



Exxon Valdez Oil Spill Trustee Council
Long-Term Research and Monitoring, Mariculture, Education and Outreach
Annual Project Reporting Form

**For Instructions for each section below, see Reporting Policy, II (B); the Reporting Policy can be found on the website, <https://evostc.state.ak.us/policies-procedures/reporting-procedures/>*

Project Number: 22110853

Project Title: Pigeon Guillemot Restoration Project

Principal Investigator(s): Robert Kaler, U.S. Fish and Wildlife Service; Dr. David Irons, U.S. Fish and Wildlife Service (retired)

Reporting Period: Feb 1, 2022 – January 31, 2023

Submission Date (Due March 1 immediately following the reporting period): March 6, 2023

Project Website: <http://www.evostc.state.ak.us>

Please check all the boxes that apply to the current reporting period.

Project progress is on schedule.

The Pigeon Guillemot Restoration Project, funded 2019-2023, is in the final year.

Project progress is delayed

NA

Budget reallocation request.

NA

Personnel changes.

Dr. Kathy Kuletz retired in February 2022, but as this is the final project year there are no new personnel.



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1. Summary of Work Performed:

The pigeon guillemot (*Cepphus columba*) restoration project at the Naked Island Group, Prince William Sound (PWS), Alaska, completed the fourth year of a 5-year study (2019-2023) to monitor the population recovery following American mink (*Neovision vision*) removal efforts (2014-2018). Our 2022 objectives were: (1) monitor the recovery of pigeon guillemots, and (2) monitor relative food availability, using black-legged kittiwakes (*Rissa tridactyla*) as indicators. By objective, below are the results of the 2022 field work.

Objective 1. Guillemot Recovery. Following standard methods (Irons et al. 1988, Oakley and Kuletz 1996, Bixler et al. 2010), guillemot surveys were conducted 1-5 June 2021 at both the Naked Island group (Naked, Storey, and Peak Islands) and the control islands (Smith, Little Smith, Seal, and Fool Islands). Numbers of guillemots recorded along shoreline surveys has more than tripled since mink removal efforts began in 2014, increasing from 69 in 2014 to 235 in 2022 (Table 1; Figure 1). Numbers of guillemots counted during shoreline surveys at control islands decreased by 111 birds compared to 2021 results (Table 1).

Objective 2. Food Availability Index. Productivity of black-legged kittiwakes (*Rissa tridactyla*) was monitored in July and August for the third year as part of the guillemot project to provide a proxy of food availability to breeding guillemots. Using a 36-year (1985-2022) time series of productivity at kittiwake colonies in PWS (N = 22), followed the classification scheme used by Alaska Maritime National Wildlife Refuge (Dragoo et al. 2020) and defined productivity, or reproductive performance, in terms of food availability where “good” is >20% above site mean, “moderate” is within 20% of site mean, and “poor” is <20% below site mean based annual kittiwake productivity compared to long-term average. Based on colony visits in 2022, food availability was “moderate”. Inner and Outer PWS kittiwake colonies (Figure 3 and 4) had 21% (long-term average 27%) and 13% (long-term average 10%) reproductive success, respectively.

Overall, the fourth year of continued monitoring of the population recovery of pigeon guillemots at the Naked Island Group was successful. Observation conditions were excellent, but due to COVID, the census was conducted by two observers rather than three (including the vessel operator). Guillemot population counts at the Naked Island group decreased from 253 birds in 2021 to 235 birds in 2022, a decline of 7% (or 17 birds). Difference between counts on transects between years were substantial. Counts of guillemots at the Control Islands decreased by 35% (or 111 birds) compared to 2021. The Naked Island Group appeared to do better than the Control Group. Visits to black-legged kittiwake colonies were conducted and estimates of reproductive performance based on nest counts indicated 2022



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was a “moderate” year for fish availability in PWS and were nearly identical to 2021 productivity estimates. Spring and summer of 2023 is the final year of funding for the Naked Island guillemot and PWS kittiwake study.

Table 1. Number of individual pigeon guillemots recorded during spring shoreline surveys at the Naked Island Group (Naked, Peak, and Storey islands) and Control Group (Smith, Little Smith, Seal and Fool Islands), Prince William Sound, Alaska, 2012-2022. In 2019-2021, game cameras were set at bait stations (N=10) at previously high-use mink areas had zero detections and no sign of mink tracks. Mink column in 2014-2018 are “number of mink trapped”, and in 2019-2021 are “number of mink observed”. *In 2012, three of the four control islands were not surveyed due to weather.

Year	Naked Island Group				Control Group					Naked Island Group
	Naked	Peak	Storey	NIG Total	Smith	L. Smith	Seal	Fool	Control Total	Mink
2012	33	12	13	58	.	.	.	31	*	NA
2013	39	13	15	67	151	36	25	53	265	NA
2014	49	8	12	69	171	38	53	106	368	76
2015	59	18	18	95	178	27	56	54	315	23
2016	88	17	46	151	168	39	46	57	310	7
2017	101	11	57	169	189	32	47	57	325	0
2018	77	14	42	163	178	45	66	88	377	0
2019	101	20	64	185	217	21	53	33	324	0
2020	111	10	100	221	161	14	30	17	222	0
2021	167	23	62	252	123	91	44	40	298	0
2022	163	24	48	235	57	57	43	30	187	NA



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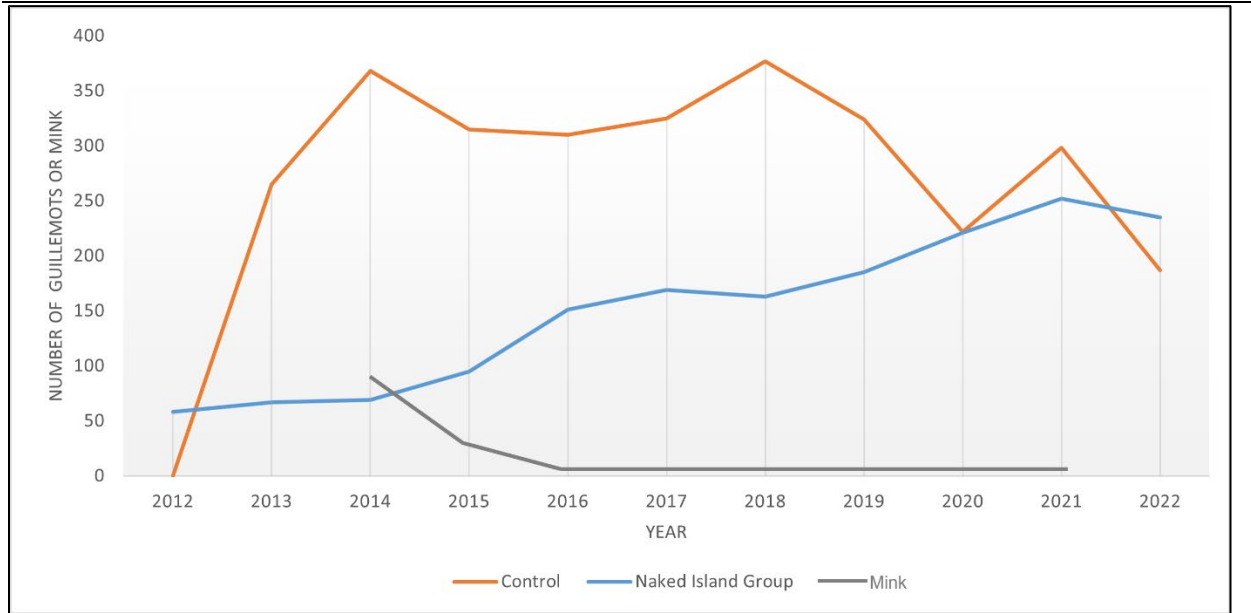


Figure 1. Number of individual pigeon guillemots recorded during spring shoreline surveys at the Naked Island Group (blue line), Control Group (Orange line), and number of mink (gray line) trapped (2014-2018) or observed (2019-2021). Since 2019, no signs of mink have been detected at previously high-use areas at the Naked Island Group.



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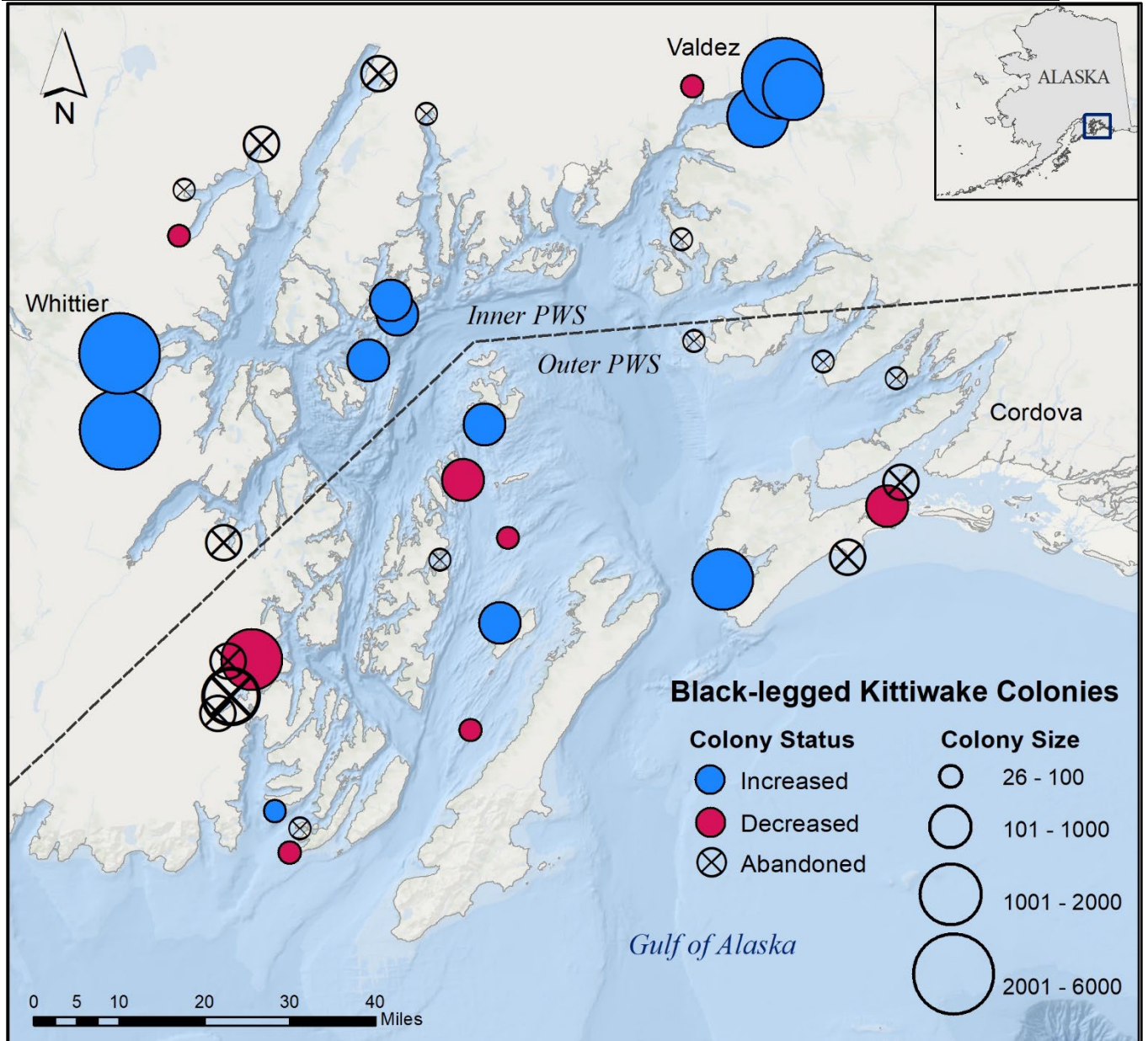


Figure 2. Map showing location, size, and status of Inner and Outer Prince William Sound black-legged kittiwake colonies from 1985-2021.



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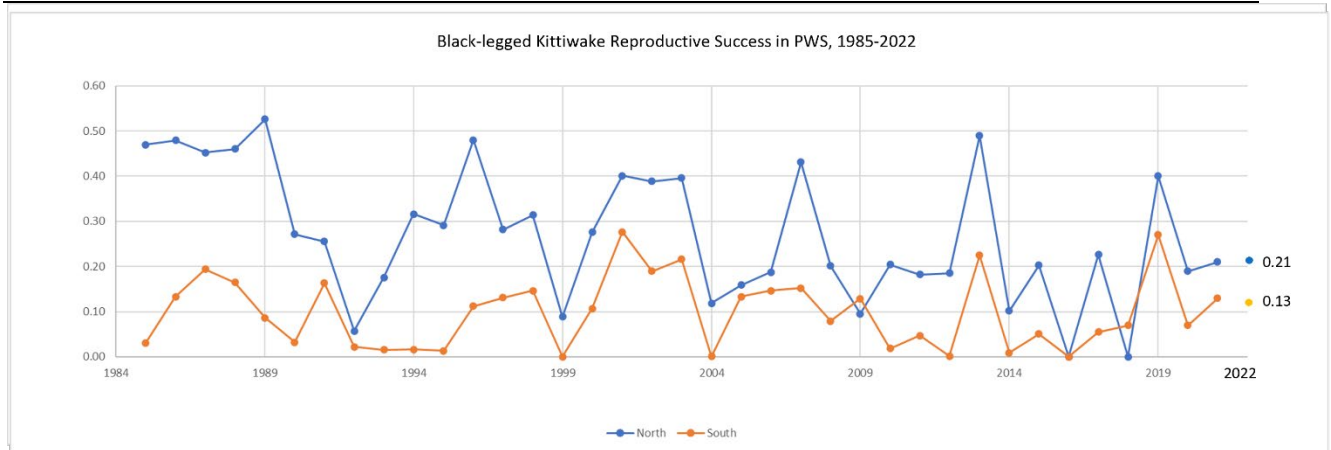


Figure 3. Reproductive success of black-legged kittiwake nests in Prince William Sound (PWS) region from 1985 to 2022. North (or Inner) PWS (blue line) was 0.21 in 2022. South (or Outer) PWS (orange line) was 0.13 in 2022.

2. Products:

Peer-reviewed publications:

Suryan, R. M., M. L. Arimitsu, H. A. Coletti, R. R. Hopcroft, M. R. Lindeberg, S. J. Barbeaux, S. D. Batten, W. J. Burt, M. A. Bishop, J. L. Bodkin, R. E. Brenner, R. W. Campbell, D. A. Cushing, S. L. Danielson, M. W. Dorn, B. Drummond, D. Esler, T. Gelatt, D. H. Hanselman, S. A. Hatch, S. Haught, K. Holderied, K. Iken, D. B. Irons, A. B. Kettle, D. G. Kimmel, B. Konar, K. J. Kuletz, B. J. Laurel, J. M. Maniscalco, C. Matkin, C. A. E. McKinstry, D. H. Monson, J. R. Moran, D. Olsen, W. A. Palsson, W. S. Pegau, J. F. Piatt, L. A. Rogers, N. A. Rojek, A. Schaefer, I. B. Spies, J. M. Straley, S. L. Strom, K. L. Sweeney, M. Szymkowiak, B. P. Weitzman, E. M. Yasumiishi, and S. G. Zador. 2021. Ecosystem response persists after a prolonged marine heatwave. *Scientific Reports*. <https://doi.org/10.1038/s41598-021-83818-5>.

Stark, S., D. Irons, and D. Roby. *In prep*. Sam Stark completed his thesis in 2019 and plans to submit two manuscripts this year based on the research completed at the Naked Island Group on pigeon guillemots and funded by the EVOSTC and National Fish and Wildlife Foundation. Initial reviewer comments on one manuscript are being addressed and will be resubmitted early 2023.



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Reports:

None

Popular articles:

Irons, D., R. Kaler, L. Labunski, K. Kuletz. 2022. Prince William Sound kittiwakes experienced dramatic decadal differences in population trends, but all collapsed in the Marine Heat Wave. Delta Sound Connections, Prince William Sound Science Center, Cordova, Alaska.

Conferences and workshops:

See oral presentation below

Public presentations:

Kaler, R. 2022. Results of Naked Island pigeon guillemot surveys and blacked-legged productivity surveys in Prince William Sound, Alaska. Oral Presentation. Seabird Monitoring Committee. The 49th Meeting of the Pacific Seabird Group. 14 February.

Kaler, R. et al. 2022. Alaska Seabird Update. Oral Presentation. Alaska Migratory Bird Co-Management Council Fall Meeting. 7 October..

Data and/or information products developed during the reporting period:

We are working with Axiom Data Science (Axiom) to finalize metadata and archival of pigeon guillemot population census data (2012-2022) and black-legged kittiwake data (2018-2022). Axiom has been an excellent partner in helping create metadata and archive count data.

Data sets and associated metadata:

None, however, efforts are underway to format guillemot shoreline data to be archived in the North Pelagic Seabird Database (managed by the U.S. Geological Survey, Alaska Science Center).

Additional Products not listed above:

None



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3. Coordination and Collaboration:

The Alaska SeaLife Center or Prince William Sound Science Center

While not directly coordinating with either the Alaska SeaLife Center or the Prince William Sound Science Center (PWSSC), project data are available to both. We collaborate with Mary Anne Bishop and Anne Schaefer (PWSSC) and explore ways to use the Naked Island guillemot population data to inform management decisions.

EVOSTC Long-Term Research and Monitoring Projects

The Naked Island guillemot project coordinates with:

- Continuing the Legacy: Prince William Sound Marine Bird Population Trends Project (Kaler and Kuletz; 22120114-M) produces a sound-wide estimate for pigeon guillemots, which will be used to monitor the population recovery at the Sound-wide scale. Where possible, the two projects share field equipment, personnel, and survey computers.
- Long-term Changes in Forage Fish Distribution, Abundance, and Body Condition in PWS (Arimitsu and Piatt; 22120114-C) and Middleton Island seabird research led by Dr. Scott Hatch (Institute for Seabird Research and Conservation) provides background on forage fish availability in the northern Gulf of Alaska and PWS region.
- Nearshore Benthic Ecosystems in the Gulf of Alaska (Coletti et al.; 22160114-H) also conduct marine bird surveys and guillemot and kittiwake data provides localized information into the broader context of the Northern Gulf of Alaska.

EVOSTC Mariculture Projects

While not directly coordinating with EVOSTC Mariculture projects, the Naked Island guillemot data are available and we are willing to collaborate, should mariculture projects be proposed at the Naked Island Group, or the control islands. We collaborate with Mary Anne Bishop and Anne Schaefer (PWSSC) and explore ways to use the Naked Island guillemot population data to inform management decisions.

EVOSTC Education and Outreach Projects

While not currently coordinating with the EVOSTC Education and Outreach Project, we will look for opportunities to share information on the success of predator management and seabird recovery. One idea includes preparing short (<90 seconds) radio segments for broadcast on public radio stations in communities impacted by the oil spill (e.g, Cordova, Valdez, Chenega) sharing information on the recovery of guillemots at Naked Island following removal of mink.



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Trustee or Management Agencies

The Pigeon Guillemot Restoration Project at the Naked Island Group staff collaborate with the U.S. Geological Survey (USGS), the U.S. Forest Service (USFS), the National Oceanic and Atmospheric Administration (NOAA), and the Alaska Department of Fish and Game (ADFG).

Native and Local Communities

Through the Alaska Migratory Bird Co-Management Council (<https://www.alaskamigratorybirds.com/>), the Pigeon Guillemot Restoration Project at the Naked Island Group provides updates on the recovery of guillemots in PWS. Additionally, we attend the PWS Natural History Symposium and have provided updates to the Chugach Regional Resources Commission meetings.

4. Response to EVOSTC Review, Recommendations and Comments:

Science Panel Comments from FY20

The Science Panel finds the results exciting and are expecting that the PIs will work in the coming year toward publication of the results of the mink eradication and at least preliminary results of the pigeon guillemot response. The data are compelling and support the authors' conclusions.

This has been a very successful active restoration project with an exponential increase of the population of pigeon guillemots on the Naked Island group from 69 birds in 2014 to 183 birds in 2019. This number is still far below the estimated pre-spill population of more than 2000 nesting guillemots at the Naked Island group and pigeon guillemots are still listed as not recovered in the spill area. Continuing this project for the next four years will allow us to monitor populations of pigeon guillemots in the absence of mink predation, and if the guillemot numbers start to decrease, then we have the opportunity to analyze what other factors may be affecting their recovery. This project also collects food availability data concurrently. Several other studies are collecting data on other population levels of species such as herring (various components of the Herring Research and Monitoring Program (HRM), humpback whales (J. Moran), killer whales (C. Matkin), and other marine birds in PWS (Kaler and Kuletz, Marine Bird Surveys; M. Bishop fall and winter seabird abundance). Environmental data such as sea surface temperature, zooplankton abundance, and currents in PWS are also being collected by components of the HRM and the Environmental Drivers



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component; these can all be used to determine which factors may be affecting changes in the population of guillemots.

In addition to pigeon guillemots, other bird species are beginning to benefit from the lack of mink predation at the Naked Island group. Dusky Canada geese, which declined on the Copper River Delta after the 1964 earthquake and are a species of concern for the ADF&G and the USFS, were at the highest level recorded in 2019. Tufted and horned puffins and parakeet auklets, while previously uncommon in PWS, are increasing in numbers which is important to tourism. A new black-legged kittiwake colony recently formed on Naked Island. We anticipate that arctic terns and black oystercatchers, once common on these islands, will also increase nesting efforts.

This project also continues the breeding black-legged kittiwake time series data which spans 36 years in PWS and include population trends and reproductive success. One of the main prey items for black-legged kittiwakes in PWS are juvenile herring and previous studies have shown that population trends and reproductive success track the availability of juvenile herring. Maintaining data collection for this time series was recently (2018) added to the PIGU project. The black-legged kittiwake time series have since been incorporated into a synthesis manuscript for Gulf Watch Alaska. Preliminary results show a response similar to other piscivorous predators to the decline in herring and the marine heatwave in the GOA. Inclusion of the black-legged kittiwake time series to synthesis efforts of EVOSTC programs (HRM and GWA) expands our understanding of ecosystem-wide impacts from depressed herring populations to multiyear marine heatwave in the GOA.

Science Coordinator Comments FY20

This project completed the first year of continued monitoring of population recovery at the Naked Island group following five years of mink removal efforts. No mink were detected in FY19. Numbers of guillemots continued to increase at the Naked Island group, up from 69 in 2014 to 185 in 2019. This project exemplifies positive results from direct seabird restoration efforts. Results from this project will be used in the next status TC report on injured resources. Productivity of black-legged kittiwakes was also monitored for the first time as part of this project as a proxy for seabird food availability. In the FY19 proposal, it is noted that kittiwakes have been monitored in PWS for 35 years and unpublished data have been used to classify years in terms of food availability (i.e., good, moderate, and poor) for seabirds in PWS. Given that this is such an important long-term data set, this may be a good opportunity for collaboration with other program projects to investigate how kittiwake food



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availability and productivity responded to environmental changes over several decades, and to perturbations such as the marine heatwave in 2014-2016. I concur with the Science Panel's comments.

Justification for the Pigeon Guillemot Project

This has been a very successful active restoration project with an exponential increase of the population of pigeon guillemots on the Naked Island group from 69 birds in 2014 to 252 birds in 2021 and a modest decrease to 235 birds in 2022. This number remains below the estimated pre-spill population of more than 2000 nesting guillemots at the Naked Island Group and pigeon guillemots are still listed as not recovered in the spill area. Continuing this project until 2023 will allow us to monitor populations of pigeon guillemots in the absence of mink predation, and if the guillemot numbers start to decrease, then we have the opportunity to explore other factors affecting their recovery. For example, this project collects food availability data concurrently as well as data on other population levels of species such as herring (various components of the Herring Research and Monitoring Program (HRM)), humpback whales (J. Moran), killer whales (C. Matkin), and other marine birds in PWS (Kaler and Kuletz). Environmental data such as sea surface temperature, zooplankton abundance, and currents in PWS are also being collected by the HRM Program and the Environmental Drivers component of Gulf Watch Alaska; these can all be used to determine which factors may be affecting changes in the population of guillemots.

In addition to pigeon guillemots, other bird species are beginning to benefit from the lack of mink predation at the Naked Island group. Dusky Canada geese, which declined on the Copper River Delta after the 1964 earthquake and are a species of concern for the Alaska Department of Fish & Game and the U.S. Forest Service. Tufted and horned puffins and parakeet auklets, while previously uncommon in PWS, are increasing in numbers which is important to tourism. A new black-legged kittiwake colony recently formed on Naked Island. We anticipate that Arctic terns and black oystercatchers, once common on these islands, will also increase nesting efforts.

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5. Budget:

Budget Category:	Proposed FY 19	Proposed FY 20	Proposed FY 21	Proposed FY 22	Proposed FY 23	TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	\$13,640	\$13,640	\$13,640	\$0	\$0	\$40,920	\$40,920
Travel	\$2,284	\$2,284	\$2,284	\$0	\$0	\$6,852	\$6,852
Contractual	\$47,850	\$47,850	\$46,910	\$43,450	\$44,550	\$230,610	\$186,060
Commodities	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Indirect Costs (<i>will vary by proposer</i>)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
SUBTOTAL	\$63,774	\$63,774	\$62,834	\$43,450	\$44,550	\$278,382	\$233,832
General Administration (9% of subtotal)	\$5,740	\$5,740	\$5,655	\$3,911	\$4,010	\$25,054	\$21,045
PROJECT TOTAL	\$69,514	\$69,514	\$68,489	\$47,361	\$48,560	\$303,436	\$254,877
Other Resources (Cost Share Funds)	\$28,600	\$28,600	\$28,600	\$28,600	\$28,600	\$143,000	\$114,400

LITERATURE CITED

Bixler, K. S., D. D. Roby, D. B. Irons, M. A. Fleming, and J. A. Cook. 2010. Pigeon guillemot restoration research in Prince William Sound, Alaska. *Exxon Valdez Oil Spill Restoration Project Final Report*, 267 pp.

Dragoo, D., H. M. Renner, and R. S. A. Kaler. 2020. Breeding status and population trends of seabirds in Alaska, 2019. U.S. Fish and Wildlife Service Report AMNWR 2020/01. Homer, Alaska.

Irons, D.B., D.R. Nysewander, and J.L. Trapp. 1988. Prince William Sound waterbird distribution in relation to habitat type. U.S. Fish and Wildlife Service, Anchorage, AK.

Oakley K. L., K. J. Kuletz 1996. Population, reproduction, and foraging of pigeon guillemots at Naked Island, Alaska, before and after the *Exxon Valdez* oil spill. In Rice S. D., R. B. Spies, D. A. Wolfe, B. A. Wright 1996. Proc *Exxon Valdez Oil Spill Symp*. Am Fish Soc Symp 18:759-769.