

ATTACHMENT B. Annual Project Report Form (Revised 11.21.19)

1. Project Number: See, Reporting Policy at III (C) (1).

20110853

2. Project Title: See, Reporting Policy at III (C) (2).

Pigeon Guillemot Restoration

3. Principal Investigator(s) Names: See, Reporting Policy at II (C) (3).

Robert Kaler, U.S. Fish and Wildlife Service; Dr. Kathy Kuletz, U.S. Fish and Wildlife Service; Dr. David Irons, U.S. Fish and Wildlife Service (retired)

4. Time Period Covered by the Report: See, Reporting Policy at II (C) (4).

February 1, 2020-January 31, 2021

5. Date of Report: See, Reporting Policy at II (C) (5).

March 5, 2020

6. Project Website (if applicable): See, Reporting Policy at II (C) (6).

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

7. Summary of Work Performed: See, Reporting Policy at II (C) (7).

The pigeon guillemot (*Cepphus columba*) restoration project at the Naked Island Group, Prince William Sound (PWS), Alaska, completed the second year of continued monitoring of population recovery following five years (2014-2018) of American mink (*Neovision vision*) removal efforts. Our 2020 objectives were: (1) search for evidence of mink in guillemot breeding areas, (2) monitor the recovery of pigeon guillemots, and (3) monitor relative food availability, using black-legged kittiwakes (*Rissa tridactyla*) as indicators. By objective, below are the results of the 2020 field work.

Objective 1. Mink Presence or Absence. To search for evidence of mink, we focused efforts at 10 previously high density mink areas in winter and spring and deployed bait stations (herring enclosed in bait container) with two (2) time-lapse/motion triggered game cameras along game trails paralleling tidal beaches or headlands. Ten stations with two cameras operated from 26 March to 14 June 2020. Several images of deer and river otter were recorded, but **no mink were detected** (Table 1). Additionally, checking for tracks along game trails resulted in no detection of mink tracks.

Objective 2. Guillemot Recovery. Following standard methods (Irons et al. 1988, Oakley and Kuletz 1996, Bixler et al. 2010), guillemot surveys were conducted 11-15 June 2020 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 doubled since mink removal efforts began in 2014, **increasing from 69 in 2014 to 221 in 2020** (Table 1; Fig. 2). Additionally, guillemots were counted on control islands (Table 1; Fig. 2) where number declined in 2020.

Objective 3. Food Availability Index. Productivity of black-legged kittiwakes (*Rissa tridactyla*) was monitored in July and August for the second time as part of the guillemot project to provide a proxy of food availability to breeding guillemots. Using a 35-year (1985-2020) time series data set of productivity at kittiwake colonies in PWS (N = 22), we classified productivity in terms of food availability where “good” is > 20% above site mean, “moderate” is within 20% site mean, and “poor” is >20 below site mean based annual kittiwake productivity compared to long-term average. Based on short visits in 2020, **food availability was “poor”**. Inner and Outer PWS kittiwake colonies had 0.19 (0.40 in 2019; average 0.27) and 0.07 (0.09 in 2019; average reproductive performance, respectively, and both colonies were >20% above their average mean, 0.27 and 0.09, respectively (Figure 4; Drago et al. 2020).

Overall, the second year of continued monitoring the population recovery of pigeon guillemots at the Naked Island Group and the continued absence of mink was successful. No mink were recorded visiting bait stations and no mink tracks were observed at the 10 high-use areas identified during intensive 5-year trapping effort (2014-2018). Guillemot population counts were conducted and numbers of guillemots continued to increase at the Naked Island group. Visits to black-legged kittiwake colonies were conducted and results of nest counts indicated 2020 was a “poor” year for fish availability in PWS.

Table 1. Results of annual spring survey data of pigeon guillemots at the Naked Island Group (NIG), Prince William Sound, Alaska, 2012-2020. Game cameras set at bait stations (N=10) at previously (2014-2016) high-use mink areas had zero detections and no sign of mink tracks. In addition to the NIG, we conducted surveys at four control islands, composed of Smith, Little Smith, Seal, and Fool islands. Survey conditions prohibited a full count at the control islands in 2012.

Year	Naked Island Group				Control Group					Naked Island Group
	Naked	Peak	Storey	NIG Total	L. Smith	Smith	Seal	Fool	Control Total	Mink
2012	33	12	13	58	.	.	.	31		
2013	39	13	15	67	151	36	25	53	265	
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

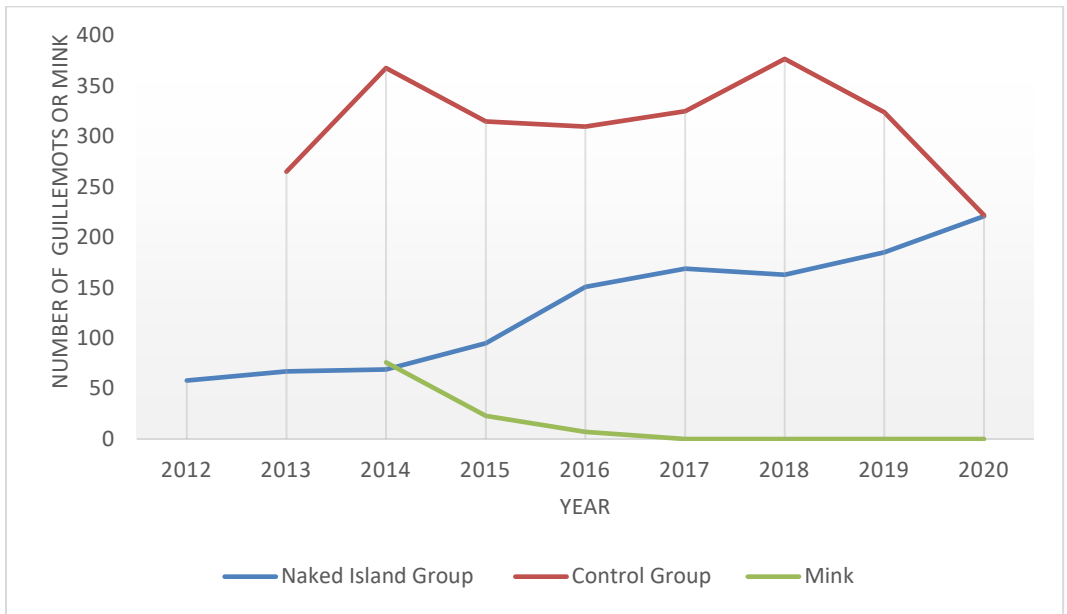


Figure 1. Annual population counts of pigeon guillemots at the Naked Island Group (blue line) and Control Group (orange line), Prince William Sound, Alaska. Mink trapping was conducted 2014 to 2018, and by 2018 no signs of mink were detected (grey line). In 2020, no signs of mink were detected using fish-baited camera traps.

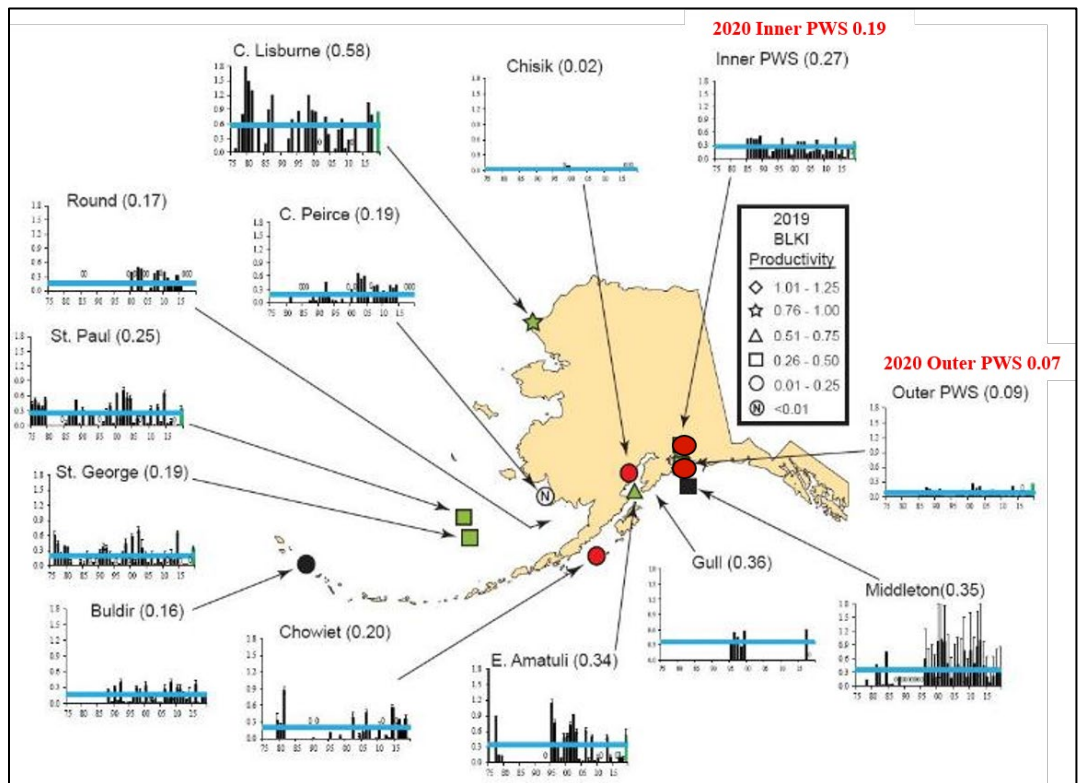


Figure 2. Productivity of black-legged kittiwakes (chicks fledged/nest) at Prince William Sound (PWS) colonies (N=22) in 2020 compared to 2019 Alaska-wide values (no 2020 data available due travel restrictions). Lack of bars indicates that no data were gathered in those years.

Figure 2. (Continued) Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean. Error bars represent ± 1 standard deviation. Inner PWS and Outer PWS is indicated in red circles. Figure source: Dragoo et al. 2020 with addition of Inner and Outer PWS 2020 productivity values.

8. Coordination/Collaboration: See, Reporting Policy at II (C) (8).

A. Long-term Monitoring and Research Program Projects (i.e., other TC-funded projects)

1. Within the Program

Not applicable

2. Across Programs

a. Gulf Watch Alaska and Herring Research and Monitoring

The pigeon guillemot population count data and black-legged kittiwake productivity data are available to all other EVOSTC-funded projects. Additionally, the guillemot restoration project collaborates closely with the Gulf Watch Alaska program. Specifically:

- *Continuing the Legacy: Prince William Sound Marine Bird Population Trends Project* (Kaler and Kuletz; 20120114-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; 20120114-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.; 20160114-H) also conduct marine bird surveys and guillemot and kittiwake data provides localized information into the broader context of the Northern Gulf of Alaska.

- The breeding black-legged kittiwake time series data span 35 years in PWS and include population trends and reproductive success and is incorporated in one of the four synthesis manuscripts being produced by the Council-funded Gulf Watch Alaska program. Inclusion of the black-legged kittiwake time series to synthesis efforts of EVOSTC programs (HRM and GWA) expands the scope of understanding ecosystem wide impacts from depressed herring populations and a continued marine heatwave in the GOA.

- Depending on data collected by the HRM Program in 2017-2021, reported information on abundance and distribution of herring in PWS will be used as a potential explanatory variable in interpreting observed changes in distribution and population trends of marine birds in PWS.

b. Data Management

In an effort led by the GWA Science Coordinator (Dr. R. Suryan), PIs from GWA Nearshore and Pelagic Programs have compiled data sets from marine bird surveys conducted in the Gulf of Alaska with the objective of a region-wide analysis to determine population status and trends of key species, including pigeon guillemots and black-legged kittiwakes. Additionally, work is underway to standardize data management of raw count data collected during nearshore surveys and productivity counts.

B. Individual Projects

Not Applicable

C. With Trustee or Management Agencies

Marine bird data from this study collected at the Naked Island group (Naked, Storey, & Peak islands) will be used to help evaluate the recovery of pigeon guillemots and other marine bird species (e.g., Arctic tern, parakeet auklet, tufted puffin) that were extirpated by mink introduced to the island group. It thus supports the management directives of USFWS to conserve and maintain populations of migratory birds. Additionally, the pigeon guillemot remains listed by the EVOSTC as “not recovered” following the oil spill. These survey data will provide information important for the continued monitoring of guillemot recovery.

The FWS has acquired permits from the USFS to work on their land. Implementation of this plan requires coordination with state and federal agencies with authority and responsibility of the Naked Island Group and pigeon guillemots (see below). Monitoring of pigeon guillemots is being conducted by the U.S. Fish and Wildlife Service. Permits for working at the Naked Island Group are obtained from the U.S. Department of Agriculture – Forest Service.

Authority and Responsibility

U. S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service mission is “to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.” Along with other Federal, State, Tribal, local, and private entities, the Service protects migratory birds, endangered species, certain fish species, and wildlife habitat. The Service is the primary agency responsible for the conservation of the pigeon guillemot and its habitat as authorized by the Migratory Bird Treaty Act. The U.S. Fish and Wildlife Service is responsible for seabirds in Alaska. They have a monitoring program to assess the status and trends of seabirds. They have also spent more than 30 years eradicating introduced predators from seabird islands in the Aleutian Islands and other places. Much of their work has taken place on lands they manage and little USFWS money has gone to PWS, although they have supported the EVOSTC work in PWS since the oil spill. The contact person is Dr. Kathy Kuletz (Alaska Region Seabird Coordinator).

U.S. Department of Agriculture Forest Service

The mission of the Forest Service is “to sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” The Forest Service is responsible for the management of the 5.4 million acre Chugach National Forest that includes the Naked Island group, along with most of the rest of the land area of Prince William Sound.

9. Information and Data Transfer: See, Reporting Policy at II (C) (9).

A. Publications Produced During the Reporting Period

1. 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>.

2. Reports

None

3. Popular articles

None

B. Dates and Locations of any Conference or Workshop Presentations where EVOSTC-funded Work was Presented

1. Conferences and Workshops

See oral presentation below.

2. Public presentations

Kaler, R. 2020. Marine Birds of Prince William Sound. Oral presentation (virtual). Prince William Sound Natural Science Symposium, Whittier, AK. 18 May 2020.

Kaler, R. 2020. Population and Trends of marine birds in Prince William Sound, Alaska: 1989-2018. Oral presentation (virtual). Chugach Regional Resource Commission, Board of Director's meeting, 7 December 2020.

Kaler, R., 2020. Results of Naked Island pigeon guillemot surveys and blacked-legged productivity surveys in Prince William Sound, Alaska. Presented at the Seabird Monitoring Committee meeting during the Pacific Seabird Group annual conference, 12 February 2020, Portland, OR

C. Data and/or Information Products Developed During the Reporting Period, if Applicable

Currently working with Axiom Data Science to finalize metadata and archival of pigeon guillemot population census data (2012-2020) and black-legged kittiwake data (2018-2020).

D. Data Sets and Associated Metadata that have been Uploaded to the Program's Data Portal

None

10. Response to EVOSTC Review, Recommendations and Comments: See, Reporting Policy at II (C) (10).

Science Panel Comments 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.

PI Response (9.25.19): Thank you for your comments. We also find the results exciting and we are working on a publication that will summarize the mink removal in pigeon guillemot nesting areas and the results of the pigeon guillemot recovery to date. We hope to submit a paper by January 2020 if not sooner.

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 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 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.

PI Response (9.25.19): The breeding black-legged kittiwake time series data 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 the black-legged kittiwake time series was recently (FY18) added to the PIGU project. This long-term data set is incorporated in one of the four synthesis manuscripts being produced by the Council-funded Gulf Watch Alaska program. Preliminary results show a similar response as 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 the scope of understanding ecosystem wide impacts from depressed herring populations and a continued marine heatwave in the GOA. We look forward to further collaboration with Gulf Watch in the future.

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 221 birds in 2020. 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. 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, 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 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. 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 1985-2020 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.

11. Budget: See, Reporting Policy at II (C) (11).

Please see provided program workbook.

Budget Category:	Proposed FY 19	Proposed FY 20	Proposed FY 21	Proposed FY 22	Proposed FY 23	TOTAL PROPOSED	ACTUAL CUMULATIVE
Personnel	\$13,640.0	\$13,640.0	\$13,640.0	\$0.0	\$0.0	\$40,920.0	\$ 27,280
Travel	\$2,284.0	\$2,284.0	\$2,284.0	\$0.0	\$0.0	\$6,852.0	\$ 4,568
Contractual	\$47,850.0	\$47,850.0	\$46,910.0	\$43,450.0	\$44,550.0	\$230,610.0	\$ 95,700
Commodities	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$ -
Equipment	\$0.0	\$0.0	\$0.0	\$0.0	\$4,568.0	\$4,568.0	\$ -
Indirect Costs (<i>will vary by proposer</i>)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$ -
SUBTOTAL	\$63,774.0	\$63,774.0	\$62,834.0	\$43,450.0	\$49,118.0	\$282,950.0	\$ 127,548
General Administration (9% of subtotal)	\$5,739.7	\$5,739.7	\$5,655.1	\$3,910.5	\$4,420.6	\$25,465.5	\$11,479.3
PROJECT TOTAL	\$69,513.7	\$69,513.7	\$68,489.1	\$47,360.5	\$53,538.6	\$308,415.5	\$139,027.3
Other Resources (Cost Share Funds)	\$28,600.0	\$28,600.0	\$28,600.0	\$28,600.0	\$28,600.0	\$143,000.0	\$57,200.0

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