Alaska Shorebird Group

Annual Summary Compilation

New or ongoing studies of Alaska shorebirds

December 2019

A Lesser Yellowlegs rests on a lily pad at Otter Lake on Joint Base Elmendorf-Richardson. Photo courtesy of Laura McDuffie (USFWS).

EXECUTIVE SUMMARY

Welcome to the Alaska Shorebird Group (ASG) 2019 annual summary. This is the nineteenth consecutive annual summary to document new and ongoing studies of shorebirds in Alaska. This document includes annual summaries for 25 studies and 12 publications from ASG members in 2019.

The Alaska Shorebird Group continues to be a highly collaborative organization with a large membership of productive principal investigators both within and outside of Alaska. This annual compilation is the only written record that acknowledges the shorebird projects occurring in the state of Alaska and provides a valuable timeline of shorebird activities for this region.

Thank you to all the principle investigators, research technicians, and skilled photographers that make this report possible. A ton of logistics, long hours, dedication, and passion goes into the research occurring within (and outside) Alaska. It is exciting to be part of a group that is so enthusiastic and forward thinking. I am looking forward too many more years of collaboration and participation within ASG. As well as the continued research and conservation of Alaska's breeding and migratory shorebirds.

Melissa Gabrielson
Secretary, Alaska Shorebird Group

STORY MAP

To visually see where shorebird projects in 2019 occurred, visit our story map (link provided below). Click on a shorebird icon or click through chronologically to view a description of the shorebird related project, location, and contact information. Some projects include work across the state of Alaska or outside of the state; this is indicated in each project description. There is also a publication page that includes all the papers published by ASG members in 2019.

Share the link with colleagues, friends, and those interested in learning more about shorebirds!

To see where shorebird research is happening in the state and a brief project summary, visit https://uploads.knightlab.com/storymapjs/2a810c05c884d4b8197ef469dccc9592/alaska-shorebird-group-2019/index.html

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#1 - MIGRATORY CONNECTIVITY OF LESSER YELLOWLEGS (*TRINGA FLAVIPES*)

Investigators: Katie Christie, Alaska Department of Fish and Game; Jim Johnson and Laura McDuffie, U.S. Fish and Wildlife Service; Audrey Taylor, University of Alaska Anchorage

Shorebird hunting is a significant threat to Lesser Yellowlegs that stage and/or overwinter in Caribbean and northern South American countries (Clay et al. 2012). It is estimated that 7,000 to 15,000 individuals are killed in shooting swamps on Barbados annually (Burke 2008, Reed and Burke 2011). The objectives of this study include: 1) determine migration routes of birds from Anchorage and across Canada, 2) determine if genetic markers can be used to explain migratory connectivity, 3) understand the breeding origins of harvested birds, 4) determine the vital rates of populations in Alaska, and 5) understand what conservation actions can be taken to reduce unregulated hunting in the Caribbean and South America.

In 2019, collaborators successfully implemented and completed the second year of this multi-year project. Study locations included: Anchorage, AK; Kanuti National Wildlife Refuge, AK; Yellowknife, NT; Churchill, MB; James Bay, ON; and Mingan, QC. During the 2018 and 2019 capture efforts, 85 Pinpoint GPS-Argos satellite tags (Lotek Wireless Inc.) were deployed and 161 adults and 97 hatch year Lesser Yellowlegs were banded (Table 1).

Table. 1. Total number of PinPoint GPS-Argos satellite tags deployed during 2018 and 2019.

	Anchorage	Kanuti NWR	Yellowknife	Churchill	James Bay	Mingan
2018	15	0	1	0	7	0
2019	17 (2 replaced)	10	10	20	2	3

Preliminary results indicate that Lesser Yellowlegs migratory movements are variable across all population segments and migratory connectivity is moderate. As shown by GPS track lines, birds breeding in Anchorage use the central, Mississippi and Atlantic flyway corridors of the contiguous United States during migration, and dispersed across Central and South America and the Caribbean Islands during the nonbreeding season. Birds migrated as far east as Suriname and as far south as Buenos Aires Province, Argentina. Additionally, birds breeding west of the Manitoba/Ontario border commonly use the prairie pothole habitat of North and South Dakota as a stopover location during autumn migration. Finally, breeding population segments generally organize migration routes to correspond with their geographic breeding distribution (i.e. birds breeding in eastern Canada migrate furthest east, while birds breeding in Alaska migrate furthest west).

This project supports conservation efforts outlined in the Alaska Shorebird Conservation Plan II, primarily by fostering cooperative research internationally to identify important stopover and nonbreeding sites across the western hemisphere. The scope of the migration study may reach beyond Alaska; however, by marking individuals breeding in Alaska, we are able to better understand the habitat associations and requirements of this boreal-breeding shorebird. Additionally, international public outreach through presentations and social media has been and will continue to be implemented to improve the understanding of boreal shorebird species of conservation concern.

Collaborators: Katie Christie and Marian Snively (ADF&G); Audrey Taylor (UAA); Christopher Harwood (USFWS); Sarah Sonsthagen and Lee Tibbitts (USGS- Alaska Science Center); Jennie Rausch, Christian Friss, Sam Hache, Benoit Laliberte, and Eric Reed (Environment and Climate Change Canada); Erin Bayne (University of Alberta); Ross Wood (Bird Studies Canada), Erica Nol (Trent University); Brad Andres (Atlantic Flyway Shorebird Initiative); Michael Hallworth, Pete Marra and Autumn-Lynn Harrison (Smithsonian Migratory Bird Center); Gerrit Vyn (Cornell Lab of Ornithology)

Funding: Alaska State Wildlife Grant, Department of Defense, USFWS Candidate Conservation Grant, USFWS Migratory Bird Management

Location: Cross-Boreal project with six study sites located at Anchorage, Alaska; Kanuti National Wildlife Refuge, Alaska; Yellowknife, Northwest Territories; Churchill, Manitoba; James Bay, Ontario; and Mingan, Quebec.

Contact: Laura Mcduffie, Wildlife Biologist, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: laura_mcduffie@fws.gov, Phone: 907-786-3979.

Figure 1. Lesser Yellowlegs with PinPoint GPS-Argos satellite tag (Lotek Wireless Inc.), Churchill, MB. Photo courtesy of Laura McDuffie, USFWS.

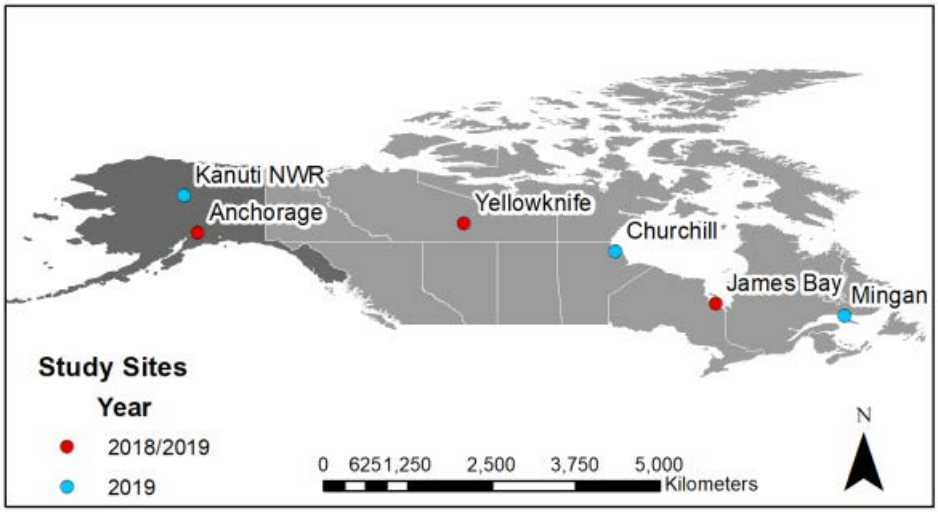


Figure 2. Lesser Yellowlegs capture locations in 2018 and 2019.

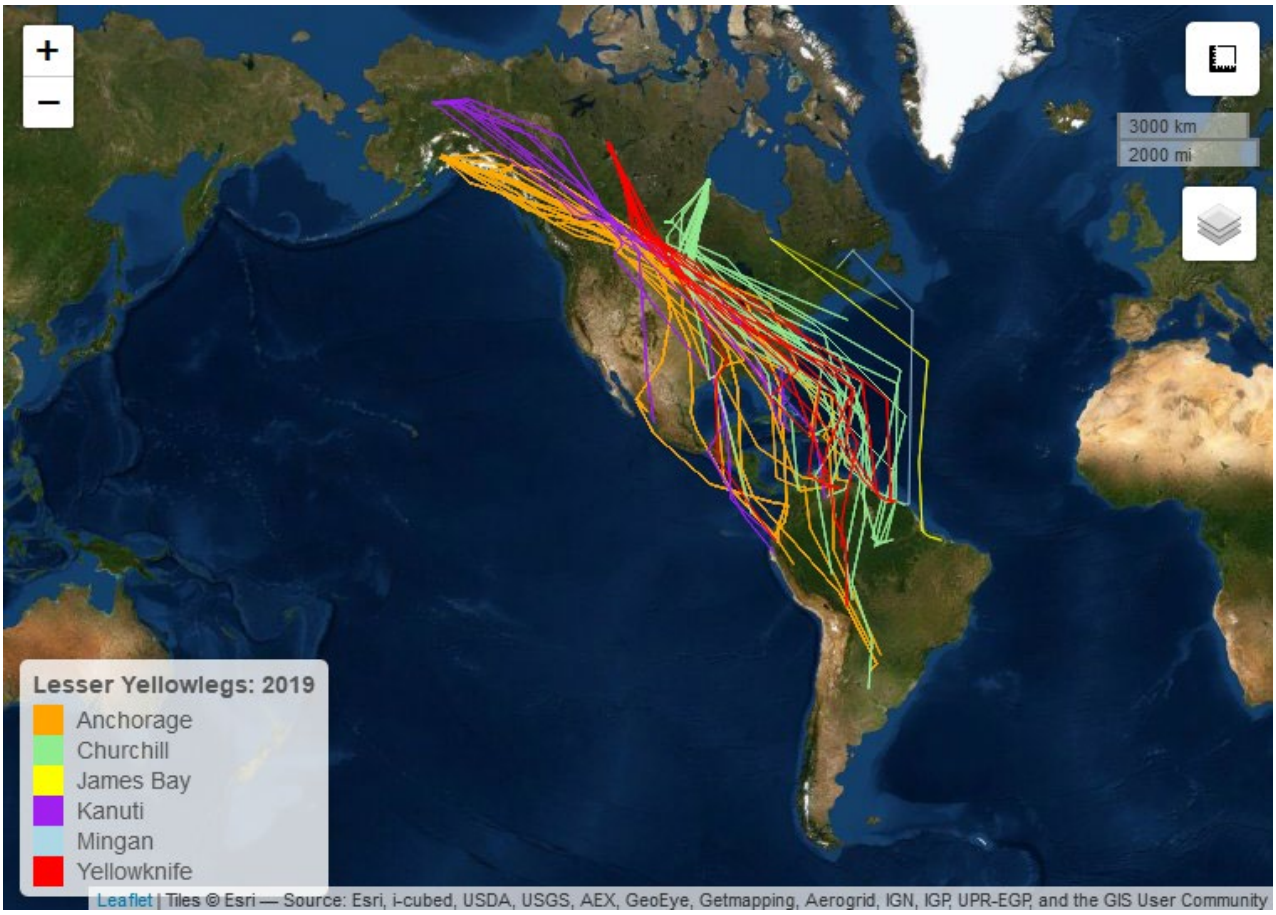


Figure 3. Lesser Yellowlegs migratory track lines from June through August 2019.

#2 – POST-BREEDING MOVEMENTS AND HABITAT USE OF RED PHALAROPES

Investigators: Richard Lanctot, Kathy Kuletz, Elizabeth Labunski, Chris Latty, Sarah Hoepfner, and Sarah Saalfeld, U.S. Fish and Wildlife Service; Stephen Brown and Shiloh Schulte, Manomet, Inc.; Rebecca McGuire and Martin Robards, Wildlife Conservation Society; Marie-Andrée Giroux, Nicolas Lecomte, and Audrey Bédard, Université de Moncton; Autumn-Lynn Harrison, Smithsonian Conservation Biology Institute; J.F. Lamarre, Polar Knowledge Canada; and Paul Smith and Willow English, Environment and Climate Change Canada

We initiated a multi-year tracking project on Red Phalaropes in 2019 to obtain baseline information on post-breeding movements along the Arctic Coast / Ocean and during southward migration. In Alaska, we also plan on comparing these data to Red Phalarope distribution maps generated from "at-sea surveys" to better understand whether we are missing areas important to this species during surveys. Additionally, we wish to compare both the at-sea survey and tracking data to oceanographic maps of various parameters (e.g., water temperature, zooplankton) to better understand what might be driving the distribution of this species. Such knowledge will help us understand how climate-mediated and development-related habitat change is likely to affect this species.

In 2019, we deployed 2-gram PTT Argos tags manufactured by Microwave Telemetry, Inc. on 21 male Red Phalaropes at four breeding sites along the Arctic Coastal Plain of Alaska (Utqiaġvik, Canning River, Colville River, and Qupałuk) and three sites in Canada (Cambridge Bay, East Bay, and Igloolik). These tags collected and transmitted location data to satellites several times per day during the post-breeding season (June–November), providing some of the best information on post-breeding movements ever recorded for this species. Examples of movements can be found on movebank.org – use the browse tracks function and search for "Arctic Shorebird Migration Tracking study – Red Phalarope 2019". Please do not use this information without first asking the authors.

For each tagged individual, we also collected information on reproduction that can be related to migration patterns. Additionally, we collected feather samples for each tagged individual, allowing future studies to assess stress levels from winter-grown feathers that can be related to migration patterns and productivity. In 2020, we plan to deploy more tags to continue monitoring the post-breeding movements and habitat use of this species.

This study fulfills action items under the Research (i.e., "determine migratory timing, routes, and site use of shorebirds"), Habitat Management and Protection (i.e., "apply abundance and distribution information to identify key shorebird habitats and sites"), and International Collaboration objectives (i.e., "foster and participate in cooperative research and monitoring efforts throughout species' ranges") of the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019).

Field assistance for conducting this work was provided by Jillian Cosgrove, Lindsay Hermanns, Peter Detwiler, and Dan Catlin at Utqiaġvik; Peter Detwiler at Qupałuk; Amy Scarpignato at the Colville River Delta; Alysha Wilson Maksagak and Emma Sutherland at Cambridge Bay, Ariel Lenske at East Bay; and Marianne Gousy-Leblanc, Sylvain Christin, Cléa Frapin, Mathieu Archambault, Tommy O'Neil Sanger, Zhiwei Zhang, and Mike Qrunnut at Igloolik. Funding to purchase and receive data from tags was provided by the Bureau of Ocean

Energy Management, Neotropical Migratory Bird Conservation Program, Manomet, Inc., and the USFWS (Migratory Bird Management, Arctic National Wildlife Refuge). Logistical support to work at the seven sites was provided by a large number of organizations not listed here.

Location: Cross-Arctic project with multiple study sites located at Utqiaġvik, Qupałuk, Colville River, and Canning River in Alaska; and Cambridge Bay, East Bay, and Igloolik in Canada.

Contact(s): Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: richard_lanctot@fws.gov, Phone: 907-786-3609

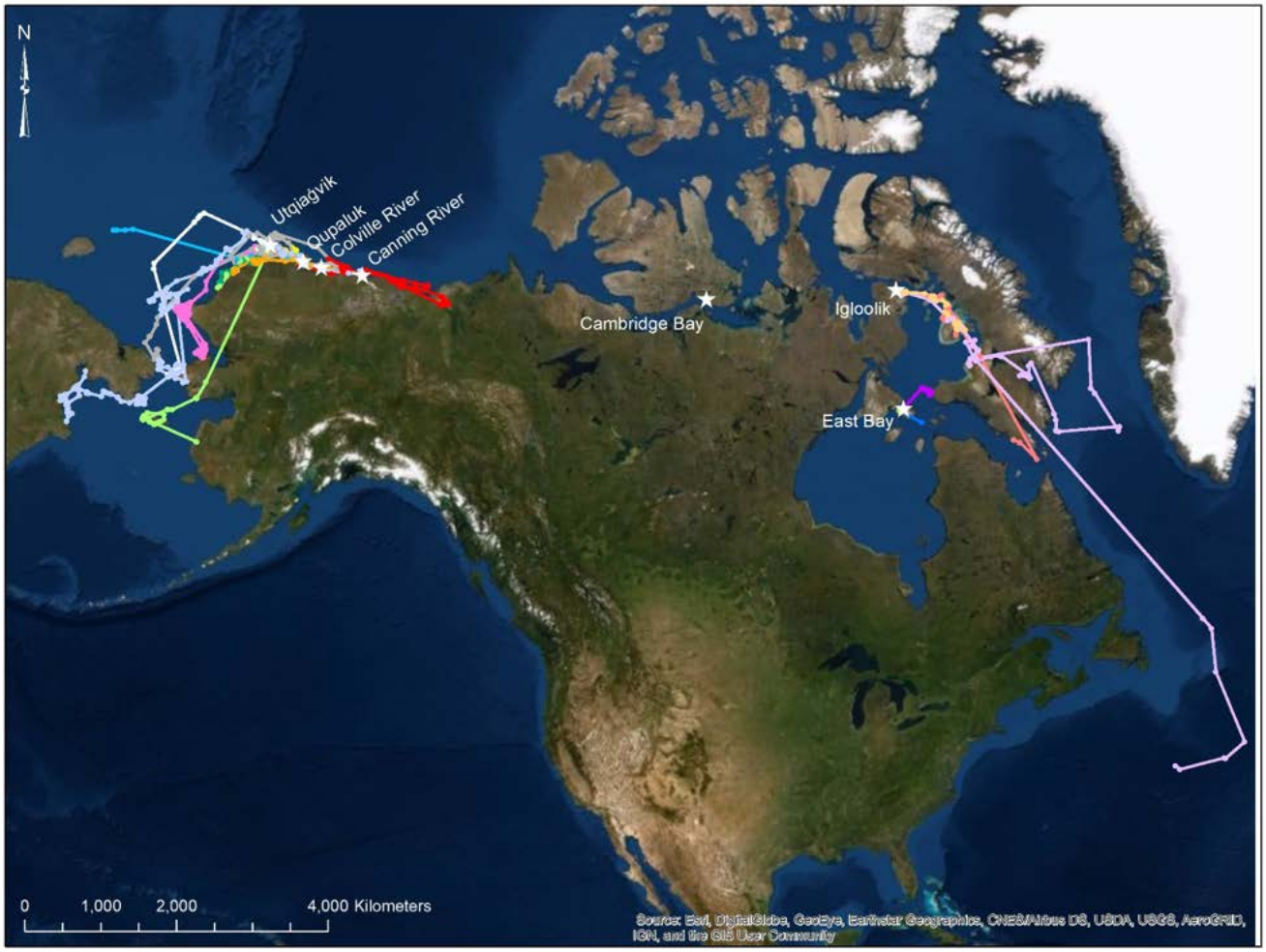


Figure 1. Movements of 21 male Red Phalaropes tracked with PTT Argos tags between 29 June and 15 October 2019. Individual birds have unique colors.

Red Phalarope with 2-g PTT tag flying over the water. Note the thin antenna. Photo courtesy of Shiloh Schulte.

#3 – MONITORING SHOREBIRD POPULATIONS ON THE ARCTIC NATIONAL WILDLIFE REFUGE

Investigators: Richard Lanctot, Chris Latty and Sarah Saalfeld, U.S. Fish and Wildlife Service; Lindall Kidd, Birdlife Australia, Stephen Brown and Shiloh Schulte, Manomet, Inc.; and Jim Lyons, U.S. Geological Survey

The Program for Regional and International Shorebird Monitoring (PRISM) seeks to (1) determine the distribution and abundance of breeding shorebirds, (2) collect information on shorebird-habitat associations, and (3) estimate population size and trends of shorebirds breeding in North America. In 2019, we initiated the first assessment of shorebird population size and distribution on the 1002 Area of the Arctic National Wildlife Refuge since it was initially surveyed in 2002 and 2004. These data will provide important baseline data on shorebird distribution and abundance before proposed oil and gas exploration occur, as well as provide the first estimates of shorebird population trends based on breeding ground surveys.

We randomly selected 16-ha sized plots in a stratified design with strata delineated by habitats that were expected to have different shorebird densities. The survey area included most of the 1002 Area of the Arctic National Wildlife Refuge, excluding private lands. We included all the areas identified as having high waterbird and shorebird diversity and abundance based on the 2002 and 2004 surveys, including the Canning River Delta, which is likely to be the first area developed for oil and gas due to its proximity to existing development. We also surveyed at lower intensity all habitats on the coastal plain, so that population estimates could be developed for the entire area. Each plot was surveyed by a single observer for 1 hour and 36 minutes using a rapid survey methodology. All shorebirds and their behaviors (especially territorial males) were mapped on a plot map. At the end of the survey, the observer tallied the number of suspected breeding pairs and total number of individual birds. Other bird species observed during surveys were noted on the data form.

In 2019, we surveyed 108 plots, of which, 54 were previously surveyed in 2002 and/or 2004. Within the 108 plots, we counted 681 individual shorebirds and waterfowl, representing 26 species. In addition, we incidentally noted an additional 29 species either in or near the plot boundaries. The most numerous species were Greater White-fronted Goose (31% of birds observed), Pectoral Sandpiper (18%), Semipalmated Sandpiper (10%), Northern Pintail (10%), Red-necked Phalarope (8%), Long-tailed Duck (6%), and American Golden-Plover (5%). In 2020, we will conduct an additional summer of PRISM surveys to improve our baseline estimates of shorebird population size and distribution; this information will help us assess future impacts to shorebird populations in the area should oil and gas development occur.

This study fulfills action items under the Research objective (i.e., “identify effects associated with energy production, mining, disturbance, and other anthropogenic activities on shorebirds”) and the Population Inventory and Monitoring objectives (i.e., “conduct long-term population monitoring efforts”) of the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019).

Field assistance for conducting this work in 2019 was provided by Metta McGarvey, Ethan Beal-Brown, Laura Benedict and Edward Hamlin. Funding or logistical support for this study was provided by the National Fish and Wildlife Foundation, Manomet, Inc., and the U.S. Fish and Wildlife Service (Migratory Bird Management, Arctic National Wildlife Refuge).

Location: 1002 Area of the Arctic National Wildlife Refuge.

Contact(s): Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: richard_lanctot@fws.gov, Phone: 907-786-3609

Pectoral Sandpiper seen while surveys on the 1002 Area of the Arctic National Wildlife Refuge in 2019. Photo courtesy of USFWS volunteer.

#4 – REPRODUCTIVE ECOLOGY OF SHOREBIRDS: STUDIES AT UTQIAĠVIK, ALASKA, IN 2019

Investigators: Richard Lanctot, U.S. Fish and Wildlife Service; Sarah Saalfeld, U. S. Fish and Wildlife Service

In 2019, we conducted the 17th year of a long-term shorebird study at Utqiaġvik (formerly Barrow), Alaska. The objectives of this study are to (1) collect baseline data on temporal and spatial variability of shorebird diversity and abundance, (2) collect information on nest initiation and effort, replacement clutch laying, clutch and egg size, nest and chick survival, and other demographic traits of Arctic-breeding shorebirds, (3) establish a marked population of as many shorebird species as possible that will allow us to estimate adult survival, mate and site fidelity, and natal philopatry, and (4) relate weather, food availability, and predator and prey abundances to shorebird productivity.

In 2019, the timing of snowmelt was fairly average, with 20% snow cover remaining on the tundra until 14 June, just 4 days later than the 17-year average of 10 June. Lemming numbers in 2019 were higher than the previous few years, but far below that experienced in 2008. However, despite the presence of lemmings, avian predator densities were moderate. Arctic foxes were fairly common, as fox trapping efforts were not conducted in 2019.

We located and monitored nests in six 36-ha plots in 2019. All six plots were the same as those sampled in 2018, with five of the six plots sampled since 2005; all plots were searched with the same intensity as in past years. A total of 285 nests were located on our plots, with an additional 79 nests found outside plot boundaries. Our total number of nests located on plots was average as compared to the prior 16 years where number of nests ranged from 75–506. Nests on plots included 131 Red Phalarope, 82 Pectoral Sandpiper, 24 Dunlin, 13 Semipalmated Sandpiper, 12 Red-necked Phalarope, 8 Long-billed Dowitcher, 6 American Golden-Plover, 6 Western Sandpiper, 2 White-rumped Sandpiper, and 1 Little Stint (the first record of this species nesting within the study plots). No Ruddy Turnstone, Baird's Sandpiper, or Buff-breasted Sandpiper nests were found on the plots in 2019. The breeding density of all shorebird species on our study area was 131.9 nests/km^2 in 2019; this was slightly more than our long-term average of 125.6 nests/km^2. In 2019, 5 species nested in slightly higher densities than the 17-year average (Little Stint, Pectoral Sandpiper, Red Phalarope, Red-necked Phalarope, and White-rumped Sandpiper); all others nested at densities below the 17-year average.

The first shorebird clutch was initiated on 30 May–3 days earlier than the long-term average of 2 June. Median initiation date was 14 June–1 day earlier than the long-term average. Median nest initiation dates for the more abundant species were 10 June for Dunlin, 12 June for Semipalmated Sandpiper, 13 June for Red Phalarope, and 16 June for Pectoral Sandpiper; all of which were within 1–2 days of their respective 17-year averages.

Predators destroyed 53.9% of the known-fate nests in 2019 (excluding human-caused mortalities). This is substantially greater than the long-term average of 34.4%, but similar to the 68.5% average for other years without fox control (2003, 2004, 2016, and 2017). Apparent hatching success (# hatching at least one young/total number of known-fate nests) was highest in White-rumped Sandpiper (100%), Semipalmated Sandpiper (61.5%), Western Sandpiper (50%), Dunlin (50%), Red-necked Phalarope (50%), and Red Phalarope (48.3%), and lowest in Pectoral Sandpiper (28.8%), Long-billed Dowitcher (28.6%), Little Stint (0%), and American Golden-plover (0%).

We captured and color-marked 251 adults located both on and off plots. This was slightly less than the 17-year average of 283. Twenty-five of these adults (17 Dunlin, 4 Red Phalarope, 2 Semipalmated Sandpiper, 1 Red-necked Phalarope, and 1 Pectoral Sandpiper) had been banded as adults in a prior year. Adults captured included 80 Red Phalarope, 63 Pectoral Sandpiper, 49 Dunlin, 16 Long-billed Dowitcher, 15 Semipalmated Sandpiper, 10 Western Sandpiper, 9 Red-necked Phalarope, 7 American Golden-plover, and 2 White-rumped Sandpiper. We also re-sighted 36 adults banded in prior years on our plots in 2019. This included 25 Dunlin, 6 Semipalmated Sandpiper, 3 American Golden-plover, and 2 Red Phalarope. We captured and color marked 244 chicks. This was less than the 17-year average of 497.

We continued to collect data for other Arctic-wide collaborations focused 1) tracking shorebirds during the post-breeding period (see Richard Lanctot entry), 2) evaluating the Program for Regional and International Shorebird Monitoring (see Jillian Cosgrove entry), and migratory connectivity of Dunlin (see Ben Lagasse' entry).

This study fulfills action items under the Research (i.e., "identify and determine the magnitude of factors limiting shorebird populations during breeding and nonbreeding periods of the annual cycle") and Population Inventory and Monitoring objectives (i.e., "conduct long-term population monitoring efforts") of the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019).

Field assistance for conducting this work was provided by Ben Lagassé (co-crew leader), Jillian Cosgrove (co-crew leader), Lindsay Hermanns (co-crew leader), Jason Loghry, Tim Baerwald, Don Cecile, Sam Stone, and Molly Tuma. The National Fish and Wildlife Foundation, Manomet, Inc., and USFWS (Migratory Bird Management, Science Applications) provided funding.

Location: Utqiaġvik (formerly Barrow), Alaska, North Slope, 71.29°N, 156.64°W

Contact: Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: richard_lanctot@fws.gov, Phone: 907-786-3609

Figure 1. Banded Dunlin resighted on plot. Photo courtesy of Tim Baerwald.

Figure 2. Little Stint nesting on plot. Photo courtesy of Ben Lagassé.

#5 – MOVEMENT PATTERNS AND HABITAT USE OF TUNDRA-BREEDING SHOREBIRDS DURING POST-BREEDING AND SOUTHBOUND MIGRATION

Investigators: Richard Lanctot, Chris Latty, Sarah Hoepfner, and Sarah Saalfeld, U.S. Fish and Wildlife Service; Stephen Brown and Shiloh Schulte, Manomet, Inc.; Lindall Kidd, Birdlife Australia; Rebecca McGuire and Martin Robards, Wildlife Conservation Society; Joël Bêty, Université du Québec à Rimouski; Marie-Andrée Giroux, Nicolas Lecomte, and Audrey Bédard, Université de Moncton; Peter Marra, Smithsonian Conservation Biology Institute; J.F. Lamarre, Polar Knowledge Canada; and Paul Smith and Willow English, Environment and Climate Change Canada

To better understand shorebird post-breeding movements and habitat use along the Arctic Coast, we initiated a multi-year GPS tracking project in 2017. This effort continued in 2018 and 2019. The objective of this study is to gather baseline information on shorebird use of coastal regions, and to understand how climate-mediated and development-related habitat change is likely to affect shorebirds. The study strives to better understand the inter-connectedness of breeding and stopover sites, as well as residency time and movements among stopover sites.

During the 2019 field season, we deployed 4–5 g GPS PinPoint tags manufactured by Lotek Wireless on 18 Pectoral Sandpipers and 34 American Golden-Plovers at five breeding sites along the Arctic Coastal Plain of Alaska (Nome, Utqiaġvik, Qupałuk, Prudhoe Bay, and Katakturuk) and four sites in Canada (Cambridge Bay, East Bay, Igloolik, and Bylot Island, see map and photo below). These tags collected and transmitted to satellites GPS-quality location data during both the post-breeding season (June–October), as well as throughout the southbound migration and early wintering period. These tags provided high accuracy locations of the birds every one or two days, depending on the species. This project provides some of the best information on post-breeding and southbound migration ever recorded for these species. Examples of movements can be found on movebank.org – use the browse tracks function and search for "Arctic Shorebird Migration Tracking study - <<species name>>." Please do not use this information without first asking the authors.

For each tagged individual, we also collected information on reproduction that can be related to migration patterns. Additionally, we collected feather samples for each tagged individual, allowing us to genetically sex birds, and in future studies, assess stress levels from winter-grown feathers that can be related to migration patterns and productivity. In 2020, we plan to deploy more tags to continue monitoring the post-breeding movements and habitat use of these species.

This study fulfills action items under the Research (i.e., "determine migratory timing, routes, and site use of shorebirds"), Habitat Management and Protection (i.e., "apply abundance and distribution information to identify key shorebird habitats and sites"), and International Collaboration objectives (i.e., "foster and participate in cooperative research and monitoring efforts throughout species' ranges") of the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019).

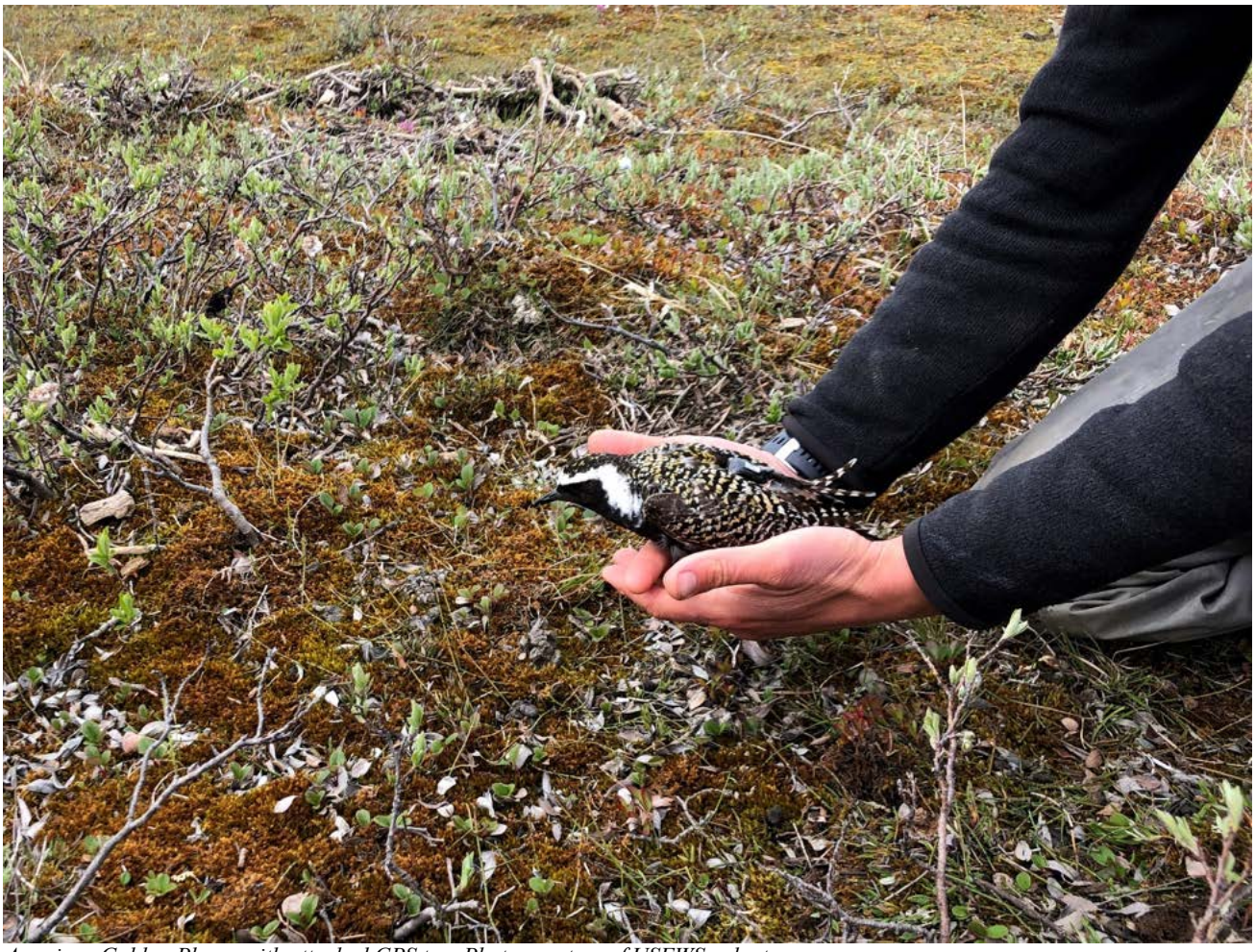
Field assistance for deploying tags in 2019 was provided by Tim Guida at Nome; Jillian Cosgrove, Lindsay Hermanns, Peter Detwiler, Dan Catlin, and Sam Stone at Utqiaġvik; Peter Detwiler at Qupałuk; Aaron Hulsey and Karla Varinia Sagastume Pinto at Prudhoe Bay; Metta McGarvey at Katakturuk; Alysha Wilson Maksagak and Emma Sutherland at Cambridge Bay; Ariel Lenske at East Bay; Marianne Gousy-Leblanc, Sylvain Christin, Cléa Frapin, Mathieu Archambault, Tommy O'Neil Sanger, Zhiwei Zhang, and Mike Qrunnut at Igloolik, and

Joasie Ootovak at Bylot Island. Funding to purchase and receive data from tags was provided by the Neotropical Migratory Bird Conservation Program; Manomet, Inc.; U.S. Fish and Wildlife Service (Arctic National Wildlife Refuge, Migratory Bird Management); Polar Knowledge Canada; Environment and Climate Change Canada; and the Wildlife Conservation Society. Logistical support to work at the nine sites was provided by a large number of organizations not listed here.

Location: Cross-Arctic project with multiple study sites located at Nome, Utqiaġvik, Qupałuk, Prudhoe Bay, and Katakturuk in Alaska, and Cambridge Bay, East Bay, Igloolik, and Bylot Island in Canada.

Contact(s): Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: richard_lanctot@fws.gov, Phone: 907-786-3609

Deployment location of GPS tags on Pectoral Sandpiper (PESA), and American Golden-Plover (AMGP) in 2019. PTT tags were also placed on Red Phalaropes (REPH, see another entry by Lanctot et al.).



American Golden-Plover with attached GPS tag. Photo courtesy of USFWS volunteer.

#6 – MONITORING AVIAN NEST SURVIVAL ON THE ARCTIC NATIONAL WILDLIFE REFUGE

Investigators: Richard Lanctot, Chris Latty, Kristine Sowl, Jordan Muir, Sarah Hoepfner, and Sarah Saalfeld, U.S. Fish and Wildlife Service; Lindall Kidd, Birdlife Australia; and Stephen Brown and Shiloh Schulte, Manomet, Inc.

Proposed oil and gas development in the Arctic National Wildlife Refuge is expected to have both direct and indirect impacts on avian nest survival. In 2019, we initiated the first landscape level assessment of avian nest survival in the Arctic to provide baseline data on shorebird nest survival rates prior to any oil and gas development. To do this, we used a combination of nest tags that measure incubation temperature and nest cameras to identify predators. Together these tools allowed us to obtain the first measure of avian nest survival and predator regimes across the northwestern portion of the 1002 Area of the Arctic National Wildlife Refuge (area above the Marsh Creek Anticline).

In June of 2019, we visited 27 plots using a R44 helicopter and searched for shorebird and waterfowl nests. Within these plots, we found 82 nests, representing 13 species. For all nests, we floated eggs to estimate embryo age and installed a small temperature logger in 64 nests to determine the duration the nest was active and its fate (the remaining nests were either near or at hatch). We also placed a camera at 26 randomly assigned nests to identify predators. These devices were retrieved in August during a separate helicopter flight to each plot. Because nest success depends on a large number of factors, we recorded other environmental variables at all sites (e.g., evidence of lemming activity, avian predators). From the camera footage, we documented 3 predator species, including Arctic fox, wolverine, and Sandhill Crane. In 2020, we will conduct an additional summer of nest survival work to improve our estimates of baseline nest survival rates and predators that will help assess future impacts to shorebird populations in the area should oil and gas development occur.

This study fulfills an action item under the Research objectives (i.e., “identify effects associated with energy production, mining, disturbance, and other anthropogenic activities on shorebirds”) of the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019).

Field assistance for conducting this work was provided by Metta McGarvey, Don Cecile, Ethan Beal-Brown, Laura Benedict and Edward Hamlin. Funding or logistical support for this study was provided by the National Fish and Wildlife Foundation, Manomet, Inc. and the U.S. Fish and Wildlife Service (National Wildlife Refuge’s Regional Inventory and Monitoring Program, Science Applications Division, Migratory Bird Management Division, and the Arctic National Wildlife Refuge).

Location: 1002 Area of the Arctic National Wildlife Refuge.

Contact(s): Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, AK 99503, Email: richard_lanctot@fws.gov, Phone: 907-786-3609

Shiloh Schulte installing nest camera on the 1002 Area of the Arctic National Wildlife Refuge in 2019. Photo courtesy of USFWS volunteer.

#7 – LONG-TERM MONITORING OF BLACK OYSTERCATCHERS IN THE GULF OF ALASKA

Investigators: Brian Robinson and Daniel Esler, U.S. Geological Survey; Heather Coletti, National Park Service

The Gulf Watch Alaska nearshore program monitors ecologically important species and key physical parameters in the nearshore marine environment (Fig. 1). These species include sea ducks, sea otters, intertidal invertebrates, and Black Oystercatchers. Monitoring of Black Oystercatchers began in 2006 and has been done nearly yearly in three sampling blocks: Katmai National Park and Preserve, Kenai Fjords National Park, and western Prince William Sound. In 2018 and 2019, we expanded our monitoring efforts to include Kachemak Bay. In each block, surveys are conducted along four or five transects to determine nest density, productivity, and chick diet. We estimate species composition and size distributions of prey fed to chicks by collecting and measuring all prey remains found near a nest, indicative of adults provisioning their offspring. Here we present preliminary results.

In 2019, we located a total of 32 nests within the four sampling blocks. Nest density this year ranged from 0.06 to 0.22 nests per km of shoreline, with the highest density in Katmai National Park and Preserve. Productivity (number of eggs + chicks / nest) was highest (2.6 ± 0.16; mean ± SE; n = 9) in Kachemak Bay and lowest (0.94 ± 0.38; n = 8) in Kenai Fjords National Park. We collected 1895 prey items from nests in 2019, representing 22 different taxa. While chick diet varied by block and transect, overall it was dominated by two species of limpets (*Lottia pelta, L. persona*); together they made up 78% of the diet in 2019 and have dominated diet throughout the 12 years of sampling. The Pacific blue mussel (*Mytilus trossulus*) and black katy chiton (*Katharina tunicata*) represented much smaller proportions in the diet (7% and 2%, respectively). Long-term monitoring of Black Oystercatchers provides an opportunity to understand how a top-level predator in the intertidal food web may respond to changes in a highly dynamic ecosystem.

This year, we initiated a migration study that compliments our Black Oystercatcher long-term monitoring. See the summary entitled “Black Oystercatcher Movement Ecology” for more details.

Contact: Brian Robinson, Alaska Science Center, U.S. Geological Survey, 4210 University Drive, 907-786-7058, brobinson@usgs.gov

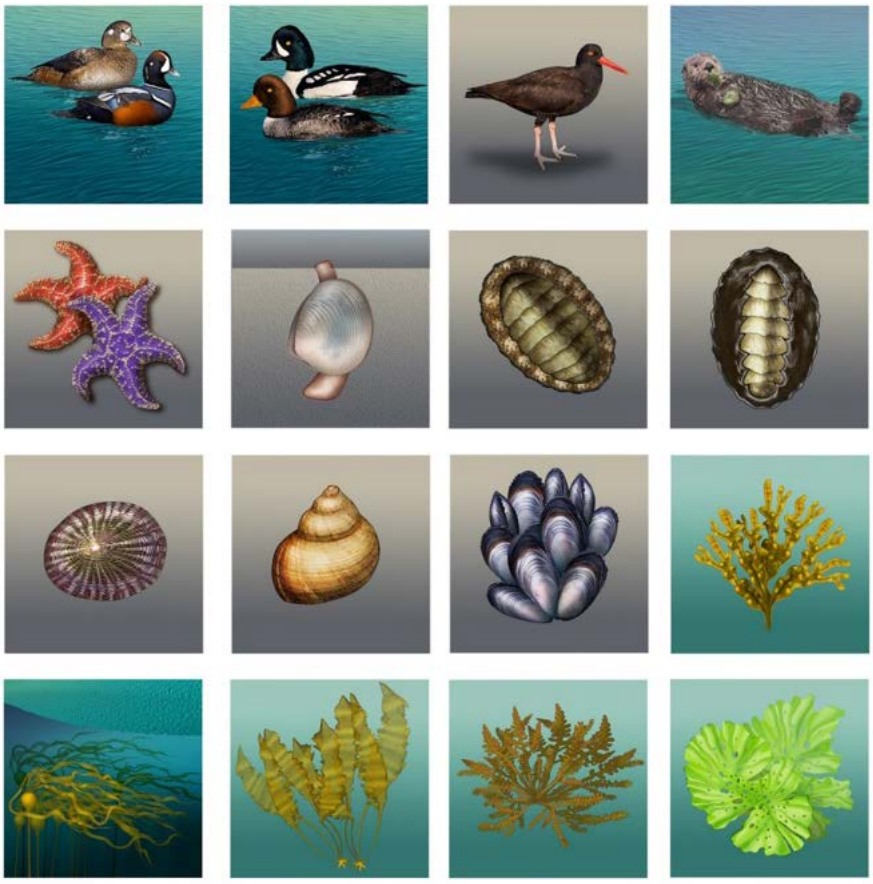


Figure 1. The Black Oystercatcher is one of many ecologically important species in the nearshore marine ecosystem that is monitored by Gulf Watch Alaska.

#8 – COPPER RIVER DELTA SHOREBIRD FESTIVAL

Investigators: Erin Cooper & Melissa Gabrielson, USDA Forest Service, Cordova, Alaska

The Copper River Delta is the largest contiguous wetland on North America's Pacific Coast; and is designated as a hemispheric site by the Western Hemisphere Shorebird Reserve Network. The Copper River Delta Shorebird Festival focuses on educating the public about birds (specifically shorebirds), bird conservation, and bird life cycles and strategies through a variety of activities, classes, crafts, and workshops.
The festival meets objectives listed under Environmental Education and Public Outreach of the Alaska Shorebird Conservation Plan; to raise the profile of Alaska's shorebirds by supporting shorebird festivals in Alaska and by collaborating with education programs on the Copper River Delta and elsewhere.

The 29th annual Copper River Delta Shorebird Festival was held on May 2-5, 2019. This year's festival featured a variety of guest speakers. Erin Cooper, from the Chugach Nations Forest, presented on the landscape and ecology of the Copper River Delta. César Guerrero from Terra Peninsular, in Baja California, Mexico presented on San Quintin Bay and human connections to migratory birds. The keynote speaker was Peter Dunn who is the former Director of the Cape May Bird Observatory and founder of the World Series of Birding. Known as the 'bard of birding' Peter shared his tales of birding gone awry. Denali National Park avian ecologist Emily Williams presented on the Park's long-term study of Canada Jays (formerly known as Gray Jays), examining their resilience against climate change. Visiting artist Zack McLaughlin of Paper & Wood in London, England showcased his incredibly detailed paper bird sculptures in the Cordova Museum and Copper River Gallery. He presented on opening night of the festival and lead 3 paper bird sculpting workshops presented by the Net Loft.

Expert guides led daily field trips to Alaganik Slough as well as high tide birding at Hartney Bay. Alaska Audubon offered a Shorebird Identification class and a Birders' Trivia Night. A two-part workshop occurred with local biologist and photographer, Milo Burcham, on Photographing Bird Life. There were a variety of kid friendly activities hosted by the Prince William Sound Science Center and the Net Loft offered a selection of fiber art workshops.

New this year was a partnership with Lazy Otter Charters out of Whitter, Alaska, who brought festival attendees across Prince William Sound on a round trip cruise to and from the festival. In addition, four charters took attendees out on boats for bird viewing.

The 2019 festival had the second greatest attendance on record for the festival with 165 full festival registrants. Attendees traveled from within Alaska, all over the United States, and abroad. In total 55% of attendees were from Alaska—18% locally from Cordova—and 27% from the contiguous United States.

The Copper River Delta Shorebird Festival is a collaborative event with partners from the Cordova Chamber of Commerce, Chugach National Forest-Cordova Ranger District, Prince William Sound Science Center, and the Net Loft. Additional support occurred from Eyak Corporation, BP Alaska, Alyeska Pipeline Service Company, Alaska Airlines, Camp Denali, Alaska Audubon, local volunteers, and numerous local businesses.

https://www.coppershorebird.com/ to view 2019 schedule and information regarding the 2020 event.

Location: Copper River Delta: 60° 22.7'N, 145° 53.6'W

Contact: Melissa Gabrielson, U.S. Forest Service, Chugach National Forest, Cordova Ranger District; PO Box 280, Cordova, AK 99574; Phone: (907) 424-7661 x 243; Email: melissa.l.gabrielson@usda.gov

Viewing shorebirds at Hartney Bay. Photo courtesy of Evan Ward, Ducks Unlimited/USFS

Ruddy Turnstone showcased at Birds By Hand exhibit made by Zack McLaughlin of Paper & Wood in London, England. Photo courtesy of Melissa Gabrielson, USFS

#9 – COPPER RIVER DELTA SHOREBIRD SURVEYS

Investigators: Investigators: Gabriela Judd, Environment for the Americas Intern, Erin Cooper, & Melissa Gabrielson, USDA Forest Service, Cordova, Alaska

From South American wetlands to Arctic tundra, millions of shorebirds in the Pacific Flyway depend on these diverse ecosystems (Pacific Flyway 2015). Coastal wetlands are one such ecosystem. Coastal wetlands provide critical habitat to support a vast array of species (Barbier 2019). The Copper River Delta, Alaska is the largest contiguous coastal wetland system along the West Coast of North America (Powers et al. 2002). It has been distinguished as having "hemispheric importance" by the Western Hemisphere Shorebird Reserve Network because of the thousands of shorebirds it welcomes and supports each spring (Handmaker 2019). Shorebirds depend on stop-over sites like the Copper River Delta to replenish resources needed to continue their energetically expensive migration. The delta's biofilm and benthic macroinvertebrates provide a critical food source for shorebirds that restores the fat reserves they need to migrate (Powers et al. 2002) to their breeding grounds. Because of this use, shorebirds may be used as an indicator species of coastal wetlands, like the Copper River Delta, to inform conservation efforts of shorebirds and coastal wetland ecosystems (Ogden et al. 2014). These surveys meet objectives listed under Environmental Education and Public Outreach and Population Monitoring of the Alaska Shorebird Conservation Plan.

The Copper River Delta also provides many ecosystem services to humans. Each year the town of Cordova celebrates the influx of shorebirds with the Copper River Delta Shorebird Festival. This festival creates economic revenue for the community, while birders and community members alike learn of the biological and ecological importance of the Copper River Delta. The United States Forest Service (USFS) partners with Environment For the Americas (EFTA), to bring an intern to Cordova to assist with the festival and conduct Pacific Flyway Shorebird Surveys.

Hosted by Point Blue Conservation, the Pacific Flyway Shorebird Surveys is part of the Migratory Shorebird Project which spans 10 different countries along the flyway from Canada to Peru. All data is stored in the California Avian Data Center and is used to monitor species population trends, risks, and habitat dependency (Point Blue Conservation Science). The data is collected by both professional biologists and citizen scientists and is available online to provide accessible, interactive information to better inform management objectives and conservation efforts. The Pacific Flyway Shorebird Survey aims to provide information to conserve shorebird habitats that are vulnerable to environmental change.

The Pacific Shorebird Survey in Cordova, Alaska is conducted at three sites - Odiak Slough (Figure 1), Three Mile Bay (Figure 2), and Hartney Bay (Figure 3). All three sites are tidal mudflats used by spring migrating shorebirds that are easily accessible from the road system. Shorebirds forage on the macroinvertebrates of these tidal mudflats at low tide and roost on the vegetated areas through the high tide. The survey is conducted once every day May 1st through May 16th to document peak migration and shorebird use of the Copper River Delta at the three sites.

A total of 105,136 shorebirds were counted in the three designated survey sites: Odiak Slough, 3 Mile Bay, and Hartney Bay in 2019. This total was less than the 2018 (133,324) but more than 2017 (229,582) but greater than

2016 (51,681). Peak abundance in 2019 took place on May 11 (24,166 shorebirds). This was approximately four days later than the average peak abundance across years (Figure 1).

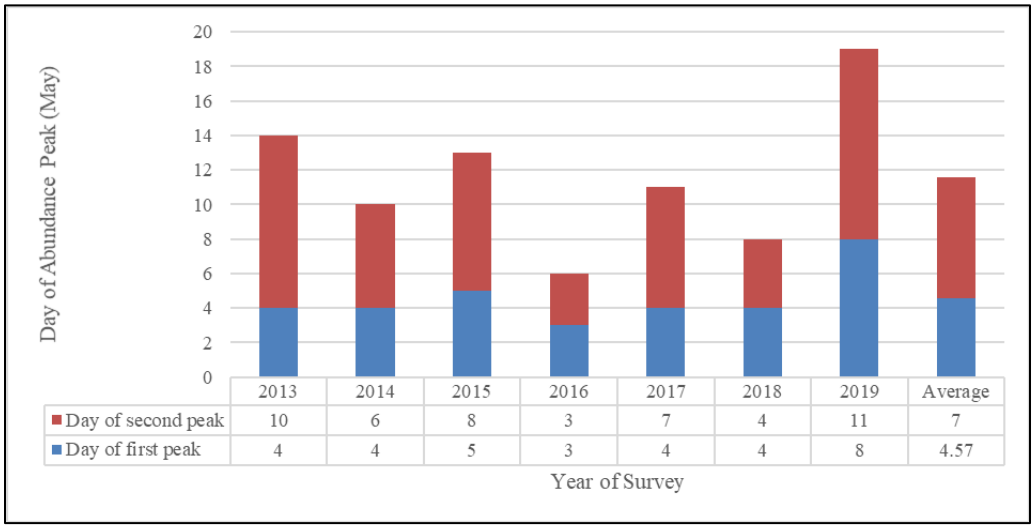


Figure 2. Timing of peak abundance during the Pacific Flyway Shorebird Survey (2013-2019).

Typically, each year's data shows an influx of two dramatic abundance peaks. These peaks are indicators of migration timing and total abundance of shorebirds within a given year. The first influx of shorebirds in 2019 occurred on May 8 with 14,414 birds. The second influx occurred during May 11 with 24,166 birds (Figure 2). Both dates in 2019 were later than previous years (2013-2019) (Figure 1). This could be due to several factors including retention of fat reserves, weather conditions, and food abundance (Hulbert 2016). It is difficult to know how these selective pressures and changes in climate directly influence the arrival of shorebirds.

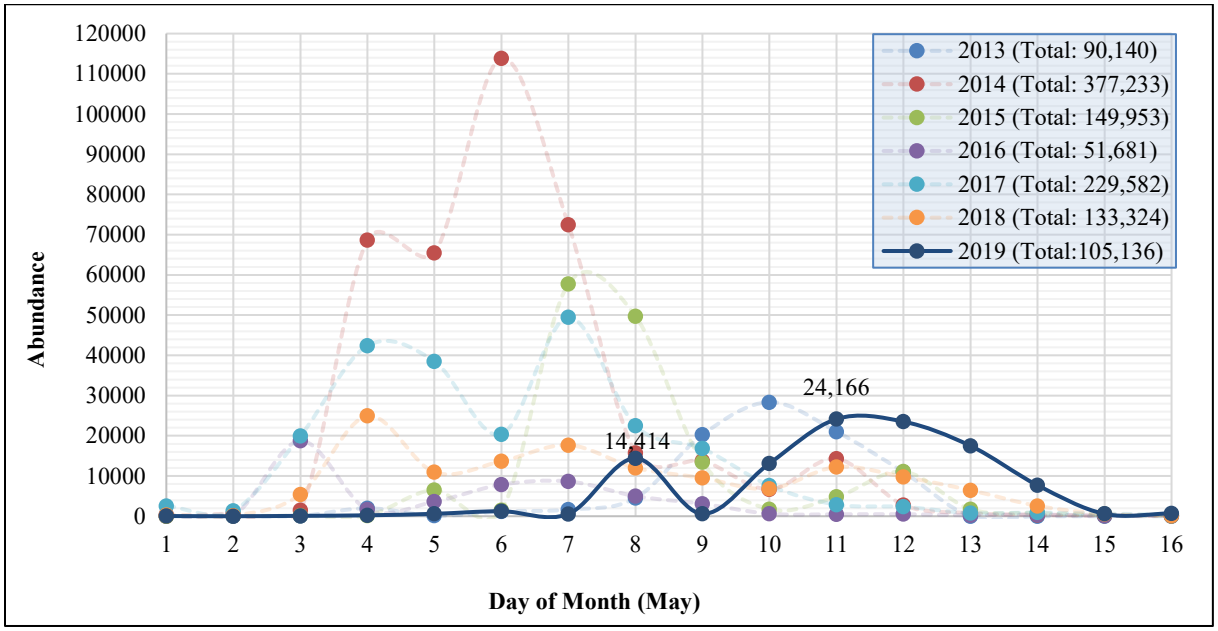


Figure 3. Shorebird abundance per day for 2013 thru 2019 of the Pacific Flyway Shorebird Survey conducted in Cordova, Alaska.

When comparing the annual abundance of shorebirds to average annual temperature during 2019 survey period, the trend line shows a gradual decline of annual average temperature (Figure 3). The annual abundance

trendline (Figure 3) also shows a decrease across years. Though these trendlines show basic shifts of temperature and abundance, a more robust, historical data set is needed to make reliable assumptions and hypothesis about overall change in abundance and temperature.

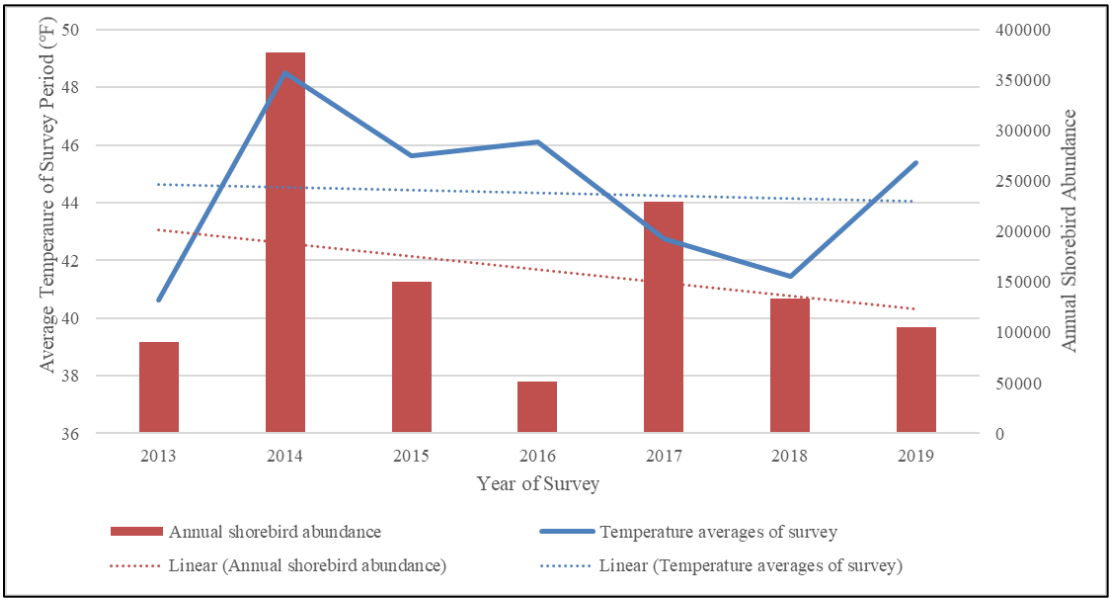


Figure 4. Comparison of annual temperature of the Pacific Flyway Shorebird Survey period, May 1-16, to annual shorebird abundance of years 2013-2019. Temperature data from www.wunderground.com.

The most abundant shorebird species in 2019 was the mixed flocks of Western/Least sandpipers (Figure 4) with a total of 66,705 or 63% of the total amount of shorebirds during the survey. The second most abundant shorebird was Western sandpipers with a total of 20,250 or 19%. The third most abundant shorebird was Dunlin with a total of 13,264 or 12%. Mixed flocks of Western/Least and Dunlin represented 2% and Least sandpipers 1% of the total shorebirds counted (Figure 4).

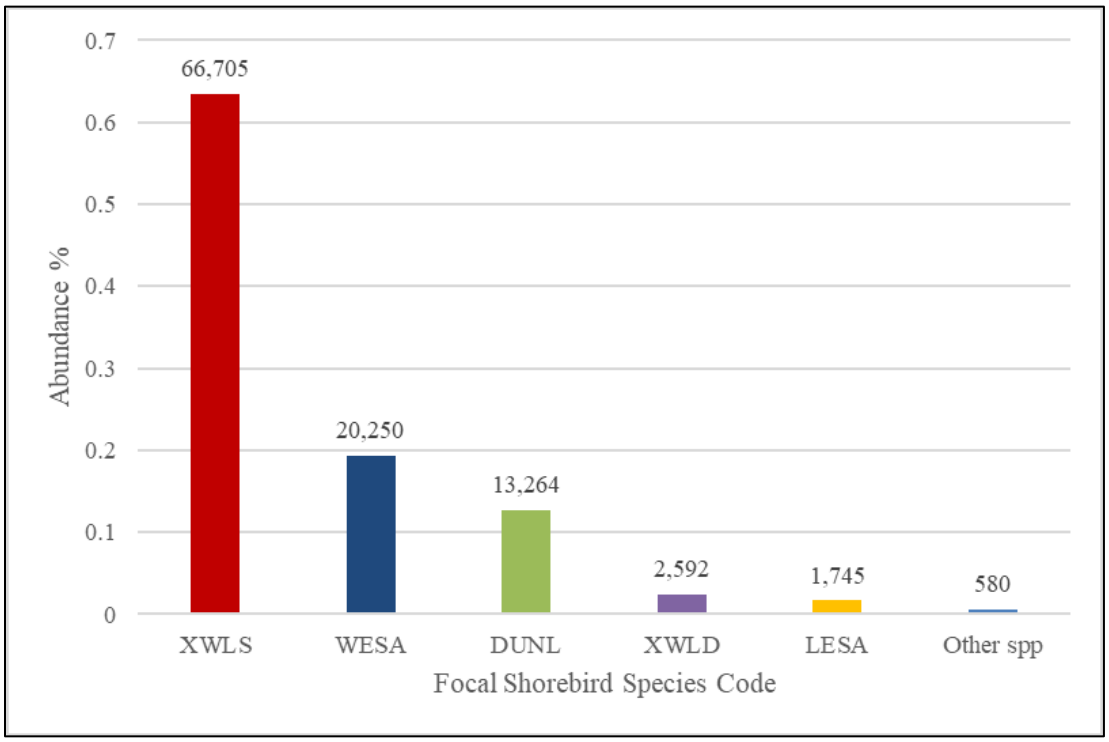


Figure 5. List of shorebird focal species abundance during the 2019 Pacific Flyway Shorebird Survey conducted in Cordova, Alaska.

Location: Copper River Delta: 60° 22.7'N, 145° 53.6'W

Contact: Melissa Gabrielson, U.S. Forest Service, Chugach National Forest, Cordova Ranger District; PO Box 280, Cordova, AK 99574; Phone: (907) 424-7661 x 243; Email: melissa.l.gabrielson@usda.gov

Environment for the Americas intern, Gabriela Judd, surveys for shorebirds at Hartney Bay. Photo courtesy of Melissa Gabrielson, USFS

#10 – BLACK OYSTERCATCHER SURVEYS

Investigators: Melissa Gabrielson & Erin Cooper, USDA Forest Service, Cordova, Alaska

Black oystercatchers (*Haematopus bachmani*) are large, long-lived shorebirds that are dependent on marine shorelines throughout their lifecycle (Tessler et al. 2007). Approximately 65% of the world's black oystercatcher population resides in Alaska (Andres and Falxa 1995, Brown et al. 2001) along the rocky shorelines and islets of Prince William Sound (Isleib and Kessel 1973). These birds forage exclusively on marine invertebrates in the intertidal zone (Tessler et al. 2007, Andres 1994).

Currently, human activity in Prince William Sound is projected to increase in proportion with the demand for access, tourism, and recreation activities. Most recreation activities are concentrated along shoreline habitats preferred by nesting black oystercatchers (Poe et al. 2009). Black oystercatchers have high site fidelity and return to the same area each year, but disturbance can cause them to abandon an area (Andres and Falxa 1995) or lead to nest failure (Poe et al. 2013). Black oystercatcher nest failure rates tend to be elevated in areas accessible by humans, presumably due to increased levels of disturbance (E. Elliot-Smith, cited as personal communication in Tessler et al. 2010). Disturbance includes walking and camping along shorelines occupied by nesting black oystercatchers. This activity can attract predators such as ravens, bald eagles, and gulls leading to inadvertent nest and egg destruction (Poe et al. 2009). Increased use of shorelines by kayakers, private vessels, and sightseeing ships can cause enough disturbance to result in nest abandonment and reduced breeding effort (Tessler et al. 2014). In addition, boat wakes, generated during high tides, by recreation and commercial vessels can create waves that wash away shoreline nests, resulting in lower fitness for the species (Tessler et al. 2014). Hence, the projected increase of human activity in Prince William Sound may pose a threat to the black oystercatcher population.

Black oystercatchers are considered a keystone species along the North Pacific coast (Tessler et al. 2007). They are listed as a "Species of High Concern" in the U.S. Shorebird Conservation Plan (Brown et al. 2001) and the Alaskan Shorebird Conservation Plan (Alaska Shorebird Group 2018), a "Focal Species" for the U.S. Fish & Wildlife Service (USFWS 2011), a "Management Indicator Species" for the Chugach National Forest (USDA 2002), and a "Sensitive Species" for the U.S. Forest Service, Alaska Region (Goldstein et al. 2009).

The Chugach National Forest Plan direction for black oystercatchers, as a management indicator species, is to monitor population trends, habitat characteristics, and habitat changes in Prince William Sound (USDA 2002, USDA 2011). The Chugach National Forest has been monitoring black oystercatchers in Prince William Sound since 1999. By monitoring black oystercatcher populations and human activity in Prince William Sound, the USDA Forest Service can locate shorelines that may be sensitive to disturbance. Resource managers can than make informed decisions and require preventative management actions as needed.

Black oystercatcher surveys are conducted during peak nesting season May 26 thru June 14. Twenty-eight survey sites were systematically chosen from the Chugach National Forest shoreline in Prince William Sound. Each survey site includes 2, 10 km transects that meet at a randomly selected center point. Within a given year, 8 or 9 of these survey sites are monitored.

Sites are surveyed within 2 hours of high tide from a small skiff traveling <5 knots and 10-15 meters from shore. Standardized datasheets are used. Data collected includes transect ID, name of observers, date, start and stop time, weather conditions, and total number of black oystercatchers observed. Additional information on weather, nesting habitat, eggs, and chicks are also recorded.

In June 2019, a total of 8 sites were surveyed in Prince William Sound including: Green Island, Lower Herring Bay, Eleanor Island, College Fjord, Unakwik, Rocky Point, Gravina Point, and Simpson Bay (Figure 1).

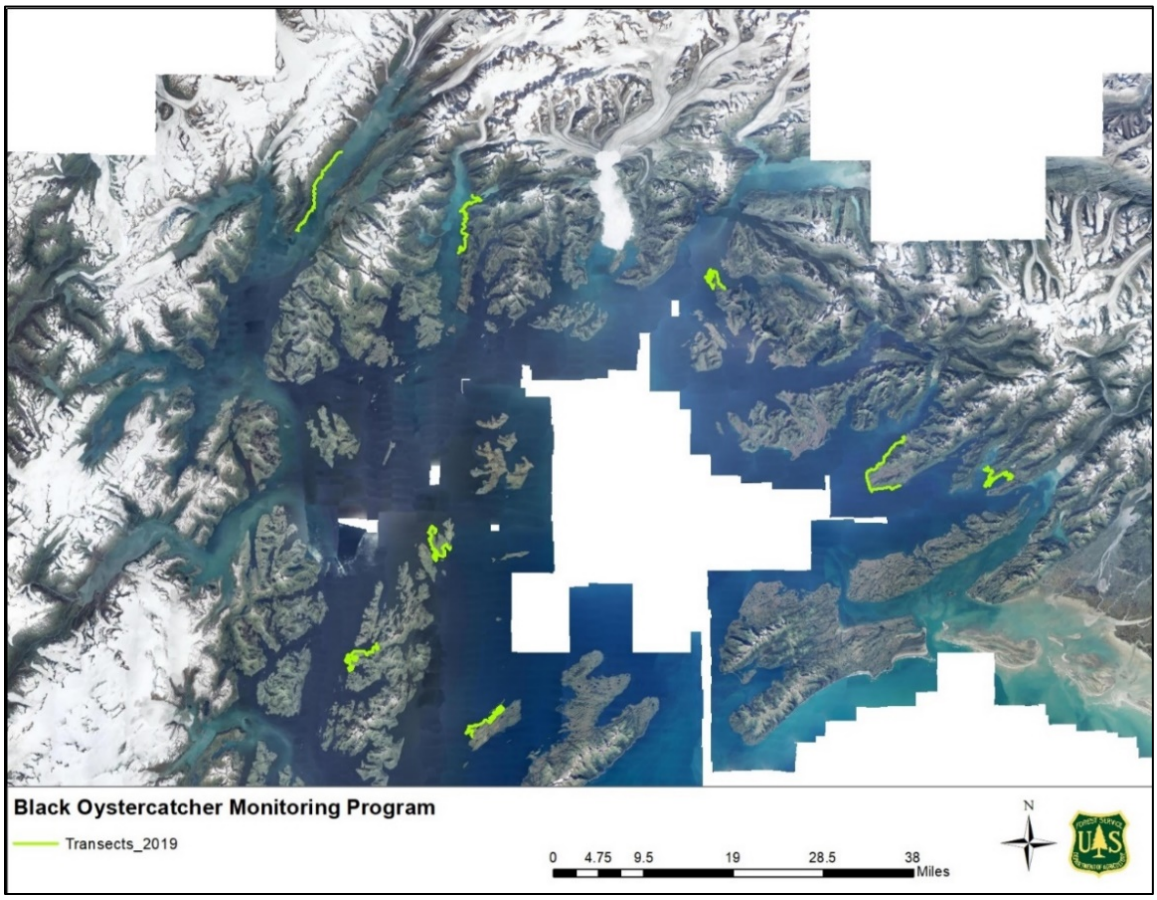


Figure 1. Black oystercatcher transects monitored during 2019 survey in Prince William Sound.

A total of 37 black oystercatcher encounters were documented during the 2019 survey. The greatest number of black oystercatcher encounters (n=12) occurred at Green Island (Table 1). This included both breeding and non-breeding black oystercatchers

Table 1. Summary results for 2019 black oystercatcher surveys in Prince William Sound.

Survey Sites	Total Encounters	Total Adults	Active Nests	Total Eggs	Total Chicks	Nesting Territories
Green Island	12	23	3	8	0	9
Lower Herring	6	10	2	6	0	4
Eleanor Island	0	0	0	0	0	0
College	6	11	2	4	0	5
Unakwik	4	8	1	3	0	4
Rocky Point	5	9	3	8	0	5
Gravina Point	2	3	0	0	0	0
Simpson Bay	2	4	2	2	0	2
Total	**37**	**68**	**13**	**31**	**0**	**29**
Range (Min-Max)	**(0-12)**	**(0-23)**	**(0-3)**	**(0-8)**	**(0-0)**	**(0-9)**
Mean	**4.6**	**8.5**	**1.6**	**3.9**	**0.0**	**3.6**

A total of 68 adults (29 breeding and 39 non-breeding), 13 active nests, and 31 total eggs (Table 1) were observed in 2019. The highest number of adult black oystercatchers were observed at Green Island (n = 23). This included both breeding and non-breeding black oystercatchers. A total of 3 active nests and 8 eggs were found at both Green Island and Rocky Point (Table 1). At least 1 breeding pair at Simpson Bay displayed behavior that indicated chicks were present. However, no chicks were found.

One of the objectives of this survey is to monitor the density of black oystercatcher nesting territories. The term nesting territory indicates evidence of a breeding pair occupying a stretch of shoreline. In 2019, 29 nesting territories were observed.

Data from the 2019 survey will be entered into the Chugach National Forest black oystercatcher database. Future analysis will compare the effects of human activity on black oystercatcher populations across Prince William Sound.

Location: Prince William Sound: multiple locations.

Contact(s): Melissa Gabrielson, U.S. Forest Service, Chugach National Forest, Cordova Ranger District; PO Box 280, Cordova, AK 99574; Phone: (907) 424-7661 x 243; Email: melissa.l.gabrielson@usda.gov

Black oystercatcher observed during 2019 surveys in Prince William Sound. Photo courtesy of Heather Thamm, USFS.

#11 - MATING SYSTEM AND MIGRATION STRATEGY OF LONG-BILLED DOWITCHERS (LIMNODROMUS SCOLOPACEUS)

Investigators: Eunbi Kwon, Bart Kempenaers, Mihai Valcu, Max Planck Institute for Ornithology - Department of Behavioural Ecology & Evolutionary Genetics; Richard Lanctot, U.S. Fish and Wildlife Service

Shorebird reproductive strategies are frequently divided into 'conservative' and 'opportunistic' modes of adapting to the Arctic environment. **'*Conservative breeders*'** are often faithful to specific breeding locations and their previous mates, breed early in the season, and provide biparental care to offspring. On the other hand, **'*opportunistic breeders*'**, ranging from sequential polygamy to being promiscuous, are less faithful to breeding locations, tend to breed later in the season, and provide uniparental care. However, the Long-billed Dowitchers are one of the rare exceptions to the rule and exhibit traits of both strategies: a conservative breeding strategy of monogamy and bi-parental care as well as an opportunistic settlement strategy of no affinity to breeding locations across years and hence likely low mate fidelity. Aims of our project are to use the Long-billed Dowitchers as the study system to answer the following questions: how does this relatively rare intermediate strategy maintain monogamy with no site fidelity? Why are Long-billed Dowitchers monogamous when their settlement strategy is seemingly opportunistic? And, does the opportunistic settlement strategy promote flexible search for a better breeding condition?

In 2019, we found and monitored 26 nests of Long-billed Dowitchers in Utqiaġvik, Alaska. We captured 50 adult birds on 35 nests (the 26 nests monitored, and an additional 9 nests found on the long-term study plots of U.S. Fish and Wildlife Service), using either a bownet or dropping a mistnet on an incubating bird. To test whether the species shows any affinity to a stopover or a wintering location outside of their breeding period, we deployed 2g Solar Argos PTT-100 satellite transmitters (Microwave Telemetry Inc.) with leg-loop harnesses on both males and females of 21 mated pairs and 6 additional breeders. On the 26 nests that we monitored, nine nests hatched at least one chick. To conduct a parentage analysis and check for extra-pair paternity, we collected blood samples from 32 hatchlings and tissue samples from 19 unhatched eggs. Although Long-billed Dowitchers are prone to deserting their clutch upon disturbance, the rate of nest abandonment was relatively low even after we banded both parents on a nest (11% or 4 out of 35 nests were abandoned in 2019).

We will continue to monitor the location of tagged birds through their wintering and north-bound migration in 2020. We plan to collect more field data in Utqiaġvik in 2020, with a special focus on 1) the local movement of breeders while they are on a break from incubating the eggs and 2) the role of female breeders in tending their broods. Although the Long-billed Dowitcher is not a species of high conservation concern, very little research has been conducted on the species (Alaska Shorebird Conservation Plan, 2019). Our planned study will provide data-driven knowledge on their basic breeding biology and migration strategy, that are important to meet many of the conservation objectives. Especially, our results will directly meet the primary conservation objective of 'determining the migratory timing, routes, and site use of shorebirds between and during pre-breeding, breeding, and post-breeding stages (Alaska Shorebird Conservation Plan, 2019)'.

Location: Utqiaġvik, Alaska (71.3232° N, 156.6464° W)

Contact: Eunbi Kwon and Bart Kempenaers, Max Planck Institute for Ornithology, Department of Behavioural Ecology & Evolutionary Genetics; Phone: (785) 477-3798; email: eunbi.kwon@gmail.com and b.kempenaers@orn.mpg.de

Figure 5. A Long-billed Dowitcher nest with four eggs found in Utqiaġvik, Alaska in 2019. Photo courtesy of Eunbi Kwon.

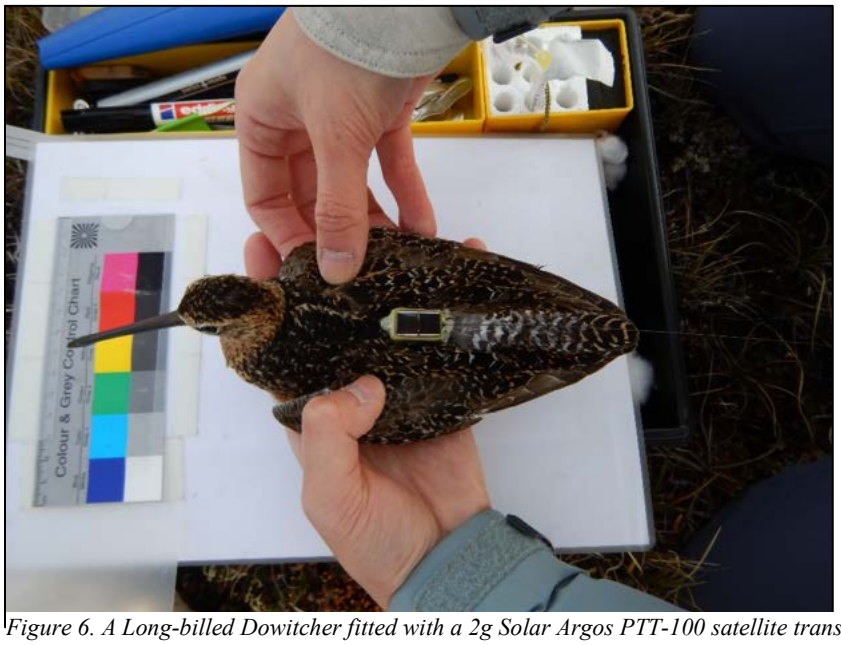


Figure 6. A Long-billed Dowitcher fitted with a 2g Solar Argos PTT-100 satellite transmitter (Microwave Telemetry Inc.) using a leg-loop harness. Photo courtesy of Eunbi Kwon.

#12 – EVALUATING PRISM SURVEY METHODS USED TO ESTIMATE BREEDING SHOREBIRD DENSITY

Investigators: Jillian Cosgrove and Bruce Dugger, Oregon State University; Richard Lanctot, U.S. Fish and Wildlife Service.

Estimating the sizes and trends of shorebird populations is an objective of national and state shorebird conservation plans. The Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM) uses a double-sampling scheme to estimate the number of shorebirds breeding in the Arctic. Double-sampling is a type of ratio estimation that estimates the variable of interest (breeding shorebird density, determined by intensive area searches) using a correlated auxiliary variable (number of shorebirds detected on rapid counts). Precision in a double-sampling estimator improves as the correlation between the auxiliary variable and variable of interest increases. We may be able to increase the precision of the double-sampling estimator (thus increasing power to detect true changes in population size) by identifying auxiliary variables that have a strong correlation with breeding shorebird density throughout the 3-week rapid survey period.

In the summer of 2019, we conducted repeated rapid PRISM surveys in Utqiaġvik, Alaska on intensively monitored plots with known nest densities to investigate the relationship between various auxiliary variables and nest density. Three types of rapid surveys were conducted. Rapid area searches were conducted in 400 m^2 areas over 96 min periods every third day from 4 – 24 June on four intensive nest searching plots monitored by the U.S. Fish and Wildlife Service. Line-transect distance sampling surveys were conducted in 600 m^2 areas over 240 min periods every sixth day from 4 – 24 June on the same four USFWS intensive nest searching plots. Finally, rapid area searches were conducted in four 400m^2 areas over 96 minutes on 8, 14, and 20 June on the Max Planck Institute study area. In the latter area, researchers intensively searched and monitored Red Phalarope nests, using Milsar tracking and genetics to determine parentage of nests. Analyses of these data are ongoing.

This project contributes to meeting Inventory and Monitoring Objectives in the Alaska Shorebird Conservation plan, Version III (e.g. “Conduct long-term population monitoring efforts” and “Evaluate the efficacy of existing programs,” p. 26).

Location: Utqiaġvik, Alaska. 71.2906° N, 156.7886° W

Contact: Jillian Cosgrove. Department of Fisheries and Wildlife, Oregon State University. Phone: (408) 410-2173. Email: jillian.cosgrove@oregonstate.edu

Hatching nest of Dunlin (Calidris alpina arcticola) near Utqiaġvik, Alaska. Photo courtesy of Jillian Cosgrove.

#13 – SPATIOTEMPORAL REPEATABILITY IN MIGRATION OF AN ARCTIC-BREEDING SHOREBIRD, THE DUNLIN (*CALIDRIS ALPINA*)

Investigators: Ben Lagasse and Mike Wunder, University of Colorado Denver; Richard Lanctot, U.S. Fish and Wildlife Service

Many arctic-breeding shorebirds are declining worldwide. Reasons for these declines are likely related to direct and indirect effects of human behavior including climate-induced changes in habitat conditions and food availability on breeding, migration and wintering grounds. However, the proximate link between a changing climate and habitat degradation on population-level declines is uncertain. It is also uncertain how arctic-breeding shorebirds might be adapting to these changes. Currently, we are studying the plasticity in the migratory behavior of four subspecies of Dunlin (*Calidris alpina*) that breed in the Arctic and migrate along three major flyways of the world, including the Atlantic and Pacific flyways of North America and the East Asian-Australasian flyway of Asia. I will compare migration timing, routes, and stopover duration between individuals tracked from six breeding sites in 2010-2018, and within individuals tracked repeatedly from Utqiaġvik (formerly Barrow), Alaska between 2016 and 2020. This approach will allow me to determine the level of individual plasticity versus population-level microevolution present in the spatiotemporal migration ecologies of Dunlin from Utqiaġvik (data between 2010 and 2020), and how it compares to the between-individual variation seen in Dunlin from other flyways undergoing different levels of environmental change. Such information will determine how migratory shorebirds might be adapting to the diverse and unsynchronized changes occurring throughout their annual cycle.

Between May and August 2019, I conducted the fourth consecutive field season for deploying light-level geolocators on Dunlin (*Calidris alpina*) breeding in Utqiaġvik, Alaska; prior work at this site dates back to 2010. Field efforts included recapturing and retagging 11 individuals that will provide migration tracks from June 2018 to June 2020 and tagging an additional 11 Dunlin that will provide migration tracks from June 2019 to June 2020. We will attempt to recapture these 22 individuals in 2020.

This study is focused on the Dunlin, one of the priority shorebird species identified in the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019). The study also fulfills action items identified in the Alaska Shorebird Conservation Plan under the Research section (i.e., “determine migratory timing, routes, and site use of shorebirds”), and the International Collaborations section (i.e., “foster and participate in cooperative research and monitoring efforts throughout species’ ranges”).

Locations in Alaska in 2019: Utqiaġvik, North Slope (71.2652°N, 156.6359°W)

Contact: Ben Lagasse, University of Colorado Denver; email: Benjamin.J.Lagasse@gmail.com

#14 – AERIAL SURVEYS OF SHOREBIRDS AT MIGRATORY STAGING SITES IN WESTERN ALASKA, 2019

Investigators: Dan Ruthrauff, US Geological Survey; Heather Wilson, Zak Pohlen, and Callie Gesmundo, U.S. Fish and Wildlife Service

We conducted aerial surveys for shorebirds staging during fall migration at sites across western Alaska from 20–22 August, 2019. The primary objective of our survey was to replicate the timing and route of surveys previously flown in 1997 on the Yukon-Kuskokwim Delta and Alaska Peninsula by Brian McCaffery and Bob Gill. We counted and attempted to identify all shorebirds that we encountered along our route, but the primary focus of our surveys was the Bar-tailed Godwit (*Limosa lapponica baueri*). Recent evidence from nonbreeding sites in the species' range suggests significant population declines, and we sought to determine how counts in Alaska compared with those from nonbreeding sites. Gill and McCaffery (1999 *Wader Study Group Bulletin*) found that counts of fall-staging Bar-tailed Godwits in western Alaska closely matched population estimates derived from counts in Australia and New Zealand. We wanted to replicate these surveys and assess the potential efficacy of monitoring this population via periodic aerial surveys in Alaska. We initiated these survey efforts in 2018, but it was subsequently determined that our survey period (7–9 September) was too late and that Bar-tailed Godwits had departed Alaska prior to our surveys.

With this in mind, we conducted this year's surveys about three weeks earlier than those in 2018. We surveyed during a series of strong diurnal high tides, conditions that ensured that godwits were not spread across vast mudflats during our flights. We flew the coast of the Yukon-Kuskokwim Delta from Kigigak Island north to the mouth of the Yukon River on 20 August, and surveyed Jacksmith Bay north to Kigigak Island on 21 August. With support from the Alaska Peninsula / Becharof National Wildlife Refuge, we next surveyed the north coast of the Alaska Peninsula from Egegik Bay to Nelson Lagoon on 22 August. In contrast to 2018, this year's survey appeared optimally timed for encountering Bar-tailed Godwits prior to their migratory departure. Colleagues in New Zealand did not detect the first arrival of godwits until nearly two weeks after the completion of our surveys, indicating that we likely surveyed the majority of staging godwits prior to any departures.

We counted just over 440,000 shorebirds in 2019, the majority of which (402,664) were identified as small calidridine shorebirds (primarily Western Sandpipers, Rock Sandpipers, and Dunlin). As in 2018, the majority of Bar-tailed Godwits occurred along the northern mouth of the Kuskokwim River and on near-shore shoals near Cape Avinof. We collected digital images of each Bar-tailed Godwit flock that we observed during our surveys, and are currently working with a software company to develop a counting algorithm to auto-process our images. As such, we have not yet determined the number of Bar-tailed Godwits on our surveys, but anecdotal observations suggest that we encountered considerably more godwits than in 2018. Notably, we surveyed distant shoals off Cape Avinof where we observed three massive flocks of godwits estimated at ~15,000 birds each. Similar to 2018, we detected very few Bar-tailed Godwits at sites along the Alaska Peninsula. We observed only Bar-tailed Godwits along the coast of the Yukon-Kuskokwim Delta, but detected 57 Bar-tailed, 748 Hudsonian, and 2,275 Marbled godwits along the estuaries of the Alaska Peninsula. We will compare our survey results with ground-based survey efforts planned to occur in Australia and New Zealand in mid-November. Our overall goal is to reassess the population status of Bar-tailed Godwits that breed in Alaska.

Our surveys were possible through the generous support of Migratory Bird Management (Julian Fischer), which dedicated a pilot-biologist and plane to fly the Yukon Delta study area, and the Alaska Peninsula / Becharof National Wildlife Refuge (Melissa Cady and Dan Pepin), which provided a pilot-biologist and plane and for the Alaska Peninsula study area.

Location: Western Alaska

Contact: Dan Ruthrauff, US Geological Survey – Alaska Science Center, 4210 University Drive, Anchorage, AK 99508. Phone: 1-907-786-7162 email: druthrauff@usgs.gov

Aerial survey along the Kuskokwim Shoals of the Yukon Kuskokwim Delta. Photo courtesy of Zak Pohlen, USFWS.

#15 – KACHEMAK BAY SHOREBIRD MONITORING PROJECT: 2019 REPORT

Investigators: George Matz and Kachemak Bay Birders volunteers.

Purpose

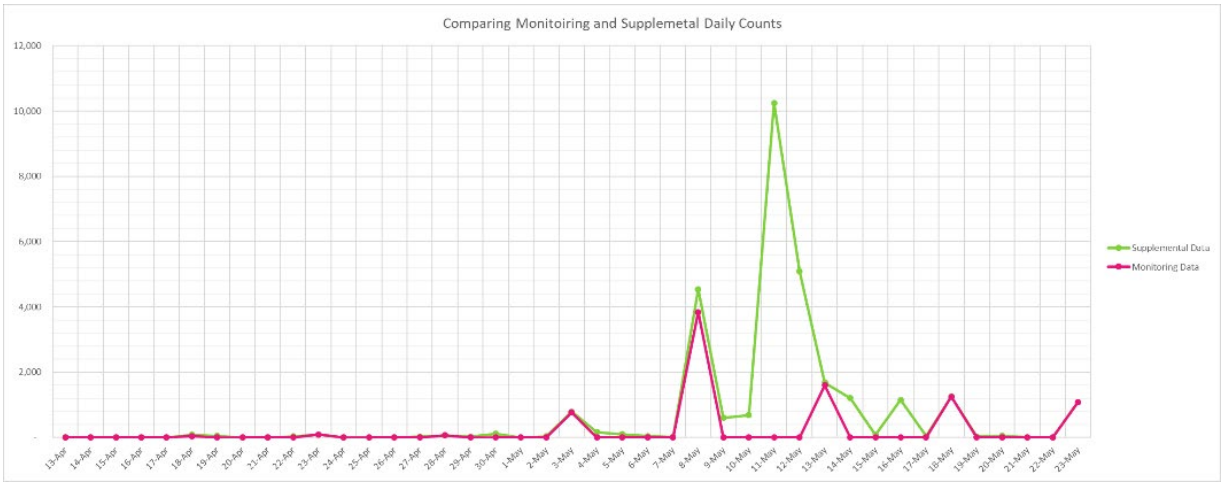
In May 2019, Kachemak Bay Birders (based in Homer, Alaska) completed its eleventh consecutive year of shorebird monitoring. The main purpose of this citizen science project is to attain a better understanding of the status of shorebird populations in the Kachemak Bay area, particularly during spring migration, and to add to our enjoyment of watching shorebirds. Secondary purposes are: 1) to contribute information that might be useful to others assessing shorebird populations across the entire Pacific Flyway, and 2) to use the monitoring data to help protect Kachemak Bay/Homer Spit shorebird populations and habitat.

Accomplishments

Between April 13 and May 23, 2019, we had nine monitoring sessions. We simultaneously monitored four sites on the Homer Spit as well as Beluga Slough for two hours once every five days when the outgoing tide reached 15.0 feet (or at high tide if less). These tide conditions provide consistency and optimized shorebird viewing conditions. Monitoring by boat occurred the same day, weather permitting, and at Seldovia Bay using a protocol suitable to access conditions. For the seventh consecutive year, we monitored the Anchor Point/River and Kasilof River. This year we had a total of 42 volunteers participate in Kachemak Bay monitoring, eight at the Anchor River, and six at the Kasilof River. We recorded any disturbance to shorebirds, which were minimal this year. Loose dogs in shorebird nesting/resting areas, which have signs asking that dogs be leashed, continues to be a problem

Results

This year at the Kachemak Bay sites (excluding Seldovia Bay) we observed a total of 23 species of shorebirds and counted a total of 8,623 individual shorebirds. There were no rare species. This was the third lowest total count in our eleven years of monitoring. However, the supplemental analysis showed that there was a pulse of about 9,075 Western Sandpipers and Dunlin on May 11, between monitoring dates. If the peak of this pulse had occurred on a monitoring date, it would obviously have made a substantial difference.



Our supplemental analysis uses eBird observations to get some idea of shorebirds that may have come and gone between scheduled monitoring dates, as illustrated above. This year the supplemental count included a count of 29,474 shorebirds for Kachemak Bay during our monitoring period. To eliminate duplicate counts, the eBird database was based on just the highest daily count per site per date.
At the Anchor River, about 15 miles north of Homer, we saw a total of 16 species of shorebirds and the total count was 273. This was the second lowest total count for this site in seven years of monitoring.

At the Kasilof River, about 60 miles north of Homer, we saw 17 species of shorebirds and had a total count of 8,875 shorebirds. This is close to the seven-year average for this site. All these observations, plus other species of birds seen, were entered in eBird. The detailed monitoring data spreadsheets can be viewed at http://kachemakbaybirders.org/ .

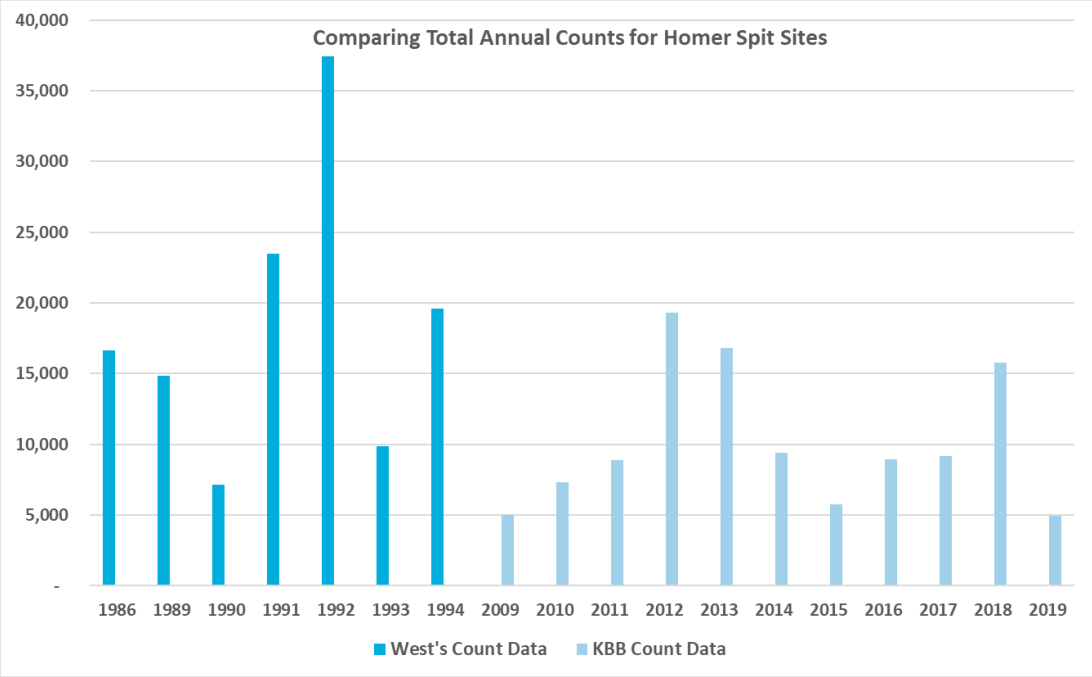
The tables below list shorebirds seen at all sites plus their total count for the respective year.

	2009-2019 Kachemak Bay Shorebird Count												
	Sorted by average abundance												
# Sp.	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
1	Western Sandpiper	3,229	4,996	4,100	16,375	7,964	4,000	2,267	1,403	7,225	14,508	2,941	6,273
	LESA/WESA/SESA	104	803	3,336	844	5,305	987	306	6,269	360	404	922	1,785
2	Red-necked Phalarope	1,630	1,500	5,152	1,501	703	3,006	1,503	39	102	1,025	2,513	1,698
3	Surfbird	292	110	574	2,919	748	2,644	2,111	1,335	1,186	715	850	1,226
4	Dunlin	1,097	561	1,283	1,205	2,548	1,530	826	508	590	928	579	1,060
5	Semipalmated Plover	194	203	197	142	92	251	273	270	246	322	204	218
6	Black-bellied Plover	179	315	282	354	221	114	210	107	80	135	106	191
7	Least Sandpiper	136	245	219	103	128	195	168	245	102	164	66	161
8	Black Turnstone	81	373	121	71	21	56	352	55	122	92	22	124
	Dowitcher sp.	99	82	57	76	344	49	65	17	14	139	176	102
9	Rock Sandpiper	141	405	482	6	4	6	6	4	47	12	3	101
10	Greater Yellowlegs	24	36	59	68	90	24	39	44	58	59	88	54
11	Wandering Tattler	13	56	30	18	62	39	39	58	58	55	28	41
12	Short-billed Dowitcher	125	-	33	76	18	15	-	20	57	24	2	34
14	Whimbrel	10	22	27	28	65	26	28	43	51	25	27	32
13	Pacific Golden Plover	5	42	5	95	96	17	4	23	13	16	13	30
15	Pectoral Sandpiper	-	7	-	1	146	98	11	-	15	11	40	30
16	Long-billed Dowitcher	-	-	15	1	22	36	-	1	37	7	3	11
17	Semipalmated Sandpiper	1	5	3	34	-	13	33	3	10	10	-	10
18	Black Oystercatcher	11	11	13	8	2	8	18	15	-	7	22	10
19	Lesser Yellowlegs	-	26	3	15	9	4	11	1	5	13	-	8
20	Marbled Godwit	3	12	1	7	-	8	5	5	11	29	4	8
21	Ruddy Turnstone	1	10	1	2	9	2	6	9	7	3	5	5
	Yellowlegs sp.	2	18	-	2	2	-	5	-	15	1	2	4
22	Hudsonian Godwit	18	-	2	-	3	3	-	-	1	3	1	3
23	Sanderling	-	1	8	8	-	2	-	-	-	1	1	2
24	American Golden-Plover	3	1	1	1	10	-	-	-	-	-	2	2
25	Bar-tailed Godwit	3	-	-	4	6	-	-	1	1	1	-	1
26	Wilson's Snipe	1	5	1	1	-	-	-	-	-	-	3	1
27	Baird's Sandpiper	1	-	-	6	-	-	-	1	-	-	-	1
28	Bristle-thighed Curlew	-	-	-	-	5	-	-	-	-	-	-	0.5
29	Red Phalarope	-	-	-	-	-	5	-	-	-	-	-	0.5
30	Spotted Sandpiper	3	-	-	1	-	-	-	1	-	-	-	0.5
31	Red Knot	-	-	2	-	-	1	1	-	-	-	-	0.4
	Total Individuals	7,406	9,845	16,007	23,972	18,623	13,139	8,287	10,477	10,413	18,709	8,623	13,227
	Total Species	24	23	25	27	23	25	21	23	22	24	23	24

	SITE : Anchor River								
	Sorted by average abundance								
#	**SPECIES**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Average**
1	Red-necked Phalarope	-	5,000	400	-	-	2	1	772
2	Western Sandpiper	606	135	204	13	219	799	80	294
	LESA/WESA/SESA	29	32	14	41	1,364	-	3	212
3	Greater Yellowlegs	44	39	42	50	54	64	51	49
4	Dunlin	67	27	24	9	47	69	41	41
5	Black-bellied Plover	40	48	40	16	19	16	10	27
6	Whimbrel	75	29	2	8	9	20	27	24
7	Semipalmated Plover	14	13	17	10	28	50	7	20
8	Least Sandpiper	10	28	24	17	12	19	3	16
9	Pacific Golden Plover	10	1	8	7	16	32	21	14
10	Short-billed Dowitcher	15	27	5	4	14	4	11	11
11	Black Turnstone	3	20	-	18	5	24	-	10
	Dowitcher sp.	19	8	15	4	3	4	8	9
12	Lesser Yellowlegs	20	20	2	1	7	5	-	8
	Yellowlegs sp.	45	-	-	1	-	-	-	7
13	Rock Sandpiper	16	22	1	-	-	2	-	6
14	Pectoral Sandpiper	3	9	-	1	6	20	3	6
15	Semipalmated Sandpiper	8	6	3	5	8	8	1	6
16	Long-billed Dowitcher	18	7	3	-	2	3	2	5
	Plover sp.	15	-	-	-	-	-	-	2
17	Spotted Sandpiper	-	-	6	5	1	2	2	2
18	Wandering Tattler	1	1	5	-	-	5	1	2
19	Ruddy Turnstone	1	-	-	-	4	3	-	1
20	Hudsonian Godwit	1	-	-	2	-	3	-	0.9
21	Red Knot	-	3	-	-	-	2	-	0.7
22	Wilson's Snipe	3	1	-	-	-	1	-	0.7
23	Marbled Godwit	1	-	-	-	1	1	1	0.6
24	American Golden-Plover	-	-	2	-	-	1	-	0.4
25	Sanderling						3	-	0.4
26	Black Oystercatcher	1	-	-	-	-	-	-	0.1
27	Surfbird	-	-	1	-	-	-	-	0.1
	Total Individuals	1,065	5,476	818	212	1,819	1,162	273	1,546
	Total Species	21	19	18	15	17	25	16	19

	SITE : Kasilof River								
	Sorted by average abundance								
#	SPECIES	2013	2014	2015	2016	2017	2018	2019	Average
1	Western Sandpiper	16,950	588	4,634	2,652	2,557	14,755	6,721	6,980
2	Dunlin	3,338	60	459	523	133	1,462	1,872	1,121
3	Short-billed Dowitcher	620	174	195	378	158	429	122	297
4	Black-bellied Plover	59	19	40	70	64	80	38	53
5	Least Sandpiper	209	5	-	2	4	41	4	38
6	Greater Yellowlegs	34	16	17	18	47	9	12	22
7	Whimbrel	43	58	8	6	5	18	18	22
8	Hudsonian Godwit	25	8	12	21	14	10	6	14
9	Semipalmated Plover	6	3	10	5	5	32	7	10
10	Lesser Yellowlegs	8	16	6	13	16	2	6	10
11	Pectoral Sandpiper	7	2	2	1	-	20	26	8
12	Long-billed Dowitcher	42	-	-	-	-	4		7
13	Semipalmated Sandpiper	8	-	1	14	2	4	21	7
14	Wilson's Snipe	3	3	4	5	4	4	7	4
15	Pacific Golden Plover	1	2	7	8	1	1	8	4
16	Rock Sandpiper	-	-	-	-	2	9		2
17	Marbled Godwit	-	2	-	1	-	6	4	2
18	Red Knot	-	-	2	5	-	-	1	1
19	American Golden-Plover	5	-	-	-	-	-		0.7
20	Sanderling	-	-	1	2	-	-	1	0.6
21	Ruddy Turnstone				2	1	-		0.4
	Dowitcher sp.	3	-	-	-	-	-		0.4
22	Red-necked Phalarope	-	2	-	-	-	1		0.4
23	Bar-tailed Godwit	1	-	-	-	-	1		0.3
24	Baird's Sandpiper	1	-	-	1	-	-		0.3
25	Killdeer	-	-	-	-	1	-		0.1
26	Black Turnstone	-	-	-	-	-	1		0.1
	LESA/WESA/SESA							1	0.1
	Total Individuals	21,363	958	5,398	3,727	3,014	16,889	8,875	8,603
	Total Species	19	15	15	19	16	20	17	17

One of our objectives each year is to compare our monitoring results with that of the late George West from 1986 through 1994. To provide a more direct comparison, adjustments had to be made to the data. Despite our more intensive approach, Homer Spit monitoring over the past eleven years has counts that on average are only about 55% of what George West had observed.



The differences between now and then varies by species. The Table below compares by species, the average annual counts by West from 1986-94 (excluding 1987-8) with Kachemak Bay Birders counts from 2009-2019. Note that this table is based on data for once every five days amounting to six counts per year. Also, for KBB data it includes only the four Homer Spit sites. While this might be limited data, it does show some distinct differences.

	Average Annual Count	
	West	KBB
SPECIES	1986-94	2009-19
Semipalmated Plover	14	179
American Golden-Plover	6	1
Pacific Golden Plover	1	28
Black-bellied Plover	113	175
Black Oystercatcher	-	0.1
Greater Yellowlegs	3	19
Lesser Yellowlegs	-	4
Yellowlegs spp.	-	1
Whimbrel	2	19
Bar-tailed Godwit	0.4	1
Hudsonian Godwit	0.1	2
Marbled Godwit	1	6
Wandering Tattler	1	33
Surfbird	2,390	654
Ruddy Turnstone	3	4
Black Turnstone	874	71
Western Sandpiper	13,420	5,981
Least Sandpiper	14	128
Semipalmated Sandpiper	-	9
LESA/WESA/SESA	-	1,693
Sanderling	-	2
Pectoral Sandpiper	1	27
Dunlin	1,102	967
Rock Sandpiper	1	1
Baird's Sandpiper	-	1
Red Knot	0.4	0.2
Short-billed Dowitcher	460	20
Long-billed Dowitcher	-	3
Dowitcher spp.	-	89
Wilson's Snipe	-	0.1
Red-necked Phalarope	29	2

ASCP Objectives

Kachemak Bay is in BCR 4 Northwestern Interior Forest. Most of the objectives for this BCR pertain to breeding shorebirds. The importance of Kachemak Bay for shorebirds is to provide a stopover with abundant food and little human disturbance on its intertidal mud flats and rocky shores. Consequently, most of the objectives don't apply to our project. But the ones that do are;

- Assess the use of ephemeral habitats by migrant shorebirds and identify any important areas.
- Assess shorebird use of Cook Inlet in winter.

We have identified the important shorebird stopovers on the Cook Inlet side of the Kenai Peninsula and have been monitoring the spring migration of those that are accessible. Also, our monitoring begins while some of the Rock Sandpipers that overwinter in the Kachemak Bay area are still in the area. We have noted that in years with warm springs, Rock Sandpipers leave early and there have been some years when we have missed them.

Contact: George Matz, PO Box 15182, Fritz Creek, AK 99603
Phone: 907 235-9344 email: geomatz41@gmail.com

Kachemak Bay volunteers monitoring shorebirds. Photo courtesy of Carol Harding

#16 – BEHAVIORAL ECOLOGY OF RED PHALAROPES (*PHALAROPUS FULICARIUS*)

Investigators: Johannes Krietsch, Bart Kempenaers, Mihai Valcu, Max Planck Institute for Ornithology - Department of Behavioural Ecology & Evolutionary Genetics, Richard Lanctot, U.S. Fish and Wildlife Service

The main objective of this study is to better understand the social and genetic mating system of the Red Phalarope. This species is a textbook example of sex-role reversal and their mating system is described as monogamous and sequentially polyandrous. Understanding the selective drivers that led to the evolution of this sex-role reversal represents a challenge for evolutionary biologists, since it is not clear which ecological, life-history or social factors facilitated conventional sex roles to be reversed. We are investigating the behavioral ecology of Red Phalaropes using a combination of detailed behavioral observations on individually marked birds, parentage analysis, data loggers to record nest attendance, and PTT Argos satellite and GPS local-downloadable tags to record large-scale and fine-scale movements, respectively. We hope to obtain a better understanding of the species' within-season mobility and post-breeding movements, which are necessary to better understand their demography and to create targeted conservation plans.

In 2019, we continued our work from past two years and banded 365 adult Red Phalaropes in Utqiaġvik, Alaska this year. With a focus on following both members of a pair, we equipped 201 adult Red Phalaropes with radio transmitters that had GPS capabilities (see photo) to study local movements on a high temporal and spatial resolution. These detailed movement data, coupled with behavioral observations, allowed us to investigate pair formation and mate guarding. Overall, we found 100 Red Phalarope nests within our study site this year, which were more than we found in the last two years combined (36 in 2017 and 39 in 2018). We took blood samples from chicks and tissue samples from unhatched eggs from these nests to be used for parentage analysis. Most nests were equipped with temperature loggers giving us data on nest attendance.

This study will help to identify and determine factors limiting the Red Phalarope population size during nonbreeding and determine migratory routes and site use of shorebirds during breeding and postbreeding.

Location: Utqiaġvik, Alaska (71.3232°N, 156.6464°W)

Contact: Johannes Krietsch and Bart Kempenaers, Max Planck Institute for Ornithology, Department of Behavioural Ecology & Evolutionary Genetics; email: jkrietsch@orn.mpg.de and b.kempenaers@orn.mpg.de

A Red Phalarope female with a radio transmitter with GPS. Photo courtesy of Johannes Krietsch.

#17 – HUDSONIAN GODWITS AND THE EFFECTS OF MULITPLE, SIMULTANEOUS ANTHROPOGENIC STRESSORS

Investigators: Nathan R. Senner, Jennifer A. Linscott, and Luke R. Wilde, University of South Carolina; Rose J. Swift, U.S. Geological Survey

Since 2009, our research group has monitored godwit breeding biology, including their habitat use, nest success, fledging success, adult survival, and recruitment on two study plots near Beluga, Alaska on the west side of Upper Cook Inlet (61.21°N, 151.02°W and 61.12°N, 151.10°W, respectively). We couple this focus on godwit breeding biology with measures of the phenology and abundance of the local invertebrates godwit chicks rely on for food. During this time, we have followed >200 godwit nests, individually marked >150 adults and >600 chicks, and counted ~600,000 invertebrates. These efforts have demonstrated that godwits breeding at Beluga have thus far been able to adequately respond to recent climatic changes by arriving in the region increasingly early each spring (Senner 2012). Upon arrival, female godwits are then able to rapidly transition to breeding readiness (Senner et al. 2014), such that they have continued to properly time their reproductive efforts in synchrony with local invertebrate phenology, and thereby allow their young sufficient resources to successfully fledge (Senner et al. 2017). Importantly, however, we have also found that breeding godwits are not evenly distributed across all seemingly suitable habitat (Swift et al. 2017a). Instead, godwits nest in loose clusters associated with breeding colonies of Mew Gulls (*Larus canus*; Swift et al. 2017b). Gulls act as protector species while godwits are incubating their nests, helping shield those nests from potential nest predators (Swift et al. 2018).

Since 2012, godwit breeding densities have declined by 50% at Beluga, apparently as a result of declines in adult survival driven by conditions on the nonbreeding grounds and along the godwit migration route. The effects of declining adult survival on godwit population dynamics, in turn, appears to be exacerbated by the effects of predators on chick survival in Beluga, where predators account for nearly 90% of all chick mortalities (Senner et al. 2017). In 2019, we thus began to increasingly focus on the predator community in Beluga. Our preliminary results suggest that the relative level of predation risk faced by godwit chicks depends strongly on where they are located on the landscape at a given moment. This context-specific risk results from two interacting factors: **(1)** as the size of the breeding population has declined, the densities of godwit nests and broods on the landscape have declined and, **(2)** godwit broods that are able to remain close together are more likely to successfully avoid predators and fledge young (Wilde et al. *unpubl. data*). The survival of godwit young may therefore be limited by the number of godwits breeding near Beluga.

Looking forward, our goal is therefore to increase our focus of community-level dynamics at Beluga and determine how climate change and predation may be synergistically interacting to influence the population dynamics of godwits, as well as the other boreal shorebird species breeding at Beluga.

Contact: Nathan Senner, University of South Carolina, senner@mailbox.sc.edu

Hudsonian Godwit. Photo courtesy of George Matz.

#18 – BREEDING ECOLOGY OF RED KNOT (*CALIDRIS CANUTUS ROSELAARI)*

Investigators: Jim A. Johnson, Zak Pohlen, Laura McDuffie, and Callie Gesmundo, U.S. Fish & Wildlife Service. Prepared by: Zak Pohlen

The 2019 field season marked the tenth consecutive year studying Red Knots (*Calidris canutus roselaari*) breeding on the Seward Peninsula. Our primary objectives were to monitor chick growth rates and brood survival, collect fecal samples from chicks, recapture adults with geolocators, and continue to monitor the marked population to estimate apparent survival.

Seven observers conducted fieldwork this year at the same seven ridgelines along Teller Road outside of Nome. Similar to 2017 and 2018, surveyors arrived on 25 June and departed 15 July (targeting brood rearing period) for a total of 104 people days in the field. Early season environmental conditions in 2019 were similar to those in 2018, when most of the Seward Peninsula experienced heavy snowfall late in winter. The 2019 and 2018 seasons contrasted with the early springs and summers experienced in 2014-2017.

In 2019, we resighted 15 previously flagged individuals, of which 14 were banded in Nome and one in Grays Harbor, WA. This is similar to our three-year average of 15.6 individuals (range 11 – 19), when conducting work with similar effort during a similar time period. Additionally, we resighted two adults this year that were only previously known as banded chicks from the study site. We banded five new adults attending broods and removed three geolocators deployed in 2018. We found 13 broods in 2019 (three-year average is 14.3) and deployed 12 VHF radios on brood attending adults to assist in monitoring brood activity. From these 13 broods, we banded and monitored a total of 39 chicks.

Chick growth and survival was impacted by a serious weather event that occurred on July 2 with heavy rain, wind, and cold temperatures. Precipitation was 3.10 cm on July 2 and 4.09 cm over the three-day period of July 1 through July 3. This is 3.5 times higher than the total rainfall recorded during the brood rearing periods in 2016, 2017, and 2018 (the only years we have accurate daily rainfall measurements). No chicks younger than 13 days survived the storm, and 58% of active broods failed.

Although our primary focus was finding broods, we incidentally discovered one nest during our search efforts. This nest was successful and hatched on June 27th. The median hatch date in 2019 was June 15th.
This study continues to fulfill objectives identified in the Alaska Shorebird Conservation Plan to assess the effects of climate change on shorebird demography and to conduct breeding ecology studies on species occupying alpine habitats.

The 2019 field team consisted of all principle investigators, Julian Garcia-Walther, Will Britton, Yvonne Verkuil, and Jesse Conklin; while Russel Rowe, Sandra Rowe, and Ben Rowe provided logistical assistance for the team. This project was supported by USFWS Migratory Bird Management.

Location: Seward Peninsula, Alaska (64.805103, -166.023428)

Contact: Jim Johnson, USFWS, Migratory Bird Management, 1011 East Tudor Road, Anchorage, AK 99503. Phone: 907-786-3423; E-mail: jim_a_johnson@fws.gov

Adult Red Knot captured attending a brood on the Seward Peninsula, Alaska. Photo courtesy of Zak Pohlen, USFWS.

#19 – QUPALUK

Investigators: Rebecca McGuire, Arctic Beringia Program, Wildlife Conservation Society; Martin Robards, Arctic Beringia Program, Wildlife Conservation Society

During late June 2019, the Wildlife Conservation Society, spent one week at the Qupaluk site (Figure 1) northeast of Teshekpuk Lake in the National Petroleum Reserve – Alaska (NPR-A). We evaluated nesting shorebird densities, timing of initiation, and determining the best camp location and logistics prior to initiating a full season on field work in 2020. Additionally, we tagged breeding shorebirds as part of a collaboration with the U.S. Fish and Wildlife Service and Manomet to determine post-breeding habitat use of Red phalaropes and Pectoral sandpipers. With increasing interest by oil and gas developers in the NPR-A, there is an imperative to provide managers with the information necessary to inform good management decisions. The Bureau of Land Management (BLM) has already worked with regional stakeholders to establish an Integrated Activity Plan that seeks a balance between operational best practices and areas that are too ecologically sensitive to disturb (Special Areas). However, this plan is being reevaluated and data is lacking in many areas and for many species. Our work focuses on a specific area – Qupaluk – within the Teshekpuk Lake Special Area. This area is a recognized important breeding area for shorebirds, both for those that migrate to the west on the East Asian-Australasian Flyway, and those that migrate to the east and south on the Americas Flyways. While this site has been designated as an internationally important flyway site for migratory birds, there is still a dearth of data with which managers can monitor or manage the area to maintain it's important attributes, and for if, or when, development occurs in this area.

During June 25-30, 2019, we conducted 20 10-minute point counts during the course of our travels in Qupaluk, identifying 35 bird species, of which nine were shorebirds. During our visit, we observed courting and breeding shorebirds, and assessed incubation stage at five pectoral sandpiper, three red phalarope, one dunlin, four semipalmated sandpiper, and two red-necked phalarope nests. We trapped and tagged three red phalarope with PTT tags and three pectoral sandpipers with GPS tags.

Location: Qupaluk, Alaska, Arctic coastal plain, 70.666° N, -152.844° E

Contact: Rebecca McGuire, Wildlife Conservation Society, 3550 Airport Way unit 5, Fairbanks, AK. 99709
Phone: 907.505.0071 email: rmcguire@wcs.org

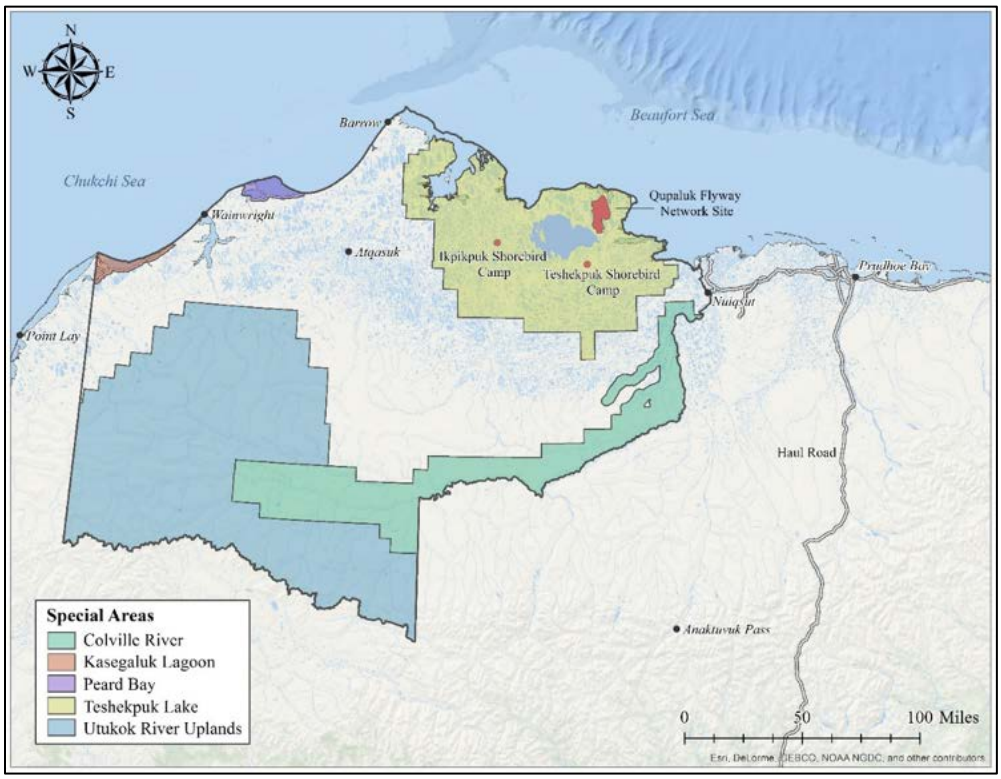


Figure 1. Location of the East Asian-Australasian Flyway site, Qupaluk, in northern Alaska. The boundary of the National Petroleum Reserve-Alaska with its five Special Areas, which are largely except from leasing under the current Integrated Activity plan.

Birds at Qupaluk, Alaska. Photo courtesy of Martin Robards.

#20 –PRUDHOE BAY LONG-TERM NEST MONITORING

Investigators: Rebecca McGuire, Arctic Beringia Program, Wildlife Conservation Society; Martin Robards, Arctic Beringia Program, Wildlife Conservation Society

Since 2003, the Wildlife Conservation Society, in cooperation with BP Exploration (Alaska), Inc., has monitored nest survivorship, nest predator abundances, predator identity, and other parameters that may influence nesting success in the Prudhoe Bay Oilfield. This on-going monitoring effort is allowing a better understanding of potential impacts from industry, climate change, and other factors on breeding birds.

In 2019 we discovered and monitored 98 nests of 11 tundra-nesting species (6 shorebird species) from June 08th to July 14th on 12 10-ha study plots using both rope drag and behavioral nest search techniques. Semipalmated and pectoral sandpiper nests accounted for the majority (82%) of shorebird nests found. During the 2019 season, we found very similar nest numbers to 2018, but nest initiation was earlier. Nests initiated between May 27 and July 02, 2019 (Figure 1). Earliest known initiation was much earlier in 2019 than in 2018 (June 06 to July 09). Peak initiation was June 2-11 in 2019 and June 16-22 in 2018. Of the 98 nests found, 74 were successful, 17 were predated, one was abandoned, one failed and five were unknown or undetermined (Table 1). For shorebirds, this is an 80% apparent nest success, which higher than that seen in previous years at Prudhoe, and at our remote site at Teshekpuk Lake 2005-2008.

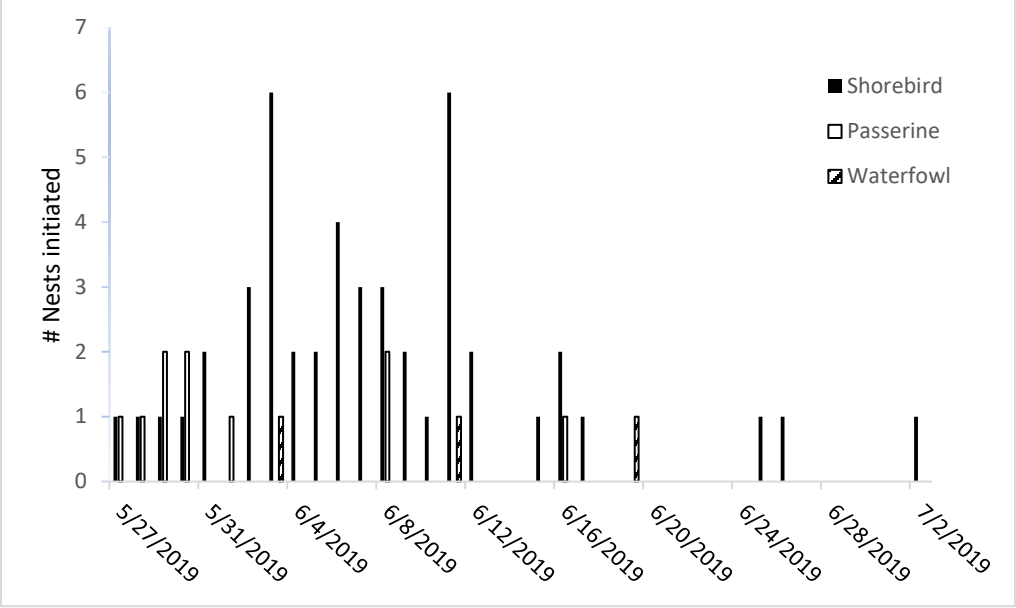


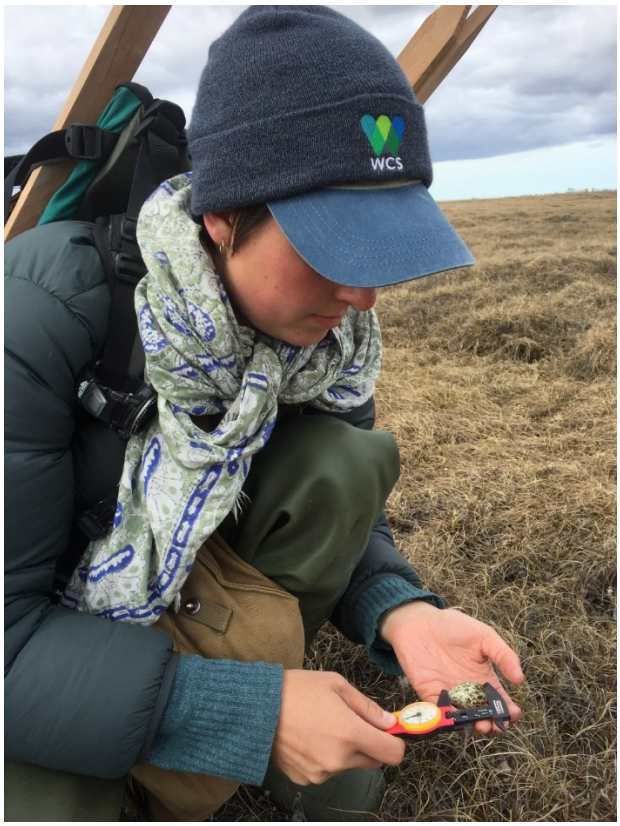
Figure 1. Number of nests initiated on each date, Prudhoe Bay, Alaska, 2019

Table 1. Numbers and fates of nests found on the long-term nest monitoring plots in Prudhoe Bay, 2019

Species	Nests	Success	Predation	Unknown	Abandoned	Failure	Undetermined
Shorebirds							
Semipalmated sandpiper	20	16	3	1	0	0	0
Red-necked phalarope	3	3	0	0	0	0	0
Pectoral sandpiper	24	14	7	1	1	0	1
Stilt sandpiper	1	1	0	0	0	0	0
Dunlin	3	2	0	1	0	0	0
Long-billed dowitcher	3	2	1	0	0	0	0
Waterfowl							
Greater white-fronted goose	25	23	2	0	0	0	0
Northern Pintail	1	0	1	0	0	0	0
Canda/Cackling Goose	3	1	1	1	0	0	0
Sandhill Crane	1	1	0	0	0	0	0
Passerines							
Lapland longspur	14	11	2	0	0	1	0
Total	**98**	**74**	**17**	**4**	**1**	**1**	**1**

Location: Prudhoe Bay, Alaska, Arctic coastal plain, 70.30754° N, -148.6104° E

Contact: Rebecca McGuire, Wildlife Conservation Society, 3550 Airport Way unit 5, Fairbanks, AK. 99709
Phone: 907.505.0071 email: rbentzen@wcs.org



Kayla Sheimreif measures a shorebird egg, Prudhoe Bay, Alaska, 2019. Photo courtesy of Varinia Sagastume, WCS.

We love rope-dragging! Prudhoe Bay, Alaska, 2019. Photo courtesy of Varinia Sagastume, WCS.

#21 – BREEDING ECOLOGY OF TUNDRA NESTING BIRDS AT THE CANNING RIVER DELTA ON ARCTIC NATIONAL WILDLIFE REFUGE

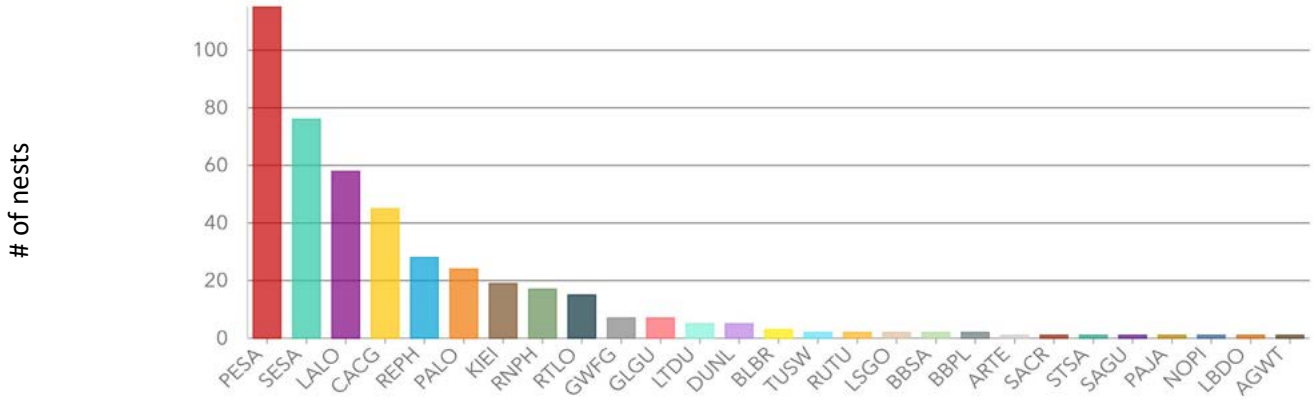
Investigators: Christopher Latty, U.S. Fish and Wildlife Service

Tundra Nesting Birds at the Canning River Delta

The Canning River Delta study site in Arctic Refuge was established in the late 1970s and has since become the primary tundra nesting bird research station for the refuge. Work at this location is a collaboration between Arctic National Wildlife Refuge, FWS Migratory Birds, Manomet, Inc., University of Alaska Fairbanks, and the U.S. Geological Survey. Crews typically arrive in early June and conduct surveys, other research activities, and outreach through mid to late July.

In 2019, crews flew into the camp on June 3rd and the camp was demobilized on July 22nd. We located 443 nests (Table 1) over the ~ 9.25 km^2 study area, of which, 249 were shorebirds from 10 species.

Table 1: Number of nests located at the Canning River Delta study site in 2019 by species.



To test the efficacy of various remote monitoring techniques, each shorebird nest was randomly assigned to 1 of 5 treatments that included revisits or no pre-fate revisits, cameras, and temperature loggers. We found temperature loggers were an effective tool for monitoring nest activity and bird behavior, and allowed us to determine incubation breaks and fate with high accuracy and precision (Figure 1 and 2).

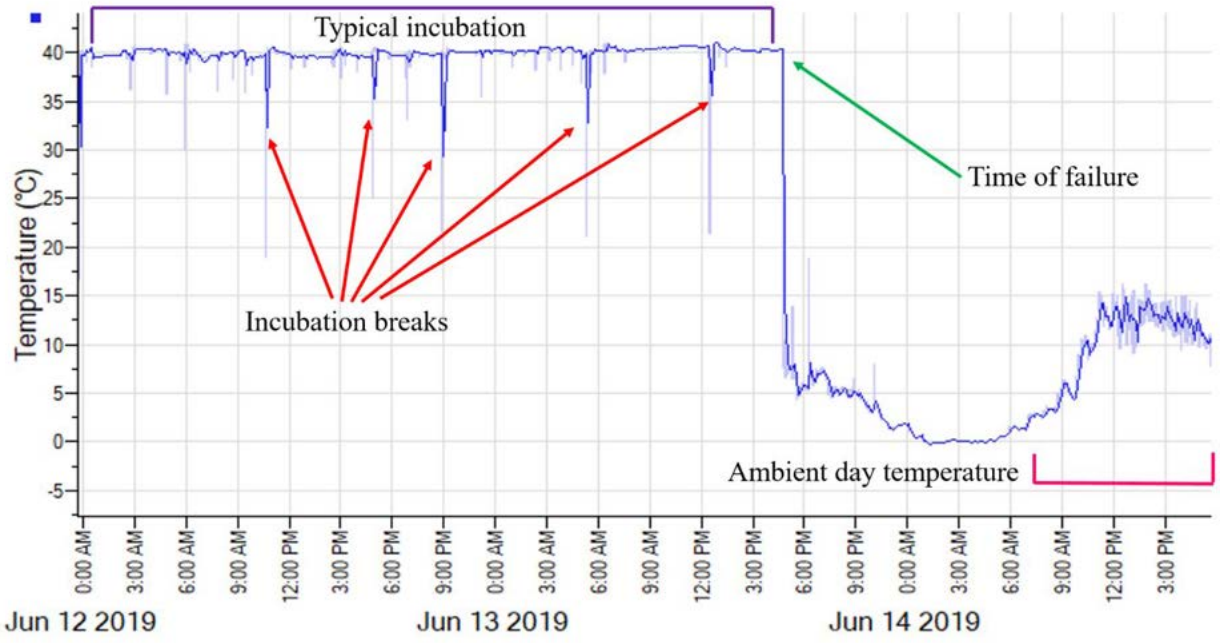


Figure 1: Tinytag temperature signature of failed semipalmated sandpiper nest.

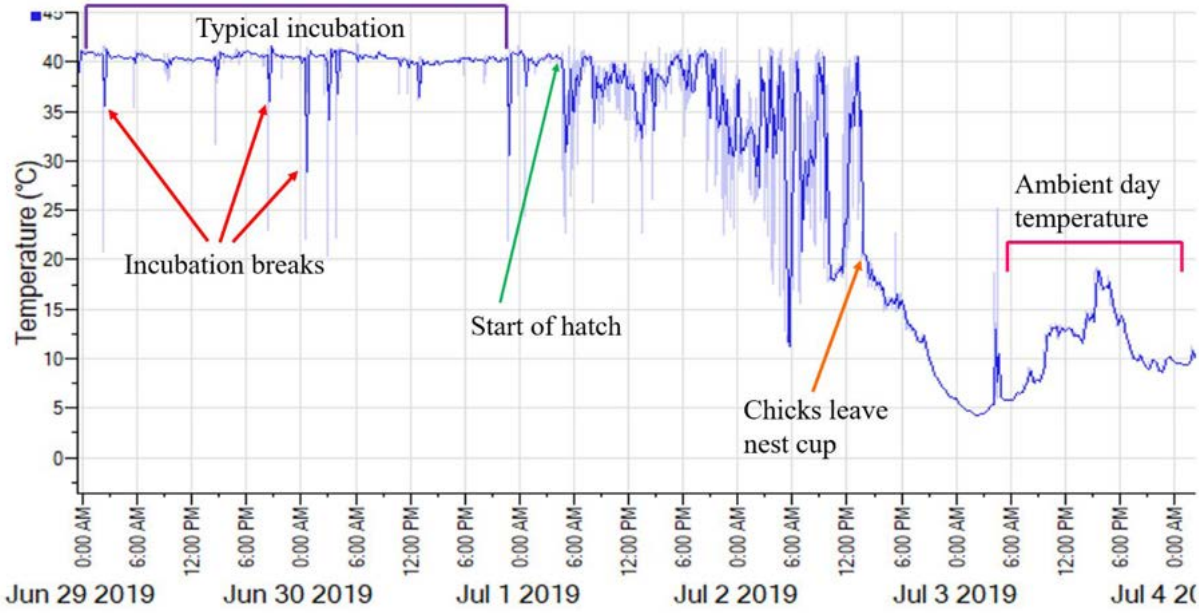


Figure 2: Tinytag temperature signature of hatched semipalmated sandpiper nest.

After preliminary review, 51% of the failed shorebird nests monitored by camera (n = 53) were depredated by parasitic jaegers and 37% by arctic foxes. Interestingly, 11% of nest failure was due to sandhill crane depredation. We also recorded chick depredation from the bowl by fox and jaeger at 4 hatched nests.

Daily nest survival of nests without devices was 0.93-0.98 and 0.93-0.97 (95% CI) for semipalmated and pectoral sandpipers, respectively (the most common species at our study site). The analysis of effects of remote sensing devices on nest survival and other parameters is ongoing.

This year marked another step forward in our effort to implement more multidisciplinary research projects at the site. This work is important to scientifically inform management decisions as we enter into a new period of energy resource development in the Refuge. In addition to our core tundra nesting bird monitoring work we have conducted in the past, this year we implemented a project to explore the use of genetic mark/recapture to monitor fox populations.

Location: Canning River Delta, Arctic National Wildlife Refuge

Contact(s): Chris Latty, Avian Biologist, U.S. Fish and Wildlife Service, Arctic NWR, christopher_latty@fws.gov

Banded dunlin at the Canning River Delta, Arctic NWR. Photo courtesy of Alex Lamoreaux.

Caribou outside the Canning River Delta camp, Arctic NWR. Photo courtesy of Alex Lamoreaux.

Arctic Fox depredating gosling at nest bowl during incubation break at the Canning River Delta, Arctic NWR.

Wolverine depredating cackling goose nest at the Canning River Delta, Arctic NWR.
**Note- Wolverine were the primary nest predator of geese in 2019.*

Parasitic jaeger about to depredate shorebird nest at the Canning River Delta, Arctic NWR.

Sandhill cranes depredating shorebird nest at the Canning River Delta, Arctic NWR.

Caribou laying nearly on top of a shorebird nest at the Canning River Delta, Arctic NWR.

#22 – POPULATION CONNECTIVITY AND MIGRATORY DYNAMICS OF THE DUNLIN (CALIDRIS ALPINA) ALONG THE EAST ASIAN-AUSTRALASIAN FLYWAY

Investigators: Master's Candidate: Ben Lagasse, University of Colorado Denver

The degree that individuals migrate among particular breeding, migration, and wintering sites can have important implications for prioritizing conservation efforts. Four subspecies of Dunlin (*Calidris alpina*) migrate along the East Asian-Australasian Flyway (EAAF). Each has a distinct and well-defined breeding range, but their migration and winter ranges are poorly defined or unknown. In Chapter I, I assessed the migratory connectivity of 3 of these subspecies by evaluating a dataset that encompasses 57 years (1960–2017), and comprises more than 40,000 Dunlin banding records, and 1,051 observations (79 recaptures and 972 band resightings). I found that regional segregation likely occurs with *arcticola* Dunlin wintering in areas of Japan, and *arcticola*, *actites* and *sakhalina* Dunlin wintering in areas of the Yellow and China seas. However, all 3 Dunlin subspecies likely occur in eastern Russia as they migrate to and from their respective breeding grounds. Furthermore, observations indicate that some individual *arcticola* Dunlin exhibit a high degree of interannual site fidelity to specific nonbreeding sites. This suggests that the degradation of specific wetland areas may negatively affect particular individuals, and if widespread, could result in population declines. Given the possible biases inherent in analyzing band recovery data, additional work is needed to understand population-specific migration ecologies in space and time.

In Chapter II, I used light-level geolocators to track 4 subspecies of Dunlin from 8 breeding sites as they migrated along the EAAF. I then constructed a migratory network using 74 recovered migration tracks to evaluate subspecific migration patterns in space and time. Using this approach, I found that Dunlin subspecies on the EAAF exhibited unique patterns of regional flyway use. For example, *arcticola* Dunlin predominated in regions along the eastern edge of the flyway such as western Alaska and central Japan, whereas, *sakhalina* Dunlin predominated in regions along the western edge of the flyway such as Bohai Bay and inland China. However, all four subspecies used the same core regions at the center of the flyway. These core regions were along Sakhalin Island, the Yellow Sea, and the East China Sea. Whereas Dunlin subspecies co-occurred in flyway regions in winter and north migration, subspecies generally did not co-occur in south migration. Taken together, these spatiotemporal dynamics indicate Dunlin subspecies may be differentially affected by regional habitat change and population declines according to when and where they occur. Subspecific considerations, therefore, could improve the effectiveness of flyway management actions for this Arctic-breeding shorebird species.

This master's thesis focused on the Dunlin, one of the priority shorebird species identified in the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2019). The study also fulfills action items identified in the Alaska Shorebird Conservation Plan under the Research section (i.e., "determine migratory timing, routes, and site use of shorebirds"), and the International Collaborations section (i.e., "foster and participate in cooperative research and monitoring efforts throughout species' ranges").

Contact: Ben Lagasse, University of Colorado Denver, email: Benjamin.J.Lagasse@gmail.com

Dunlin carrying a geolocator. Photo courtesy of Ben Lagasse.

#23 – Migratory Connectivity of Interior Alaska Lesser Yellowlegs

Investigators: Chris Harwood, Amanda Zuelke, and Laura McDuffie, U.S. Fish and Wildlife Service

The unregulated sport and subsistence harvest during fall migration of Lesser Yellowlegs (hereafter, yellowlegs) in the Caribbean and northern South America has been identified as a potential threat to the Alaskan population of this species. In summer 2018 colleagues deployed GPS tags on yellowlegs in the Anchorage Bowl to understand the fall migratory movements of these birds, including whether they might be exposed to harvest during this season. With interest in establishing a complementary site in Alaska to answer these questions about yellowlegs, in summer 2018 Kanuti Refuge staff conducted a reconnaissance of yellowlegs along the Kanuti River (some 350 miles north of Anchorage) and located a sufficiently numerous local study population. We then purchased 10 GPS tags in fall 2018 and secured assurance from Migratory Bird Management colleagues that they would help us deploy them in 2019.

Crew members of Kanuti National Wildlife Refuge returned on 20 May 2019 to our administration cabin at Kanuti Lake, base of operations for shorebird work nearly annually from 2008–2014. Almost daily between 22 May and 13 June we searched on foot and by boat for presumably incubating yellowlegs pairs in wetland, taiga, and tundra habitats within three miles of the cabin; we encountered no likely broody adults to that point. For much of these three weeks, the Kanuti River was at considerable flood stage, effectively connecting all waterbodies and seasonal wetlands within the floodplain and seemingly limiting potential nesting areas. We revisited all sites that from 18–21 June 2018 had brood-rearing yellowlegs and also investigated other areas with similar habitats.

Master's degree candidate, Laura McDuffie (see project #XX), arrived on 14 June and during an introductory "show-me" tour of historical brood-rearing areas, we immediately encountered broody yellowlegs. From 14–19 June, we trapped and individually color-marked 13 adult yellowlegs and fitted 10 of these with GPS tags (Fig. 1); we also color-marked one chick. Over the six days we encountered 20–23 family groups or alarm calling individuals, many of which we attempted to capture using audio lures (i.e., chick distress calls) and 6- or 9-m mist nets. Families tended to be clumped, with one 14-ha lake supporting 5–6 broody pairs. Most families concentrated along pond and lake shorelines with recently flooded or shallow emergent vegetation (Fig. 2). Given the widespread spring flooding between and around many of these waterbodies, we believe that many pairs nested in elevated tundra and woodlands and then led their chicks to these shoreline areas.

In 2020 we intend to conduct reconnaissance in the study area to relocate marked individuals. We hope that the batteries of some of the GPS-tagged birds may still be working to help us pinpoint nests of some returning individuals. We also intend to color-mark as many individuals as we can during brood rearing; however, we will not deploy any more GPS tags. If we can mark a sufficient population, we will consider a study of adult survival in the future.

This project met objectives listed in the 2019 Alaska Shorebird Conservation Plan.

Location: Kanuti Lake, 66° 10.76'N, 151° 44.30'W
Contact: Chris Harwood, U. S. Fish and Wildlife Service, Kanuti NWR, 101 12th Ave., Room 206, Fairbanks, AK 99701; phone: (907) 455-1836; email: christopher_harwood@fws.gov

Figure 1. Laura McDuffie shows just-marked Lesser Yellowlegs, "PU." Captured birds received a federal band, a blue color band signifying Kanuti NWR, and the green leg flag with the unique alpha characters. Ten of the 13 marked yellowlegs also received GPS transmitters. (Photo Amanda Zuelke, USFWS)

Figure 2. Laura McDuffie and Chris Harwood (behind willows) employ the "Whoosh" method to capture yellowlegs (note circling bird in largest cloud). This site was typical of where we found families—recently flooded shoreline with mostly damp, dead graminoids and willows just inland. Note the more elevated area in the background that may have served as nesting habitat. These "uplands" comprised tussock-shrub meadows with scattered black spruce. (Photo Amanda Zuelke, USFWS)

#24 – POPULATION REASSESSMENT OF ROCK SANDPIPERS BREEDING ON BERING SEA ISLANDS

Investigators: Rachel Richardson, U.S. Geological Survey and University of Alaska Anchorage; Steve Matsuoka and Daniel Ruthrauff, U.S. Geological Survey; Jim Johnson and Marc Romano, U.S. Fish and Wildlife Service; and Audrey Taylor, University of Alaska Anchorage

The nominate subspecies of the Rock Sandpiper (*Calidris p. ptilocnemis*) breeds primarily on four islands in the Bering Sea (St. Matthew, Hall, St. Paul, and St. George), and has a relatively small nonbreeding range centered at Cook Inlet and coastal sites in Southeast Alaska. Colloquially known as the Pribilof Rock Sandpiper, the subspecies' population size is estimated at ~19,800 birds, ranking as one of the smallest populations of any shorebird in North America. Given the restricted range of the subspecies and its small population size, the Pribilof Rock Sandpiper is considered a species of high conservation concern.

The first population estimate for the endemic Pribilof Rock Sandpiper derives from a series of line-transect surveys conducted at each of the four breeding islands across successive spring seasons in 2001–2003. In 2018, crews supported by the USFWS's Alaska Maritime National Wildlife Refuge accessed the remote and uninhabited islands of St. Matthew and Hall to reassess the population status and habitat associations of both the Pribilof Rock Sandpiper and the endemic McKay's Bunting (*Plectrophenax hyperboreus*). In addition to replicating the line-transect surveys for both species, crews also conducted a habitat classification of the islands by ground truthing locations to train a classification based on high-resolution satellite imagery. This effort will enable a habitat-based assessment of the density and distribution of these two species. The successful completion of surveys in 2018 at the remote and costly to access St. Matthew and Hall Islands inspired efforts to similarly reassess the population size and habitat associations of Pribilof Rock Sandpipers on St. Paul and St. George Islands in 2019–2020.

In 2019, we conducted line-transect surveys for Pribilof Rock Sandpipers on St. Paul Island from 7–11 May resulting in completion of 38 transects totaling 204 km. We will finalize population surveys on St. George Island in early May 2020 which will consist of completing 39 transects following the same survey protocols. A final land cover classification for the Pribilof Islands will also be completed in 2020. Forthcoming analysis will include estimating current population size to compare with abundance estimates from previous surveys.

Pribilof Rock Sandpipers breed in Bird Conservation Region 1 and are identified as a priority shorebird species in the 2019 Alaska Shorebird Conservation Plan. Efforts from this ongoing research aim to fulfill several objectives outlined in the plan including: (1) develop habitat-based models to predict the abundance and distribution of shorebirds (Research), (2) conduct long-term population monitoring efforts (Population Inventory and Monitoring), and (3) apply abundance and distribution information to identify key shorebird habitats and sites (Habitat Management and Protection).

Additional field assistance in 2019 was provided by Tony DeGange, Laura McDuffie, and Sarah Tanedo. Funding and logistical support for this study was provided by the National Fish and Wildlife Foundation, Alaska Maritime National Wildlife Refuge, USFWS Migratory Bird Management, University of Alaska Anchorage, Cornell Lab of Ornithology, and USGS Alaska Science Center. Special thanks to John Faris and the crew of the R/V Tiĝlax̂ for providing hospitality, accommodations, and safe transport to and from St. Matthew and Hall Islands.

Location: St. Matthew and Hall Islands, 60°27′N, 172°50′W; St. Paul Island, 57°10′N, 170°16′W; St. George Island, 56°34′N, 169°36′W

Contact: Rachel Richardson, U.S. Geological Survey, Alaska Science Center, 4210 University Drive, Anchorage, AK 99508; Phone: (907) 786-7194; Email: rrichardson@usgs.gov

Female Pribilof Rock Sandpiper on St. Matthew Island. Photo credit: Rachel Richardson.

#25 – BLACK OYSTERCATCHER MOVEMENT ECOLOGY

Investigators: Lena Ware and David Green, Simon Fraser University; Brian Robinson and Daniel Esler, U.S. Geological Survey; Heather Coletti, National Park Service

The following study is a collaboration among researchers at the Centre for Wildlife Ecology, Simon Fraser University, the Nearshore Marine Ecosystem Research Program at the USGS Alaska Science Center, and the Southwest Alaska Inventory and Monitoring Network of the National Park Service. We are studying migratory strategies and spatial ecology throughout the annual cycle of the Black Oystercatcher by attaching tracking technology to breeding adult birds in the Gulf of Alaska. This study is paired with ongoing work in British Columbia where many Black Oystercatchers from Alaska winter. Our research is examining factors that drive migration and residency, identifying important migratory stopover sites/wintering sites, and improving effectiveness of using Black Oystercatcher as an indicator species for intertidal ecosystem status.

The field season occurred from June 1 to July 7, 2019 at 4 sites across the Gulf of Alaska (Figure 1). Breeding birds were primarily captured near existing Gulf Watch Alaska (https://gulfwatchalaska.org/) nearshore marine monitoring sites. We deployed 46 tracking devices and banded an additional 22 individuals as a control group to compare return rates across attachment methods (table 1). 6 GPS tags were deployed using leg-loop harness. Geolocators were attached to birds by leg band (n = 20) and by leg-loop harness (n = 20). We distributed tag and attachment types, as well as control birds, as evenly as possible, spatially and temporally.

We had several interesting recaptures. We recaptured two breeding males who were initially banded by Brian Robinson in 2014 as chicks in Kenai Fjords National Park. One was occupying a breeding territory 17km from its natal site and the other 3km. Most exciting was a recapture of a breeding adult female in Northwestern Fjord (Kenai Fjords National Park) with an old worn band. The Bird Banding Lab informed us that this bird was banded in 2005 as a chick in Harriman Fjord, Prince William Sound (over 250 km dispersal) by Caleb Spiegel 14 years ago. This likely sets a new longevity record for the species!

During the 2020 field season, we will collect loggers and compare return rates of the control group with those marked using the different attachment types. The data from the devices also will indicate the proportion of individuals that leave Alaskan breeding sites during winter, the attributes that are related to their decision to migrate, the wintering locations of birds that migrate, and, for the GPS tagged birds, details about migration chronology and habitat use through the annual cycle.

This study will address an objective of the Alaska Shorebird Conservation Plan by assessing the nonbreeding locations of Black Oystercatchers, identifying areas of high concentrations, and determining migratory connectivity between breeding and wintering areas.

Table 1. Proportion of tracking devices (by attachment type) to controls at each field site.

Site	Leg-loop harness	Leg-band attachment	Controls	Total birds per site
West Prince William Sound	7	6	7	19**
Kenai Fjords National Park	8	8	6*	22
Kachemak Bay	4	3	3	10
Katmai National Park	7	3	7	17
Total birds per group	26	20	23	**68**

*one previously banded bird – re-sighted but not captured is included as an additional control.
**one opportunistically banded non-breeder is not included because it was not linked to a territory.

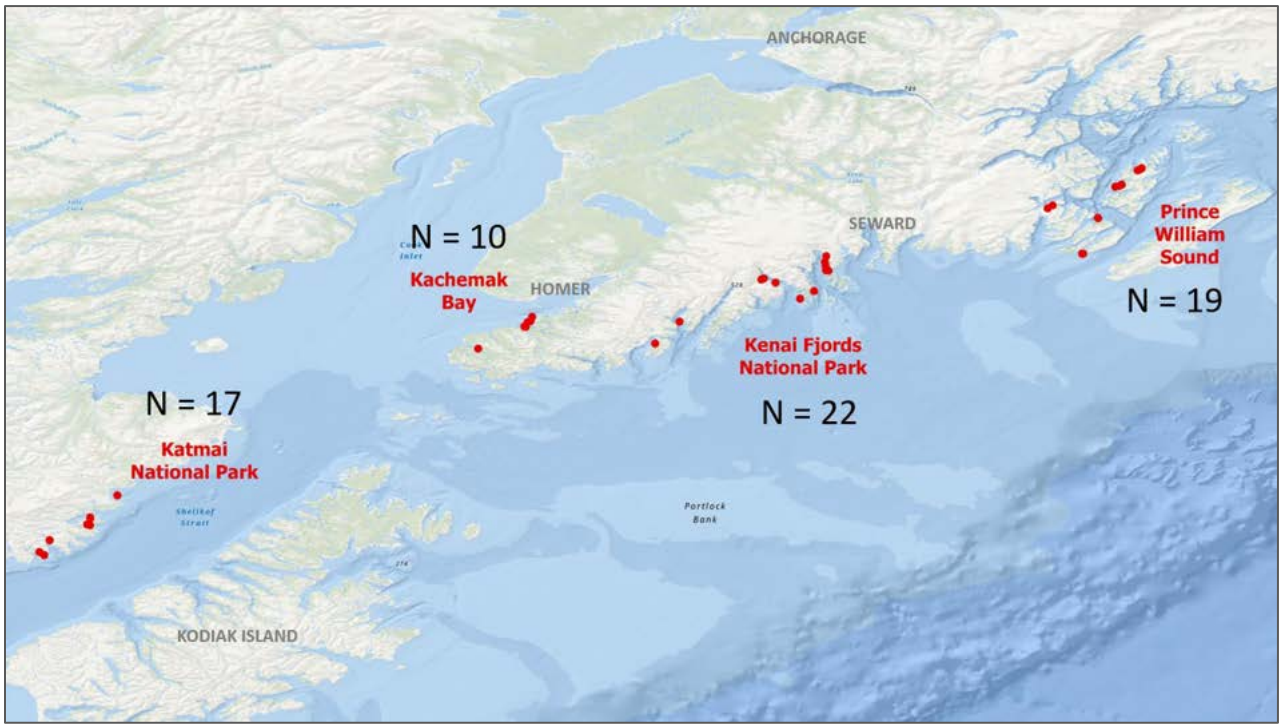


Figure 1. 2019 black oystercatcher capture locations in the Gulf of Alaska. These regions correspond with the four nearshore monitoring regions of the Gulf Watch Alaska Program.

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Oystercatcher decoy and speaker used to lure territorial pairs over noose-mats. Photo by Lena Ware (SFU).

Black Oystercatcher with a solar-powered GPS logger attached by leg-loop harness. Photo by Lena Ware (SFU).

Brian Robinson (USGS) with a bird he banded as a chick in 2014. Photo by Lena Ware (SFU).

Black Oystercatcher with geolocator attached to leg band seen foraging with her two chicks in Kachemak Bay 8 weeks after release. Photo by Will Green (local photographer).

Black Oystercatcher breeding pair in Hallo Bay, Katmai National Park and Preserve. Last day of fieldwork. Photo by Lena Ware (SFU).

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