

August 2022

# The Seabird Restoration Database

## About the Database

The Seabird Restoration Database seeks to improve knowledge transfer among practitioners and enhance seabird conservation by documenting the methods and outcomes from social attraction and translocation activities applied to recover seabird populations worldwide. These activities are typically called active seabird restoration efforts, which are defined as:

*The deliberate, human-aided movement or attraction of seabirds to establish or enhance a colony.*

The Seabird Restoration Database was created in 2020 and completed in 2021 after a systematic review of nearly 1400 documents and reach-out to over 500 seabird experts, resulting in the collation of >850 seabird restoration efforts. A synthesis of this effort will be available for publication soon. Stay tuned! You can now find important results from this effort online at [seabirddatabase.org](https://www.seabirddatabase.org).

The Database was created by the Seabird Restoration Database Partnership, which includes the following members:

Dena Spatz, Lindsay Young, Eric Vanderwerf (Pacific Rim Conservation)

Nick Holmes (The Nature Conservancy)

Holly Jones (Northern Illinois University)

Don Lyons, Steve Kress (National Audubon Society)

Graeme Taylor (The New Zealand Department of Conservation)

Colin Miskely (Museum of New Zealand Te Papa Tongarewa)

The Seabird Restoration Database Project was funded by the Packard Foundation.

**Citation:** Seabird Restoration Database (2022), developed by the Seabird Restoration Database Partners: Pacific Rim Conservation, the National Audubon Society, the Nature Conservancy, New Zealand Department of Conservation, Museum of New Zealand Te Papa Tongarewa, Northern Illinois University. Version 2022.1. Available at <https://www.seabirddatabase.org>

## Seabird Restoration Database Glossary

### Seabird Restoration Database Terms and Definitions

The terms below represent all the data available at seabirddatabase.org plus all the data collated into the Seabird Restoration Database

Term	Definition	Sub-Categories	Sub-category Definitions	Available online
<b>Project Details</b>				
<b>ProjectID</b>	Unique ID for each project. Projects are typically guided by species or land management plans with specified goals, objectives, and justifications and may include one or more seabirds targeted at one more sites.	None	n/a	No
<b>Project</b>	The name of the overarching project that guides a restoration activity.  One project can have multiple restoration events. Events within projects are implemented under the same management plan, goals, and justifications as well as by the same managers, often within the same time period.	None	n/a	Yes
<b>Project Goal</b>	Describe the goal of the project as it relates to seabird restoration	None	n/a	No
<b>Seabirds targeted</b>	How many seabird species were targeted for this project?	None	n/a	No
<b>Primary Objective</b>	The primary objective for the project.	Active Restoration	Restoring seabird population(s)	Yes
		Research	Restoration research techniques	
		Other	Other objective	
<b>Project Justification</b>	The justifications for the project.	Species Conservation	Improve the conservation status of a species, increasing population sizes and metapopulations	Yes

	<p>Here we present the <i>primary</i> justification, yet projects may have many justifications.</p>	Restore Ecosystem Function	Restore seabirds to restore ecosystem function, including connectivity and habitat restoration			
		Research	Research techniques for restoration			
		Legal Mandate	Legal obligation to achieve restoration outcomes or mitigate wildlife damage (e.g., to mitigate human-wildlife conflicts)			
		Community Engagement	Engage communities and stakeholders; to promote long-term economic benefits, conservation awareness, flagship species, etc.			
		Indigenous Use	Restore/Conserve modern and/or historical value of seabird to indigenous communities			
		Other	Other project justifications			
		Unknown	Unknown project justification			
<b>Primary Threat Addressed</b>	<p>The <i>primary</i> threat that is being addressed through active restoration. Note, other threats may also be addressed through this process but of are lesser impact</p>	Climate Change	The primary threats that impact seabirds globally	No		
		Invasive Species				
		Problematic Native Species				
		Human-Wildlife Conflict				
		Habitat Loss				
		Poaching				
		Pollution/Lights				
		Fisheries Bycatch				
		Other				

August 2022

<b>Secondary Threat Addressed</b>	The <i>secondary</i> threat that is being addressed through active restoration (if applicable). Note, other threats may also be addressed through this process but of are lesser impact	See categories above	See definitions above	No
<b>Project Website</b>	If there is a primary project website, what is it?	None	n/a	No
<b>Expert Contact</b>	If there is a primary contact person, who is it?	None	n/a	No
<b>Event Details</b>				
<b>EventID</b>	Unique ID for each event. Event = An active restoration effort targeting one seabird species at one restoration site in a discrete time period using social attraction and/or translocation methods.	None	n/a	Yes
<b>Seabird Order</b>	The taxonomic order of the target seabird. Taxonomy is based on BirdLife International 2019.	None	n/a	No
<b>Seabird Family</b>	The taxonomic family of the target seabird. Taxonomy is based on BirdLife International 2019.	None	n/a	Yes
<b>Target Seabird</b>	The seabird species targeted for restoration – common name (English). Taxonomy is based on BirdLife International 2019.	None	n/a	Yes
<b>Scientific Name</b>	The seabird species targeted for restoration – scientific name (Latin). Taxonomy is based on BirdLife International 2019.	None	n/a	Yes
<b>IUCN Status</b>	The IUCN threat status category (2019)	Critically Endangered Endangered Vulnerable Least Concern	See IUCN Red List definitions	Yes

		Near Threatened		
<b>Artificial Nests</b>	Were nest provisions (e.g., nest boxes, structures) applied at the restoration site?	Yes, No, or Unknown	n/a	No
<b>Monitoring Timing</b>	Is/has monitoring occurred to track seabird responses at the restoration site?	During Operation; Post-Operation; During and Post Operation; Some Monitoring - Timing Unknown; None; Unknown	Pick one of the categories to describe the timing of monitoring	No
<b>Monitoring Status</b>	What is the current status of biological monitoring of seabirds at the site?	complete, incomplete, ongoing, none, planned, unknown	See definitions above for these categories	No
<b>Monitoring Yr</b>	Most recent monitoring year of monitoring, even if the operation is ongoing. If no longer active, the last year of monitoring	Year	n/a	No
<b>Monitoring Frequency</b>	What type of monitoring effort was conducted? Systematic and frequent monitoring of the colony vs Monitoring only occurred when colony could be accessed	Systematic; Opportunistic; Mixed; Unknown	n/a	No
<b>Social Attraction Details</b>				
<b>Social Attraction</b>	A seabird restoration method that uses sensory cues to lure individuals to a restoration site. Sensory cues include broadcasting calls, deploying decoys, and mirrors to mimic colony attendance.	Yes	Social attraction attempted or planned	Yes
		No	Social attraction not attempted nor planned	
		Unknown	Unknown if social attraction was used	
<b>Social Attraction Status</b>	This is used to describe the status of any social attraction effort; does not include pre or post implementation monitoring or project activities other than social attraction	Complete	Event was previously implemented and equipment is now removed	Yes
		Incomplete	Event started but terminated before planned completion	

		Planned	Event is planned	
		Ongoing	Event is underway at time of reporting (e.g., decoys deployed). Includes operational breaks (e.g. in non-breeding season)	
		Unknown	Unknown implementation status	
		NA	Social attraction not planned nor implemented	
<b>Social Attraction Start Year</b>	The first year the social attraction implementation began (e.g. equipment was deployed)	None	n/a	Yes
<b>Social Attraction End Year</b>	The year the social attraction implementation ended (e.g. equipment was removed from site/turned off and not redeployed at this restoration site for this species ; if part of a different effort it would be a separate event)	None	n/a	Yes
<b>Stimuli</b>	The source used to lure seabirds into a restoration site; more than one stimuli may be used in an event	Audio	Playback systems broadcasting the sounds of the target species and/or conspecifics. Audio cue.	Yes
		Decoy	Life-sized objects placed in the field that appear to look like the target species. Visual cue.	
		Mirror	Mirrors placed in the field, typically in conjunction with decoys, to make the appearance of a colony. Visual cue.	
		Scent	The scent of guano, regurgitation, and/or seabird feathers placed to lure seabirds to a breeding area. Olfactory cue.	
		Other		
<b>Stimuli Count</b>	For any stimuli used (above), what was the max number deployed?	None	n/a	No
<b>Method Changes</b>	Did practitioners alter the methods as the operation progressed?	Yes, No, Unknown	n/a	No
<b>Social Attraction</b>	A rating marking the ability of the practitioner to implement and complete the intended restoration	Achieved	Equipment successfully installed and working effectively during the necessary biological window (e.g., sound system playing loudly enough to be	No

<b>Implementation Rating</b>	implementation. Overall success in implementation procedures meeting operational goals according to a seabird restoration and/or management plan, or as stated by lead practitioner. Implementation achieved genuine biological utility and any issues were minor		heard, decoys present and visible, habitat maintained in suitable condition).	
		Partially Achieved	Only some equipment being successfully installed or only partially functional over the planned project duration (e.g. equipment failure, unrealistic or too few decoys).	
		Not Achieved	Failure to install equipment, equipment failure, equipment did not have genuine biological utility in attracting species to the site.	
		Unknown	The event is ongoing or complete but the rating is unknown	
		NA	Not Applicable: events that are planned or too early to assess (<1 year of activity)	
<b>Translocation Details</b>				
<b>Translocation</b>	A seabird restoration method in which individual seabirds are physically moved by humans from a source location to a restoration location.  Excludes wildlife rehabilitation transfers unless the intention is to build a wild colony.	Yes	Translocation of seabird individuals attempted or planned	Yes
		No	Translocation not attempted nor planned	
		Unknown	Unknown if translocation was attempted nor planned	
<b>Translocation Status</b>	This is used to describe the status of any translocation effort; does not include pre or post implementation monitoring or any project activities other than translocation	Complete	Event was previously implemented and is no longer operating/no transfers scheduled	Yes
		Incomplete	Event started but terminated before planned completion	
		Planned	Event is planned	
		Ongoing	Event is underway at time of reporting (e.g., birds transferred, more planned in future years). Includes operational breaks (e.g. in non-breeding season)	
		Unknown	Unknown event status	
		NA	Translocation not planned nor implemented	

August 2022

<b>Translocation Start Year</b>	The first year the translocation implementation began (e.g. birds transferred to a restoration site)	None	n/a	Yes
<b>Translocation End Year</b>	The year the translocation implementation ended (e.g. no plan to transfer birds in subsequent seasons; if part of a different effort it would be a separate event)	None	n/a	Yes
<b>Total Translocated</b>	Per event, the approximate # of total birds translocated from all translocation years	None	n/a	Yes
<b>Total Fledged</b>	Total # of individuals fledged to date	None	n/a	No
<b>Number of Cohorts</b>	The number of cohorts translocated to date (assuming 1 cohort/yr)	None	n/a	No
<b>Cohort Size</b>	The minimum and maximum number of birds translocated in a cohort (year)	None	n/a	No
<b>Age Category</b>	The overall age class translocated	Eggs; Chicks; Adults; Mixed; Unknown	n/a	No
<b>Age Range</b>	The minimum and maximum ages of birds translocated (in weeks) based on time since hatching	None	n/a	No
<b>Age Determination</b>	Was the age range known (hatch date known), or estimated (based on measurements, growth curves, fledging date, etc.)?	Known, Estimated, Unknown	n/a	No
<b>Sex Ratio</b>	if known, what was the average % of females in the population	None	n/a	No
<b>Transport Method</b>	How were most individuals transported?	Air; Ship; Land; Multiple; Unk	n/a	No
<b>Transport Duration</b>	How long did it take to transport most individuals? 24hrs or less is grouped in the hours category	Hours; Days; Mixed Duration; Unk	n/a	No

<b>Supplemental Diet</b>	Were birds provided a supplemental diet by caretakers on a regular basis?	Regular, irregular, none, unknown	n/a	No
<b>Supplemental Diet Type</b>	If there was supplemental feeding, what was the primary diet used across the years of the translocation? Choose from at least one category	Frozen fish; Canned fish; Squid; Fish Oil; Water; Electrolytes; Vitamins; Pet Food; Other	n/a	No
<b>Translocation Method Changes</b>	Did practitioners alter the methods as the operation progressed?	Yes, No, Unk	n/a	No
<b>Translocation Implementation Rating</b>	A rating marking the ability of the practitioner to implement and complete the intended restoration operation. Overall success in implementation procedures meeting operational goals according to a seabird restoration and/or management plan, or as stated by lead practitioner. Implementation achieved genuine biological utility and any issues were minor	Achieved	Successful translocation of birds from source colony to restoration site, and survival rate of birds to the end of human care (typically fledging) meets the anticipated rate.	No
		Partially Achieved	Translocation of birds from source colony to restoration site, but with fewer individuals than anticipated and/or with difficulties in transport or captive care (resulting in lower than anticipated survival to fledging, reduced cohort size, etc.).	
		Not Achieved	Failure to successfully translocate all or most birds from the source colony, difficulties during captive care resulting in mortality well above anticipated rate, with a surviving cohort being too small to have genuine biological utility in contributing to goals of project.	
		Unknown	The operation is ongoing or complete but the rating is unknown	
		NA	Not Applicable: events that are planned or too early to assess (<1 year of activity)	
<b>Seabird Responses Pre- and Post- Implementation</b>				
		Yes	Birds visiting in the year(s) prior to the operation	Yes

August 2022

<b>Visits Pre-Implementation</b>	The current visitation status of the target seabird since the restoration social attraction and/or translocation operation started (based on the most recent data available at time of reporting)	No	Birds not visiting in the year(s) prior to the operation	
		Unknown	Unknown status of visitation prior to operation	
<b>First Yr Visitation Post-Implementation</b>	The first year the target seabird was observed at the restoration site since the social attraction and/or translocation operation started	None	n/a	Yes
<b>Current Visitation Status</b>	The current visitation status of the target seabird since the restoration social attraction and/or translocation operation started (based on the most recent data available at time of reporting)	Present	Birds are currently visiting	Yes
		Absent	Birds are not currently visiting	
		Unknown	Unknown status of visitation.	
<b>Breeding Pairs Pre-Implementation</b>	The number of breeding pairs of the target seabird at the site before in the breeding season prior to the start of the social attraction and/or translocation operation	0	0 pairs	Yes
		1 – 10	Between 1-10 pairs	
		11 - 50	Between 11-50 pairs	
		51 - 100	Between 51-100 pairs	
		101 - 500	Between 101-500 pairs	
		500 - 1000	Between 500-1000 pairs	
		>1000	Greater than 1000 pairs	
		Breeding Unknown Size	Breeding size unknown	
		Unknown	Unknown if breeding was occurring pre-operation	
<b>Current Breeding Pairs</b>	The most recent approximation of breeding pairs of the target seabird since the social attraction and/or translocation operation started.	See categories above	See category definitions above	Yes

<b>First Yr Breeding Post-Implementation</b>	The year that breeding was first observed of the target seabird since the social attraction and/or translocation operation started.	None	n/a	Yes
<b>Last Yr Known Breeding</b>	The most recent year breeding was observed of the target seabird since the social attraction and/or translocation operation started (based on the most recent data available at time of reporting)	None	n/a	Yes
<b>Breeding Yr Reference</b>	The data year of the most recent record providing the details above on visiting and breeding responses to the social attraction and/or translocation operation	None	n/a	Yes
<b>Attraction to Stimuli?</b>	The attraction response from target seabird to the stimuli. This is measured via interaction with any of the stimuli - i.e. courting with decoys, breeding, or resting near speakers, etc.	Yes	Observed or presumed seabird response to stimuli	Yes
		No	No target seabird response to stimuli observed nor presumed	
		Unknown	Unclear if target seabird responded to the stimuli	
<b>Translocated Returnees?</b>	If any of the target translocated seabirds returned to the site as breeders and/or as visitors at any time after transfer	Yes	≥ 1 returned to the site	Yes
		No	0 returned	
		Unknown	Unknown if any returnees	
<b>Event Challenges</b>	Aspects of the restoration process reported as significantly challenging in that it had the potential to impact the outcome of the event. Categories are not mutually exclusive. We sought to fill out each category with the following response: Yes, No, or Unknown. Where data could not be determined, we used unknown. The presence of a challenge does not signify the absence of others. We also included notes about each challenge marked as yes.	Predation	Predation by native or non-native predators on target birds	No
		Habitat/ Environmental Conditions	Lack of appropriate seabird habitat, issues with habitat restoration, nests (natural or artificial), extreme weather, etc.	
		Monitoring	Challenges with conducting monitoring efforts e.g., issues with equipment or ability to monitor outcomes	
		Acceptance/ Permitting	Difficulty gaining acceptance by local or greater community, government, or any stakeholders in the project And/Or Challenges with obtaining permits for the project	

August 2022

		Funding	Issues securing financial support for project	
		Practitioner Experience	Inexperienced project staff, lack of aviculture protocols, etc.	
		Social Attraction Stimuli		
		Translocation Cohort Dynamics	Issues with cohort dynamics - cohort sizes, total numbers, sex ratios, etc.	
		Diet (translocated birds)	Issues with natural or supplemental diet, plastic ingestion, etc.	
		Disease/Mortality (translocated birds)	Birds sick or dying at the restoration site or during transfer due to disease, predation, human error, body condition, not surviving fledging, etc.	
		Imprinting	Of translocated birds on birth site or on humans during translocation process	
		Other		
<b>Restoration Site Details</b>				
<b>LocationID</b>	Unique ID for Restoration Site	None	n/a	No
<b>Restoration Site</b>	The name of the location where active restoration techniques were applied.	None	n/a	Yes
<b>Region</b>	The region where the restoration took place. Based on UN's standard country or area codes for statistical use ( <a href="https://unstats.un.org/unsd/methodology/m49/">https://unstats.un.org/unsd/methodology/m49/</a> ). **The assignment of countries or areas to specific groupings does not imply any assumption regarding political or other affiliation of countries or territories	None	n/a	Yes
<b>Subregion</b>	The subregion where the restoration took place. Based on UN data (see above)	None	n/a	Yes

August 2022

<b>Island or Mainland</b>	Is the site on an island or on the mainland?	Island, Mainland, Unknown		No
<b>Country</b>	The country or area where the restoration took place. Based on UN data (see above). Based on standard ISO 3166 country code standards	None	n/a	Yes
<b>Country Income</b>	Country-level income categories for World Bank member countries and all other economies with populations of more than 30,000, according to 2020 gross national income (GNI) per capita, calculated using the <a href="#">World Bank Atlas method</a>	High	≥\$12,696	No
		Upper-middle	\$4,096 to \$12,695	
		Lower-middle	\$1,046 to \$4,095	
		Low	≤ \$1,045	
<b>Latitude</b>	General location of the restoration site (in decimal degrees); sensitive locations omitted from online dataset	None	n/a	Yes
<b>Longitude</b>	General location of the restoration site (in decimal degrees); sensitive locations omitted from online dataset	None	n/a	Yes
<b>Artificial Restoration Site</b>	Site is artificially created (e.g., barge, pontoon, raft, lifted table, floating platform(s), levee, rooftop, building, bridge, dredge spoil).	Yes, No, or Unknown	n/a	Yes
<b>Ownership</b>	Who owns the land? The government option includes military and public land. Choose the majority selection for the site	Private, Government, Mixed, Unknown	n/a	No
<b>Protected Area</b>	Is the site inside a legal protected area?	Yes, No, or Unknown	n/a	No
<b>Protected Area Designation</b>	The main protected area designation at the site, choose the highest order protected area type if there are multiple. designation type is the category or type of protected area as legally/officially designated or proposed.	National, Regional/State, International, None, Unknown	n/a	No

<b>Fencing</b>	Is there fencing to prevent invasive species and/or native problematic species from entering the restoration site, and if so, what kind?	Predator-proof, Ungulate-proof, Both types, Type Unknown, None, Unknown	n/a	No
<b>Restoration Site Threats</b>	Do any of the following known seabird threats impact/have potential to impact the seabird at the restoration site : Invasive Animals, Invasive Plants, Problematic Native Species, Lights, Human Disturbance, Environment/Climate, Other	Yes, No, Unknown	n/a	No
<b>Restoration Site Threat Management</b>	What is the status of management activities in addressing the above listed threats	Complete	The threat existed and has been removed	No
		Ongoing	There is ongoing management addressing this threat	
		None	No Management	
		Unknown	Management actions are unknown	
		NA	Not applicable	
<b>Data Management</b>				
<b>Sensitive Data</b>	Any event or location marked by the expert/land owner as sensitive and not to be shared publicly. Data available online excludes all sensitive locations; all data is tallied in the online dashboard regardless of sensitivity status	No	n/a	No
<b>Data Quality</b>	Each event is rated for data quality, which impacts subsequent inclusion into the web map (high, medium, low data quality only) and analyses of the data (inclusion is relative to analytical focus, with high and medium data records recommended for most analyses. Quality is primarily based on the presence and accuracy of critical data: the site, species, method(s), status, years of the event, implementation rating; breeding response	High	Event is verified, with high confidence in the accuracy of references cited; critical attributes are entered and we are confident in most of the remaining data	Yes
		Medium	Event is verified, with confidence in the accuracy of most data yet one or two critical data attributes may be missing or conflicting; OR all critical attributes recorded but we do not have access to primary references, we have low confidence in	

			reference and/or lead practitioner of the event did not provide a review	
		Low	Event is verified, with low confidence in the accuracy of most related data and/or more than half of critical attributes are unknown or lack confidence; other data largely absent.	
		Unknown	Event is not verified, we are unsure if it occurred and other data is lacking (do not use)	
<b>Entry Date</b>	The date of data entry/modification into the restoration database	None	n/a	Yes
<b>Lead Organization(s)</b>	The name of the lead organization(s) on the project. Note, this is not a comprehensive list of all entities involved	None	n/a	Yes
<b>Website</b>	A website describing the project – hyperlink available if website was identified	n/a	n/a	Yes
<b>Short References</b>	A list of reference cited with this event; full references can be found at <a href="#">this link</a>	None	n/a	Yes
<b>Full References</b>	Each event is linked with at least one reference detailing the reference type and detail (see categories), website (if available), journal, lead author, year, title, data quality status (see above for categories), and sensitivity of reference	Grey Literature	Reports, plans, or technical documents; not peer-reviewed	No
		Publication	Peer-reviewed articles (original research or review articles), books, or book chapters	
		Database	Spreadsheet or other database format	
		Blogs and Media	Online content not published elsewhere with the exception of magazine articles that may be paper copies	
		Personal Communication	Information from an expert via email, verbal, or presentation, or via our online web survey	
<b>Expert Details</b>	For every individual that contributed information for the database, we collected their name, email, organization, contact /response dates, and details about data	Data provided		

August 2022

	contribution, including if data, contacts for other experts, and/or documents were provided			
<b>Expert Reviewed</b>	For each event we document if it was reviewed by an expert	None	n/a	No
<b>Complete</b>	Was this entry completed?	Yes or No	n/a	No
<b>Data Entry Person</b>	Who last completed the data entry?	Name	n/a	No