project partners. Considering all the data collected from the interviews, follow-up projects were identified to create a roadmap to colony restoration. These are as follows:

- For the 20 highest priority sites identified by participants, sites should be formally ranked anew based on a smaller number of key criteria. These could include presence of existing seabird colonies, proximity to potential source colonies, proximity to threats, existence of project infrastructure (such as predator-proof fences), existing management, etc. Similar exercises have previously been undertaken in the region, for example when assessing potential management sites for endangered seabirds (Hawaiian Petrel and Newell's Shearwater) in the Main Hawaiian Islands.
- Although participants were asked about budgetary costs for the projects they were suggesting, budgetary information gathered from participants was often imprecise or not provided at all. Furthermore, participants often mentioned multiple projects using different management tools and for a range of species, meaning a single budget was inappropriate. A detailed budgetary assessment should be carried out for each of the top ten sites identified through the formal ranking process outlined above. This assessment would consider different management scenarios (social attraction only or translocation and social attraction) and different species assemblages (single vs. mixed).
- The top five sites from the formal ranking exercise would then benefit from site visits, designed to fill data gaps, corroborate data provided by participants, and carry out on-the-ground rapid

[1] The Seabird Metapopulation Viability Analysis (mPVA) online tool provided on the Conservation Action Lab website (https://ccal.ucsc.edu/seabirdmpva/) provides an excellent way for users to assess these trends themselves.

assessments of key management needs prior to the initiation of restoration projects. These site visits could also include meetings with relevant stakeholders to assess willingness to engage in projects of this nature, funding or staffing gaps, and additional challenges and opportunities.

- Following all these actions, a strategic action plan should be created, with focus projects identified and the key actions and partners identified to drive them forward. Full budgets (both for set-up and long-term maintenance) should be developed and possible funding sources outlined.

While this report identifies specific sites as highlighted by project participants, we must stress that the success of colony restoration projects will require on-the-ground, locally driven, and holistic approaches towards future planning and implementation efforts. On inhabited islands in particular, seabird restoration projects require extensive engagement and support by local communities. Without open dialogue and communication there is the risk that projects may be perceived negatively from the outset if the local community is not fully aware of the scope and intent of each project. Additionally, multiple participants during this assessment highlighted the importance of incorporating indigenous knowledge and ensuring dialogue with indigenous groups throughout the process of undertaking seabird restoration projects. Exchanging information with indigenous groups and incorporating traditional ecological knowledge (TEK) at the earliest stage in the planning and implementation process is essential for any colony restoration proposal, along with a commitment to addressing any cultural sensitivities and accommodating traditional cultural practices. Furthermore, project infrastructure (such as predator-proof fences) and management activities (such as predator control and invasive plant management) need to be managed in perpetuity to protect restored seabird populations. For translocation projects in particular, the work involved in locating birds, moving them, and hand-rearing them to fledging is logistically complex and expensive, subject to intense public scrutiny, and may involve cultural sensitivities and be limited by the availability of birds within source populations. It is therefore imperative to assess the costs and benefits before any colony restoration project is initiated (particularly translocation) to determine whether this is an appropriate conservation strategy.

With climate change models predicting the loss of significant breeding colonies in low-lying islands within the USPI, it is however clear that colony creation projects on high islands is an increasingly important and urgent element of conservation throughout the region. By utilizing the expertise of a very large number of seabird experts throughout the region and synthesizing the data gathered, this document represents an important step in moving this process forward.

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Appendix 1. Questionnaire verbally discussed with participants during conversation.

Seabird Translocation and/or Social Attraction Prioritization

1) What top priority (non-federally listed) seabird species do you consider most in need of translocation and/or social attraction (please rank in priority order).
2) Explain the rationale behind your rankings (i.e., how did you prioritize which species are most in need of these actions).
3) What are the specific locations that the above species should be translocated from and why?

Existing or Planned Colony Creation Projects

4) Do you have any seabird translocation or social attraction projects currently underway or planned, and/or any budget to do this work?
5) Do you have any information you can share about costs associated with the set-up of specific seabird translocation or social attraction projects (if you do not have specific dollar amounts, use the following cost brackets - <$250K, $250K-$500K, $500K-$1M, $1M+) and projected annual maintenance (can limit to the following annual cost brackets - <$100K, $100K-$250K, $250K-$500K, $500K+)? **Can email follow-up for this question if needed.**
6) What do you see as your role or that of your organization with respect to seabird social attraction or translocation projects? (e.g., planning, securing funding, maintenance, etc.)

Determining Receptor Sites

The following questions will be answered through the use of an Excel survey sent to survey participants: https://docs.google.com/spreadsheets/d/1HWeUGwab5CWlwkER9JMJSaM5nmEdwpGS/edit#gid=682146326

7) What specific receptor sites do you consider most suitable for seabird translocation and/or attraction?

7.1) What are the specific reasons why these sites are most suitable for these actions (site by site)?

7.2) What (if any) studies need to be undertaken at these receptor sites to understand their suitability as seabird translocation and/or attraction projects?

7.3) Is there additional work that is needed to ready these sites to receive seabirds (such as fences, predator control, etc.)

7.4) Are there conflicts or challenges at any of these sites which should be mitigated before a seabird translocation or attraction should be undertaken (such as power lines, unshielded lights, etc.)?

7.5) Are there any native species (including seabirds) that are already established at the receptor sites that could be positively or negatively affected by translocation or social attraction projects?

7.6) Are there any bird species (native or non-native) that are present on the site that could affect the success of colony creation?

7.7) At the receptor site(s) you recommend, is there already an entity / manager identified that can provide the organizational infrastructure / budget / fundraising capacity to support a colony creation project in the long term (including annual maintenance costs)?

Closing Questions

8) Can you suggest any other seabird biologists/managers with whom we should speak? (Give context of large contact list/limit answer to 1-3 people only)

9) Do you have any final thoughts or comments?

Appendix 2. List of survey participants and their affiliations (in alphabetical order).

Name	Organisation	Name	Organisation
Adam Miles	American Samoa DMWR	Kelly Goodale	USFWS
Afsheen Siddiqi	DOFAW	Lainie Berry	DOFAW
Alex Wang	DOFAW	Laura Duenas	Guam DAWR
André Raine	Archipelago Research & Conservation	Leila Nagatani	USFWS
Beth Flint	USFWS	Linda Elliott	Hawai'i Wildlife Center
Brad Keitt	American Bird Conservancy	Lindsay Young	Pacific Rim Conservation
Bret Mossman	DOFAW	Marc Romano	USFWS
Brian Peck	USFWS	Mark Macdonald	Independent
Butch Haase	Molokai Land Trust	Mark Rauzon	Independent
Cathleen Bailey	independent	Megan Laut	USFWS
Charlotte Forbes-Perry	NPS	Mele Khalsa	TNC
Chris Swenson	USFWS	Michelle Bogardus	USFWS
Coral Wolf	Island Conservation	Michelle Hester	Oikonos
Cori Gibble	Packard Foundation	Nanea Valeros	USFWS
David Duffy	University of Hawai'i	Nanette Seto	USFWS
Dena Spatz	Pacific Rim Conservation	Nick Agorastos	DOFAW
Diane Vice	Guam DAWR	Nick Holmes	TNC
Don Croll	University of Santa Cruz	Norma Creps	US Navy
Eldridge Naboa	USFWS	Rachel Rounds	USFWS
Eric Brown	NPS	Rachel Sprague	Pūlama Lāna'i
Eric VanderWerf	Pacific Rim Conservation	Randy Harper	independent
Frans Juola	US Navy	Ric Lopez	USFWS
Gregg Howald	Island Conservation	Robby Kohley	Pacific Rim Conservation
Hannah Nevins	Independent	Roberta Swift	USFWS
Helen Raine	Archipelago Research & Conservation	Sabra Kauka	independent
Holly Friefeld	USFWS	Scott Burch	NPS
Ian Cole	DOFAW	Scott Fisher	Hawai'i Land Trust
Jamie Bruch	Kaho'olawe Island Reserve Commission	Scott Fretz	DLNR
Jared Underwood	USFWS	Scott Hall	National Fish and Wildlife Foundation
Jay Penniman	Maui Nui Seabird Recovery Project	Sea McKeon	American Bird Conservancy
Jeff Burgett	USFWS	Sheila Conant	Independent
Jeffrey Quitugua	Guam DAWR	Sheri Mann	DOFAW
John Gilardi	Independent	Steve Mullin	CNMI division of FWS
Jonathan Plissner	USFWS	Steven Hess	USDA APHIS
Josh Adams	USGS	Tammy Summers	USFWS
Joy Tamayose	NPS	Tiana Bolosan	DOFAW
K. Yuki Reiss	DOFAW	Tyler Willsey	USFWS