



Alaska Shorebird Group

Annual Summary Compilation:
New or ongoing studies
of Alaska shorebirds

December 2015



Semipalmated Sandpiper two days after hatch. Photo by Z. Pohlen

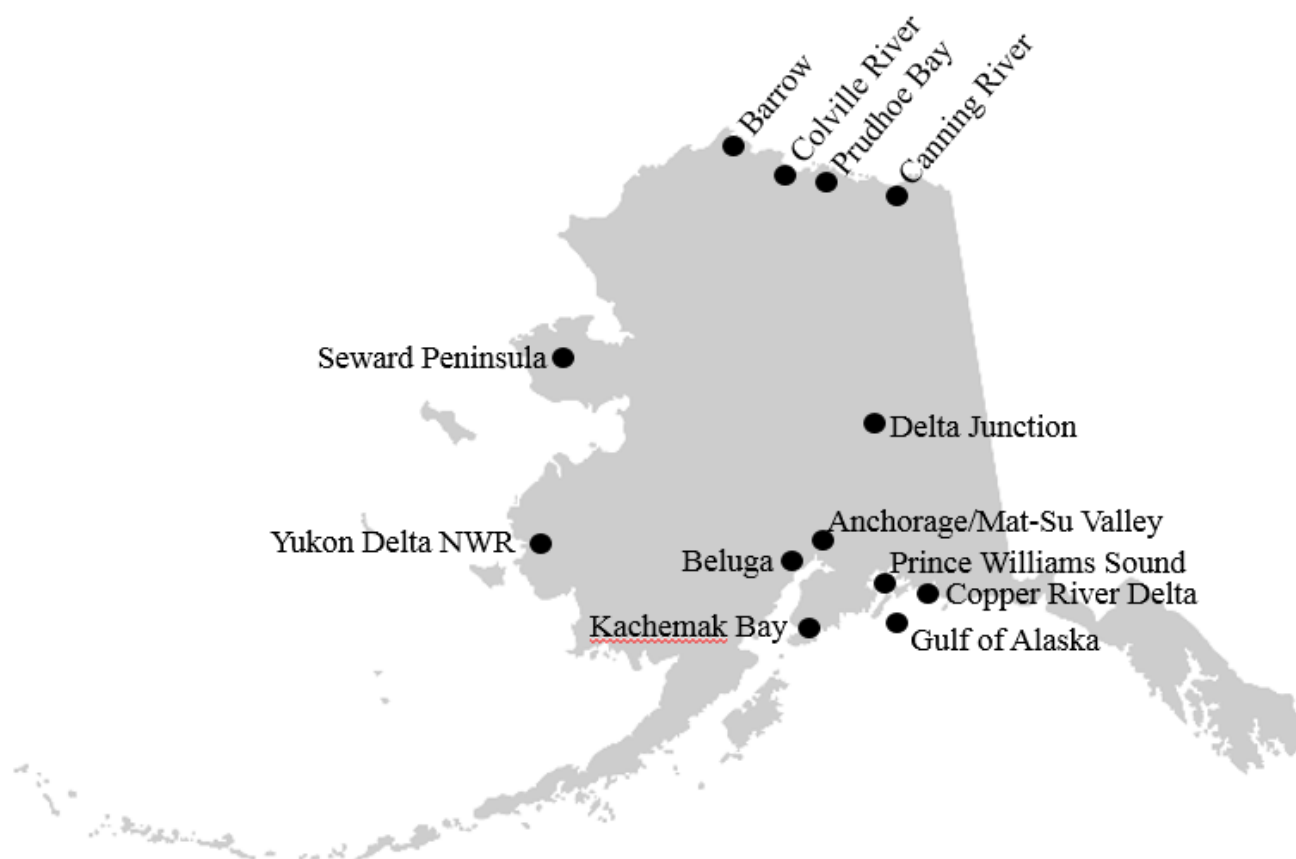
EXECUTIVE SUMMARY

Brian Robinson, Alaska Shorebird Group Secretary

Welcome to the 2015 summary report of ongoing or new studies of Alaska shorebirds. This is the fifteenth consecutive report put together by the Alaska Shorebird Group. In this document, members of the Alaska Shorebird Group compiled annual summaries for 19 studies, highlighting many interesting projects investigating Alaska shorebirds. The Alaska Shorebird Group continues to be a highly collaborative organization with a large membership of productive principal investigators. This annual compilation is the only written record we have of shorebird projects in the state of Alaska and provides a valuable timeline of shorebird science activities for this region.

The map of our study site locations within Alaska (next page) shows the statewide distribution of projects from this summary where these locations could be gleaned from the summary. Much of the work in Alaska was conducted in arctic breeding sites and in south central Alaska with additional studies in western Alaska and the interior. I would like to thank all of the talented photographers who submitted their images for use in this document. Photo credits (when given) and a brief caption are listed for each photo.

Thank you to the principal investigators for making contributions to this year's annual summary report. Big thanks to the field biologists for their valiant efforts in conducting these important field studies in Alaska. We look forward to many more years of fruitful research and conservation of Alaska's breeding and migratory shorebirds.



Dispersal of 2015 Alaska Shorebird Group Projects throughout Alaska. Locations may represent more than one project.

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#1—LONG-TERM MONITORING OF TUNDRA-NESTING BIRDS IN THE PRUDHOE BAY OILFIELD, NORTH SLOPE, ALASKA

Investigators: Rebecca Bentzen and Martin Robards, 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 2015 we discovered and monitored 122 nests of 13 tundra-nesting species (8 shorebird species) from 3 June to 22 July on (or near) 12 10-ha study plots using both rope drag and behavioral nest search techniques. Semipalmated Sandpiper, Pectoral Sandpiper, and Lapland Longspur nests accounted for the majority (69%) of those found. Among all species, 83 nests successfully hatched/fledged, 26 depredated, and 10 nests were of unknown fate, 3 abandoned and 1 nest was infertile. We relied heavily on the presence of pip fragments in the bowl. We cannot stress enough the importance of spending time at each nest bowl looking for pip fragments. On two separate occasions, the chicks' egg tooth was also found in the nest bowl to support nest success. The unknown fates occurred most often within 4 days of the estimated hatch date when no pip fragments, tops or bottoms, or chicks were found near the nest. Apparent nest survival was higher in 2015 (83 successful/26 depredated) than in 2014 (56 nests hatched/55 depredated). Overall, 9 species of potential nest predators were detected during timed surveys with the most common being Glaucous Gulls, Parasitic Jaegers, and Long-tailed Jaegers.



Egg tooth discovered in a Pectoral Sandpiper nest. Photo by Zak Pohlen

#2— ALASKA STOPOVER AREAS USED BY RED KNOTS DURING SPRING

Investigators: Mary Anne Bishop, Prince William Sound Science Center, Joseph Buchanan, Washington Department of Fish and Wildlife, Brian McCaffery, US Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, Jim Johnson, US Fish and Wildlife Service, Migratory Bird Management

With an estimated population of 22,000 individuals, the Red Knot (*Calidris canutus roselaari*) is one of the smallest and least studied shorebird populations in North America. The objectives of this study were to: 1) identify key spring stopover areas on the Copper-Bering and Yukon-Kuskokwim River deltas; 2) determine migration timing; and 3) evaluate the connectivity between the Copper-Bering and Yukon-Kuskokwim deltas and Grays Harbor. We captured and radiotagged a total of 50 Red Knots at Grays Harbor, Washington - one of the most important spring stopovers - on 1 May (n = 3) and 6 May 2015 (n = 47). Across the Copper-Bering River deltas a total of 18 consecutive telemetry flights were conducted from 10-27 May, and 11 telemetry flights were conducted along the coastline of the Yukon-Kuskokwim deltas between 11 May and 1 June. In all, 96% of the radiotagged birds (n=48) were detected either at the Copper-Bering or Yukon-Kuskokwim deltas. First and last detections occurred on 10 and 25 May on the Copper-Bering and 12 and 27 May on the Yukon-Kuskokwim. This study identified new concentration areas used by Red Knots during spring migration: Controller Bay on the Copper-Bering River deltas, and Kipnuk and the outflow of Baird Inlet on the Yukon-Kuskokwim deltas. Our work confirms that most Red Knots stopping at Grays Harbor in spring later stop at the Copper-Bering and Yukon-Kuskokwim River Deltas en route to their breeding grounds.

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#3— MONITORING SEMIPALMATED PLOVERS BREEDING AT EGG ISLAND, COPPER RIVER DELTA

Investigators: Mary Anne Bishop, Prince William Sound Science Center and Erica Nol, Trent University

North American shorebirds have experienced population declines over the last several decades. Semipalmated Plover, however, are one shorebird species whose numbers are apparently stable. Building on research conducted in 2006 and 2008, we began a study in 2011 on a breeding population of Semipalmated Plovers at Egg Island, a barrier island on Alaska's Copper River Delta. The objectives of our study are to monitor breeding phenology and to determine survivorship based on return rates of banded breeders. Between 31 May and 2 June 2015 we located 12 plover nests, and again on 7 June we located an additional two nests. Unfortunately from 3-6 June we had to forego all nest and resight

searches due to inclement weather. In all, we banded three Semipalmated Plover adults and resighted 16 birds banded previously on Egg Island. Additional field work is planned for Egg Island in 2016.

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Semipalmated Plover. Photo by Anne Schaefer, PWSSC

#4— ARE WINTER CONDITIONS DRIVING POPULATION TRENDS IN SEMIPALMATED SANDPIPERS (CALIDRIS PUSILLA)? EVIDENCE FROM A CORTICOSTERONE BIOMARKER

Investigators: Megan Boldenow, Department of Biology and Wildlife, University of Alaska Fairbanks, Abby Powell, U.S. Geological Survey Alaska Fish and Wildlife Cooperative Research Unit, Richard Lanctot, U.S. Fish and Wildlife Service Migratory Bird Management, Alexander Kitaysky, Institute of Arctic Biology, University of Alaska Fairbanks, and Stephen Brown, Manomet Center for Conservation Sciences, plus ASDN collaborators Rebecca Bentzen, Wildlife Conservation Society, David Lank and Willow English, Simon Fraser University, David Payer, U.S. Fish and Wildlife Service, Ron Porter, Delaware Bay Shorebird Project, Brett Sandercock and Eunbi Kwon, Kansas State University

Semipalmated Sandpipers (*Calidris pusilla*, SESAs) have traditionally been divided into three breeding populations across the North American Arctic. The eastern population shows pronounced declines, while the central and western populations show stable or increasing trends. Factors on the wintering grounds are suspected as primary drivers of declining trends. We aim to use CORT deposited in winter-grown feathers as a tool to examine how wintering conditions impact individual SESAs. Corticosterone (CORT, the primary avian stress hormone) has been shown to relate to environmental stressors, and chronically high levels affect fitness.

Here we present preliminary results for 41 SESAs at five of the Arctic Shorebird Demographics Network (ASDN) breeding sites. These sites are Canning River, Ikpikpuk River, Barrow, Cape Krusenstern, and Nome. We deployed geolocators (archival, light level-detecting tracking devices) on SESAs during the 2013 breeding season. These 41 birds wore their geolocators for a full annual cycle, until breeding season 2014, when we retrieved the geolocators and collected winter-grown tenth secondary feathers. We measured the CORT levels deposited during feather molt and used winter locations recovered from the geolocators to analyze individual variation in feather CORT (fCORT) by wintering region, as well as breeding site. We grouped birds into five winter regions: Atlantic (including the Atlantic coastlines of South America and islands), Caribbean South America, Caribbean Islands (Caribbean Sea coast), Pacific South America, and Caribbean South America.

Due to the small size of the original data set and unknown distribution of fCORT values in SESAs, we bootstrapped the fCORT data and performed Wilcoxon rank sum tests to give a more robust analysis. Results indicate fCORT varies significantly by wintering region ($p \leq 0.05$). This variation in fCORT levels likely reflects differences in conditions across the winter range, such as weather, baseline habitat quality, or large-scale land use patterns. CORT in winter-grown feathers also varies with breeding site, which may reflect some degree of segregation of breeding populations on the wintering grounds. However, winter fCORT values in SESAs are only partially explained by location, which suggests fCORT may reflect conditions at smaller scales than we are able to show through this analysis, and/or factors that are intrinsic to individual birds.

We will test for cross-seasonal effects of fCORT and reproductive success, using a larger data set. We will specifically examine whether nest initiation date and total egg volume (indices of reproductive potential) vary with fCORT as a predictor variable. Based on preliminary results, there does not seem to be a relationship between fCORT and egg volume, but a potential carry-over effect of wintertime stress on nest initiation date is indicated. Specifically, fCORT is included within a set of top models chosen through the Akaike Information Criterion (i.e. within 2 units of the lowest AIC value), suggesting that SESAs with higher fCORT levels may initiate nests later. Because nest initiation date may partially determine reproductive success in the short Arctic breeding season, our results demonstrate a potential seasonal interaction. Impacts to individuals may scale up to the population level. If there is an effect of chronically elevated CORT on fitness, including reproductive success, these results may further our understanding of why some breeding populations of SESAs are declining, while others are not.

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#5— SHOREBIRD MONITORING ON THE YUKON DELTA NATIONAL WILDLIFE REFUGE

Investigators: Stephen Brown, Manomet Center for Conservation Sciences, Brad Andres, Diane Granfors, Jim Johnson, Jim Lyons, Sarah Saalfeld, and Richard Lanctot, U.S. Fish and Wildlife Service, Kristine Sowl and Brian McCaffery, Yukon Delta National Wildlife Refuge

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. To date, most PRISM surveys have been conducted in Arctic Alaska and Arctic Canada. However, preliminary work from the Yukon Delta National Wildlife Refuge (NWR) in 2002 indicated that this area might have some of the highest densities of shorebirds in the world. A large survey effort was begun in 2015 to estimate the population size and habitats used by shorebirds on the Yukon Delta NWR. The survey was also designed to generate a baseline inventory of shorebirds, passerines and waterfowl breeding on the Yukon Delta NWR.

Sixteen-hectare sized plots were selected in a stratified random design with strata delineated by expected shorebird densities based on habitat. The survey area included most of the refuge, but several areas were excluded including Nunivak Island, the Andreafsky Wilderness, part of the eastern edge of the refuge (considered lower priority), and non-suitable habitat, such as forested areas. This region was then divided into two survey areas based on access. Most of the refuge was surveyed by two teams that were transported by R44 helicopters. However, the Central Coast between the Askinuk Mountains and Nelson Island and up to 16 km inland is no-helicopter fly zone and this area was surveyed by two additional teams that used boats and float planes to access sites. Each plot was surveyed by a single observer for 1 hour and 36 minutes. 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 breeding pairs and total number of individual birds. Other bird species observed during surveys were noted on the data form.

A total of 301 plots were surveyed between the 15 May and 9 June 2015. The surveys documented 7,669 individuals, including 1,269 breeding pairs, of 22 species of shorebirds. The most numerous were Red-necked Phalarope (29% of birds observed), Dunlin (20%), Western Sandpiper (16%), Pectoral Sandpiper (8%), Black Turnstone (6%), and Bar-tailed Godwit (5%). There appears to be a strong coastal density gradient with the highest densities of shorebirds occurring within a few kilometers of the coast.

There are several areas where further work is needed. First, we did not include measures of detectability because we felt this was best done in the 2nd year of the study after we had gained a better understanding of shorebird use on the refuge. Second, because the Yukon-Kuskokwim Delta is in the Subarctic, it was difficult to differentiate breeders and nonbreeders that had stopped prior to migrating further north to distant breeding areas. This was especially problematic for the Pectoral Sandpiper, which accounted for 8% of our observations. Third, the dates when it was possible to conduct surveys within the Central Coast may have underestimated population sizes because of lower detectability. The coastal-based crews could not start their surveys until ice break-up had occurred on the rivers, which was well past dates when snow had melted off the tundra and shorebirds had begun nesting. Fourth, some surveys were conducted during less than desirable weather conditions (wind, rain). Since these factors affect detectability, we need a way to describe and control for variable weather conditions. Finally, quality imagery was often not available for remote areas on the Yukon Delta NWR. Survey plot maps outside of the Central Coast were often pixelated and not very helpful for mapping bird locations. An effort will be made to seek better imagery for the second year of the survey.

Plans for 2016 include addressing the issues identified above, if possible. Questions remain about whether we should estimate detectability using one or more intensive plots or use another methodology such as double observer or multiple counts. We also need to define habitat types so we can adequately assign bird-habitat associations and extrapolate bird densities.

This project was a huge cooperative effort. Partners included Yukon Delta National Wildlife Refuge, USFWS Migratory Bird Management Program (National and Alaska Region), USFWS Inventory and Monitoring Program (National and Alaska Region), Manomet Center for Conservation Sciences, and Audubon Alaska. Funding was provided by a grant from the National Fish and Wildlife Foundation, the USFWS Inventory and Monitoring Program, USFWS Migratory Bird Management Division, Yukon Delta National Wildlife Refuge, as well as contributions from generous donors of the Manomet Center for Conservation Sciences.

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#6— ARCTIC SHOREBIRD DEMOGRAPHICS NETWORK: OVERVIEW

Investigators: Stephen Brown, Manomet Center for Conservation Sciences, Richard Lanctot, U.S. Fish and Wildlife Service, Brent Sandercock and Emily Weiser, Kansas State University

To obtain a better understanding of how shorebirds will respond to climate-mediated changes in the Arctic's morphology and ecology, we established a network of sites, known as the Arctic Shorebird Demographics Network (ASDN), wherein we collected information on a suite of predictor variables thought to be responsive to climate change, with a future goal of correlating these variables with

measures of shorebird distribution, ecology, and demography. Starting in 2010, we established nine field sites across the Arctic, from Nome, Alaska to Hudson Bay, Nunavut. The number of sites was expanded from 9 to 11 sites in 2011, 11 to 14 in 2012, and 14 to 16 in 2013. This includes work being conducted by 32 principal investigators and 11 graduate students (4 PhD, 7 M.Sc.) from 15 institutions. Protocols were adopted/modified from prior studies in the Arctic to create a standardized protocol that has been updated prior to each field season. We have compiled all of the data from the various sites during the first five years (2010 – 2014) of the ASDN operation, and a summary from all five field seasons are presented here.

A total of 9,204 nests belonging to 39 species were located in the five years of the study. The largest number of nests belonged to the five ASDN focal species: Dunlin, Semipalmated Sandpipers, Red and Red-necked Phalaropes, and Pectoral Sandpipers. Unexpectedly high number of Western Sandpiper and American Golden-Plovers were also discovered. Nest initiation dates varied tremendously across sites for the focal shorebird species investigated during this study. Apparent nest success was 55% across all sites and species; rates varied between years within sites, and also between sites within years. An investigation into what environmental variables best explain the variation in nest success is underway. A total of 5,489 adults belonging to 27 species were banded in the five years of the study. The number of adults banded per species ranged from 1 to 1,618 during the study (mean $\pm$ SD = 203.0 $\pm$ 366.1). ASDN focal species were again captured the most frequently, but like nests, high numbers of Western Sandpipers and American Golden-Plovers were also captured. A total of 5,700 chicks belonging to 27 species were banded in the five years of the study. The number of chicks banded per species ranged from 3 to 1,209 during the study (mean $\pm$ SD = 211.1 $\pm$ 369.7). The highest returns of color-marked adults were observed in American Golden-Plover, Dunlin, Hudsonian Godwit, Red-necked Phalarope, Ruddy Turnstone, Semipalmated Sandpiper, Western Sandpiper, and Whimbrel, which should allow adult survival estimates to be made (detailed analysis beginning now). Besides the shorebird data, field personnel kept daily species lists throughout all five years of the study, and established sampling stations to document aquatic and terrestrial invertebrate diversity, phenology, and abundance (primarily during first three years of the study). In addition, data were collected on predators, small mammals and other alternative prey for predators of shorebirds, snow and surface water, and general climatic variables. These data show tremendous variation across sites and within sites that are currently being explored to help understand variation in shorebird densities.

ASDN principal investigators are collaborating on 21 projects that use the geographically vast and taxonomically rich ASDN data. This includes work being conducted by 33 principal investigators and 10 graduate students (8 PhD, 1 M.Sc. and 1 Honors B.S.) from 21 institutions. ASDN studies include investigations of the potential for an ecological mismatch between invertebrate emergence and shorebird hatching, variation in shorebird nest predation across the Arctic, and factors affecting shorebird settlement patterns. Avian health issues being investigated include avian influenza, avian malaria, gut microbiota, and mercury exposure. Migratory connectivity studies include projects using light-level geolocators to document migratory pathways and wintering areas of American Golden-Plover, Dunlin, and Semipalmated Sandpipers. An additional study is using stable isotope signatures to document connections between breeding, migration and wintering areas of Semipalmated Sandpipers. Other studies are focusing on the effects of spring phenology on timing of breeding in shorebirds, invertebrate phenology in relation to habitat and weather, long-distance dispersion of moss by

shorebirds, the distribution of Arctic invertebrates, trends in shorebird population trends, and genetic diversity of shorebirds in relation to population size and other factors.

The ASDN principal investigators have been highly successful at producing products from the data collected at their field sites. Although the major analyses and publications that will address core objectives of the ASDN have not been completed, investigators have collectively produced 28 peer-reviewed publications, 2 PhD theses, 5 Master's thesis, 3 popular articles, 34 reports, and 94 presentations. We anticipate that many more publications will be produced in the coming years.

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#7— BLACK OYSTERCATCHER MONITORING

Investigator: Heather Coletti, National Park Service

The National Park Service Southwest Alaska Network Inventory and Monitoring Program (NPS SWAN I&M) and the USGS Alaska Science Center (USGS ASC) are close collaborators within a long-term monitoring program called: Gulf Watch Alaska (GWA). GWA is funded by the Exxon Valdez Oil Spill Trustee Council and heavily leveraged by agency support. The GWA nearshore program has been integrated with nearshore monitoring implemented in 2006 by the NPS SWAN to cost-effectively monitor nearshore ecosystems across the central and western Gulf of Alaska, including spill-affected areas, and provide information on recovery and restoration of injured resources.

For the Nearshore ecosystem component of SWAN and GWA, we have implemented a long-term monitoring program at three locations across the GOA, including sampling areas in Western Prince William Sound (PWS), Kenai Fjords National Park (KEFJ), and Katmai National Park and Preserve (KATM). Monitoring metrics include marine invertebrates, kelps, sea grasses, marine birds, black oystercatchers and sea otters as well as some physical parameters. In addition to taxa-specific metrics, monitoring includes recognized important ecological relations that include predator-prey dynamics, measures of nearshore ecosystem productivity, and contamination.

One of the species of focus, the black oystercatcher, is a common and conspicuous member of the rocky and gravel intertidal marine communities of park shorelines. This species is completely dependent on nearshore marine habitats for all critical life history components, including foraging, breeding, chick rearing, and resting, but is highly susceptible to human disturbance. The black oystercatcher serves as “keystone” species and is important in structuring nearshore ecosystems.

SWAN and USGS staff have been monitoring black oystercatcher breeding density, nest productivity, and feeding behavior along the rocky intertidal coast of KATM since 2006 and in KEFJ since 2007.

WPWS has been surveyed annually since 2010. Annual boat-based surveys are conducted in early summer to determine breeding density. Nests are located on foot and examined for presence of chicks and/or eggs to determine productivity; shell remains are collected and identified to species to determine chick provisioning habits.

Detailed survey methods for estimation of nest territory density, productivity and diet can be found in the black oystercatcher SOP (Bodkin 2011). More information can also be found on the SWAN website: <http://science.nature.nps.gov/im/units/swan/index.cfm>

Bodkin, J. L. 2011. SOP for monitoring black oystercatchers - Version 1.1: Southwest Alaska Inventory and Monitoring Network. Natural Resource Report NPS/SWAN/NRR—2011/391. National Park Service, Fort Collins, Colorado

#8— BLACK OYSTERCATCHER SURVEYS IN PRINCE WILLIAM SOUND – 2015 FOREST MONITORING PLAN

Investigator: Melissa Gabrielson, U.S. Forest Service, Cordova, AK

Black Oystercatchers (*Haematopus bachmani*) are listed as a “species of high concern” in the U.S. National Shorebird Conservation Plan, a Focal Species for the U.S. Fish & Wildlife Service (USFWS), a Chugach National Forest (CNF) Management Indicator Species (MIS), and a US Forest Service Alaska Region Sensitive Species. Approximately 800-1200 individuals inhabit the shorelines and rocky islets of Prince William Sound, an area primarily managed by the CNF. The Chugach Forest Plan calls for monitoring population trends, habitat relationships, and habitat change for nesting Black Oystercatchers in Prince William Sound. The CNF has been monitoring Black Oystercatcher nest locations since 1999. This data has been used to analyze interactions between Black Oystercatchers and human use and have been integrated into a sensitive species analysis for Prince William Sound.

The sampling design was developed in an attempt to retain the historically important survey regions of Harriman Fjord, Green Island, Montague Island, and the Dutch group, while supplementing additional shoreline segments from the entire Prince William Sound. In order to minimize travel time and expense to visit other sampled shorelines we took a regional approach to sampling, and developed a split-panel rotating design to provide a balance between estimation of trend and estimation of yearly status. This design designates some areas with high historic concentrations of Black Oystercatchers to be visited every other year and other less populated areas to be visited less frequently. A split-panel rotating design also has the advantage of allowing more shorelines to be visited during the life of the monitoring program, which provides more opportunity to detect changes in the spatial distribution of nesting Black Oystercatchers in Prince William Sound.

In early June 2015, the following areas were surveyed in Prince William Sound: Hawkins Island, Port Chalmers (Montague Island), Flemming Island, Whale Bay, Knight Island, Harriman Fjord, the Dutch

Group, and Simpson Bay. A total of 21 active Black Oystercatcher nesting territories were identified during the survey and an additional sixteen sites were identified with non-breeding Black Oystercatchers. The greatest densities of active Black Oystercatcher territories were located near Port Chalmers (n =12) on Montague Island. Overall, 21 active nests, 52 total eggs, 6 chicks, and 91 (breeding and non-breeding) adults were observed during the 2015 survey. Data from the 2015 survey will be entered into the CNF Black Oystercatcher GIS database. Future analysis will continue to compare Black Oystercatcher populations and human use effects across Prince William Sound.

#9 —RED KNOT (*CALIDRIS CANUTUS ROSELAARI*) SURVEYS ON THE COPPER RIVER DELTA DURING SPRING MIGRATION

Investigators: Melissa Gabrielson and Erin Cooper, U.S. Forest Service, Cordova, AK

The Atlantic Flyway subspecies of Red Knot (*Calidris canutus rufa*) has recently been listed as a threatened species under the Endangered Species Act due to sharp population declines over the past decade, but little is known about the current status of the Pacific Flyway subspecies of Red Knot (*Calidris canutus roselaari*). The Copper River Delta in south-central Alaska is one of the Western Hemisphere's most important shorebird stopover sites. Recently, thousands of Red Knots were observed on one of the western barrier islands on the Copper River Delta (i.e. Little Egg Island). This led to questions about the Copper River Delta's importance as a stopover site for Red Knots. In 2013, the Copper River International Migratory Bird Initiative (CRIMBI) funded a small survey that documented the timing of the Red Knot migration and use of the Copper River Delta. From May 4-13, 2015, 2 observers were stationed on Little Egg Island to document Red Knot numbers, flagged individuals, behavior, arrival times, and departures. This project was an extension of the survey that was conducted in 2013 and 2014 (see past ASG summaries). The information collected from this effort will be tied in with other surveys that are being conducted to determine the interconnectedness of the Red Knot and its use of stopover sites along its migration pathway.

Results:

Two surveys were conducted each day on the 10th, 11th, and 12th of May. On all other days only 1 survey was conducted due to hours of daylight and weather conditions. Total shorebird numbers were the largest on 11 May when approximately 6,120 were observed on Little Egg Island. Total Red Knot numbers were also the largest on 11 May when approximately 1,930 were observed. A large spring storm occurred 7-10 May on Little Egg Island. The storm brought heavy winds (gusting up to 35 + mph) and rain. Red Knot and total shorebird numbers on Little Egg Island increased daily leading up to the storm. Once the storm arrived the estimated numbers dropped. It is unclear whether this decrease in estimated numbers (total shorebirds and Red Knots) was due to the storm, decreased detectability, movement of Red Knots to other locations, or other contributing factors.

Total shorebird numbers and total Red Knot numbers fluctuated throughout the survey timeframe and an evident increase or decrease in numbers due to migration was not apparent. During the storm,

underestimation of shorebirds totals may have occurred as activity was low due to the heavy winds (35 mph gusts) and rain. Many of the shorebirds were observed roosting in debris from previous tides, in grassy areas where there was more topography, or among driftwood. In addition, the high winds, heavy rain, and low light conditions were not ideal for the surveying equipment (i.e. scopes and binoculars).

Red Knots were consistently observed in the presence of Dunlin (*Calidris alpina*), Black-bellied Plover (*Pluvialis squatarola*), Short-billed Dowitchers (*Limnodromus griseus*), Western Sandpiper (*Calidris mauri*), and Ruddy Turnstones (*Arenaria interpres*).

The evening surveys continually had greater numbers of total shorebirds and Red Knots compared to the morning surveys. The larger flocks of Red Knots and total shorebirds were located on the northern point of the island just north of camp. This area had a substantial amount of cover (i.e. drift wood, grass, sand mounds) that the shorebirds seemed to prefer, especially during windy/rainy weather. Common shorebird activities included feeding, moving around near the tideline, preening, and roosting. The majority of the shorebirds were observed resting/roosting when surveys occurred.

Additional effort was put into sighting flagged Red Knots in 2015. Flagged Red Knots were first observed on 5 May. All of the flagged Red Knots had a metal band on the lower right leg and a yellow flag over a red flag on the left leg. The yellow flags had numerical codes that individually identified the Red Knots. All flagged shorebirds observed were turned into bandingbirds.org for documentation. One of Red Knots was identified as 734. Information on this shorebird has not yet been received from the banding organization. The other flagged birds were not able to be individually identified. Flagged shorebirds were observed until 6 May when a storm hit Little Egg Island and visual resight of flags was hindered.

Observers on the island also listened for radio-marked Red Knots as part of a concurrent study on site specific use on the Delta (Bishop et al. 2015. Alaska Stopover Areas Used By Red Knots During Spring). Radio transmitter frequencies were checked daily starting on 5 May. No frequencies were heard until 11 May. A total of 4 frequencies were heard between 11 and 12 May (164.283, 164.743, 164.824, 164.842).



Group of Red Knots (Dunlin, etc.) surveyed on Little Egg Island. Photo courtesy of Mike Ausman.

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#10— INVESTIGATION OF ARCTIC SHOREBIRD DIETS: DNA BARCODING ANALYSIS OF ARTHROPOD PREY IN SHOREBIRD FECES

Investigators: Danielle Gerik, University of Alaska Fairbanks, Richard Lanctot and Sarah Saalfeld, U.S. Fish and Wildlife Service, Andres Lopez, University of Alaska Fairbanks, Kirsty E. Gurney, Environment Canada

It is not well understood why Arctic breeding shorebirds as a group are experiencing population declines nor how shifts in climate on breeding grounds may factor into these population trends. Changes in climate in the Arctic are affecting the phenology of arthropod prey available for nesting shorebirds and their young. It is unclear whether shifts in arthropod availability may impact shorebird chick growth as a result of a trophic mismatch. Understanding exactly what insects (size and type) are eaten by shorebird young as they develop is important for evaluating whether a trophic mismatch exists and assessing its impact.

Recent advancements in molecular techniques to detect environmental DNA offer a new method for conducting diet analysis. These techniques do not require sacrificing birds and have the potential to reduce biases innate in shorebird diet analysis conducted through visual examination of invertebrates

found in the upper gastrointestinal tract. In this study, we used DNA barcoding analysis of feces with next generation sequencing to determine arthropod diet compositions of shorebird adults and young on their breeding grounds in Barrow, Alaska.

A total of 311 shorebird fecal samples were collected during the summers of 2014 and 2015 from adult Red Phalarope (90, *Phalaropus fulicarius*), Dunlin (79, *Calidris alpina*), Pectoral Sandpiper (72, *Calidris melanotos*), Semipalmated Sandpiper (40, *Calidris pusilla*), Long-billed Dowitcher (19, *Limnodromus scolopaceus*), and American Golden-plover (11, *Pluvialis dominica*) captured at nest sites. An additional 153 chick fecal samples were collected from Dunlin, Red Phalarope and Pectoral Sandpipers. Genetic signatures from these samples will be compared to an invertebrate reference library developed from over 300 arthropods collected in Barrow that are specific to the Alaskan Arctic Coastal Plain.

To validate the genetic diet analysis technique, a captive study was conducted during the summer of 2015 with 15 Red Phalarope and Pectoral Sandpiper chicks. During these experiments, chicks were fed arthropods and their subsequent fecal samples were collected to measure how variables such as chick age, prey type, and the length of time following consumption of prey affect the molecular detection of prey in their feces. We also assessed what size prey chicks were able to consume as they grew. Captive studies will be informative for evaluating the extent to which we are able to assess shorebird diet compositions using genetic analyses of fecal samples collected from wild shorebirds.

Besides assessing the trophic mismatch, these findings may help us understand the relationship between shorebird diets and the phenology and availability of arthropods in the environment. It is possible that shorebirds have preferences for food items and our prior assessments of food availability may need to be revised.

Thanks go out to the volunteers, technicians and collaborators on this project. External funding was provided by the Arctic Landscape Conservation Cooperative and the National Fish and Wildlife Foundation.

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#11—IDENTIFYING SHOREBIRD SPECIES AND BREEDING SITES TO PROTECT SUITABLE SHOREBIRD NESTING HABITAT ON MILITARY LANDS IN INTERIOR ALASKA

Investigators: Kim Jochum and Calvin Bagley, Colorado State University

Little is known about shorebird nesting behaviors and specific habitat requirements in Interior Alaska, including all of Fort Wainwright's Training Area lands. The US Army Garrison Alaska recently funded this three-year study to ensure conservation success of migrating shorebirds on Fort Wainwright's Training Lands. The aim of this shorebird project is to determine the range of shorebird species

inhabiting military lands in Interior Alaska and their associated breeding habitats. Study areas are vast, including over 640,000 acres in the Tanana Flats Training Area just South of Fairbanks and over 660,000 acres in Donnelly Training Area (DTA), Black Rapids Training Area, and Gerstle River Training Area near Delta Junction, which form the DTA lands. Landscapes range from extensive lowland wetlands and river terraces in Tanana Flats Training Area to the moraines, boreal forest and mountains in DTA. Due to the large spatial scales and difficulty accessing most of these areas, the final study design including stratification and sample size calculations will depend on various factors like habitat, elevation, patch size and additional geophysical parameters. We aim to combine a repeat plot sampling and repeat linear river sampling approach to estimate the probability of detection and to determine possible occupancy rates for key shorebird species. Field work will begin in spring 2016, and is scheduled for three field seasons at this time. Detailed habitat assessments for upland shorebird species nesting sites were performed across DTA lands this summer. Results were compared to a successfully breeding Whimbrel colony within DTA. We look forward to finalizing our study design during winter 2015 and to collecting first occupancy data in spring 2016.

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#12— BREEDING ECOLOGY AND MIGRATORY CONNECTIVITY OF RED KNOTS (*CALIDRIS CANUTUS ROSELAARI*), 2015

Investigators: Jim Johnson, Lucas DeCico, Nicholas Hajdukovich, and Richard Lanctot, U.S. Fish and Wildlife Service, Migratory Bird Management

The 2015 field season marked the second consecutive year of studying migratory movements and disease dynamics of Red Knots (*Calidris canutus roselaari*) captured during spring migration at Grays Harbor, WA, and the sixth consecutive year of studying aspects of breeding ecology at the Seward Peninsula, AK.

Objectives of the Grays Harbor fieldwork were to: 1) deploy VHF radio transmitters on 50 adult Red Knots to determine timing and distribution on the Copper-Bering and Yukon-Kuskokwim river deltas, during spring migration (see Bishop and others' 2015 summary for details); 2) assist the long-term knot resighting effort and mark additional birds so that they are available for resighting; and 3) opportunistically sample adult knots to determine active and past avian influenza virus and blood-borne pathogen infection rates.

Primary objectives at the Seward Peninsula were to: 1) monitor 20 Red Knot broods using VHF transmitters to estimate brood survival rates and describe previously unstudied aspects of their breeding ecology (e.g., duration of parental care, age when juveniles are capable of flight, age when juveniles and

adults depart natal/breeding areas); 2) deploy GPS tags on 11 adults to identify staging sites in w. Alaska; 3) opportunistically sample adults and chicks to determine active and past AIV infection rates, and blood-borne infection rates; 4) retrieve remaining geolocators previously deployed on adults; and 5) resight previously marked birds to estimate apparent adult survival and mark additional birds so that they are available for resighting at breeding and non-breeding areas.

Grays Harbor Banding, Biosampling, and Resighting:

During 28 April–8 May we captured and individually marked 165 adult Red Knots (including five recaptures from previous years or other sites), successfully deployed 50 VHF radio transmitters, and collected disease samples from 23 adults. Finally, we recorded ~200 individually marked knots including birds banded in Alaska, Baja California, and Washington.

Seward Peninsula Geolocator Retrieval, Resighting, and Banding:

We arrived to our Seward Peninsula study area on 21 June and departed 4 August. We retrieved one additional geolocator. In total we have recovered 55% (22/40) of the geolocators deployed since 2010. We resighted 21 of 72 (29%) adults that were marked on the Seward Peninsula in a prior year: eight originally banded in 2014, six in 2013, two in 2012, and three in 2010. We also resighted a single bird marked in Washington in 2014. Additionally we resighted two adults with single metal bands; these were likely banded as chicks during an unknown year at our study site. We have now recorded four birds banded as chicks that returned to their natal area as adults, which suggests either poor survival, low natal fidelity, or both.

Of the 79 adults banded during 2010–2014 (72 at Seward Peninsula and 7 at Cape Krusenstern), 2 were resighted in the Gulf of Santa Clara, Mexico in July 2015 (banded as siblings in 2014). These are the first chicks banded on the Seward Peninsula to be resighted at a non-breeding site.

We individually marked (metal band and/or unique alpha-numeric lime green flag) 5 new adults and 39 chicks in 2015, which increased the total number of Red Knots banded over the 6-year study to 84 adults and 146 chicks.

GPS PinPoint Tag Deployment

We deployed Lotek GPS PinPoint tags (model: GPS Argos 75, weight: 3.5g) on 11 adult Red Knots. These tags record up to 30 GPS locations (accuracy $\pm 3\text{m}$) following a predefined schedule and upload them to the Argos satellite network. We glued tags to skin free of feathering centered over the synsacrum area. We chose a glue-on attachment because of reported poor success using harnesses on knots; our tags were meant to fall off during pre-basic molt soon after birds arrived to wintering areas. This attachment method proved successful. We received data from all 11 tags, although one transmitted incomplete data. Knots staged at two sites on the Yukon-Kuskokwim Delta: Angyoyavarak Bay (central Delta) and the mouth of the Kolavinarak River (southern Delta). Two birds carried tags programmed to

record the entire southbound migration. After staging on the Yukon-Kuskokwim Delta they flew non-stop to Guerrero Negro, Baja California, MX. Further details are forthcoming.

Breeding Ecology:

Similar to 2014, 2015 was another good year for Red Knots breeding on the Seward Peninsula. We found 20 broods (27 broods in 2014), which is substantially higher than the 14 brood average during 2010–2013. Estimated and observed hatch dates of these broods ranged 15–27 June (median = 19 June). This was the earliest hatching period recorded during our six year study (cf. median of 23 June in 2014, 28 June in 2013, 3 July in 2012, 25 June in 2011, and 27 June in 2010). Even with the aid of VHF transmitters attached to adults and chicks, determining accurate estimates of brood survivorship was difficult because of shorter than anticipated detection range of tags. In general, the number of broods encountered and survivorship appeared to be high in 2015 likely in part to no below-freezing temperatures and heavy precipitation events that can substantially reduce chick survival.

During past field seasons we departed study areas during the first week of July (early to mid-brood-rearing period). This year, however, we remained until early August and attempted to fill in some of the many information gaps in our understanding of the later stages of the brood-rearing period. Here we summarize a few interesting and novel findings. Although chicks are capable of long-distant flight at ~21 d and appear completely independent, males continued to attend and maintain cohesive broods for an additional ≥ 7 d. Extended parental care could reduce predation of chicks by aerial predators (e.g., Parasitic Jaeger). Geolocator and GPS data indicate that when males abandon broods they immediately fly to coastal areas. Broods not attended by adults tended to aggregate; several flocks of 15 juveniles were observed. Juveniles also formed interspecific flocks with American and Pacific Golden-Plovers. Most juveniles appeared to depart natal areas ~30 days after hatch and only a few individuals remained at the end of July.

We are grateful to V. Ayala, L. Chartier, W. Holman, C. Wright, and the staff of Washington Department of Fish and Wildlife for their assistance with fieldwork. This project was supported by the USFWS Avian Health Program and Migratory Bird Management.

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#13—REPRODUCTIVE ECOLOGY OF SHOREBIRDS: STUDIES AT BARROW, ALASKA, IN 2015

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

In 2015, we conducted the 13th year of a long-term shorebird study at Barrow, Alaska (71.29°N, 156.64°W). 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 addition to these objectives, we conducted a second year of an interdisciplinary study investigating climate change effects on shorebirds.

We located and monitored nests in six 36-ha plots in 2015. All six plots were the same as those sampled in 2014 and five of the six plots were the same as those sampled in 2005-2012; all plots were searched with the same intensity as in past years. A total of 506 nests were located on our plots and an additional 68 nests were found outside the plot boundaries. Our total number of nests located on plots was the highest in this 13-year study (above a previous high of 406 recorded in 2011). Nests on plots included 261 Red Phalaropes, 110 Pectoral Sandpipers, 45 Dunlin, 31 Semipalmated Sandpipers, 25 Long-billed Dowitchers, 14 Western Sandpipers, 11 American Golden-plovers, and 9 Red-necked Phalaropes. No Ruddy Turnstone, White-rumped, Baird's, or Buff-breasted sandpiper nests were found on the plots in 2015. The breeding density of all shorebird species on our study area was 234.3 nests/km² in 2015; this was the highest ever recorded and about 1.82 times larger than our long-term average of 128.6 nests/km². In 2015, seven species nested in higher densities than the 13-year average (American Golden-Plover, Dunlin, Long-billed Dowitcher, Pectoral Sandpiper, Red Phalarope, Red-necked Phalarope, and Western Sandpiper) and five nested at densities below the 13-year average (Baird's Sandpiper, Buff-breasted Sandpipers, Ruddy Turnstone, Semipalmated Sandpiper, and White-rumped Sandpiper).

The first shorebird clutch was initiated on 25 May – 7 days earlier than the long-term average of 1 June and 12 days earlier than in 2014. Median initiation date was 12 June; this date was 3 days earlier than the long-term average. Median nest initiation dates for the more abundant species were 7 June for Pectoral Sandpiper, 11 June for Dunlin and Semipalmated Sandpiper, and 12 June for Red Phalarope. Median initiation dates were earlier for all species (compared to their respective 13-year averages), except for Dunlin and Semipalmated Sandpiper, whose median initiation dates were both 1 day later than the 13-year average.

Predators destroyed 21.0% of the known-fate nests (N = 98) in 2015 (excluding human-caused mortalities). This is less than the long-term average of 27.8%, but similar to the 21.5% average for other years with fox control (2005–2015). Apparent hatching success (# hatching at least one young/total number of known-fate nests) was highest in Dunlin (88.4%, N = 38), Semipalmated Sandpiper (87.1%, N = 27), Western Sandpiper (78.6%, N = 11), Red-necked Phalarope (75.0%, N = 6), Red Phalarope (70.2%, N = 167), and Pectoral Sandpiper (69.4%, N = 68), and lowest in Long-billed Dowitcher (45.8%, N = 11) and American Golden-Plover (36.4%, N = 4).

In 2015, we captured and color-marked 242 adults located both on and off plots. This was less than the 399 banded in 2014, and less than 13-year average of 294. We captured fewer adults because we

focused more energy on radio-tracking and capturing chicks than in prior years. Thirty-two of these adults (19 Dunlin, 7 Red Phalarope, 3 Semipalmated Sandpipers, and 1 Pectoral Sandpiper) had been banded as adults in a prior year, and one Dunlin and one Red Phalarope had been banded as chicks in a prior year. These returns, combined with those recorded in 2013 and 2014, represent some of the first evidence of natal philopatry at our site. Adults captured included 60 Red Phalaropes, 56 Dunlin, 42 Pectoral Sandpipers, 28 Semipalmated Sandpipers, 26 Long-billed Dowitchers, 17 Western Sandpipers, 10 American Golden-plovers, and 3 Red-necked Phalaropes. We also re-sighted 39 adults banded in prior years nesting on our plots in 2015. This included 20 Dunlin, 12 Semipalmated Sandpiper, 5 American Golden-Plover, 1 Red Phalarope, and 1 Western Sandpiper. We captured and color marked 1,001 chicks. This was 1.79 times more than the 13-year average of 559, but lower than our previous high of 1,014 in 2012.

In regards to other environmental features at Barrow, the summer of 2015 was the earliest snow melt recorded in the past 13 years with 20% snow cover remaining on the tundra on 28 May (average long-term date is 10 June). Lemming numbers in 2015 were similar to 2014, being low to moderately available. However, these levels were far below that experienced in 2006 and 2008. Despite the lack of lemmings, a few Snowy Owls, Pomarine and Parasitic jaegers nested in the Barrow area.

We continue to conduct ancillary studies as time allows at Barrow. One such project started in 2014 is an interdisciplinary study whose goal is to investigate how climate-mediated changes in weather (precipitation, temperature) affect snow and hydrology conditions, which in turn affect invertebrate emergence and indirectly shorebirds (through timing of nest initiation and hatch; as well as brood survival and growth rates). Shorebird related field components included assessing whether a trophic mismatch currently exists between invertebrate emergence and chick hatch; and experimentally creating a mismatch by delaying shorebird hatching date and assessing how this affects growth and survival of young. An important component of this study is assessing the diet of chicks, which Danielle Gerik explored this summer as part of her MS program at the University of Alaska Fairbanks (see her summary).

Field assistance for conducting this work was provided by Willow English and Patrick Herzog (crew leaders), Danielle Gerik, Don Cecile, Cecile Houle, Marcela Liljestrom, Veronica Albornoz, and Ben Lagasse. Funding was provided by the Arctic Landscape Conservation Cooperative, National Fish and Wildlife Foundation, and USFWS Migratory Bird Management division.

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#14—KACHEMAK BAY SHOREBIRD MONITORING PROJECT: 2015 REPORT

Investigators: George Matz and Kachemak Bay Birders

Purpose

In May 2015, Kachemak Bay Birders (based in Homer, Alaska) completed its seventh consecutive shorebird monitoring project. 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. We continued to include monitoring at Anchor Point/River and the Kasilof River, which now includes three years of data. By comparing our current Homer Spit data to monitoring data collected by former Homer resident George West, who conducted counts of Homer Spit shorebirds during the 1980s and 1990s, we are able to get a better understanding of population trends. Secondary purposes for this project 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 habitat.

Protocol

The monitoring protocol we used was identical to previous years. Between April 16, 2015 and May 26, 2015 we had nine monitoring sessions. In the Homer Spit area we simultaneously monitored five sites for two hours once every five days when the outgoing tide reached 15.0 feet (or at high tide if less). Using these tide conditions provided consistency and optimized shorebird viewing conditions. We also recorded any disturbance to shorebirds. In addition, we received observations from a boat on the south side of Kachemak Bay about the same time. All the data was entered on eBird.

A record number of 49 volunteers participated: 40 in the Homer Spit area, 4 at Anchor Point, and 5 at the Kasilof River. This amounted to 400 hours of volunteer effort at the Homer Spit, 54 hours at the Anchor River, and 24 hours at the Kasilof River (monitoring sessions were two hours except for the Kasilof River which was 1.5 hours) for a total of 478 hours of effort. This does not include travel time or time spent caucusing.

Results

Despite the record mild previous winter, which had us wondering if there would be an earlier shorebird migration, our early spring weather was close to normal and so was the timing of the migration. This year we observed a total of 21 species of shorebirds and counted a total of approximately 8,287 individual shorebirds. The number of shorebird species counted this year is less than our seven year average (24). There were no new species. The total number of individual shorebirds counted this year was also less than average (13,897) and the second least of our seven years of effort.

Migrating shorebirds stopover at the Homer Spit for only a day or two. In order to estimate how many shorebirds might have come and gone between scheduled monitoring sessions, we reviewed daily eBird reports for the Homer Spit during the peak of shorebird migration (May 1-14). Since a lot of birders visit Homer at this time, primarily for the Kachemak Bay Shorebird Festival, eBird offers a reasonable

amount of supplemental data that we can use compare to our monitoring data. From this comparison we determined that our monitoring dates did not hit the peak of the pulse, but one date was on the shoulder. Adding up the data, it appears that our scheduled monitoring accounts for about one-quarter of the shorebirds that stopped over this year at the Homer Spit.

The top ten taxa seen this year include Western Sandpiper (2,267), Surfbird (2,111), Red-necked Phalarope (1,503 of which 1,500 were seen by boat), Dunlin (826), Black Turnstone (352), LESA/WESA/SESA which is a lumping of *Calidris* species (306), Semipalmated Plover (273), Black-bellied Plover (210), Least Sandpiper (168), and Dowitcher sp. (65). We noted some minor disturbances of shorebird flocks by loose dogs, low-flying aircraft (particularly helicopters), and off-road vehicle traffic on some beaches.

A highlight this year was the large number of Surfbirds seen in the Kachemak Bay area, particularly near the entrance to the boat harbor. I was able to get a good photo of nearly the entire flock against the sky, which enabled a good count. There are 2,030 birds in the photo below, nearly all being Surfbirds. This represents a significant percentage of its entire population.

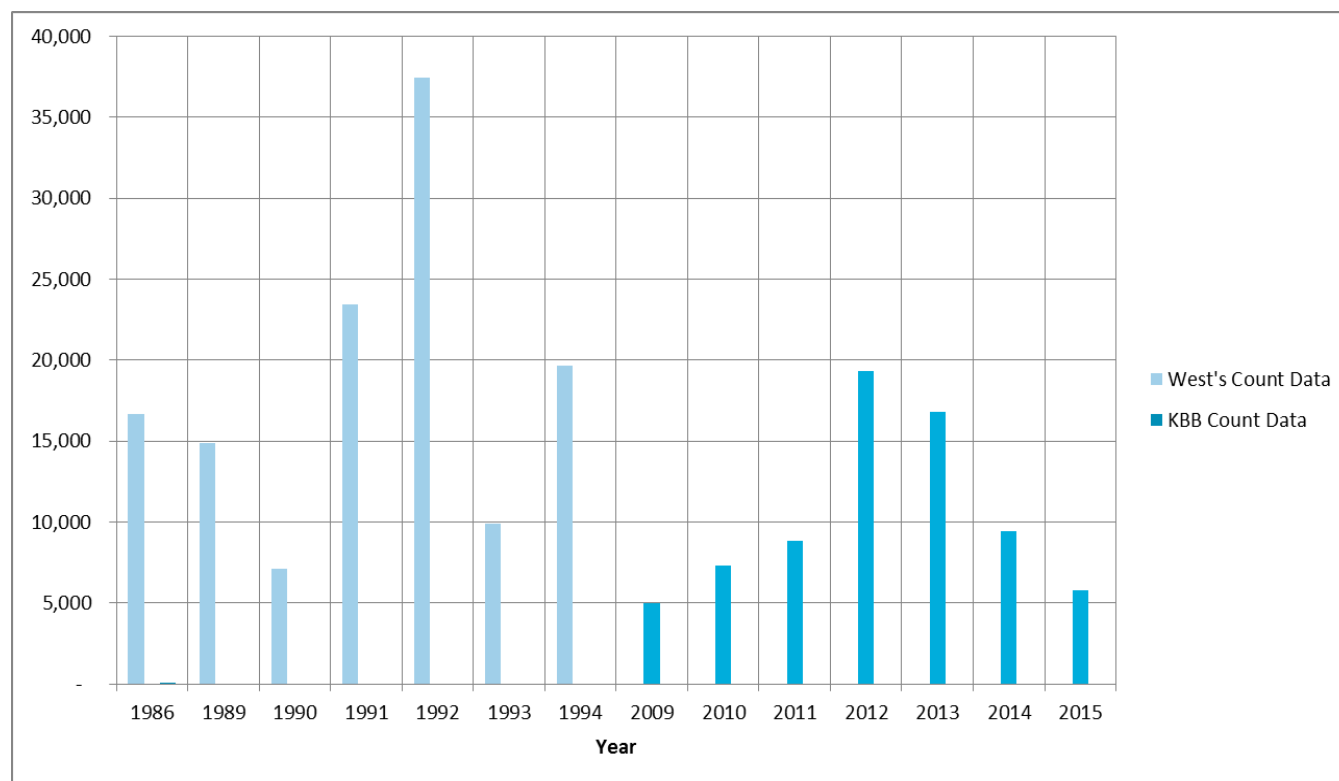
Comparison to past surveys

The table below provides the number of species seen each year of this project and its count. Spreadsheets, available at <http://kachemakbaybirders.org/>, provide much more detail, including breakdown by site.

2009-2015 Kachemak Bay Shorebird Count									
Sorted by average abundance									
# of Sp.	Species	2009	2010	2011	2012	2013	2014	2015	Average
1	Western Sandpiper	3,229	4,996	4,100	16,375	7,964	4,000	2,267	6,133
2	Red-necked Phalarope	1,630	1,500	5,152	1,501	703	3,006	1,503	2,142
	LESA/WESA/SESA	104	803	3,336	844	5,305	987	306	1,669
3	Surfbird	292	110	574	2,919	748	2,644	2,111	1,343
4	Dunlin	1,097	561	1,283	1,205	2,548	1,530	826	1,293
5	Black-bellied Plover	179	315	282	354	221	114	210	239
6	Semipalmated Plover	194	203	197	142	92	251	273	193
7	Least Sandpiper	136	245	219	103	128	195	168	171
8	Black Turnstone	81	373	121	71	21	56	352	154
9	Rock Sandpiper	141	405	482	6	4	6	6	150
	Dowitcher sp.	99	82	57	76	344	49	65	110
10	Greater Yellowlegs	24	36	59	68	90	24	39	49
11	Short-billed Dowitcher	125	-	33	76	18	15	-	38
12	Pacific Golden Plover	5	42	5	95	96	17	4	38
13	Pectoral Sandpiper	-	7	-	1	146	98	11	38
14	Wandering Tattler	13	56	30	18	62	39	39	37
15	Whimbrel	10	22	27	28	65	26	28	29
16	Semipalmated Sandpiper	1	5	3	34	-	13	33	13
17	Long-billed Dowitcher	-	-	15	1	22	36	-	11
18	Black Oystercatcher	11	11	13	8	2	8	18	10
19	Lesser Yellowlegs	-	26	3	15	9	4	11	10
20	Marbled Godwit	3	12	1	7	-	8	5	5
21	Ruddy Turnstone	1	10	1	2	9	2	6	4
	Yellowlegs sp.	2	18	-	2	2	-	5	4
22	Hudsonian Godwit	18	-	2	-	3	3	-	4
23	Sanderling	-	1	8	8	-	2	-	3
24	American Golden-Plover	3	1	1	1	10	-	-	2
25	Bar-tailed Godwit	3	-	-	4	6	-	-	2
26	Wilson's Snipe	1	5	1	1	-	-	-	1
27	Baird's Sandpiper	1	-	-	6	-	-	-	1
28	Bristle-thighed Curlew	-	-	-	-	5	-	-	1
29	Red Phalarope	-	-	-	-	-	5	-	1
30	Spotted Sandpiper	3	-	-	1	-	-	-	1
31	Red Knot	-	-	2	-	-	1	1	1
	Total Individuals	7,406	9,845	16,007	23,972	18,623	13,139	8,287	13,897
	Total Species	24	23	25	27	23	25	21	24

As in previous years, we compared our data to George West's seven years of shorebird monitoring data (1986, 1989-1994). West saw a total of 23 shorebird species. Over the past seven years of monitoring we have seen 31 species. Perhaps our more intense coverage explains our higher number of species. West's average annual count was 90,326 shorebirds. But comparison of this data to ours requires some adjustment. West monitored daily and our protocol calls for monitoring once every five days. Consequently, the comparison includes is based on every fifth day of West's data. Also, since West's observations were only on the Homer Spit, we need to exclude data from the Beluga Slough and Islands and Islets sites. Based on these adjustments, West's average shorebird count was 18,436. Our adjusted

count for this year was 9,402 shorebirds. Our average for six years was 11,115 shorebirds; or 60% of West's.



Anchor and Kasilof Rivers

In addition to the Homer Spit area we also continued shorebird monitoring at the mouths of the Anchor and Kasilof Rivers. The Anchor River is located at the northern edge of Kachemak Bay about 15 miles north of Homer. The volunteers that monitored here followed the same protocol that was used at Homer Spit. They reported seeing a total of 19 species of shorebirds. The count this year for the Anchor River was 818.

The Kasilof River empties into Cook Inlet about 60 miles north of Homer. The protocol for this site is to monitor the incoming tide starting when it is about half-way between low and high tide. Monitors at the Kasilof River saw 15 species of shorebirds. On May 16 they saw a Baird's Sandpiper, which is not being included since it wasn't a monitoring date. The total count for the nine scheduled monitoring days was 5,411 shorebirds.

Many thanks to all the volunteers who made this happen. This project will continue next year.

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#15—POTENTIAL CLIMATE-MEDIATED IMPACTS ON THE REPRODUCTIVE ECOLOGY OF SHOREBIRDS AT THE COLVILLE RIVER, ALASKA

Investigators: Dan Ruthrauff, Aaron Gottesman, Elyce Gosselin, Lee Tibbitts, and David Ward, US Geological Survey, Autumn-Lynn Harrison, Smithsonian Institution

We monitored the reproductive output of shorebirds at the Colville River Delta following Arctic Shorebird Demographic Network protocols. This included monitoring the seasonal timing and outcomes of reproductive events as well as documenting the seasonal abundance of invertebrate prey resources. We arrived at the study site on 20 May to warm, sunny conditions and a near lack of snow cover. Pectoral Sandpipers, Semipalmated Sandpipers, Ruddy Turnstones, and Red-necked Phalaropes were present at the site upon arrival, and most of the ten other breeding shorebird species arrived within the next seven days. Upon arrival, our field site was experiencing a major flooding event, anomalous both in terms of its large magnitude and early occurrence. After flood waters receded on 23 May, many Semipalmated Sandpipers initiated nests, but cold weather returned in late May and delayed nest initiation for most other species. Most species initiated nests only once conditions improved after 9 June.

We monitored 297 nests of 10 shorebird species across each of two ~1.5 km² study plots, and the observed hatching success across all species was 66%. Predation was the cause of most nest failures (primarily attributable to Parasitic Jaegers and Red Fox), but many nests that were initiated relatively late in the season (primarily by Red Phalaropes and Pectoral Sandpipers) were abandoned. To better understand potential impacts of food availability and climatic conditions on chick growth and survival, we monitored chicks of Semipalmated Sandpipers (n=90 broods). In general, those nests that hatched in the latter half of June experienced warm conditions and an abundant invertebrate biomass, conditions resulting in rapid chick growth. Chicks attained body mass values comparable to adults after approximately two weeks. After the first week of July, however, a combination of cold weather and low

invertebrate biomass apparently inhibited chick growth. During this period, chicks grew slowly, if at all, and numerous chicks appeared to starve to death.

In addition to these inquiries, we initiated a habitat selection modeling project that will use WorldView-2 satellite imagery (sub-2-m resolution) to map habitat types and assess evidence for shorebird nesting preferences. By classifying nesting habitats at this fine scale, we hope to refine predictions about potential impacts to breeding shorebirds under climate-mediated habit change scenarios. We also initiated collaborative research on Black-bellied Plovers with researchers from the Smithsonian Institution's Migratory Connectivity Project. Despite the widespread occurrence of Black-bellied Plovers across tundra habitats in Alaska, there exists almost no information linking breeding and nonbreeding locations for the species. We deployed 10 5-g solar satellite transmitters on breeding plovers to document the use of migratory flyways, stopover sites, and nonbreeding destinations. Plover locations are updated daily at the Migratory Connectivity Project's website: <http://www.migratoryconnectivityproject.org/livetracks>.

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#16—ECO-EVOLUTIONARY CONSEQUENCES OF REPRODUCTIVE INVESTMENT OF HUDSONIAN GODWITS IN A CHANGING WORLD

Investigators: Rose Swift, Amanda Rodewald, Cornell University, Nathan Senner, University of Groningen



Hudsonian Godwit chicks on hatch day. Photo by Rose Swift.

After a year hiatus in 2013, we're monitoring the population of Hudsonian Godwits in the Beluga, Alaska area again. Building on work done by former Lab of Ornithology graduate student Nathan Senner, I began a focused effort to better understand the drivers and consequences of different reproductive investments and the impacts of global climate change in a long-distance migratory bird of conservation concern, the Hudsonian Godwit (*Limosa haemastica*). My research on reproductive investment is centered on one central driving force, predation, from which derive the following question. How does the trade-offs in nest site selection between microhabitat, thermal preferences, community composition, and predation risk influences breeding success? My work will be one of the few studies to examine parental investment throughout the full breeding season – from incubation through post-hatching stages to get a complete view of reproductive investment. In addition, I aim to take an annual cycle approach to fully understand the constraints of their migratory path on their reproductive investments. By building our knowledge of nest site selection, seasonal carry-over effects, and breeding success, I will aid conservation and management efforts by developing a habitat suitability map for potential breeding areas. This could be especially useful, since the population appears to disperse across the landscape for breeding and much of the census population is not represented by breeding-bird population surveys.

During my second field season, we continued monitoring Hudsonian Godwits, other shorebirds, and predators in two study plots of ~700 ha. We monitored over 100 nests found in the bogs of all waterbird species including 36 shorebird nests. We continued monitoring species arrival and abundance and entered all data into eBird. On the tidal mudflats during spring and fall migration we identified 16 species of shorebird including a Wandering Tattler in June.

In addition to work in Alaska, 2015 marked another year of monitoring Hudsonian Godwits on Chiloé Island in Chile. Surveys took place between January 4th – January 16th, 2015. Six Susitna Flats banded individuals were seen, one from Churchill, MB, as well as number of Chilean banded birds. Of note, a second-country record Bar-tailed Godwit was found over-wintering in the same bay as the first country record in 2014 – Quetalmahue.

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#17—AERIAL INVENTORY OF STAGING SHOREBIRDS ON THE BERING LAND BRIDGE NATIONAL PRESERVE COASTLINE

Investigators: Audrey Taylor, Department of Geography & Environmental Studies, UAA, Jeremy Mizel, Stacia Backensto, Arctic Inventory and Monitoring Network, National Park Service

Shorebirds are an important component of the avifauna of the Western Arctic National Parklands, yet are typically understudied compared to more easily surveyed waterfowl or seabirds. Anecdotal evidence

suggests that a number of shorebird species congregate in large numbers prior to fall migration along the coastline of Bering Land Bridge (BELA) National Preserve. Despite the vulnerability of these areas to effects of offshore energy development and increased shipping traffic, little is known regarding abundance, species composition, or distribution of shorebirds prior to fall migration. Furthermore, protecting habitat for internationally significant populations of migratory birds is a mandate for Western Arctic Parklands. Our goal for this project was to describe the spatial variation in shorebird use along the BELA coastline prior to fall migration, and to identify potential hotspots for staging/migrating shorebirds. We conducted replicate aerial surveys in late July and early August along a random sample of transects in mudflat habitat. Over 26,000 shorebirds were counted from the aircraft between 28 July and 13 August, the majority of which were found at Cape Espenberg, Cowpack Lagoon, and the Arctic/Ikpek Lagoon complex. We used Bayesian hierarchical models implemented in WinBugs 1.4.3 to estimate spatial variation in shorebird use of mudflat habitat along the BELA coast. Missing values (from days where a transect was not surveyed) were imputed using a Markov chain Monte Carlo algorithm, and we assessed model fit using the Bayesian p-value. Model output indicated that the highest densities of shorebirds occurred on transects in Ikpek and Lopp Lagoons (50-100 shorebirds/ha), with second-highest densities occurring near Shishmaref and at Cape Espenberg (20-50 shorebirds/ha). Shorebird densities across all transects peaked in late July and declined thereafter. A technical report for NPS and a Waterbirds note are being prepared for publication.

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#18—BIRDS ‘N’ BOGS CITIZEN SCIENCE PROGRAM UPDATE

Investigators: Audrey Taylor, Julia Michele Craig, Department of Geography and Environmental Studies, UAA, Beth Peluso, Nils Warnock, Audubon Alaska

2015 represented the third year of Birds ‘n’ Bogs, a citizen science program initiated through Audubon Alaska and the University of Alaska Anchorage’s Department of Geography and Environmental Studies. The goal of this program is to document spring distribution of boreal birds in wetland habitats of Anchorage and the Matanuska Valley, as well as to foster communication and collaboration between university students and long-term Anchorage residents, two populations for whom contact is limited. A total of 34 volunteers participated in the Birds ‘n’ Bogs program in 2015. In Anchorage participants observed 207 Lesser Yellowlegs, 68 Greater Yellowlegs, 5 Solitary Sandpipers, 10 Rusty Blackbirds, 282 Tree Swallows, and 50 Violet-Green Swallows. In the Matanuska Valley a total of 165 Lesser Yellowlegs, 18 Greater Yellowlegs, 3 Rusty Blackbirds, 28 Tree Swallows, and 11 Violet-Green Swallows were observed. Data analysis is ongoing, and will be compiled into a cumulative 2013-2015 report in spring 2016.

We plan to continue this effort in 2016 with additional recruiting of participants in the Matanuska Valley, and the addition of two new target species: Wilson's Snipe and Short-billed Dowitcher.

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#19—BLACK TURNSTONE: A POPULATION DECLINE OR SHIFTING MIGRATION PATTERNS?

Investigators: Investigators: Audrey Taylor, Department of Geography and Environmental Studies, UAA, Mary Anne Bishop, Prince Williams Science Center, Kristine Sowl, Yukon Delta National Wildlife Refuge

Counts of Black Turnstones (BLTU) stopping at Prince William Sound's Montague Island during spring migration have declined dramatically in the last 15 years. The overall goal of this project is to understand if the decrease in observed numbers of birds stopping at Montague Island (which has traditionally been the principal spring staging site for this species) represents a breeding population decline or if the reduced numbers reflect a shift in the migration routes and stopover sites used by BLTU in Prince William Sound.

To address the population decline aspect of our research question, we conducted breeding ecology fieldwork on BLTU at the Tutakoke Brant Research Camp, located on the central Yukon-Kuskowkim Delta in western Alaska, in 2013 and 2014. During each summer, we located and monitored BLTU nests, banded adults, and collected information on nesting habitat. In 2014 we conducted distance sampling-based surveys along historic transects to estimate densities of breeding BLTU and compare these with densities estimated from the same transects in 1981 by Colleen Handel and Bob Gill. We also deployed geolocators to track migration patterns: 30 units at Tutakoke and 5 at Cape Krusenstern in the summer of 2013, and 7 units at Oak Harbor (a wintering site) in March 2013. We had also deployed 13 units at Oak Harbor in 2011 as a pilot study. We retrieved a total of 23 functional geolocators between 2012 and 2015: 3 from Oak Harbor in 2012, 18 from Tutakoke in 2014 (one of which had stopped functioning completely which made the data irretrievable), 2 from Cape Krusenstern in 2014 (courtesy of Megan Boldenow), and 1 from Tutakoke in 2014.

The last fieldwork component of this project was completed in spring 2015, when M.A. Bishop and technician A. Schaefer conducted shipboard surveys of potential BLTU habitat on and near the historical spring stopover "hotspot" on northern Montague Island in Prince William Sound. Fewer than 1000

individuals were counted between 27 April and 6 May 2015 despite covering almost 700 km of rocky shoreline on and around Montague.

The project is currently in the analysis phase, with manuscript preparation planned for spring 2016. We have completed analysis of the Tutakoke transect data and the geolocator data (courtesy of A. Schaefer and R. Porter), and have compiled historical and current aerial photo and satellite imagery to assist with understanding mechanisms of landscape change on the Yukon-Kuskokwim Delta in general and at Tutakoke in particular over the last 40 years. We are also finishing up a side project linking stable isotope values of BLTU feathers collected at breeding and wintering areas with geolocator-derived wintering locations. This project formed the basis of Tesia Forstner's undergraduate honors thesis and was conducted in collaboration with Jeff Welker and Doug Causey at UAA.

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Short-billed Dowitcher chicks on hatch day. Photo by Garrett MacDonald.