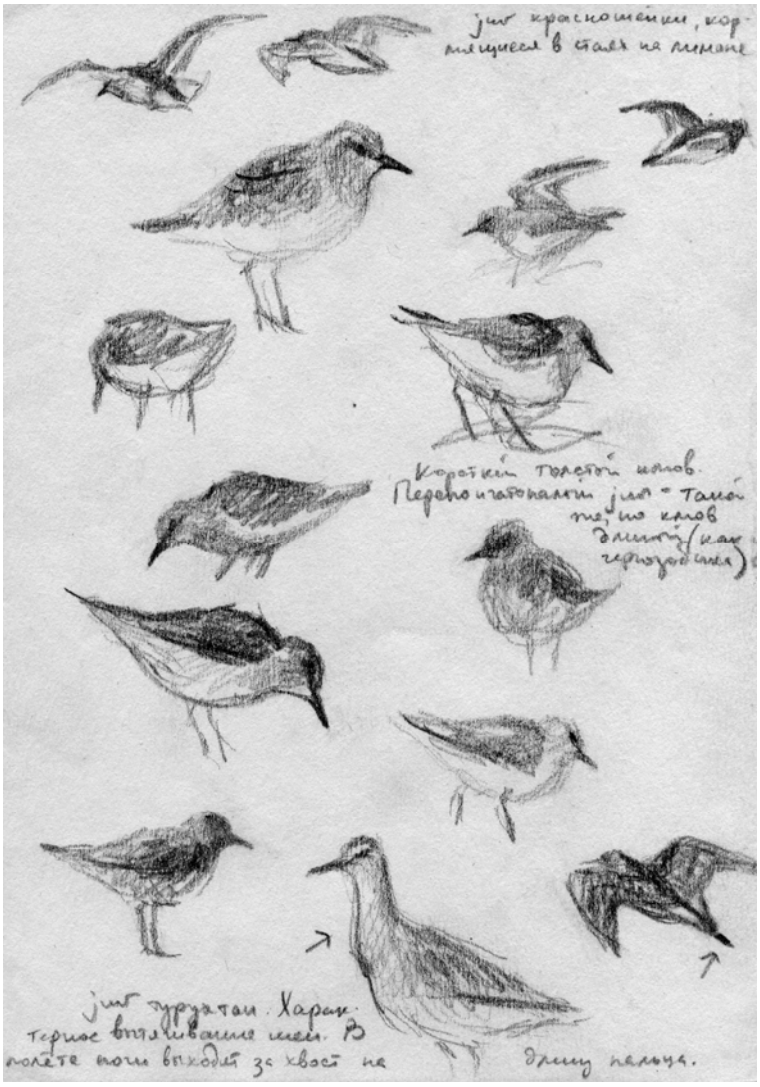
Alaska Shorebird Group

Summaries of ongoing or new studies of Alaska shorebirds during 2006



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No. 5

Compiled and lightly edited by Richard Lanctot for the Alaska Shorebird Group. Anyone wanting more information about these studies should contact the individual(s) noted at the end of each project summary.

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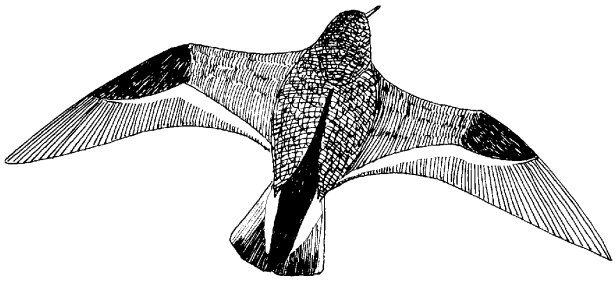


A note from the compiler – R. Lanctot

Welcome to the fifth annual summary of ongoing or new studies of Alaska Shorebirds. As an interim compiler for this document, I have attempted to live up to the high standards shown in the first four compilations prepared by our esteemed colleague Bob Gill. His dedication and service to the Alaska Shorebird Group is very much appreciated. I have kept the same general format initiated by Bob with one main change; project summaries are now listed in alphabetical order by primary investigator rather than geographic location. This approach made it easier to fit in international and cross geographic studies, and should allow principal investigators to easily find their project so they can copy abstract outlines for next year ☺

There were a total of 66 individual investigators involved in the 33 projects summarized in this document. Thirteen people participated in two projects, 3 people participated in three projects, 3 people participated in four projects, and 3 people participated in five or more projects. Women led nine of the total studies (27%) and accounted for 39% of the total investigators. This was slightly down from 2005 but higher than 2003 and 2004. Most principal investigators (42%, n = 14) were affiliated with government resource agencies, with 27% (9) from non-governmental organizations and 24% (8) from academic institutions. The percentage of non-governmental PIs was much higher than in the prior three years, with the bulk of the studies conducted by the Prince William Sound Science Center and the Wildlife Conservation Society. The percentage of government- and university-based PIs was lower than in the past three years.

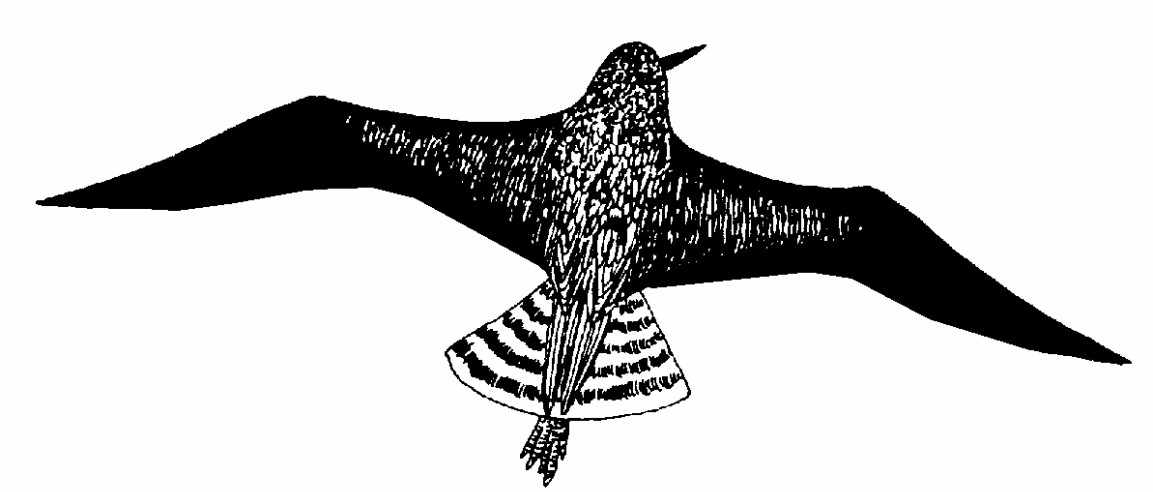
Being an employee of the U.S. Fish and Wildlife Service, I was happy and somewhat surprised to see that eight different groups had personnel who participated in shorebird studies, including Migratory Bird Management, Marine Mammal Management, Alaska Maritime NWR, Alaska Peninsula/Becharof NWR, Arctic NWR, Izembek NWR, Kodiak NWR, and Yukon Delta NWR. Other government agencies with personnel included the U.S. Geological Survey (Alaska Science Center, Forest and Rangeland Ecosystem Science Center, San Franciso Bay Estuary Field Station), Alaska Department of Fish and Game, (Nongame Program, Wildlife Conservation), National Park Service (Glacier Bay NP, Kenai Fjords NP), and the USDA Forest Service (Alaska Region, Chugach National Forest). International agencies included the Max Planck Institute for Ornithology, the Canadian Wildlife Service and Parks Canada. Academic institutions included the University of Alaska – Fairbanks, Brigham Young University, Kansas State University, Lund University, Moscow State University, Oregon State University, Simon Fraser University, Texas Tech University, Southern Illinois University, University of Nevada Reno, and the University of Tasmania. The remaining principal investigators represented non-government organizations including Audubon Alaska, Manomet Center for Conservation Science, PRBO Conservation Science, Prince William Sound Science Center and the Wildlife Conservation Society. Two private corporations (EAI Corp., CombiMatrix Corp.) also collaborated on a project to detect avian influenza in the field.

The year 2006 was probably most noted for being the year Avian Influenza (H_5N_1) became a hot issue, with a large amount of time spent capturing shorebirds throughout the state.

Although only four studies had titles including avian influenza, funds from this effort allowed biologists to gain access and conduct many other studies. Additional topics of study included monitoring (10), breeding ecology (8), postbreeding and migration (5), genetics (2), winter ecology (1), climate change (1), and ecotoxicology (1). The majority of studies were Alaskan based (26 or 79%), but other work was conducted on migration and wintering grounds within Canada, the lower 48 states of the U.S., Mexico, Central and South America, South and Western Pacific, Australia and New Zealand.

Finally, I would like to acknowledge and thank Maksim Dementyev for the cover page and the drawing on page 36, and George West for the remaining drawings in this summary. Their drawings remind us of what it is like to be in the field while reading in the office.

Contact: Rick Lanctot (compiler), U.S. Fish and Wildlife Service, 1011 East Tudor Road, MS 201, Anchorage, Alaska 99503. Phone: (907) 786-3609; Email: Richard_Lanctot@fws.gov



Winter ecology of Buff-breasted Sandpiper in Brazil: molt and body mass – J.B. de Almeida and L. Oring

Investigators: Juliana Bosi de Almeida and Lewis W. Oring, University of Nevada, Reno

Monitoring molt and changes in body mass of Buff-breasted Sandpipers was a secondary objective of a winter ecology study of Buff-breasted Sandpipers conducted in southern Brazil between 2001 and 2006 as part of JBA's PhD project. Buff-breasted Sandpipers captured at Parque Nacional Lagoa do Peixe (PNLP) and Estação Ecológica do Taim (ESECT) were aged, weighed, and had flight and tail feathers scored to determine molt stage. Sex was determined genetically. We recorded wing molt on 193 individuals that could be identified by age and sex. Buff-breasted Sandpipers underwent complete molt during the boreal winter. Wing molt starts at the wrist by the end of October, continuing inwards towards the 10th secondary and outwards towards the 10th primary. Secondaries are molted at a faster rate, with complete replacement and full growth by early February when the last primary – the 10th – is dropped. Wing molt scores varied by sex, age and body condition. Tail molt starts in December at the middle rectrice, and continues symmetrically outwards. Tail molt score varied by sex and despite not being able to test for the effect of age, plots suggest that tail molt also differs between age classes. Body mass was recorded for 204 birds of known sex and age. Average body mass of after-hatch year (AHY) birds did not vary by month, remaining at approximately 50g for females and between 63 – 65g for males. Average body mass of hatch-year (HY) birds was similar to that of AHY. Body condition (defined as residual value of the regression line of body mass x tarsus length) varied by sex and year, being greater in males and during the boreal winter of 2002. Lack of increase in body mass suggests that Buff-breasted Sandpipers must rely on re-fueling at staging areas along South America for a successful northward migration.

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Monitoring Shorebirds on Barrier Islands of the Copper River Delta – M.A. Bishop

Investigator: Mary Anne Bishop, Prince William Sound Science Center

Along the Pacific Coast of North America, the majority of research on shorebird migration has been conducted in protected waters, such as bays and estuaries. In contrast, relatively little information exists on shorebird use of ocean beaches.

The Copper River Delta, one of the most important North American shorebird stopover sites in spring, is protected from the Gulf of Alaska by a series of barrier islands and spits. Beginning in July 2005 the Prince William Sound Science Center initiated the first comprehensive study of shorebird use of the Delta's outer barrier islands.

The objectives of the study include to: a) determine the phenology, relative abundance and species composition of shorebirds using the outer barrier islands of the Copper River Delta during spring and fall migration; b) examine spatial and temporal distribution of shorebirds on outer beaches; and, c) establish permanent transects for baseline and long-term studies.

The project is funded by the Alaska Department of Fish and Game Nongame Program and the Prince William Sound Oil Spill Recovery Institute. Other cooperators include Chugach National Forest-Cordova Ranger District and Alaska Department of Fish and Game Cordova office.

For a second season, a field camp was established at Egg Island, a 6.3 km wide and 14.5 km long island located on the western edge of the Copper River Delta. Beach, upland, and estuarine line transects were conducted regularly from late April through mid October. For spring migration (23 April – 1 June) 32,579 shorebirds representing 25 species were recorded during 99 transects. By far the most abundant species observed on the beach (n = 44 transects) in spring were Sanderling (>9,300 birds) followed by Dunlin (>1,400 birds), both migrant species. Upland transects (n = 36) were dominated by Pectoral Sandpiper, a migrant, and Least Sandpiper, a migrant and local breeder. In the island's estuary (n = 19 transects) the most abundant species observed was Western Sandpiper, a migrant, followed by Least Sandpiper. Most likely we underestimated numbers of Western Sandpiper stopping in the island's estuary as inclement weather prevented conducting estuary transects during 30 April – 6 May, a peak migration time for this species.

Except for local breeders, from 2 June to 5 July few shorebirds were observed during weekly beach and upland transects. In the estuary, the first evidence of southbound migration was not observed until 30 June, when flocks of Western Sandpiper were observed on transects. During the 2006 fall migration (30 June – 13 October) a total of 17,642 shorebirds representing 29 species were recorded during 161 transects. Based on plumage, juveniles comprised 61% of the aged birds. The most abundant species observed on the beach (n = 60 transects) were Least Sandpiper and Semipalmated Plover, both local breeders, followed by Western Sandpiper a migrant from western Alaska. In the island's estuary (n = 43 transects) Least Sandpiper was the most numerous species recorded (>4,200 birds) followed by Pectoral Sandpiper and Long-billed Dowitcher, both migrants. Similar to spring migration, upland transects in fall (n = 58 transects) were dominated by Pectoral Sandpipers.

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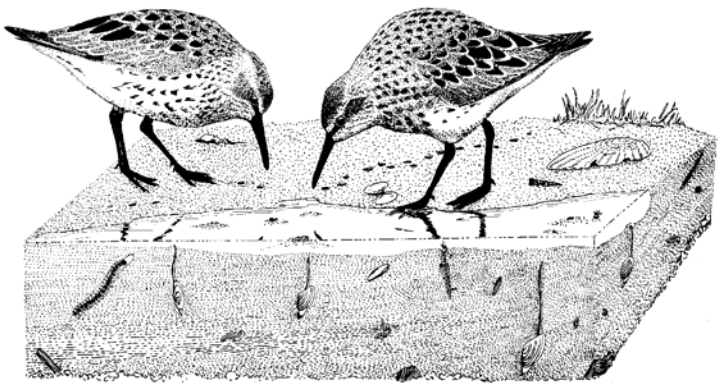

Technologies for the Field Identification and On-Site Confirmation of Outbreaks of Avian Influenza on the Copper River Delta Alaska – M.A. Bishop, J. Takekawa, S. Iverson, J. Dudley, and M. Lodes.

Investigators: Mary Anne Bishop, Prince William Sound Science Center; John Takekawa and Sam Iverson, USGS San Francisco Bay Estuary Field Station; Joseph Dudley, EAI Corporation; Michael Lodes, CombiMatrix Corporation.

We obtained cloacal swabs for avian influenza testing from shorebirds captured during 2006 spring and fall migration on the Copper River Delta of Alaska including from: 70 western sandpipers, 30 pectoral sandpipers, 13 least sandpipers, 1 semipalmated sandpiper, and 1 Baird's sandpiper. We focused on Western Sandpiper and Pectoral Sandpiper because both species had previously been identified as potential carriers of the highly pathogenic HPAI H5N1. In addition, cloacal and pharyngeal swabs were taken from 3 salvaged waterfowl: 2 surf scoters, and 1 white-winged scoter.

We tested three methods in the field or in the laboratory for detecting avian influenza: antigen test strips, real-time reverse transcriptase Polymerase Chain Replication (RRT-PCR), and microarrays. We used antigen test strips on archived and fresh samples of shorebirds. These strips were relatively simple to use and provided results in 20 minutes. They were used in remote conditions on Egg Island, as well as at the Prince William Sound Science Center (PWSSC) and the USGS San Francisco Bay Estuary Field Station. The ability of these tests to detect low titers of virus in wild birds, however, is not known. At the PWSSC, we also used a portable Ruggedized Advanced Pathogen Identification Device (RAPID: Idaho Technologies, Salt Lake City, UT), to perform RRT-PCR. We used influenza A matrix gene reagents to screen 24 shorebird samples collected during fall migration. All were AI negative, with results confirmed in molecular laboratories. Although some technical issues related to maintenance of cold chain for reagents were encountered, we determined that it would be feasible to use the RAPID for on-site confirmation of avian influenza outbreaks. A research microarray was used to screen avian influenza samples in cooperation with CombiMatrix Corporation. Results from all 90 wild shorebird samples, including 26 from fall migration on the Copper River Delta were AI negative when tested.

Our study demonstrated that there is significant potential for coupling state-of-the art technologies like antigen strip tests, RRT-PCR, and microarray chips for obtaining surveillance results. Development of these systems could prove vital in efforts to reduce the impact of highly pathogenic avian influenza outbreaks on wildlife, commercial poultry, and human health.

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Breeding Ecology of Semipalmated Plover and Least Sandpiper on the Copper River Delta – M.A. Bishop and H.R. Gates

Investigators: Mary Anne Bishop and H. River Gates, Prince William Sound Science Center

As part of a study on shorebird use of barrier islands on the Copper River Delta, in 2006 we investigated the breeding ecology of two shorebird species: Semipalmated Plover and Least Sandpiper. Our objectives were to monitor breeding phenology, nesting habitat, and post-breeding movements by these two species on Egg Island. A total of 47 shorebird nests were located in a 120 ha study plot located between the primary and secondary dune system on the island's outer shore. Thirty-one Semipalmated Plover, 13 Least Sandpiper, and 3 Red-necked Phalarope nests were monitored every 3-4 days and their fates determined. Average hatch date for both Semipalmated Plover and Least Sandpiper was 19 June. Our hatch dates for both species are comparable to what Cooper and Miller previously found for the Queen Charlotte Islands, ~1100 km to the south of Egg Island. The 3 Red-necked Phalarope nests failed.

We captured nesting adults and marked them with unique color band combinations.
We color-marked 21 Semipalmated Plovers (10 males, 11 females; sex determined by plumage) and 13 adult Least Sandpiper (5 male, 4 female, 4 unknown sex; sex determined by culmen). Nesting pairs were marked on the nest an average of 5 days before the estimated hatch date and were searched for every 2 days post-hatch. Behaviorally the Least Sandpipers were less conspicuous post-hatch, and as a result were more difficult to resight. The latest resighting of individual banded females ranged from 24 June to 5 July and for individual males ranged from 19 June to 9 July. Adult Semipalmated Plovers tended to alarm call and perch conspicuously, lending themselves to resightings. The latest date for resighting individual plovers ranged from 25 June to 21 July for females and 11-29 July for males.

We color-banded 9 Semipalmated Plover (n = 34 chicks) and 7 Least Sandpiper (n =25 chicks) broods with unique brood color combinations and searched for them every 2 days. Post-hatch, we resighted at least one chick from 6 of the 9 Semipalmated Plover and 4 of the 7 Least Sandpiper broods. The latest Semipalmated Plover chick was observed 13 August, 50 days post-hatch. The last date a banded Least Sandpiper chick was observed was 18 July, 29 days post-hatch.

Although potential large mammalian nest and/or shorebird predators such as Brown Bear, Red Fox, and Coyote have been observed in the past on Egg Island, we saw no sign of these predators this year. Nest predation was probably due to avian predators either nesting or foraging in and around Egg Island including Glaucous-winged Gulls (1000's) , Mew Gulls (100's), Common Raven (<10), as well as small numbers of raptor species (e.g. Bald Eagle, Peregrine Falcon, Merlin, Northern Harrier, Short-eared Owl).

Our work this summer marks the first time that shorebird nesting ecology has been investigated on the barrier islands of the Copper River Delta (CRD). Our work has

documented breeding ecology for Least Sandpiper and Semipalmated Plovers on the CRD's barrier islands and can be used to compare with similar studies of these two shorebird species.

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Pacific Flyway Shorebird Migration Program: Spring 2006 Western Sandpiper and Long-Billed Dowitcher Migration - Pt. Mugu, California to Copper River Delta Alaska – M.A. Bishop, N. Warnock, J. Takekawa, and T. Williams.

Investigators: Mary Anne Bishop, Prince William Sound Science Center; Nils Warnock, PRBO Conservation Science; John Takekawa, USGS San Francisco Bay Estuary Field Station; Tony Williams, Simon Fraser University

Since 1992, the Pacific Flyway Shorebird Migration Program has been investigating the migration ecology of shorebirds along the Pacific Flyway. In 2006, the Pacific Shorebird Migration Program conducted its seventh spring migration study. We organized and coordinated a team to monitor the spring migration ecology of shorebirds at 11 coastal sites from Pt. Mugu, California, to the Copper River Delta, Alaska. From 31 March-6 April we radio-marked 30 Western Sandpipers and 36 Long-billed Dowitchers at Pt. Mugu, California. From 10-14 April, we radio-marked 30 Western Sandpipers at San Francisco Bay, California. Monitoring continued at both banding sites until 19 May (San Francisco) and 22 May (Pt. Mugu).

Past the banding site, we relocated at least once 56% and 69% of the Western Sandpiper marked at Pt. Mugu and San Francisco, respectively. For Long-billed Dowitcher, 37% were relocated at least once past their banding site. Past their banding sites, Western Sandpipers were relocated at 8 sites and Long-billed Dowitcher at 4 sites. For Western Sandpipers marked at Pt. Mugu, CA, San Francisco Bay had the highest recovery rate (22%). The Copper River Delta had the highest recovery rates of Western Sandpipers marked at San Francisco (66%) and Long-billed Dowitchers marked at Pt. Mugu, CA (20%). Mean length-of-stay past the banding site ranged from 2.0 – 10.2 days for Western Sandpipers and from 2.0 – 13.3 days for Long-billed Dowitcher. Longest stopovers were recorded for both species at San Francisco Bay (WESA $\bar{x}$ = 10.2 ± 8.7 d; LBDO $\bar{x}$ = 13.3 ± 16.6 days).

As part of this spring's migration study, we collected blood samples for triglyceride analyses. Blood samples were collected at Pt. Mugu, San Francisco Bay, Gray's Harbor, Fraser River Delta, and the Copper River Delta. At this time, our data from this component of the study is still being analyzed.

For more than a decade, we have led a network of cooperators to examine the importance of coastal habitats used by shorebirds during the spring migration. These studies have revealed the complexity of migration strategies used within and among species along the

Pacific Flyway and highlighted the importance of how such information may improve conservation and management to benefit their populations.

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Ruddy Turnstones, plovers, blue eggs and unseasonal weather at Woolley Lagoon, Seward Peninsula – P. and A. Bruner.

Investigators: Phil and Andrea Bruner, Brigham Young University, Hawaii

Our 2006 field season (3-16 June) at Woolley Lagoon (40 mi. NW of Nome) was devoted primarily to our ongoing behavioral ecology study of Ruddy Turnstones. We also began a smaller investigation of egg recognition in Black-bellied Plover, collected cloacal cells for avian influenza testing, and monitored the nests of previously banded Pacific and American Golden-Plover.

Spring was late by at least two weeks in our area of the Seward Peninsula. Temperatures ranged from 15-30 degrees F over the first two weeks of June. On the 5, 6 June we got six inches of snow. This was later followed by flooding. In the 19 years on this study site this was the first significant snowfall and prolonged, unseasonally low temperatures we have experienced.

Two females and one male Ruddy Turnstone banded in 2004, but not recorded in 2005, returned in 2006 along with 2 of 3 males banded in 2005. One of the females nested 150m from her 2004 nest while the other used a nest cup constructed in 2005 by another pair. The 2004 male was seen approximately 1.5 miles from his 2004 nest. Both 2005 males returned to their territories. Seven turnstone chicks were banded in 2004. One female chick returned to nest in her natal territory in 2005. She did not come back in 2006. A male chick banded in 2004 returned to nest in his natal territory in 2006. He used a nest cup occupied by his mother and an unbanded male in 2005. His mate was his mother's neighbor in 2004. This is the first confirmed example of Ruddy Turnstones using a nest cup constructed by another pair. The father of this 2004 male chick has wintered at Kona, Hawaii the past three years. He has not been observed at Woolley Lagoon since 2004. One of the 2005 males returned in August 2006 for a second winter to Kualoa Park on Oahu, Hawaii.

Ruddy Turnstone decoy eggs were substituted for Black-bellied Plover eggs in 4 nests to test for egg recognition and willingness to incubate. All of the females readily sat on the decoy eggs while only two of the males would incubate. The test was conducted twice on different days with the same results. One of the female Black-bellied Plover was later trapped when she sat on an active Ruddy Turnstone nest 100m from her own. Male Black-bellied Plover are apparently more discriminating when it comes to which eggs they will incubate. This may be in part the consequence of their lower certainty of paternity. Another possibility could be the time of the test relative to the point in the incubation cycle. An egg

switch conducted closer to the time of hatch might produce different results due to the male's increased time investment.

During our 2006 search of territories and nest cups previously used by Pacific and American Golden-Plover we discovered a pair of American Golden-Plover using a nest cup occupied by another pair in 2001 and 2003. This is the first recorded example of American Golden-Plover using another plover's nest cup. The nest had only 2 eggs on 15 June (delayed breeding season) but both were extremely atypical. The dark brown pigments were all concentrated in a thick band around the large end of the egg. The rest of the shell was various shades of blue. O.W. Johnson found a somewhat similar egg in a Pacific Golden-Plover nest at Port Heiden in 2004.

We will be back at Woolley Lagoon in June 2007 and will continue our work on site fidelity, mate-retention and natal philopatry in Ruddy Turnstones. The egg recognition study will be expanded to include Pacific and American Golden-Plover.

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Tundra-Nesting Shorebirds in Relation to Landscape Transformation and Climate Change – N. Coutsoubos, F. Huettmann, and R. Lanctot

Investigators: Nathan Coutsoubos and Falk Huettmann, UAF, and Richard Lanctot, USFWS

In June and July 2006, we carried out the second year of a dissertation research program on tundra-nesting shorebirds in relation to ongoing local-scale landscape transformation and climate change. Work was conducted 5-12 km south of Barrow and involved studies at a recently constructed landfill and at a water-level manipulated wetland.

The North Slope Borough began constructing a new, modern landfill during the winter of 2004/2005. Construction will be completed this winter and waste transfer will start in late 2006. This construction project provides an ideal opportunity to determine how local birds respond to a landfill prior to and during landfill use. Ten transects (8.5 km total) were established near the landfill (stratified by distance and direction). Distance sampling surveys were conducted along these transects weekly during the territory establishment, nest initiation and incubation periods of the breeding cycle, for a total of 5 surveys per transect. Individual avian detections (single or clusters) numbered 1890 from 28 species, including 1133 shorebird detections of nine species. The most common shorebirds (unadjusted counts) were Pectoral Sandpiper (n=475 detections), Red Phalarope (n=333), and Dunlin (n=160). This and similar information collected in succeeding years will allow us to assess changes in shorebird distribution and abundance as the landfill grows. We also measured parental attendance at 12 shorebird nests located in and near the landfill, using within-nest temperature probes. This information may provide mechanistic evidence of how landfill disturbance affects nesting shorebirds.

Additionally, we carried out surveys in a 60-ha wetland, whose water levels will be manipulated over the next several years, to mimic the predicted effects of global climate change on tundra hydrology (the Barrow Biocomplexity Project). This year, no wetland manipulation occurred. Surveys were conducted twice weekly on three separate 300m transects during shorebird nesting. A total of 392 avian detections were recorded belonging to 24 species, including 291 shorebird detections of 7 species. The most common shorebirds (unadjusted counts) were Red Phalarope (n=94 detections), Pectoral Sandpiper (n=56), and Long-billed Dowitcher (n=38). Shorebird surveys will continue as the local hydrology is manipulated, providing experimental evidence of the local effects of a warming climate and altered hydrology on shorebirds.

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US Geological Survey Alaska Science Center shorebird avian influenza monitoring efforts – B. Gill, L. Tibbitts, and D. Ruthrauff.

Investigators: Bob Gill, Lee Tibbitts, and Dan Ruthrauff, USGS

In early 2006, the Interagency Avian Influenza Working Group determined that 10 species of shorebirds in Alaska should be monitored for the presence of the Asian H5N1 subtype of highly pathogenic avian influenza (HPAI). This determination was based on five factors: 1) proportion of the population occurring in Asia, 2) contact with a known "hot spot," 3) use of particular habitats in Asia, 4) population size in Alaska, and 5) ability of scientists to obtain a representative sample of sufficient size from a population. Based on these criteria, 10 species fit the profile of being a possible vector for the introduction of HPAI into North America: Dunlin (articola subspecies), Sharp-tailed Sandpiper, Bar-tailed Godwit, Ruddy Turnstone, Pectoral Sandpiper, Red Knot, Long-billed Dowitcher, Rock Sandpiper (tschuktschorum subspecies), Pacific Golden-Plover, and Buff-breasted Sandpiper.

Biologists from the US Geological Survey Alaska Science Center sampled shorebird species for avian influenza at six sites in western and south-central Alaska. Overall, we collected a total of 1,709 AI samples (1,035 cloacal swabs and 674 fecal/environmental samples) from 27 avian species between May and early October in 2006. Most of the samples (n = 1,513; including 964 cloacal swabs and 549 fecal samples) were from 9 target species of shorebirds. Other samples were from 10 non-target species of shorebirds (n = 178; 60 cloacal, 118 fecal), 4 target species that were not shorebirds (n = 7; 6 cloacal, 1 fecal), and 4 non-target species that were not shorebirds (n = 11; 5 cloacal, 6 fecal). Non-target species were usually captured incidentally during efforts focused on target species.

We sampled shorebirds at the Anchorage Coastal Wildlife Refuge from May 17–19 (n = 34 captures, 10 cloacal samples collected); Tutakoke River, Yukon Delta National Wildlife Refuge from May 17–June 8 (n = 83, 22); Old Chevak, Yukon Delta National Wildlife

Refuge from June 7–13 (n = 9, 9); central Seward Peninsula from June 24–29 (n = 13, 11); Tutakoke River again from August 8–September 20 (n = 789, 768); Egegik Bay, Alaska Peninsula from August 9–October 7 (n = 176, 169); and Ugashik Bay, Alaska Peninsula from September 27–October 2 (n = 46, 46). Including 2005 collections, 3, 2, and 2 individual Bar-tailed Godwits, Dunlin, and Rock Sandpipers, respectively, tested positive for low-pathogenic avian influenza. Highly pathogenic H5N1 subtype avian influenza was not detected in any bird samples collected in Alaska in 2005 or 2006. Because the migration patterns and life histories of many of the target species are poorly understood, we also color banded, affixed radios, and collected blood and feather samples from numerous individuals of select species. These additional data will help to better interpret and predict potential transmission vectors, and improve our knowledge of Alaska's shorebirds in general. Full results of 2006 state-wide sampling efforts are available under the 'USGS Alaska Avian Influenza Studies' link at http://alaska.usgs.gov/index.php.

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Status of the Marbled Godwit on BLM lands of the Alaska Peninsula – B. Gill, L. Tibbitts, and D. Ruthrauff.

Investigators: Bob Gill, Lee Tibbitts, and Dan Ruthrauff, USGS

Between 2 and 11 May 2006, personnel of USGS's Alaska Science Center continued an avifaunal inventory of birds on selected Bureau of Land Management (BLM) lands on the north side of the Alaska Peninsula and continued aerial line transect surveys over known or suspected Marbled Godwit nesting habitat. The investigation was funded by BLM as part of its evaluation of critical natural resources, particularly special-status species occurring on BLM lands for which title might be conveyed to other federal, state, or Native interests. These projects continue efforts commenced in 2004 to determine the breeding range and estimate the population size of Marbled Godwits in Alaska.

The northern and southern extent of the Marbled Godwit's breeding range in Alaska is poorly described, but evidence of breeding is scarce north of Ugashik Bay and south of Port Heiden. From 2–5 May, we inventoried two BLM parcels located along the Bering Sea coast near the Black Hills, approximately 250 km southwest of Port Heiden. These plots were dominated by gently rolling crowberry (Empetrum nigrum) uplands interspersed with sedge-dominated wetlands. We detected no Marbled Godwits during our inventory, but observed other shorebird species (Rock Sandpiper, Dunlin, Wilson's Snipe) engaged in breeding displays. These results agree with previous observations of breeding Marbled Godwits being limited to low-lying wetlands of the central Alaska Peninsula.

Following our assessment of the two BLM parcels we traveled to Ugashik where we initiated helicopter-based aerial line transects of the region to better delineate the northern and southern extent of the Marbled Godwit's breeding range in Alaska. Since previous work suggested that Marbled Godwits were primarily located at elevations below 100 m, we

restricted our transects—all east-west oriented and spaced at 2.5 km intervals—to lands less than 100 m elevation that were bounded by the Bristol Bay coast and the Aleutian Range to the east (see 2005 summary for details of the sampling protocol). We placed the northernmost transect at 57.75° N, approximately 15 km north of Ugashik Bay, and the southernmost transect at 56.66° N, approximately 13 km south of Port Heiden. From 9–11 May, we flew 38 transects (totaling 1,584 km) on which we detected a total of 127 godwits, primarily on low-elevation wetlands. Our southernmost godwit detection was near the village of Port Heiden at 56.66° N, approximately 23 km north of the southernmost transect, suggesting that we successfully delimited the southern extent of the breeding range. Our northernmost detection, however, occurred along the northernmost transect, suggesting that the godwit breeding range may extend north of our survey area.

These results augment 2005 aerial survey efforts focused over a smaller study area, and refine our knowledge of the breeding range of Marbled Godwits in Alaska. In 2007, we will conduct additional surveys to the north of the 2006 effort to better define the northern extent of the breeding range and conduct surveys along transects that we were unable to visit in 2006 due to funding constraints. These efforts will allow us to refine our population estimate and provide necessary information to guide future potential conservation efforts.

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Using satellite telemetry to track local movements and migration flights of Numeniini shorebirds – B. Gill, L. Tibbitts, D. Ruthrauff, D. Mulcahy, D. Douglas, C. Handel, and B. McCaffery.

Investigators: Bob Gill, Lee Tibbitts, Dan Ruthrauff, Dan Mulcahy, David Douglas, Colleen Handel, USGS, and Brian McCaffery, USFWS

Recent miniaturization of satellite transmitters (PTTs) now allows us to study movements of the larger species of shorebirds. In 2005 and 2006, we used satellite telemetry to track 12 Bar-tailed Godwits (Limosa lapponica), 10 Bristle-thighed Curlews (Numenius tahitiensis), and one Whimbrel (N. phaeopus), for up to 5 months each. Birds were captured on nesting areas and tagged with either battery-powered implantable PTTs or externally mounted solar-powered PTTs. Post-breeding curlews and godwits spent 8 to 12 weeks in western Alaska at inland and coastal staging sites, respectively. The Whimbrel departed Alaska in mid-August, stopped for 3 weeks in southern California, and continued to coastal Colombia. Curlews and godwits made remarkable nonstop flights. Total tracking distance for curlews (n = 9) from their last reported location in Alaska to their first landfall on atolls in the South Pacific (or last reported location) ranged from 7050–9725 km (8800 ± 900 SD), and their flight duration ranged from 5.7–8.3 days (7.2 ± 1.2). Godwits also traveled great distances to non-breeding areas in New Zealand and Australia and on atolls in the western Pacific. Godwits (n = 5) flew nonstop for 7000–10800 km (8600 ± 1600) and 5.5–9.6 days (7.0 ± 1.6); unfortunately, all the PTTs on godwits failed before birds reached their final non-breeding destinations. Subsequent observations of tagged individuals indicated that some

godwits have made at least 2 round-trips between breeding and nonbreeding areas. Over the next 3 years we will continue work with Bar-tailed Godwits and Bristle-thighed Curlews and begin PTT-tracking of Long-billed Curlews (N. americanus), Whimbrels, and Hudsonian (L. haemastica) and Marbled (L. fedoa) godwits.

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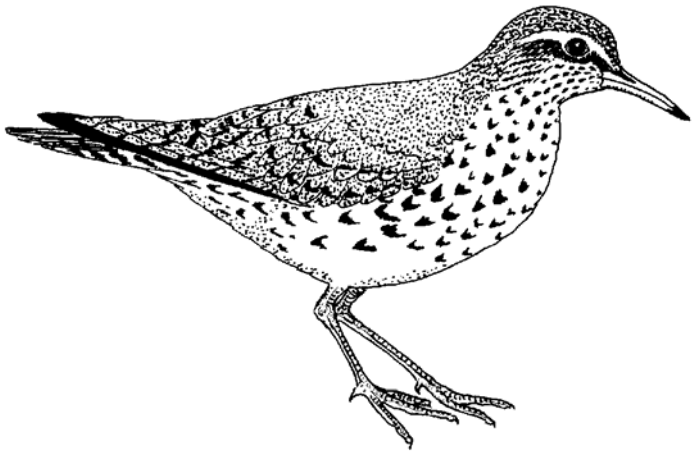

Sexing Black Oystercatchers (Haematopus bachmani) in the field – B. Guzzetti, V. Gill, E. Murphy, E. Wilner, and D. Tessler.

Investigators: Brian Guzzetti, UAF; Verena Gill, USFWS; Edward Murphy, UAF; Eduardo Wilner, UAF; David Tessler, ADF&G

Determining the sex of shorebirds in the field can be extremely difficult because male and female plumages are identical. For some species sex can only be reliably assessed in the lab. Previous studies of Black Oystercatchers have found marked morphological differences between the sexes: the most visually observable difference is that female bills are proportionately longer overall than male bills. However, bill length alone is of limited diagnostic utility. The method requires capturing both pair members for comparison, or relies on inference from measurements of one bird against a range of normal values for a given sex. Individual variation, and significant differences in average bill length between breeding areas further complicate interpretation and increase the chances of misidentification. However, we noticed another characteristic that appeared to be unambiguous. Anyone who has seen an Oystercatcher knows they have brightly colored eyes. Those who have worked closely with them know this color changes over time. Chicks are born with dark eye rings and a dark iris while adults have a bright orange eye ring and yellow iris. However, some adults have darkened regions in the iris. The presence of these darkened regions, which we term “eye flecks”, has been observed in all 11 species of Oystercatchers in the world. In 2004 and 2005, we recorded the presence and relative

intensity of these eyeflecks for 101 Black Oystercatchers captured on Middleton Island, Prince William Sound, and Glacier Bay. Profile photographs of all captured birds augmented this effort on Middleton Island in 2005, and in Prince William Sound and Glacier Bay in 2006. We sexed all birds using genetic molecular markers, and compared these results to eye fleck and morphological data. Preliminary analysis of 2004 and 2005 data suggests that eye flecks are strongly related to sex. Using eye flecks alone, we could correctly visually identify females 100% of the time, and males 78%. As we refine this method, accuracy should increase. We will complete our final analysis using DNA samples and photographs from 2006 over the winter of 2007. It is unclear at this time if and how eyeflecks change over time, as no Black Oystercatchers for which photos were taken have been recaptured. Groups working on American Oystercatchers and Eurasian Oystercatchers have also recorded eyefleck data for their respective species and we are currently discussing coordinating efforts.

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Biological monitoring at Aiktak Island, Alaska, in 2006 – J.A. Helm and T.A. Zeman.

Investigators: Joel A. Helm and Tyra A. Zeman, USFWS

The Alaska Maritime National Wildlife Refuge (AMNWR) annually monitors selected species of seabirds at nine ecological monitoring sites throughout Alaska. The objective of this long term project, is to collect baseline status and trend data for a suite of species representing piscivorous and planktivorous trophic guilds. Aiktak Island has been monitored annually since 1995. In 2006, biologists visited Aiktak Island to estimate population and/or productivity parameters for 11 indicator species representing 3 major feeding guilds: diving fish-feeders, diving plankton feeders, and surface plankton feeders. Other species monitored at Aiktak Island include glaucous-winged gulls (Larus glaucescens) and black oystercatchers (Haematopus bachmani).

Aiktak Island (N 54’ 11.19, W 164’ 49.84) is one of the Krenitzin Islands, located in the eastern Aleutian Islands, on the west side of Unimak Pass. Unimak Pass is the main shipping route between the North Pacific Ocean and the Bering Sea. Aiktak is a small island, approximately 2km by 1km, with a circumference of 7.3 km and a maximum elevation of 170m (556 ft). The total area of the island is 155 ha. Aiktak is low-lying on the north shore with 10-15 m (40-50 ft) rock cliffs alternating with grassy slopes. On the south side of Aiktak are sheer bluffs, the tops of which approach the highest parts of the island. Several small Elymus covered islets lie just offshore on the eastern and western sides of the main island. In 1921, arctic foxes were introduced to Aiktak Island (Bureau of Biological Survey 1940). They were trapped for pelts and eventually died off. With no foxes present on the island today, Aiktak has a breeding bird community that is one of the most diverse of any island in the eastern Aleutian Islands.

The presence of Black Oystercatcher adults and nests have been documented on island maps annually since 1995. Data on clutch size, hatching chronology and success, and brood size are also recorded. In 2006, 14 pairs and 13 nests were documented. These numbers are low to average considering that between 12 and 25 pairs, and 5 and 20 nests are typically found on the island. Hatch occurred primarily between the 22 and 26 June, very close to the long-term average dates. Hatching success was close to 80% and brood size was slightly more than 1.5 chicks / nest. 159 adults were documented on the island, far exceeding the previous maximum of 101 adults. , and revisits to nests are used to document hatching chronology, success,

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Behavioral Ecology of Pectoral Sandpipers – B. Kempenaers, M. Valcu, and R. Lanctot

Investigators: Bart Kempenaers and Mihai Valcu, Max Planck Institute for Ornithology, and Richard B. Lanctot, USFWS

In 2006 we continued our field study on the pectoral sandpipers in the same area as in 2005 (71.32 N, 156.66 W), but enlarged by 0.6 km2 to a total surface of 2.6 km2. We captured (using mistnets or nest-traps) 298 adult individuals (176 males and 119 females). Five males and one female were recaptures from 2005. Besides the standard morphometric measures, we also measured the thickness of the male throat sack using a modified skinfold calliper. All individuals were blood sampled and marked with a unique combination of colour bands. The colour bands allowed us to re-sight each individual present on the study area on a daily basis. For each re-sighting, the individual's GPS position and a few standardised behavioural measures were recorded. We found a total of 87 nests, most of them in the early incubation stage. Based on our previous successful experience, we collected all eggs and artificially incubated them. The overall hatching success (at least one hatched young per nest) was 85%, which is only 5 % lower than the natural hatching rate of this species recorded on an adjacent plot. However, our method reduced predation of clutches to zero, so that overall more offspring were born in the study area. Within a few hours after hatching each chick was measured and weighed and a small blood sample was collected. All hatched chicks were brought back to the incubating female and in all cases they were accepted immediately.

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Nesting Ecology of Tundra-Nesting Birds at the Canning River Delta, Arctic National Wildlife Refuge, Alaska – S. Kendall and C. Villa.

Investigators: Steve Kendall and Cashell Villa, USFWS

The Arctic National Wildlife Refuge (Arctic Refuge) joined several partners in 2002 in a multi-year, multi-site study of nest survival and predation of tundra-nesting birds on the Arctic Coastal Plain (ACP). The overall objective was to determine anthropogenic influences on this relationship (for additional information see Alaska shorebird project summaries from 2002-2005). Field studies for this project concluded in 2005. Initial data analyses have been conducted and the partners are working on preparing a manuscript to present the conclusions.

In 2006 we continued investigating tundra nesting bird ecology at the Canning River Delta, the primary Arctic Refuge study site for the larger collaborative study. We did this in partnership with the Wildlife Conservations Society (WCS), which conducted studies on the ACP at Prudhoe Bay and near Teshepuk Lake. During the previous 4 years of field studies we found considerable annual environmental variability, resulting in natural variability of nesting ecology, nest survival and predator abundance. We wanted therefore to increase our sample size and enhance baseline data through additional monitoring. We have identified the Canning River Delta region as an important area for breeding shorebirds on the Arctic Refuge. However, due to its location relative to existing oil field infrastructure on the ACP, it would likely be one of the first areas impacted if oil exploration and development were to occur on the Refuge. This site could also be impacted by development of nearby gas fields at Pt. Thompson. Adequate baseline data for bird populations on the Delta will be vital to evaluate impacts of future activities and to develop appropriate mitigation strategies if necessary.

Our objectives included: evaluate nest survival of tundra-nesting birds; compare predator abundance and activity among sites and years; compare nest density and causes of nest failure among sites and years; evaluate the confounding effects of weather, habitat characteristics, and small mammal abundance on nest success and density; and document the life history of breeding birds and nest predators.

Conditions at the Canning River Delta in 2006 were atypical compared to the previous 4 years. Snow melt was early, and small mammal and predator abundance were higher than previously observed. Average snow cover at the beginning of the season in 2006 was less than all other years except 2002. We do not have a reliable measure of small mammal abundance other than observational data and the presence of nesting Snowy Owls and Pomarine Jaegers (both species usually only nest in high lemming years). Observations of small mammals were at least an order of magnitude higher in 2006 than the previous 2 years (when we quantified observations), and anecdotal observations 2003 and 2002 indicate small mammal abundance was also relativly low in those years. In 2006, we found two Snowy Owl nests and four Pomarine Jaeger nests, but suspected that several more were present. Total predators observed during predator surveys were also higher in 2006 compared to all other years, due primarily to the higher abundance of Pomarine Jaegers. In

addition there were at least three arctic fox dens at the study site, one with nine kits. A commonly held assumption is when small mammals are abundant, predators switch their focus away from birds resulting higher nest success. This was not true at the Canning River Delta in 2006. For all nesting species nest survival in 2006 was much lower than most of the previous years. It appears that benefits of a higher mammal prey base may have been offset by the higher predator abundance.

At the Canning River Delta in 2006 we located and monitored 180 of nests of 12 species. The most abundant shorebird species were Semipalmated Sandpipers (density = 16.0 nests/km2) and Red-necked Phalaropes (density = 11.5 nest/km2). This was the highest density we have observed for Red-neck Phalaropes at the study site, which was not surprising as higher abundance of phalaropes are expected years of early snow melt. However, Red Phalaropes nesting density in 2006 was much lower than 2002, an early snow melt year with the highest density observed for this species at the study site. In 2006, Pectoral Sandpipers had the lowest nest density observed for that species (density = 6.5 nests/km2) at our site.

In conjunction with investigating nesting ecology, we collected samples from shorebirds to screen for the presence of avian influenza. Samples were collected from the following species: Ruddy Turnstone (n=7), Pectoral Sandpiper (n=45), Dunlin (n=28), Buff-breasted Sandpiper (n=14) and Long-billed Dowitcher (n=5). Some species, such as Long-billed Dowitchers and Ruddy Turnstones occurred in lower than expected numbers in 2006 and were difficult to capture. The high nest failure rate was another complication. However, we exceeded our goal for total samples by catching more of other species and by augmenting cloacal swab samples with fecal samples. None of the samples tested positive for avian influenza. Blood and feather samples were also collected from these birds for use in genetic and stable isotope analyses.

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Post-breeding Shorebird Studies on the Arctic National Wildlife Refuge, Alaska – S. Kendall, A. Taylor, and S. Brown.

Investigators: Steve Kendall, USFWS, Audrey Taylor, UAF and Stephen Brown, Manomet Center for Conservation Sciences.

In 2006 the Arctic National Wildlife Refuge and Manomet Center for Conservation Sciences assisted University of Alaska, Fairbanks doctoral student Audrey Taylor in investigating post-breeding shorebird distribution, abundance, movement and physiology in coastal areas of the Arctic Coastal Plain. The results of the larger study are reported separately by Audrey Taylor in this document. In this summary we report on specific work done on the Arctic Refuge.

We collected data from a study site on the Okpilak/Hulahula river delta on Arctic Refuge in 2005 and 2006. In 2006 investigations were conducted 17 July to 5 September. To assess species abundance and distribution, ground-based surveys were done using Distance Sampling techniques on 10 transects established in 2005. To quantify movement patterns (both within the staging period and relative to breeding location) and residency times of pre-migratory shorebirds at staging site, birds were captured and marked with radio transmitters, color leg bands and/or paint at 3 breeding sites and at the Okpilak/Hulahula staging area. Movements of birds were monitored by radio-telemetry and by conducting surveys to look for color marked birds. Birds were also monitored at 3 sites on the Refuge using automated radio-tracking systems. To examine relationships between physiological factors (metabolic status and stress levels) and staging behavior, blood samples were collected from shorebirds captured at staging areas. These samples will be analyzed for fat metabolite concentrations (a measure of metabolic fattening rate) and corticosterone levels (a measure of stress).

We radio tagged 13 Semipalmated Sandpipers, 10 Red-necked Phalaropes and 3 Dunlin at breeding sites on the Arctic Refuge. We radio tagged 9 Semipalmated Sandpipers and 6 Red-necked Phalaropes at staging areas. An additional 70 Semipalmated Sandpipers, 51 Red-necked Phalaropes, 5 Red Phalaropes and 2 Western Sandpipers were marked with color leg bands or paint at staging sites. We collected blood samples from 67 Semipalmated Sandpipers, 32 Red-necked Phalaropes, 2 Red Phalaropes and 1 Western Sandpiper.

By partnering with the Manomet Center for Conservation Sciences we were able to expand the area of investigation on the Arctic Refuge in 2006. We used Distance Sampling techniques on randomly distributed transects to determine distribution and abundance of shorebirds on all river deltas from the Canadian border to the Canning River. Despite challenging weather conditions, we were able to meet our goal and complete surveys on all deltas. We saw relatively few shorebirds, apparently due to weather-driven high water flooding of staging habitat and the timing of the survey. Prior to the time period of our survey, the numbers of birds present decreased on the deltas at other study sites across the Coastal Plain. However, by visiting additional areas on the Refuge we gained a better understanding of habitat availability and the dynamics driving use of these areas. We hope to partner with Manomet again in 2007 to refine the survey methods and continue these investigations.

In conjunction with this study, we collected samples from shorebirds to screen for the presence of avian influenza. Samples were collected from the following species: Ruddy Turnstone (n=9), Pectoral Sandpiper (n=27), Dunlin (n=20), Buff-breasted Sandpiper (n=18) and Long-billed Dowitcher (n=5). None of the samples tested positive for avian influenza. Blood and feather samples were also collected from these birds for use in genetic and stable isotope analyses.

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Reproductive Ecology of Shorebirds: studies at Barrow, Alaska, in 2006 – R. Lanctot, L.C. Naves, A. Taylor, N. Coutsoubos, B. Kempenaers and M. Valcu.

Investigators: Richard Lanctot and Liliana Coelho Naves, USFWS; Audrey Taylor and Nathan Coutsoubos, UAF; and Bart Kempenaers and Mihai Valcu, Max Planck Research Centre for Ornithology

In 2006, we conducted the fourth 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 arrival date, nest initiation and effort, clutch and egg size, and hatching success of arctic-breeding shorebirds, (2) to establish a marked population of as many shorebird species as possible that would allow us to estimate adult survival, mate and site fidelity, and natal philopatry, and (3) to relate weather, predator and prey abundances to shorebird productivity. Data on demographic parameters are vitally needed to understand why many shorebirds are declining.

We located and monitored nests in six 36-ha plots in 2006. All six plots are the same as those sampled in 2005. We used the same search intensity and methodology as in 2004 and 2005. The breeding density of all shorebird species on our study area was 52.1 nests/km2 in 2003, 66.6 in 2004, 63.0 in 2005, and 150.5 in 2006 (overall average density across years was 83.0). The exceptionally high density of nests in 2006 far surpassed previous years. As in 2005, our ability to find nests was probably enhanced by a fox removal program that allowed many nests to survive through to hatching (see below), giving us more time to find the nests. While this may partially explain the high nest densities, it seems likely that the high shorebird numbers are somehow related to the extremely high lemming, Snowy Owl and jaeger numbers. Indeed, lemmings numbers were the highest documented since the early 1990s when Denver Holt and his crew began systematically trapping them on an annual basis.

In 2006, we recorded the highest breeding density of the four most abundant shorebird species in the four years of our study. These included Red Phalarope (50.5 nests/km2), Pectoral Sandpiper (48.2), Dunlin (17.6), and Semipalmated Sandpiper (8.3). We also had record densities of Long-billed Dowitchers (11.1), Buff-breasted Sandpipers (8.3), American Golden-plovers (2.8), and Red-necked Phalarope (3.2). A total of 325 nests were located on our plots and another 92 nests were found outside the plot boundaries. Nests on plots included 104 Pectoral Sandpiper, 109 Red Phalarope, 38 Dunlin, 18 Semipalmated Sandpiper, 24 Long-billed Dowitcher, 7 Red-necked Phalarope, 6 American Golden-plover, and 1 Baird's Sandpiper. For the first time since the beginning of this study, we located Buff-breasted Sandpiper nests on the tundra plots in 2006 (n=18). Western Sandpiper and White-rumped Sandpipers were not observed on our plots in 2006, and have only been documented nesting in 2004.

The first shorebird clutch was initiated on 3 June and the last on the 3 July in 2006 (on or within 1 day for both dates in prior years). Peak initiation date was the 12 June and median initiation date was the 15 June; this is within 1-2 days of median dates in earlier years. Median nest initiation dates for the more abundant species were the 11 June for Dunlin, 12

June for Semipalmated Sandpipers, 15 June for Red Phalarope, and 16 June for Pectoral Sandpipers. This pattern is similar to prior years. Predators destroyed only 8.3% of the nests in 2006 compared to 11.2% in 2005, 67.9% in 2004, and 42.6% in 2003. Across the more abundant species, hatching success (# hatching at least one young/total number of nests) was highest in Pectoral Sandpipers (90.4%, N = 94), followed by Red Phalarope (86.6%, N = 103), Semipalmated Sandpipers (93.6%, N = 29), and Dunlin (85.7%, N = 42). These numbers are even higher than in 2005 when predator removal appeared to substantially increase nest success. Alternative food sources in the form of high lemming abundance may have further enhanced shorebird hatching success, although other factors may be involved. A comparison across study plots indicated that hatching success was greater than 90% in plots 2 and 3, greater than 80% in plots 5 and 6, and equaled 72.7% in plot 8.

In 2006, we captured and color-marked 342 adults and 707 young. These numbers are about two times higher than 2005 captures and three times higher than 2003-2004 captures. Thirty adults (mostly Dunlin and Semipalmated Sandpipers) captured in 2006 had been banded in a prior year. Adults captured included 91 Dunlin, 72 Pectoral Sandpipers, 61 Semipalmated Sandpipers, 60 Red Phalarope, 29 Long-billed Dowitchers, 13 American Golden-plovers, 13 Buff-breasted Sandpipers, and one each of Baird's Sandpiper, Red-necked Phalarope and Western Sandpiper. We are confident that we could have captured more birds had we had additional personnel.

We continue to conduct ancillary studies as time allows at Barrow. Avian influenza studies were a prominent feature of our work in 2006 – all captured birds were swabbed to test for the highly pathogenic H5N1 avian influenza virus. Nathan Coutsoubos (University of Alaska, Fairbanks) completed the second year of his PhD studies investigating how the construction of a landfill and the experimental flooding/draining of a wetland influence shorebirds (see his report). We also placed radio transmitters on 18 individuals to help Audrey Taylor (PhD, University of Alaska Fairbanks) document movements to postbreeding sites (see her report). Finally, we collected eggs from Dunlin and Red Phalaropes for the second year in a row as part of a collaborative project with Sarah Jamieson (PhD, Simon Fraser University) to investigate whether shorebirds use endogenous or exogenous resources to produce eggs.

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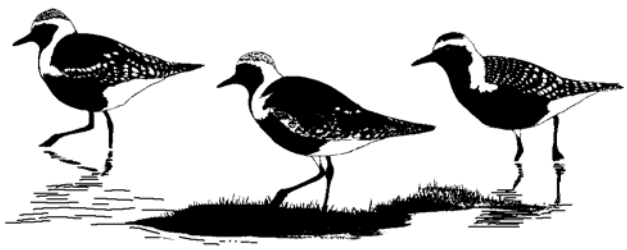

Avian Influenza Sampling and Shorebird Surveys in the National Petroleum Reserve – Alaska, in 2006 – R. B. Lanctot

Investigator: Richard B. Lanctot, USFWS

Serious concerns surround the probability that migratory waterbirds might spread highly pathogenic H5N1 avian influenza (HPAI) from Asia to North America. Five of the 26 high target avian influenza species are shorebirds that breed on the North Slope of Alaska. These include the arcticola subspecies of Dunlin, Pectoral Sandpipers, Long-billed Dowitchers, Ruddy Turnstones, and Buff-breasted Sandpipers. All five species have some or all of their population winter in Southeast Asia where exposure to the HPAI is likely. Taking advantage of data accumulated within the National Petroleum Reserve-Alaska (NPR-A) between 1998 and 2001, we identified abundant and species rich shorebird locations to visit for capturing birds. We relied on two R-44 helicopters to transport four 2-person field crews to survey sites where they spent an 8-hr day searching for nests and capturing birds. The use of helicopters allowed us to gather samples over a large geographic area, which we hoped would increase our chances of detecting the virus.

Field crews captured displaying birds with mist nets and incubating adults with bow nets. All individuals had a metal band placed on their legs, and in the case of dunlin a unique set of color bands were placed on each bird. Birds were also weighed and measured so that we could determine age and sex (for some species). In addition, we recorded a fat index and the stage of molt for their flight and tail feathers. We also collected a blood sample for use in genetic and hormone studies, and one or more feathers for use in stable isotope studies. Finally some birds (9 Dunlin, 8 Semipalmated Sandpipers, and 10 Red Phalaropes) had radio transmitters attached as part of an effort to determine movement patterns of birds to and among Alaskan coastal staging sites (see Audrey Taylor summary). While at these sites, we also replicated rapid surveys of plots originally surveyed as part of the Program for Regional and International Monitoring.

Field crews captured a total of 197 shorebirds (2 American Golden-plovers, 3 Black-bellied Plovers, 3 Buff-breasted Sandpipers, 41 Dunlin, 1 Long-billed Dowitcher, 55 Pectoral Sandpipers, 53 Red Phalarope, 1 Red-necked Phalarope, 4 Ruddy Turnstones, 28 Semipalmated Sandpipers, 3 Stilt Sandpipers, and 3 Western Sandpipers) at 58 sites between the 8 and 24 June. Three sites were visited twice because of the high number of shorebirds in the area. From these birds, 196 avian influenza swabs, 193 feather samples, and 191 blood samples were collected. To date, no positive cases of H5N1 avian influenza virus has been detected. The wide sampling coverage of this study should be particularly useful when other types of data collected during this study are analyzed. Feathers from dunlin and pectoral sandpipers are being used to assess movements of birds between breeding and wintering grounds using stable isotope markers. Blood samples collected from Dunlin will provide the basis for a genetic study and resightings of captured birds are helping to document migration pathways to Southeast Asia.

During the 50 rapid surveys conducted, a total of 1312 shorebirds were recorded belonging to 16 species. The most commonly observed species were the Pectoral Sandpiper (383), the

Red Phalarope (338), Dunlin (172) and Semipalmated Sandpiper (167). A large number of other species were also observed but not tallied here. We plan to conduct an analysis to determine the amount of between-year variation in shorebird composition and abundance that exists at these plots.

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Long-term monitoring of tundra-nesting birds in the Prudhoe Bay oilfield, North Slope, Alaska – J. Liebezeit and S. Zack.

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

The North Slope of Alaska supports millions of birds that return each summer to breed in its productive wetlands. Since 2003, the Wildlife Conservation Society (WCS), in cooperation with BP, has monitored nest survivorship, nest predator abundances and other parameters that may influence nesting success in the Prudhoe Bay Oilfield. This on-going monitoring effort will help us better understand potential impacts from industry, climate change, and other factors on the nest survivorship of breeding birds.

In 2006, we discovered and monitored 157 nests of 16 species from 6 June to 20 July on 12 10-ha study plots using both rope drag and behavioral nest search techniques. Lapland Longspur, Pectoral Sandpiper, Semipalmated Sandpiper, Red-necked Phalarope and Greater White-fronted Goose nests accounted for the majority (80%) of those found. Among all species, 95 nests successfully hatched/fledged, 47 failed, and 15 nests were of unknown fate. Nest predation was the most important cause of nest failure (91%). Other sources of nest failure included abandonment and predation due to observers. Overall nest density was 101.6 nests / km2, noticeably higher than at this site in all previous years (previous high since 2003 was in 2005 at 75.8 nests / km2). Mayfield estimates of nesting success ranged from 0.66 to 0.77, for the four most common breeding species (n > 10 with some of the highest nesting success for all previous years monitored.

We documented the highest lemming abundance at this site since monitoring began, over a 6-fold increase from previous years. Despite this noticeable increase; lemming abundance at this site was four times lower than at our field site near Teshekpuk Lake. Nonetheless, as at Teshekpuk, we documented conspicuous increases in the number of Pomarine and Parasitic Jaegers compared to 2005 although Glaucous Gull and Long-tailed Jaeger numbers were similar in both years. Overall, eight species of potential nest predators were detected during timed surveys in 2006 with the most common being Parasitic Jaegers and Glaucous Gulls.

Snow melt occurred earlier in 2006 than the previous three years monitored. On June 2nd mean snow cover was ~22%. In the three previous years, snow cover was still >40% on

June 2nd. Correspondingly, nest initiation dates for most species were 2-4 days earlier compared to 2005, and earlier than in any of the previous years for most species.
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Breeding bird diversity, density, nesting success and nest predators at a study site in the Teshekpuk Lake Special Area, North Slope, Alaska – J. Liebezeit and S. Zack.

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

The North Slope of Alaska contains some of the most important breeding grounds for over 30 species of migratory shorebirds and waterfowl. Within this region, the Teshekpuk Lake Special Area (TLSA) in the National Petroleum Reserve – Alaska (NPR-A) has been identified as a region of exceptional importance to wildlife including breeding shorebirds and waterfowl. Proposed expansion of oil development into this region may negatively impact these populations. However, no baseline studies have been conducted in the TLSA that evaluates the reproductive success for many of these species – a critical factor that is vital in understanding avian population trends. The Wildlife Conservation Society (WCS) is investigating the importance of the TLSA as a breeding ground for migratory birds (focusing on shorebirds). Our objective is to collect baseline information on breeding biology of tundra-nesting birds, nest predator abundance, and other factors known to influence nest survivorhip and to compare the nest survivorship results with other sites on the North Slope to help evaluate the importance of this region for breeding birds.

In 2006, WCS continued in the second year of this study conducting field work on 16 10-ha study plots near the SE shore of Teshekpuk Lake. We discovered and monitored 246 nests of 20 species from 7 June to 15 July using both rope drag and behavioral nest search techniques. Lapland Longspurs, Pectoral Sandpipers, Semipalmated Sandpipers, and Red Phalaropes accounted for the majority (62%) of those found. Among all species, 162 nests successfully hatched/fledged, 70 failed, and 14 nests were of unknown fate. Nest predation was the most important cause of nest failure (90%). Other sources of nest failure included abandonment, predation due to observers, and caribou trampling. Mayfield estimates of nesting success ranged from 41 to 94% and were relatively high for most species sampled (>50% for 7 of 9 species; $n \geq 5$). Overall nest density was 132.4 nests / km2, noticeably higher than at this site in 2005 (90.7 nests / km2).

We documented high lemming abundance with many more lemmings observed compared to 2005 (0.01 vs. 0.33 lemmings / 30min. count). Correspondingly, we documented conspicuous increases in the number of predators observed. In particular, Pomarine Jaegers were detected significantly more this year than in 2005 and were observed nesting in the study area. Overall, eleven species of potential nest predators were detected during timed surveys with the most common being all three jaeger species and Glaucous Gulls. The nesting success results from 2005-06 indicates high nest survivorship at Teshekpuk in seasons with both high and low abundances of lemmings.

Snow melt occurred 2-3 days earlier at Teshekpuk in 2006 compared to 2005. Correspondingly, nest initiation dates for most species were 2-3 days earlier at compared to 2005. This positive correlation between nest initiation and snow melt was also observed at the nearby Prudhoe Bay study site.

Nests were found in eight of 15 landform types ("habitat" types). As in 2005, most nests were located in Unit 7 (strangmoor and disjunct polygon rims) and Unit 2 (High-center polygons, center-trough relief <0.5m) landform types. We did not detect any advantage in nesting success due to vegetative concealment.

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Surveillance for Avian Influenza H5N1 in breeding shorebirds at Prudhoe Bay and Kuparuk, North Slope, Alaska – J. Liebezeit and S. Zack.

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

Serious concerns surround the probability that migratory waterbirds might carry and spread highly pathogenic H5N1 avian influenza (HPAI) from Asia to North America via their flyways in Alaska. To determine whether this was occurring, the Wildlife Conservation Society (WCS) took part in a concerted effort, lead by the U.S. Fish and Wildlife Service, to sample waterbirds deemed most likely to carry the virus to North America. WCS led these efforts in the Prudhoe Bay and Kuparuk oilfields by sampling five shorebird species in which some or all of their populations' winter in Southeast Asia where exposure to the HPAI is likely. These include the Dunlin (arcticola subspecies), Pectoral Sandpipers, Long-billed Dowitchers, Ruddy Turnstones, and Buff-breasted Sandpipers.

Sampling took place between 3 June and 14 July 2006. Shorebirds were captured by finding active nests (primarily using the rope drag method) and then trapping at least one of the adult birds on the active nest during mid-late incubation using bow-nets. For Buff-breasted Sandpipers, we trapped displaying males and attendant females using mist nets at known lek locations. Birds were sampled throughout both the Prudhoe Bay and Kuparuk Oilfields on up to 36 10-ha study plots originally established for a previous shorebird study. In addition to collecting cloacal swab samples to test for HPAI, all captured individuals were fitted with a metal band and unique color bands to aid in tracking the bird's migratory movements. Other data recorded included: age, sex, flight feather molt, weight, fat index, blood samples (to be used in genetic and hormone studies), and feather samples (for use in stable isotope studies). Finally, some birds had radio transmitters attached as part of an effort to determine movement patterns of birds to and among coastal staging sites (Audrey Taylor, PhD study, Univ. of Alaska Fairbanks).

We trapped and sampled 124 birds for Avian Influenza taking samples from 53 Buff-breasted Sandpipers, 43 Pectoral Sandpipers, 16 Dunlin, and 6 each from the following species: Long-billed Dowitchers, Ruddy Turnstone, Red-necked Phalaorope, and Semipalmated Sandpiper. To date, no positive cases of H5N1 avian influenza virus has

been detected and feather / blood samples have been distributed to collaborators for additional studies.

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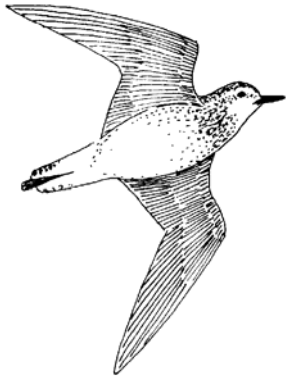

Staging ecology of Bar-tailed Godwits at Cape Avinof, Yukon-Kuskokwim Delta, Alaska – B.J. McCaffery, M. Green, A. Pomeroy, and S. Lovibond.

Investigators: Brian J. McCaffery, USFWS; Martin Green, Lund University, Sweden; Andrea Pomeroy, Simon Fraser University, Canada; Sarah Lovibond, University of Tasmania, Australia

The Yukon-Kuskokwim Delta (YKD) is an important staging area for the Alaska-breeding race of the Bar-tailed Godwit (Limosa lapponica baueri). In 1999 and from 2001-2005, Yukon Delta National Wildlife Refuge personnel studied post-breeding godwits at Tern Mountain, recording age ratios and resighting godwits captured and flagged elsewhere in the East Asian Australasian Flyway. In 2005, field work incorporated observations on foraging rates and godwit prey densities during mid-September.

In 2006, we expanded this programme by initiating more intensive studies at a new site, Cape Avinof, about 30 km southwest of Tern Mountain. Cape Avinof is a subtle inflection point along the southwest coast of the YKD, where the coast curves gradually north from Kuskokwim Bay. The cape is just inshore of a chain of barrier islands that extends for nearly 40 km between 5 and 13 km offshore of the mainland coast. In recent years, this stretch of coastline has supported the vast majority of the YKD's staging Bar-tailed Godwits.

Objectives in 2006 included:
(1) conducting aerial surveys to estimate the number and proportion of godwits occupying this region of the YKD,
(2) collecting > 400 fecal samples from staging Bar-tailed Godwits to be analyzed for Asian H5N1,

3) developing additional information on the scale and timing of godwit movements in western Alaska by a) resighting birds flagged in other countries throughout the East Asian/Australasian Flyway, b) estimating minimum lengths of stay by repeated observations of birds individually color-marked in New Zealand, c) collaborating with colleagues from USGS by reporting observations of i) birds with PTTs, and ii) major departures of migrant godwits from the study area to correlate with departures of individuals with PTTs,
4) estimating age and sex ratios to evaluate the degree to which collections at the site may be representative of the entire population, and
5) describing staging behavior and ecology by quantifying a) godwit foraging rates, b) invertebrate prey taxa taken by foraging godwits, c) invertebrate densities, d) both population-level and individual fattening rates through an analysis of abdominal profile indices (API), and e) frequency, duration, success of , and godwit responses to, attacks on shorebirds by raptors and jaegers

On 23 August, 36,260 Bar-tailed Godwits were counted along the coast of the YKD from the Kuskokwim River mouth to Norton Sound. 33,947 godwits (94%) were found on or inshore of the barrier islands; 99% of these occupied high tide roosts on the barrier islands themselves. By 11 September, the number of godwits on or inshore of the barrier islands had fallen to19,808. These findings were similar to those derived from surveys on comparable dates in 1995, 1997, and 2005.

While studying foraging godwits from mid-August to mid-September, we collected 409 fecal samples from foraging Bar-tailed Godwits. By focal sampling randomly selected birds from foraging flocks, we obtained over 4200 determinations of age, sex, and API. As at Tern Mountain in 5 of 6 years, the proportion of juveniles at Cape Avinof was < 5%. We made nearly 400 observations color-flagged godwits marked at sites throughout the East Asian/Australasian Flyway. Because our colleagues in other countries attach plastic flags to shorebirds with site-specific color codes, we were able to ascertain that our study site supported godwits originally captured and marked in Victoria, New South Wales, and Queensland in Australia; on both the north and south islands of New Zealand; and at > 2 different locations in China (northern Yellow Sea and Yangtse River mouth). We also made nearly 300 observations of over 110 individually-marked godwits. Most were godwits banded in New Zealand, but we also observed several that had been banded and outfitted with PTTs on the YKD in both 2005 and 2006. Because we had multiple observations of dozens of these individuals, we were able to develop individual histories which included minimum lengths of stay in the area and rates of fat accumulation. In addition, we collected hundreds of five-minute foraging samples, and hundreds of invertebrate cores (from sites where godwits were actively foraging as well as from sites systematically located along 5 transects extending out on the flats for > 1 km perpendicular to the shoreline). Most of these data will be summarized and analyzed in the months ahead.

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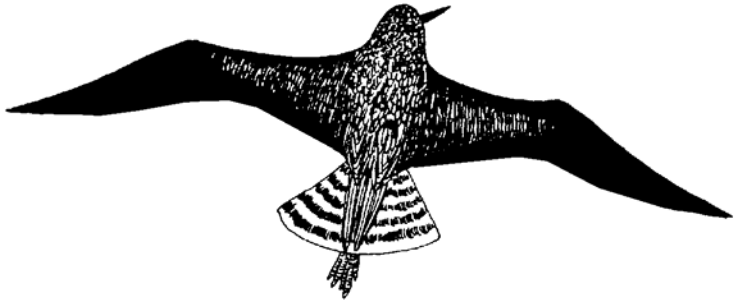

Inventory of montane-nesting birds in Katmai and Lake Clark National Parks and Preserves – D. Ruthrauff, L. Tibbitts, B. Gill, and C. Handel.

Investigators: Daniel Ruthrauff, Lee Tibbitts, Bob Gill, and Colleen Handel, USGS

In the final year of a three-year study to inventory montane-nesting birds within two parks within the Southwest Alaska Network, scientists from the U. S. Geological Survey's Alaska Science Center conducted surveys within both Katmai and Lake Clark National Parks from 29 May–5 June, 2006. We deployed two, two-person crews in both parks, and surveyed seven and three 10-km x 10-km plots in Katmai and Lake Clark, respectively. We sampled sites along the Shelikof Strait and Cook Inlet coasts of each park that were inaccessible in previous years due to poor weather or unsafe snow conditions. Although most study sites were still blanketed under heavy snow during our visit, the weather was excellent and birds were active at all sites.

Over the three years of our study, we conducted surveys at 885 points spread across 30 and 25 randomly-selected study plots in Katmai and Lake Clark, respectively, and recorded nearly 4,500 detections of over 5,700 individuals. Crews detected a total of 92 species in Katmai and 104 species in Lake Clark. Over the course of the survey, the most commonly detected species were Golden-crowned Sparrows (Zonotrichia atricapilla; 573 individuals), Fox Sparrows (Passerella iliaca; 383 individuals), and Wilson's Warblers (Wilsonia pusilla; 296 individuals).

Highlights from the 2006 field effort include additional detections of Wandering Tattlers (Tringa incana) at sites in both parks, augmenting detections from 2004 and 2005. In contrast, we detected no Surfbirds (Aphriza virgata) or Baird's Sandpipers (Calidris bairdii) during this year's surveys, despite visiting appropriate habitats at numerous sites. Both the presence and absence of these birds at this year's sites help to further define the southern extent of the breeding ranges for this trio of little-studied montane shorebirds. Additionally, because we conducted this year's work at more southerly, coastal sites, we detected a suite of birds different from the previous two years. In 2004 and 2005, higher-elevation montane species like Golden-crowned Sparrows and American Pipits (Anthus rubescens) were the most common birds at the drier interior sites visited in both parks, while in 2006 we detected more mid-elevation, shrub-associated species like Fox Sparrows and Wilson's Warblers. The nature of this year's sites also provided numerous observations of mammals,

especially on a plot overlooking Swikshak Lagoon in Katmai where Brown Bears (Ursus arctos) nearly outnumbered birds.

Results of this inventory describe the distribution of birds across both parks, and characterize both habitat and elevational affinities of species with enough detections. These data serve as a basic avifaunal inventory of these parks and, given the repeatable nature of the methodology, will also allow for population monitoring over time. Results from this three-year effort were published in a NPS report, accessible online at: http://science.nature.nps.gov/im/units/swan/index.cfm?theme=inventoryspecies#Birds.

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Alaska Peninsula shorebird inventory – S. Savage, K. Sesser, and L. Tibbitts

Investigators: Susan Savage and Kristin Sesser, USFWS; Lee Tibbitts, USGS

In 2006, personnel with the Alaska Peninsula/Becharof National Wildlife Refuge continued inventories of birds inhabiting lowlands of the Alaska Peninsula. Project goals include establishing baseline information on distribution and abundance of the region's breeding birds (with a focus on shorebirds). The sampling universe for the inventory encompassed all lowland areas (defined as lands <100 m in elevation) located between the Naknek River drainage and the tip of the Alaska Peninsula. A stratified random sampling design was used to select plots (n=64; size = 5 x 5 km) and variable circular plot methodology incorporating distance estimation (i.e., point transects) was used to survey plots. For details see the 2004 project summary.

Between 10 May and 31 May, teams of two observers spent 1-2 days at each of 14 plots located in the Egegik drainage (5 plots), between the Egegik and Ugashik systems (1 plot), in the Ugashik/Dog Salmon drainage (6 plots), in the Meshik drainage (1 plot) and at Aniakchak Lagoon (1 plot). Among these plots we sampled a total of 227 points on which we recorded 13 species of shorebirds totaling 1,113 individuals. We also recorded 15 species of avian predators, totaling 859 individuals. Besides shorebirds and avian predators, we recorded 20 species of landbirds (e.g., ptarmigan, passerines) and 18 species of waterbirds (e.g., loons, grebes, waterfowl, terns) on the point transects. An additional 11 species (Canvasback, Common Goldeneye, Common Merganser, Pacific Loon, Wandering Tattler, Hudsonian Godwit, Pectoral Sandpiper, Downy Woodpecker, Alder Flycatcher, American Dipper, Pine Grosbeak) were observed on plots, but not detected during a point transect. To date, we have surveyed 38 plots and 579 points and recorded information for 3,325 shorebirds and 1,980 avian predators. These data will be used to calculate species specific estimates of relative abundance and density and to assess habitat associations.

During plot visits, we found 2 nests of 2 species of shorebirds (Least Sandpiper, Dunlin). We experienced a cold, late spring and the shorebirds seamed to arrive and initiate nesting later than average. We also found 11 nests of 9 other species including Tundra Swan,

American Wigeon, Willow Ptarmigan, Red-throated Loon, Northern Harrier, Rough-legged Hawk, Sandhill Crane, Mew Gull, and American Robin.

Based on all years, we continue to find Wilson's Snipe and Least Sandpiper to be the most widely distributed shorebirds, occurring on all but one of the 38 plots (97%). Short-billed Dowitcher, Dunlin, and Greater Yellowlegs were also widely distributed, occurring on 84%, 74%, and 66% of plots, respectively. Marbled Godwits, a species of conservation concern, were found on 17 plots (45%).

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Black Oystercatchers on St. Lazaria Island – L. Slater and D. Tessler.

Investigators: Leslie Slater, USFWS, and David Tessler, ADF&G

On St. Lazaria Island (Sitka Sound), five pairs of Black Oystercatchers (Haematopus bachmani) were documenting holding territories; of these 4 were known to have laid eggs although the clutch size is unknown. No chicks survived to fledge.

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Video documentation of nest failure, nest disturbance, and parental behavior of Black Oystercatchers (Haematopus bachmani) in western Prince William Sound, AK – C.S. Spiegel, S.M. Haig, M.I. Goldstein, and B.A. Brown.

Investigators: Caleb S. Spiegel and Susan M. Haig, Oregon State University & USGS Forest and Rangeland Ecosystem Science Center; Michael I. Goldstein, USDA Forest Service Alaska Region; and Bridget A. Brown, USDA Forest Service, Chugach National Forest.

From May - July 2006 we documented nesting behavior and hatch success at 11 Black Oystercatcher (BLOY) nests in Harriman Fjord, western Prince William Sound, AK using digital video cameras and recorders. The 2006 field season marks the second and final year of BLOY video nest monitoring in Harriman Fjord. BLOY are an important indicator of intertidal ecosystem health and a species of concern in U.S. and Canadian Shorebird Conservation Plans. Research is part of a multi-year, collaborative BLOY demographic study being conducted by several agencies and institutions including the U.S. Forest Service, Alaska Department of Fish and Game, Oregon State University, USGS Forest and Rangeland Ecosystem Science Center, U.S. Fish and Wildlife Service and University of Alaska Fairbanks.

Studies of reproductive success frequently fail to conclusively identify specific causes of nest failure, instead relying on often scant evidence and educated guesses. However, video technology is a valuable tool for collecting data on the causes of nest failure and parental nesting behavior because it allows data to be collected 24 hours per day with minimal observer disturbance, and permits decisive determination of nest fates. In 2004, 52% of BLOY nest losses documented at Harriman Fjord were a result of unknown causes (Brown et al. 2004). In 2005, causes of nest failure were unambiguously identified at all video monitored nests in Harriman (Spiegel et al. 2005). Studies of parental nesting behavior and time budgeting can also be greatly aided by around-the-clock video monitoring. Information collected at night is especially lacking in studies of nesting behavior, although research has indicated important variations in parental sex roles during periods of darkness (Warnock and Oring 1996, Wallander 2003). Processes driving incubation patterns such as day length, tides, and disturbance may have a large effect on reproductive success (Warnock and Oring 1996). Having comprehensive nesting information is vital for truly understanding these behavioral patterns and processes.

During the 2006 field season, 11 BLOY nests were continuously monitored with remote camera and video recorder units (SeeMore Wildlife Technologies), from early incubation through nest failure, or until approximately seven days post-hatching. Video units were placed randomly at nests within a subset of territories where at least one member of the pair was banded, to allow for identification of individuals and gender determination during footage analysis. Image quality was high, allowing for color band combinations to be read, for subtle nesting behaviors to be observed, and for all causes of failure and potential failure to be clearly identified.

In 2005 two nest losses due to tidal flooding were observed (Spiegel et al. 2005). During the 2006 season no nest failure due to monthly extreme tidal flooding was video-documented, although minor nest flooding of a nest was recorded during two nights. Incubation continued after the events, however, and the nest eventually hatched 2 of 3 eggs. Four egg predation events were captured on video, revealing evidence of three formerly undocumented BLOY nest predators in Harriman Fjord, black bear (Ursus americanus), marten (Martes americana), and Wolverine (Gulo gulo). An additional nest predator, American mink (Mustela vison) was documented during the 2005 (Spiegel et al. 2005) and 2006 seasons. Minks and marten left few signs at nests, removing eggs whole. Therefore such predation events would likely be underestimated without video monitoring. All recorded nest failure events, except the black bear predation, occurred during darkness. Infrared LED lights were effective in capturing night-time activity.

Seven successful hatches were documented on video in 2006. Novel footage of nesting and chick rearing behavior was obtained, including removal of recently hatched eggshells and cracked eggs by adults, sibling aggression, chick feeding, and brooding.

No nests were abandoned as a result of video camera use. Nest failure rates due to predation at nests monitored with video units were similar to predation rates at non-video monitored nests (36% vs. 38%). This result supports several prior video nest monitoring

studies, indicating that the technology does not produce a greater incidence of nest predation than standard monitoring methods (Keedwell and Sanders 2001, Williams and Wood 2002).

Currently, work is underway at Oregon State University to analyze video footage for sex-related patterns in incubation and brood behavior. An in-depth analysis of nesting and early chick rearing activities will be conducted, and relationships between activities and reproductive performance will be examined. Specifically, we will search for video evidence of direct and perceived threats to reproductive failure and frequency of these threats, determine whether natural processes such as tide cycle are driving nesting behavior, and examine sex based differences in breeding behavior. Results will determine the degree to which such threats and life history traits limit reproductive performance.

Video footage will additionally be used for public education projects. At U.S. Forest Service Glacier Ranger District, 2006 footage will be added to a web-based public information program about BLOY reproduction in PWS. (http://www.fs.fed.us/r10/chugach/pages_district/glacier/GRDWildlifeWeb/grdbloy_videos.html) This program uses video nesting footage collected in Harriman Fjord to inform the public about basic BLOY life history, the importance of Chugach National Forest as a breeding area, and the threats BLOY face during reproduction.

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Identifying and cataloging the Important Bird Areas of Alaska – I. Stenhouse.

Investigator: Iain Stenhouse, Audubon Alaska

The Important Bird Area (IBA) concept was developed in Europe in the 1980s by BirdLife International, and IBAs are now recognized around the world as a valuable tool in bird conservation. To qualify as an IBA, sites must satisfy at least one of a series of strict criteria: they must support (1) species of conservation concern, (2) species with restricted ranges, (3) species with particular habitat requirements, and/or (4) species, or groups of species, which are vulnerable because they congregate at specific sites. IBAs are usually discrete sites that stand out from the surrounding landscape as having local, continental or global significance for birds.

Over the course of 2006, a total of around 40 IBA nominations were either completed or are currently in progress. A good number of these sites were specifically nominated due to the presence of large concentrations of migratory shorebirds. After review by local and national technical committees, most of these sites are expected to be recognized as IBAs of global significance.

This work is highly dependent on the collaboration and cooperation of a range of partnering organizations and communities across Alaska, including the Alaska Shorebird Group.

Anyone can nominate a site as a potential IBA, and, if we are to reach our goal of identifying all the globally and continentally significant sites in Alaska by the end of 2007, we urgently require more researchers and other interested individuals to take on a nomination. If you do not have a specific site in mind, but would like to contribute to this global conservation project, we can provide a list of potential sites across the state. To request an IBA nomination package, or for further information,

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Ecotoxicology of Migratory Shorebirds – K.M. Strum, B.K. Sandercock, M.J. Hooper, K.A. Johnson, and R.B. Lanctot

Investigators: Khara M. Strum and Brett K. Sandercock, Kansas State University, Michael J. Hooper, Texas Tech University, Kevin A. Johnson, Southern Illinois University, Richard B. Lanctot, USFWS.

Several factors have been identified as possible causes for the continuing declines in shorebird populations. One factor that may be important is exposure to agricultural chemicals. Organophosphates (OP) and carbamates (CB) can be highly toxic and are commonly used insecticides in agricultural settings of North and South America. Agricultural fields provide food and habitat for shorebirds that migrate through the central flyway and winter in temperate South America. OPs and CBs affect the nervous system, inhibiting cholinesterase function and can cause paralysis, asphyxiation and death. The aim of this project is to assess migratory shorebird exposure to OP and CB pesticides away from the breeding grounds. Cholinesterase is a specific bio-indicator for OP and CB poisoning and can be easily measured in the lab using plasma samples from live birds. In addition, chemical residues can be extracted from footwashes and feather samples.

During 2006, shorebirds were captured on spring and fall migration throughout the central flyway and on the wintering grounds in Paraguay, Argentina and Uruguay. Capture locations included natural wetlands and grasslands in addition to altered habitats such as sod farms and rice fields. In total, 431 individuals belonging to 21 species of shorebirds were sampled in the Great Plains including 40 Tryngites subruficollis. During the spring and fall migration, 174 and 258 individuals were captured in 3 and 2 states, respectively. The winter capture effort in South America resulted in a total of 248 individuals belonging to 12 species from three countries with an additional 24 T. subruficollis.

Preliminary laboratory analyses were conducted on a subset of the individuals captured during spring migration. In total, cholinesterase activity analyses have been completed for 141 individuals from 9 species. Assays completed include total cholinesterase, acetylcholinesterase and specific assays for OP and CB inhibition. Initial assays results indicate that there may be evidence of pesticide exposure in some individuals but this result must be verified with further analyses and additional validation. One preliminary result of note is the species-specific variation in background levels of cholinesterase activity. Small-

bodied species such as White-rumped Sandpipers (C. fuscicollis) appear to have higher levels of plasma butyryl-cholinesterase than large-bodied species such as American Golden-Plovers (P. dominica). Activity of aceytl-cholinesterase shows less variation and is the neurotransmitter most affected by exposure to OP and CB pesticides. Additional laboratory analysis will take place at the beginning of 2007, and field captures of wild birds will continue this spring in the Midwestern United States.

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Distribution, Movements, and Physiology of Post-breeding Shorebirds on the North Slope – A. Taylor, A. Powell, and R.B. Lanctot.

Investigators: Audrey Taylor and Abby Powell, AK Cooperative Fish and Wildlife Research Unit, UAF; Richard B. Lanctot, USFWS

Little information exists to quantify pre-migratory shorebird distribution across Alaska's North Slope or what factors may influence site selection, movement patterns, or residency times. This information is critical given increased levels of human activity and development near littoral areas across the Arctic Coast. This project was initiated to gain a better understanding of the abundance, distribution, phenology, movements, and physiology of post-breeding shorebirds during the staging period, and to aid in assessing how future industrial and human activity across the North Slope may affect shorebird populations. The specific objectives for this research are (1) to assess the abundance, distribution, and species composition of shorebirds staging along North Slope coastlines prior to the fall migration, (2) to quantify phenological aspects of staging, such as timing of arrival after breeding for adult and hatch-year birds, overall and species-specific peaks in shorebird numbers, residency times at staging sites, and movement patterns of birds across the North Slope, and (3) to examine differences in measures of physiological condition (fattening rates and stress hormone concentrations) among species and sites.

In 2006, we conducted four fixed-wing aerial surveys designed to count staging shorebirds along the entire North Slope coastline from the southern end of Kasegaluk Lagoon (69.28490°N, 163.27091°W) to the eastern border of the Arctic National Wildlife Refuge (69.66046°N, 141.06690°W). Survey dates were (1) 22-26 July, (2) 3-7 August, (3) 9-17 August, and (4) 23-27 August 2006. Over 30,000 individual shorebirds were counted during the four surveys; the majority of these were small calidrid sandpipers and phalaropes. We also continued our site-specific studies examining staging phenology and physiology at five locations across the North Slope (Barrow, Peard Bay, Colville River delta, Sagavanirktok River delta, and Okpilak River delta), and added an additional camp at Icy Cape in Kasegaluk Lagoon. Personnel at each location conducted regular surveys to examine shorebird abundance, distribution, species composition, and habitat use from mid July to early August. Field camp crews also captured birds to collect blood samples for analysis of fattening rates and stress hormone levels, and to band and radio-equip individuals to determine length of stay (LOS) at each site. In total, we banded 698 shorebirds of five species across the North Slope (dunlin, western sandpipers, semipalmated

sandpipers, red phalaropes, and red-necked phalaropes), collected close to 600 blood samples, and radio-equipped 88 adults and 112 hatch-year birds of the same five species. Each camp maintained an automated telemetry station and conducted manual telemetry on a regular basis to examine the probability of birds dispersing between and among breeding and staging areas. Two additional remote telemetry stations were located on the Canning River delta and at a site 40km south along river to detect shorebirds (particularly semipalmated sandpipers) potentially using the river as a migration corridor. We also conducted telemetry surveys from the airplane while doing abundance surveys as described above.

Several locations that appeared to be hotspots of shorebird abundance in 2005 also hosted large numbers of staging shorebirds in 2006: Peard Bay, the southeast shoreline of Elson Lagoon, and the east side of Dease Inlet. In addition, phalaropes of both species appeared to use the barrier islands in the Beaufort Sea extensively. Semipalmated sandpipers were the most common species at all field camps again; individuals of this species also exhibited the highest fattening rates and departed from the North Slope earlier than the other species studied. Radio-equipped semipalmated sandpipers tended to move north along the Chukchi coast and east along the Beaufort coast after departing from their banding location. This is similar to the pattern observed in 2005 and leads us to believe that birds may use multiple sites along the North Slope as staging sites, or at least as temporary resting/refueling stopovers. Dunlin appeared at coastal staging areas in mid to late August, and exhibited lower rates of fat deposition and longer LOS at individual sites than other terrestrially-feeding species. We are currently investigating whether dunlin molting concurrent with pre-migratory fattening affects their rate of fat deposition, and is regulated by stress hormone (corticosterone) levels. Data entry and analysis is ongoing and is expected to comprise the majority of the upcoming year.

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An integrated regional ecological assessment of the Black oystercatcher (Haematopus bachmani) – D.F. Tessler, S. Boudreau, P. Clarkson, T. Gaston, V. Gill, M. Goldstein, B. Guzzetti, B. Johnston, M. Kirchoff, R. B. Lanctot, J. Morse, A. Powell, K. Romanoff, S. Talbot, M. Tetreau, D. Zwiefelhofer, and K. Sowl.

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2006 was the final year of coordinated productivity and population genetics work for this project in Glacier Bay National Park, Prince William Sound, Middleton Island, and in British Columbia on Vancouver Island and the Queen Charlotte Islands. 2005 was the final year of Julie Morse's work in Kenai Fjords National Park. We surveyed each study area thoroughly to determine the locations of all actively defended territories, and revisited each territory every five to seven days. We monitored nest, egg, and chick fate, causes of loss, and relaying effort. We also continued banding efforts for another year, capturing adult oystercatchers using a variety of techniques, and hand capturing chicks. We collected blood samples from all captured birds for subsequent genetic analyses. Broken eggshells with attached membrane were collected opportunistically for inclusion in the population genetics dataset. Collaborators in British Columbia contributed eggshell membrane for the population genetics work, but, due to logistical constraints preventing weekly visitation schedules, used different methods to assess apparent productivity.

Since 2003, we have monitored 185 individual breeding pairs, comprising 454 territory seasons, and 432 breeding pair seasons. We have banded 434 Black Oystercatchers (4-5% of the global population), including 217 adults and 217 chicks, and have collected over 600 genetic samples. We have found significant sex-linked morphometric differences: Females' average mass is 623 grams, about 40 grams more than males ($p<0001$); Female culmens are longer by about 6mm ($p<0001$). There are no statistically significant differences in wing or tarsal length. We have also uncovered a characteristic that allows easy sex identification in the field (see Brian Guzzetti). Molecular analyses of population structuring, using both microsatellites and mitochondrial DNA, is currently underway at the USGS Molecular Ecology Lab.

Although we are currently analyzing our complete data set, analyses of Alaskan data collected through 2005 indicate that clutch size, hatching percentage, fledging success, overall productivity, and causes of egg and chick loss vary widely both between study areas and between years. When all Alaskan sites and years are considered together, the average size was 2.34 eggs (n=468), with Middleton Island significantly higher at 2.77. Overall hatching success was 24%, and again was significantly greater at Middleton at 68%. Out of 1093 total eggs laid, 567 or 52% were lost. Causes of loss were: Depredation 35%; Tidal flooding 23%; Duds 9%; Abandoned 6%; Observer induced 0.5%; and Unknown 27%. Cause of loss varied between areas and years. Overall fledging success was 13.2% (range 5

– 25 %) with no significant difference between. Overall productivity was 0.42 (range 0.15 – 0.89), again with no significant difference between. 468 clutches produced 1093 eggs, 314 chicks, and 144 fledglings.

The coordinated banding effort also produced some interesting preliminary results. We found 91% of returning birds renested in the same territory, and only 6% switched mates. Apparent overwintering adult mortality is about 12%. Only 6 chicks have been resighted in their natal areas in subsequent breeding seasons (all in Kenai Fjords). Three Black Oystercatchers banded in Alaska have been resighted in British Columbia during winter; one chick banded in Glacier Bay, one chick banded in Kenai Fjords, and one adult banded on Middleton Island. 2007 will be our final year of winter survey efforts to identify important wintering concentrations and possible movement patterns. 2006 winter surveys were postponed for one year to take advantage of a VHF telemetry effort undertaken in Harriman Fjord, Prince William Sound.

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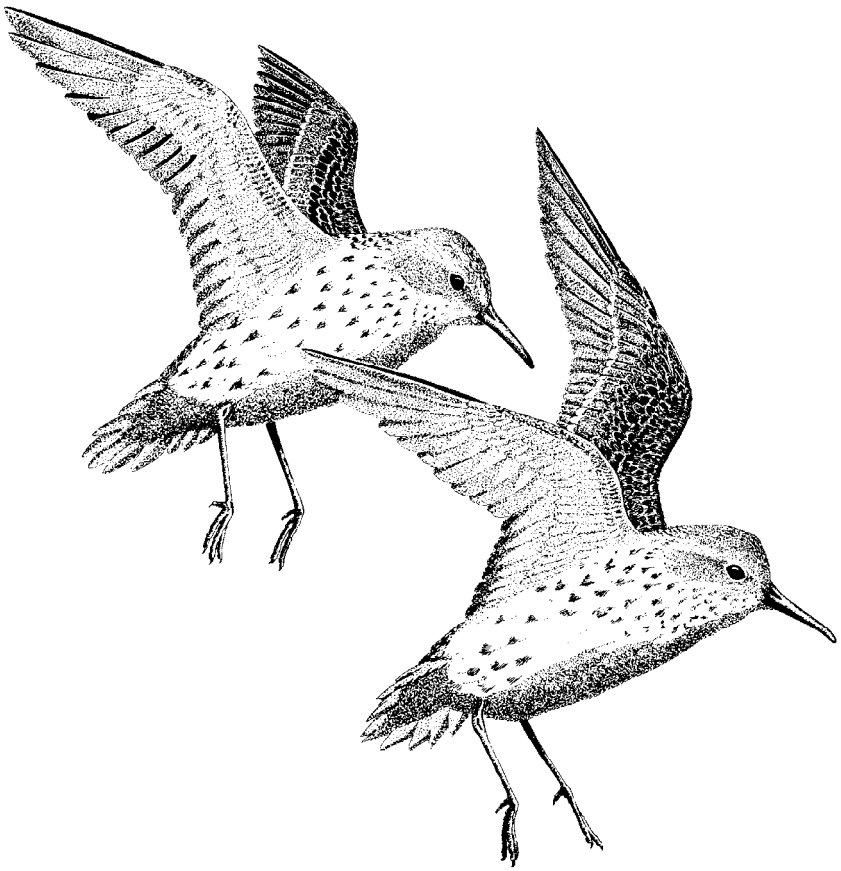

A Survey for Breeding Black Oystercatchers (Haematopus bachmani) at Select Groups of Rocky Islets in Southeast Alaska – D.F. Tessler, M. Kirchoff, and K. Romanoff.

Investigators: David F. Tessler, Matt Kirchoff and Kristen Romanoff, ADF&G

In 2006, the Alaska Department of Fish and Game conducted surveys at select groups of rocky islets in Southeast Alaska suspected of supporting breeding American Black Oystercatchers. Study sites included the Myriad Islands, Sitka Sound, the Necker Islands, the coast of Baranof Island, the Tebenkof Bay islands, and the Forrester Island group. Survey protocols followed standards previously agreed to by the Alaska Black Oystercatcher Working Group. We surveyed the shoreline of each study area thoroughly by boat and recorded the location of all Oystercatchers. Where sea conditions permitted, actively defended territories were searched on foot to locate nests. Historical declines had been observed in the islands of Sitka Sound, where breeding numbers dropped from 102 individuals in 1940 down to 4 individuals in 1985 (J.D. Webster, pers. comm.). The 2006 surveys found a total of 30 oystercatchers with 11 documented breeding pairs in Sitka Sound. The 2006 surveys also found 26 Oystercatchers total in the Myriad Islands, with five pairs positively identified; The Necker Islands had five pairs and 17 total birds; the remaining coast of Baranof Island, including the Gribert and Slate Islets, had 16 identified pairs and 36 birds total; and islets in Tebenkof Bay had only four Black Oystercatchers. Surveys turned up five birds on remote Lowrie Island, consisting of one nesting pair, one territorial pair, and one single bird. Neighboring Forrester Island had 39 Oystercatchers; with 11 pairs and 17 single birds observed.

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Subspecific identity of Red Knots found at spring staging sites in western Alaska – P. Tomkovich, M. Dementyev, and R. Gill.

Investigators: Pavel Tomkovich and Maksim Dementyev, Moscow State University, Russia, and Robert Gill, USGS

The status and distribution of Red Knots in Alaska is poorly known. It is likely that only a few thousand birds breed in Alaska, but many thousands migrate to Alaska each spring, probably en route to breeding sites on Wrangel Island, Russia. Counts at spring staging sites on the Copper River Delta and along the Yukon-Kuskokwim Delta over the past thirty years, however, indicate a population decline. To better understand the status and subspecific identity of Red Knots in Alaska, two observers (Dr. Pavel Tomkovich and Maksim Dementyev) studied Red Knots at a camp situated at the mouth of the Tutakoke River, Yukon Delta National Wildlife Refuge, from 2 May–7 June 2006.

The majority of Red Knots were present at the study site between 14–29 May, when approximately 5,700 birds were recorded. The maximum daily count was 1,000 birds, with

the bulk of the birds recorded over the period 21–26 May. Extensive snow cover was present at the site throughout the first three weeks of the study period, which facilitated capture of knots by focusing arriving birds on the few available patches of thawed habitat. Bow traps were used to capture a total of 19 Red Knots over the nine-day period from 15–23 May. Each bird received a unique alphanumeric leg band, and we collected blood and feather samples from all individuals. Results of these analyses are on-going, and will direct future field efforts in Baja California, Mexico, and Wrangel Island, Russia to better characterize the subspecific identity and non-breeding range of Red Knots utilizing sites in western Alaska.

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