Summaries of ongoing or new studies of Alaska shorebirds during 2003

March 2004

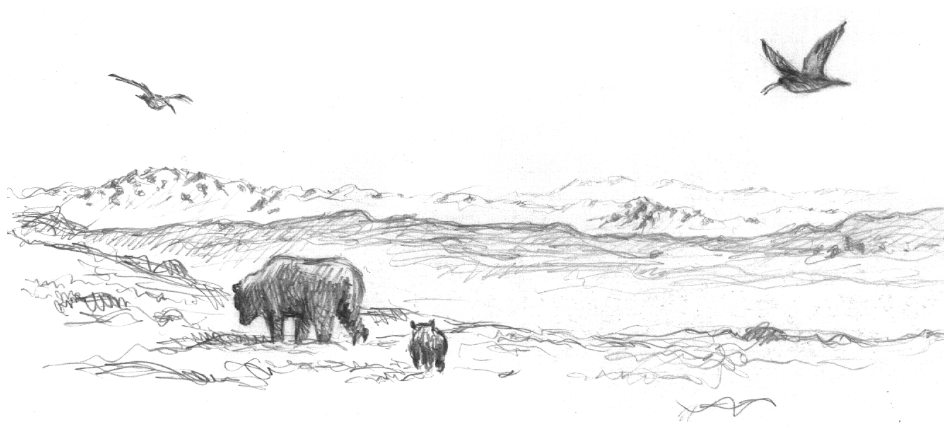
Compiled and edited by Bob Gill for the Alaska Shorebird Group. Anyone wanting additional information about these studies should contact the individual(s) noted at the end of each project summary.

A note from the compiler: This is the second in what will hopefully be an annual product of the Alaska Shorebird Group. The report appears in two sections: the first a compendium of Alaska-based studies that are presented throughout the state from north to south, and the second a group of international studies. In a few instances, however, it seemed better to have topical groupings —regardless of geographic location—for subjects like census methodology and range-wide population assessments.

This year we received reports for 34 projects for which 56 different investigators were identified. The numbers of projects and investigators were both up considerably from those reported in the 2002 summary. The increase in 2003 was in part the result of a couple of shifts in emphasis. For example, the increasing interest in resource development in northern Alaska saw more studies on the North Slope, including a renewed interest in the Barrow area, where shorebird work was a major focus during the 1960s and 1970s. There were also new efforts on the North Slope and Yukon Delta to test some of the assumptions underpinning protocols of the Program for Regional and International Shorebird Monitoring (PRISM). Yet a third factor for the increase was greater involvement by students and/or academics, with 11 universities represented this year compared to 5 in 2002.

Most (52%) of the 56 different investigators were again affiliated with government resource agencies, followed by universities (30%), and NGOs (13%). Cooperators included other Department of Interior agencies (Bureau Land Management, National Park Service), major oil companies (BP Exploration, ConocoPhilips, Exxon Mobil), Alaska Native Corporations (Utqiagvik, Egegik), and the Barrow Arctic Science Consortium. Twenty-five percent of all investigators and 21% of lead investigators were women. Most projects were obviously conducted in Alaska, but the scope of several entailed work at staging and/or stopover sites as well as on the nonbreeding grounds. These included habitat assessments in South America (Brazil, Argentina, Uruguay), and studies of distribution and migration in Asia (Russia, Japan, Korea, Taiwan) and Oceania (French Polynesia, New Zealand, Australia).

The artwork used in this report again came mostly from Maksim Dementyev with a contribution from George West. And lastly, I would be remiss if I didn't point out the efforts of one of your Executive Committee members, namely, Rick Lanctot. Richard was personally involved in almost one third of all projects reported herein. And he insists he drinks only two Mountain Dews a day!



Project: Tundra-nesting bird study, Point Thomson, Alaska

Investigator: Bob Rodrigues, LGL Alaska Research Associates, Inc.

During summer 2003, LGL Alaska Research Associates, Inc., was funded by the Point Thomson Unit owners to conduct a tundra-nesting bird study in the Point Thomson area about 80 km east of Prudhoe Bay. This was part of a cooperative study involving three other study site locations on the North Slope. Twenty 10-ha study plots were surveyed to determine nest density and success, species composition, and predator levels. These study plots were also surveyed during summer 2002, with 2003 marking the third consecutive year of bird study in the Point Thomson area. Although no detailed analysis of the data was undertaken in 2003, preliminary results indicated that overall nest density was about 60 nests/km^2, and nest success was about 70% based on the number of successful nests divided by the total number of nests. Twelve species were discovered nesting on study plots, with Lapland Longspur the most abundant species followed by Pectoral and Semipalmated sandpipers. These three species accounted for about 84% of all nests. The most abundant predator observed on study plots was the Parasitic Jaeger. They and Glaucous Gulls were observed with almost equal frequency off study plots. Arctic fox (*Alopex lagopus*) was observed once during predator counts. Nest success was much higher in 2003 than in 2002, probably because two fox dens that were occupied during the 2002 field season were unoccupied during 2003.

Contact: Bob Rodrigues, LGL Alaska Research Associates, Inc., 1101 E. 76th Ave., Suite B, Anchorage, AK 99518. Phone: 907-562-3339; email: brodrigues@lgl.com.

Project: Nest survivorship of tundra-nesting birds in relation to human development on the North Slope of Alaska—Kuparuk field site

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

In 2002, the Wildlife Conservation Society, along with cooperators (USFWS–Fairbanks, BP Exploration (Alaska), ConocoPhillips, ABR, Inc., and LGL, Inc.) initiated a long-term, multiple-site study to investigate the potential impacts of predators on the nest survival of tundra-nesting birds in human-developed and undeveloped areas of the Alaskan North Slope. In this summary, we report preliminary results from the 2003 field season at a study site we established at the Kuparuk Oilfield as part of the larger collaborative effort.

The impetus for this research stems from the growing concern that the abundance of nest predators has increased in developed regions of the North Slope. These increases are believed to be due to the presence of human infrastructure that in turn has provided artificial nest and den sites. The presence of anthropogenic food subsidies is also thought to be a contributing factor to the reported increase in nest predators. A number of studies support these claims, but this is the first large-scale effort to determine if avian nesting success may be adversely affected. The need to investigate this issue is three-fold: 1) the North Slope is as an important breeding area for shorebirds and waterfowl, 2) nest predation is believed to be a major factor regulating populations of North Slope nesting birds, and 3) human development is increasing in this region.

We discovered and monitored 223 nests of 17 species from 11 June to 25 July. Nests of Lapland Longspur, Pectoral Sandpiper, Semipalmated Sandpiper, and Greater White-fronted Goose accounted for the majority (75%) of those found. Among all species, 131 nests successfully hatched/fledged, 74 failed, and the fate of 17 nests went unknown. Nest predation was the most important cause of nest failure (91%); other sources of failure included abandonment of infertile eggs or observer disturbance. Among the four species with the largest sample sizes ($n \geq 15$), Mayfield estimates of nesting success ranged from 0.379 for Lapland Longspur to 1.0 for Semipalmated Sandpiper. Overall, nest density was 64.6 nests/km^2.

Seven species of potential nest predators were detected during point count surveys. The most numerous were Glaucous Gulls and Parasitic and Long-tailed jaegers. We used motion-detection cameras to monitor nine nests of five species in an effort to confirm actual nest predators. Two predation events were captured on tape, both involving Arctic fox (*Alopex lagopus*) and single nests of Dunlin and Semipalmated Sandpiper.

We used landform type (as defined by Walker et al. 1980) as a surrogate classification method for habitat type. Nests were found in 8 of 15 landform types. Most nests were located in the Unit 5 (mixed high and low center polygon) and Unit 7 (strangmoor and disjunct polygon rims) landform types. With at least Lapland Longspur and Pectoral Sandpiper, nest concealment was not significantly different between successful and depredated nests.

Mean nest initiation dates were later in 2003 than in 2002. For two species, Lapland Longspur and Greater White-fronted Goose, this trend was significant—possibly the result of the later snowmelt during the 2003 season.

Contact: Joe Liebezeit, Wildlife Conservation Society, and P.O. Box 4322, Arcata, CA 95518. Phone: 707-825-7819; email: joebird57@hotmail.com.

Project: Nest survivorship of tundra-nesting birds in relation to human development on Alaska's North Slope (Arctic Refuge study site)

Investigator: Steve Kendall, U.S. Fish and Wildlife Service

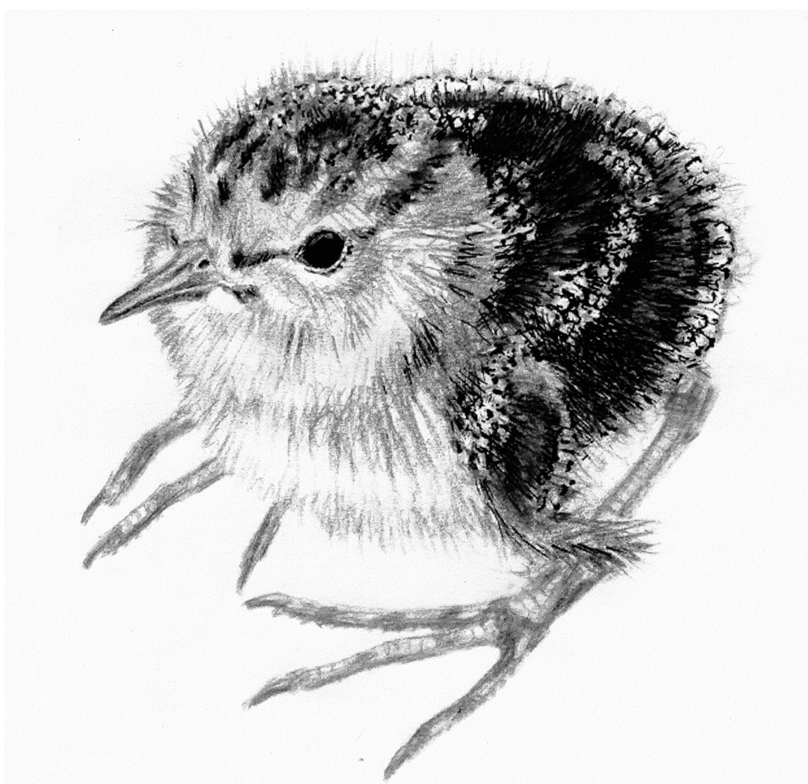
We continued to participate in a cooperative study (see previous summary) to investigate nest survival of tundra-nesting birds in relation to human development on the Arctic Coastal plain. The primary objective of the study is to look at how human development activities may enhance and alter distribution of predators and if this increases predation on young and eggs of tundra-nesting birds. Other cooperators include: the Wildlife Conservation Society, Ecological Services (USFWS), BP Exploration (Alaska), Inc., ConocoPhillips, Exxon Mobil, Inc. (Alaska), and Manomet Center for Conservation Sciences. We all are following standardized protocols to collect data on nest survival, nest density, predator abundance, small mammal abundance, and nest-site habitat. So far data collection has occurred at study sites in the NPR–A, the Prudhoe Bay and Kuparuk oilfields, Point Thomson, and the Arctic NWR.

In 2002, we established a study site within the Arctic Refuge on the Canning River Delta. In 2003, we continued work at this site, adding seven more study plots to the nine monitored in 2002. During the 2003 field season, we located 155 nests of 12 species. The most abundant species were King Eider, Dunlin, Pectoral Sandpiper, Semipalmated Sandpiper, Stilt Sandpiper, Red Phalarope, Red-necked Phalarope, and Lapland Longspur. Nest success and daily survival rates were generally higher in 2003 than 2002. Also, there were some noticeable shifts in abundance of birds. Most notably, nesting density of Pectoral Sandpipers was much higher in 2003 and there were fewer nesting phalaropes this year.

Also this summer, Jon Bart from USGS and Stephen Brown from Manomet monitored nesting birds on separate plots at the Canning River Delta study site to test PRISM protocols. At the completion of their work we continued to monitor nests they had found and included these results in the overall dataset.

We plan to collect data for at least one more field season. After completing the field portion of this project, we plan to pool the data from all of the study sites for analysis and then jointly write a paper summarizing the results.

Contact: Steve Kendall, Wildlife Biologist, Arctic National Wildlife Refuge, 101 12th Ave., Box 20, Room 236, Fairbanks, AK 99701. Phone: (907) 456-0303; email: steve_kendall@fws.gov.



Project: Arctic PRISM: a test of the intensive survey method

Investigator: Richard Lanctot, U.S. Fish and Wildlife Service

In 2003, the Barrow Shorebird Camp participated in a multi-site international effort to test some of the assumptions inherent in the Program for Regional and International Shorebird Monitoring (PRISM). Other camps were located in Alaska on the Yukon Delta NWR (see report by B. McCaffery) and the Arctic NWR, and in Canada at East Bay, Southampton Island, and Dewey Soper Game Sanctuary, Baffin Island.

Arctic PRISM relies on a double-sampling protocol for estimating the population sizes and trends of tundra-breeding shorebirds. One assumption of this approach is that all (or nearly all) items of interest (e.g., territorial males, nests) are located on a sample of intensively surveyed plots. The study design provides for independent searches of the same plots by different intensive surveyors, as well as by an independently operating rope-dragging crew, to estimate both the proportion of discovered nests missed by one or more observers, and to estimate the actual number of nests on the plots.

Like at the Kanaryarmiut Field Station on the Yukon Delta NWR, we established four 16-ha survey plots. These 400 x 400-m plots were located in the middle of our 600 x 600-m plots used in the demography study (see below). We relied on four observers that intensively surveyed two plots each, resulting in two different surveyors independently searching for nests on each of the four plots. These same observers also served on rope-drag teams that searched for nests on plots that they were not already searching (two people/rope-drag team). In addition, there were two people banding birds at nests found by other observers. The banding team also searched for nests opportunistically. Thus we had two observers and a rope-drag team searching for nests independently and a fourth “all-knowing” team that was also searching for nests. Over a 22-day period spanning the peak of laying, observers visited each plot six times, and spent 48 hours per plot searching for nests. The rope-drag team visited each plot for a 6- to 8-hr period 3 times over a 16-day period. The banding team had no preset schedule for visiting plots, but rather went where they were needed to successfully capture incubating adults. Information collected by the banders, however, proved very useful for locating nests not discovered by the other teams and for determining when nests were active.

A total of 34 nests was found on the four plots by one of the 3 independent search teams, including 19 nests of Red Phalarope, 10 Dunlin, 1 Red-necked Phalarope, 1 American Golden-Plover, and 1 Semipalmated Sandpiper. Five additional nests—three Long-billed Dowitcher, one Dunlin, and one Pectoral Sandpiper—were not detected by either the independent observers or the rope-drag team. These included two nests that were only detected after eggs hatched and alarming adult and chicks were found (despite being active during the survey period); two other nests found only by the banding team; and one nest that was initiated after the survey period. The percentage of the total nests discovered by any one observer on any one plot ranged from 33 to 80%. Across all plots, the four individual surveyors discovered between 43.5 and 75.0% of all documented nests. These values are considerably lower than the percentages reported on the Yukon Delta NWR (see beyond). The Barrow data may reflect less frequent visits to plots, fewer hours spent searching for nests, and/or the presence of a banding team that found nests not found by the independent observers.

At our study site, rope dragging proved to be a satisfactory way of finding nests. The rope-drag teams found 62% (24/39) of the total nests discovered and 65% of those that were active during the rope-dragging period. In addition, the rope-drag teams found 6 of 39 nests not found by any other survey team (except for the banding team). Single independent observers found only 5 of 39 nests not located by the other observer or the rope-drag team. This contrasts with results from the Yukon Delta NWR (see McCaffery summary) where rope-drag teams contributed little to the overall results, despite conducting four drags compared to the three conducted at the Barrow Shorebird Camp.

Next we used a Lincoln-Peterson (LP) estimator, which uses information from two independent observers, to approximate the true number of nests on the plots. Compared to the 39 nests known to be on the plots, the LP estimator indicated there were 1) either too few nests (30.5 ± 5.3, based on data from two independent observers), 2) at most 42 nests (35.1 ± 6.6, based on one of the independent observers and the rope-drag team), or 3) between 15 and 63 nests on the plot (39 ± 23.5, based on the other independent observer and rope-drag team. This suggests that at least in the Barrow area, rope-drag teams are important for generating a more accurate approximation of the number of nests on shorebird plots.

Collectively, these results indicate that biologists frequently miss shorebird nests on the Arctic tundra. The use of independent observers, and a mark-recapture methodology, to approximate the number of nests missed is advisable. More detailed studies are needed to better understand how search method and effort affects the probability of a nest being detected.

Contact: Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: richard_lanctot@fws.gov.

Project: A test of the intensive survey approach: how many nests do we miss?

Investigators: Brian J. McCaffery and Travis Booms, U.S. Fish and Wildlife Service

A double-sampling protocol has been developed for estimating the population sizes and trends of tundra-breeding shorebirds. One assumption of this approach is that all (or nearly all) items of interest (e.g., territorial males, nests) are located on a sample of intensively surveyed plots. Our previous work with Western Sandpipers on the Yukon-Kuskokwim Delta suggested that, on average, about 15–20% of nests are missed by intensive surveyors. In 2003, working under the auspices of PRISM (Program for Regional and International Shorebird Monitoring), the Yukon Delta National Wildlife Refuge participated in a multi-site international effort to test this assumption more broadly. The study design provided for independent searches of the same plots by different intensive surveyors, as well as by an independently operating rope-dragging crew, to estimate both the proportion of discovered nests missed by one or more observers, and the actual number of nests on the plots.

At the Kanaryarmiut Field Station, we established four 16-ha survey plots. Each of four observers intensively surveyed two plots each, resulting in two different surveyors independently searching for nests on each of the four plots. In order to guarantee independence of results, surveyors were prohibited from communicating with their fellow observers about their findings. Over a four-week period spanning the peak of egg-laying, surveyors visited each plot 10–11 times, and spent 57–70 hours per plot searching for nests. The rope-dragging crew visited each plot four times over a three-week period, and conducted its searches when the intensive surveyors were not present on the plots.

Traditional protocols for nest-marking (e.g., flags, tongue depressors, marking eggs) could have compromised the study in three ways. First, even cryptic nest markers may attract predators searching by sight or scent; high predation rates would reduce the effectiveness of our inter-observer comparisons. Second, visual markers left by one surveyor might serve as a cue for other independent surveyors. Third, marking eggs may leave a scent, and repeated handling of eggs to verify if they have been marked increases the probability of egg breakage. To avoid these problems, we used pit-tags to mark our nests. The tiny devices were dropped directly into the shorebird nest cups, where they were quickly incorporated into the nest lining. When a nest was located, the surveyor could quickly scan the nest with a small manual scanner to determine if it was a newly-discovered nest or a nest located by the same or a different surveyor on a previous visit to the plot.

A total of 88 nests was found on the four plots in the survey period, including 62 nests of five shorebird species: Black-bellied Plover (2), Western Sandpiper (30), Dunlin (11), Rock Sandpiper (3), and Red-necked Phalarope (16). The number of detected nests discovered by any one observer on any one plot ranged from 64% to 100%. Even on the plot where one observer found all nests discovered during the survey, a Wilson's Snipe nest was found later in the season. Float angle data indicated that it had been active during the survey period; thus, even on this plot, neither observer found every shorebird nest. Across all plots, the percent of discovered nests found by the four individual surveyors ranged from 70% to 89%.

At our study site, rope-dragging contributed relatively little to both the overall total of nests found (50%) and those active (61%) during the rope-dragging period (cf. Lanctot summary, above). Rope-dragging also contributed little to the overall shorebird totals; only 2 of 62 nests were found only by the rope-draggers. Our rope-dragging crew had multiple observations of the rope sliding over incubating waterfowl, ptarmigan, and shorebirds without flushing them.

Contact: Brian McCaffery, U.S. Fish and Wildlife Service, P.O. Box 346, Bethel, AK 99559. Phone: 907-543-1014; email: brian_mccaffery@fws.gov.

Project: Behavioral ecology of Semipalmated Sandpipers

Investigators: Bart Kempenaers, Max Planck Research Center for Ornithology, and Richard Lanctot, U.S. Fish and Wildlife Service

Matings between close relatives often have negative fitness consequences, probably because homozygosity leads to the expression of recessive deleterious alleles. Recent studies of birds and mammals have shown that reproductive success is negatively related to genetic similarity between parents, and that fitness-related traits correlate with individual levels of genetic diversity. These studies strongly suggest that selection favors avoidance of matings with genetically similar individuals. Yet, constraints on social mate choice, such as a lack of alternatives, may lead to pairing with genetically similar mates. It has been suggested that females might then seek extra-pair copulations with less related males, but evidence is weak or lacking. In a prior study (Blomqvist et al. 2002), we showed that extra-pair paternity and maternity (quasi-parasitism) in three wader species was strongly related to genetic similarity between social pair members. We suggested that extra-pair parentage in many non-passerine birds might represent adaptive behavioral strategies to avoid negative effects of pairing with a genetically similar mate. To further test this hypothesis, we located nests and genetically sampled Semipalmated Sandpiper adults and young at Barrow, Alaska, in June and July 2003. A total of 51 nests were located and 99 adults and 127 chicks (plus 16 embryos) were sampled for genetic material. We have recently begun conducting laboratory analyses to determine the genetic similarity of adults within a pair and the likelihood of that pair having extra-pair offspring.

Contact: Bart Kempenaers, Research Behavioral Ecologist, Max Planck Research Center for Ornithology, P.O. Box 1564, 82305 Starnberg (Seewiesen), Germany. Phone: 49-8157-932334, email: B.Kempenaers@erl.ornithol.mpg. Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: richard_lanctot@fws.gov.

Project: Pre-migratory movements and physiology of shorebirds staging on Alaska's North Slope

Investigators: Audrey Taylor and Abby Powell, University of Alaska

Preliminary work conducted in the 1970s at Barrow, Alaska, indicated that littoral habitats in the Arctic were of critical importance for most shorebirds during the postbreeding period. Despite this, little information exists on where and how many shorebirds use the littoral areas of the North Slope or what factors influence the length of time sites are used. This information is critical given increased levels of human activity and development across the Arctic plain.

During July and August of 2003, we initiated a pilot study to investigate staging shorebird populations at Barrow. Fieldwork included counting shorebirds along littoral transects between 16 July and 1 August. Peter Connors and colleagues surveyed these same transects in the 1970s. To assess site-specific fat metabolism among birds, we captured and collected blood from 25 individuals (total) at two different locations. Species captured included Red Phalarope, Red-necked Phalarope, Semipalmated Sandpiper, and Pectoral Sandpiper. Preliminary analyses of these samples indicate the birds were either in poor condition (i.e., low fat status) or were not fattening rapidly.

Information collected during the pilot study in 2003 will be used to develop a Ph.D. proposal during the winter of 2003–2004. The expanded objectives of this research are to (1) assess the abundance, species composition, and distribution of shorebirds staging along selected North Slope coastlines prior to the fall migration; (2) quantify premigratory characteristics of staging shorebirds, including habitat preferences, timing of arrival after breeding, and turnover rates; and (3) examine factors (e.g., fattening rates and stress levels) that might influence shorebird use of staging areas. To meet the first objective, we plan to conduct repeated aerial surveys at five sites on the North Slope in August 2005. Ground-based personnel at each of these locations will develop correction factors for the aerial counts and verify species composition. The second and third objectives will be met by repeatedly conducting transects in littoral areas near Barrow during July and August 2004–2006, and by capturing and marking pre-migratory shorebirds. Radio-equipped and marked birds will be used to assess turnover rates, and blood samples from these birds will be analyzed for fat metabolites and stress hormones. Values from the latter two analyses will be compared between staging areas at Barrow and related to fat and stress levels.

Contact: Audrey Taylor, Alaska Cooperative Fish and Wildlife Research Unit, Dept. Biology and Wildlife, 209 Irving I Bldg., University of Alaska, Fairbanks, AK 99775. Phone: (907) 474-6051; e-mail: ftart@uaf.edu.

Project: Distribution and abundance of shorebirds and waterbirds on the Coastal Plain of the Arctic National Wildlife Refuge

Investigators: Jim Johnson, Jay Johnson, Joel Reynolds, and Richard Lanctot, U.S. Fish and Wildlife Service, Migratory Bird Management; Steve Kendall and Dave Payer, U.S. Fish and Wildlife Service, Arctic NWR; and Stephen Brown, Manomet Center for Conservation Sciences

The Alaska National Interest Lands Conservation Act mandated studies of biological resources and potential petroleum reserves on 1.5 million acres in the northern part of the Arctic National Wildlife Refuge. A Biological Baseline Study of this area (known as the 1002 Area) was conducted from 1982 to 1985 (Garner and Reynolds 1986), and additional studies have continued through the present (e.g., Douglas et al. 2002). Multi-year data sets are available for all of the large mammals, but data for birds—of which there are over 150 species associated with the coastal plain—is much more limited. More than 70 species are known to breed within the 1002 Area, including about 50 species of shorebirds and waterbirds. Seventeen of the shorebird species are listed as "high or moderate priority" in the Alaska Regional Shorebird Conservation Plan, and six shorebird and waterbird species are designated as "Birds of Conservation Concern" by the U.S. Fish and Wildlife Service. Because of the importance of this area for avian species and uncertainty about future land uses, there is an urgent need for reliable information about overall abundance and distribution of birds.

Between 1982 and 1985, USFWS biologists investigated habitat associations of terrestrial birds at eight dispersed study sites within the 1002 Area (Garner and Reynolds 1986). At the time investigators planned to extrapolate results to the entire 1002 Area to identify important bird habitats and to aid planning for proposed developments, but the accuracy and resolution of land cover maps were insufficient for the required analyses. Information now available from recently created National Wetland Inventory maps and other landcover classifications (e.g., Jorgensen et al. 1994) will allow completion of predictive bird-habitat models and development of abundance and distribution maps, as intended in the Baseline Study.

We have already made significant progress towards accomplishing this goal. Historic bird-occurrence and habitat data have been collated into a common database, and habitat-based models are being developed to predict the abundance of the most common shorebird and waterbird species, overall bird abundance, and species diversity. These models will be used to create predictive maps of shorebird and waterbird abundance and distribution for the 1002 Area. During the summer of 2004, we plan on conducting a field survey to assess the model predictions. Bird census methods at randomly selected plots will follow peer-reviewed protocols developed for the arctic region by the Program for Regional and International Shorebird Monitoring (PRISM).

Contact: Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: Richard_Lanctot@fws.gov.

Project: Reproductive ecology of shorebirds: studies at Barrow, Alaska, in 2003

Investigators: Richard Lanctot, U.S. Fish and Wildlife Service, and Audrey Taylor, University of Alaska

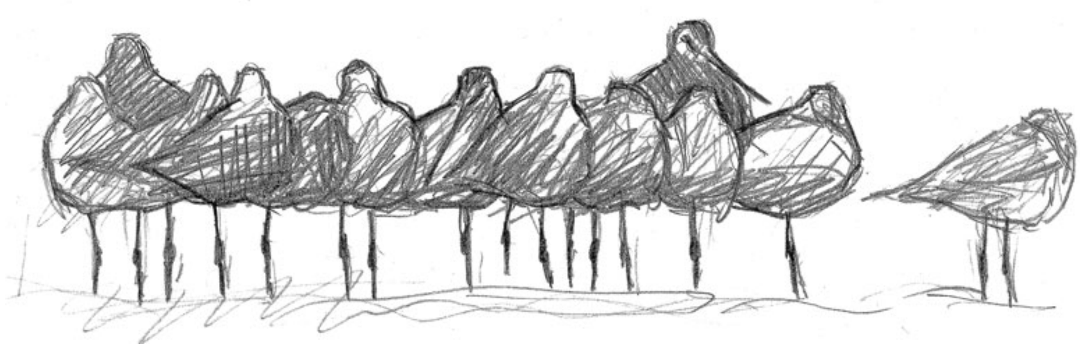
In 2003, we initiated the first year of a long-term shorebird study of Arctic-breeding shorebirds at Barrow, Alaska (71.29°N, 156.64°W). The objectives are to (1) collect baseline data on arrival date, nest initiation and effort, clutch and egg size, and hatching success, and (2) establish a marked population of as many shorebird species as possible that will in turn allow us to obtain estimates of adult survival, mate and site fidelity, and natal philopatry. Data on demographic parameters is vitally needed to understand why many populations of shorebirds are declining.

Our study focused on surveying and locating nests of all shorebirds residing on four plots (600 x 600-m each), two of which had been surveyed in the 1970s and 1990s. The principal species nesting on the study area were Red Phalarope (n = 34 nests), Dunlin (n = 20), Pectoral Sandpiper (n = 9), and Semipalmated Sandpiper (n = 6), although small numbers of Long-billed Dowitcher (n = 3), Red-necked Phalarope (n = 2), and American Golden-Plover (n = 1) were also detected. In addition, nests of 1 American Golden-Plover, 2 Pectoral Sandpipers, and10 Dunlin were located near our plots. Snow completely covered the ground when we arrived on 1 June, but cover decreased to 26% by 7 June and to only 4% by 11 June. After a fairly warm first week of June, the weather turned cold and windy, remaining unpleasant between 9 and 20 June. The latter part of June and early July were warmer, with mid- to late July again turning very cold, windy and rainy.

The first shorebird clutch was initiated on 4 June and the last on the 4 July (median and peak initiation dates were 14 June). American Golden-Plover and Semipalmated Sandpiper were the first to initiate nests (median laying date = 9 June for both; n = 1 and 5, respectively), followed by Dunlin (10 June, n = 20), Red Phalarope (14 June, n = 34), Red-necked Phalarope (15 June, n = 1), Pectoral Sandpiper (18 June, n = 9), and Long-billed Dowitcher (21 June, n = 3). Nest initiation began and then was delayed by the cold weather, resulting in a bimodal laying distribution. Nest density, calculated as the number of nests found divided by the study area size (= four plots of 36 ha each) was 0.51 nests/ha, although nest density per plot varied from 0.33 to 0.72 nests/ha. Nest predation was documented in 42.7% of the nests; most predation was probably by one or more Arctic fox (*Alopex lagopus*) that raised young in the area. A comparison of nesting success across species (data limited to species with at least five nests), indicated hatching success (# hatching at least one young/total number of nests) was highest in Semipalmated Sandpiper (83.3%), followed by Red Phalarope (47.1%), Pectoral Sandpiper (44.4%) and Dunlin (35.0%). A similar comparison across study plots indicated plots 1 and 2 had higher hatching success (52.6 and 46.2%, respectively) than plots 3 and 4 (38.8 and 33.3%, respectively). We did not follow broods to document fledging success.

We captured and color-marked adults and young on nests located both on and adjacent to our four study plots. These included 34 adults and 44 chicks of Dunlin, followed by 27 and 48, respectively, for Red Phalarope, 12 and 20 for Semipalmated Sandpipers, 9 and 23 for Pectoral Sandpipers, 5 and 1 for Long-billed Dowitchers, 2 and 4 for Red-necked Phalaropes, and 1 and 3 for American Golden-Plover. We documented a single re-nest on our plots—an American Golden-Plover that initiated on 9 June, later abandoned, but then initiated again on 26 June. Other birds likely re-nested, but the lack of marked adults made this difficult to detect.

Contact: Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: richard_lanctot@fws.gov; Audrey Taylor, Alaska Cooperative Fish and Wildlife Research Unit, Dept. Biology and Wildlife, 209 Irving I Bldg., University of Alaska, Fairbanks, AK 99775. Phone: (907) 474-6051, e-mail: ftart@uaf.edu.



Project: Inventory of montane-nesting birds in national parks of northwest Alaska

Investigators: Lee Tibbitts, Robert Gill, Dan Ruthrauff, and Colleen Handel, U.S. Geological Survey

Between 26 May and 10 June 2003, we completed the third and final field season allocated for an inventory of montane-nesting birds in Alaska's Arctic Network of national parks (Cape Krusenstern National Monument, Gates of the Arctic National Park and Preserve, Kobuk Valley National Park, and Noatak National Preserve). Because these parks are thought to provide important nesting habitat for several montane-nesting shorebirds, our surveys were designed to focus on this group, but all avian species were recorded. We conducted up to 24 point counts in each of 20 study plots in 2001 (5 plots in Cape Krusenstern, 15 in Noatak), 22 plots in 2002 (8 in Kobuk, 14 in Noatak), and 28 plots in 2003 (1 in Kobuk Valley, 6 in Noatak, and 21 in Gates of the Arctic). Plots were 10 x 10 km in size and randomly selected. Points within plots were spaced at least 500 m apart along transects and allocated in proportion to available topography and habitat (i.e., ecoregion). At each point, we conducted a 10-minute count of shorebirds and potential predators, followed by a 5-minute count for all other birds. These totaled 276 hours of actual survey time for shorebirds and 137 hours for other species. We recorded 2,044 shorebirds and potential predators during the 10-minute counts and 5,330 birds during the 5-min counts. A total of 115 species of birds was detected on the plots both on and off surveys (53 in Cape Krusenstern, 57 in Kobuk Valley, 91 in Noatak, and 96 in Gates of the Arctic). This included 23 species of shorebirds and 14 species of potential predators of shorebirds or their eggs or young. The most commonly detected shorebirds and potential shorebird predators (expressed as average occurrence per point) over the three years were American Golden-Plover (0.19), Wilson's Snipe (0.17), Whimbrel (0.15), Long-tailed Jaeger (0.10), and Common Raven (0.25). The overall plot diversity (total number of species encountered during two-day plot visit) was highest in coastal Cape Krusenstern (30.4 ± 2.2 SD), with slightly fewer species recorded in the three more interior parks (Kobuk Valley, 25.4 ± 3.5; Gates of the Arctic, 25.8 ± 9.1; Noatak, 25.6 ± 5.6). A more detailed summary can be found at:
http://www1.nature.nps.gov/im/units/AKRO/Fieldnotes/Fieldnotes.htm

We are currently analyzing data from the inventory and will have a final report completed later in 2004. Also in this year, we will initiate a multi-year inventory of Alaska's southwest network of national parks with Lake Clark National Park and Preserve scheduled to be surveyed in May.

Contact: Lee Tibbitts, Alaska Science Center, U.S. Geological Survey, 1011 E. Tudor Road, Anchorage, Alaska 99503. Phone: (907) 786-3340; email: lee_tibbitts@usgs.gov.

Project: Verifying the status of Eskimo Curlew in Alaska

Investigator: Jack Whitman, Alaska Department of Fish and Game

The U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game continue to list the Eskimo Curlew as endangered, though the last confirmed record of the species occurred in the mid-1980s. Because the species is likely long-lived—like other members of its genus—and sightings of purported Eskimo Curlews continue to surface into the 21st century, conservationists are obligated to assess all reasonable sightings.

In summer 1989, a report was received of Eskimo Curlews nesting in a remote and largely inaccessible area north of McGrath. Because of access difficulties and conflicting time constraints, no effort was expended at that time to substantiate this report.

In July 2003, the Alaska Department of Fish and Game deployed biologists to McGrath to investigate the area identified in the 1989 report. Between 7 and 10 July, a 46.6-km^2 segment of the northwest quadrant of the Sunshine Mountains was surveyed on foot for presence of Eskimo Curlews. During the four-day period, a total of 77.8 km was walked through a variety of upland habitats (between 280 and 1100 m elevation), including wet sedge meadows, dry alpine tundra, and bare rocky terrain. No evidence of Eskimo Curlews was found during the assessment. A total of 15 avian species was recorded during the survey, with the most common (> 20 individuals observed) being American Pipit, American Tree Sparrow, Northern Wheatear, Horned Lark, and Lapland Longspur. The only shorebird species recorded was Baird's Sandpiper of which six were seen.

Contact: Jackson Whitman, Alaska Department of Fish and Game, 1300 College Road, Fairbanks, Alaska 99701. Phone: (907)-459-7328; email: jack_whitman@fishgame.state.ak.us.

Project: Population size and habitat requirements of Rock Sandpipers

Investigators: Dan Ruthrauff, Lee Tibbitts, and Robert Gill, U.S. Geological Survey; and Maksim Dementyev, Moscow State University

The nominate subspecies (*Calidris p. ptilocnemis*) of the Rock Sandpiper breeds only on Pribilof, St. Matthew, and Hall islands. In a continuation of work conducted on the Pribilof Islands in 2001 and 2002, we studied Rock Sandpipers at St. Matthew and Hall islands in 2003 to assess the population size and breeding habitat requirements of this subspecies. Due to logistical constraints, we did not arrive on the island until 26 May, which was likely after the period of peak breeding display, as four-egg nests were discovered upon our arrival. Nonetheless, our crew of five observers surveyed St. Matthew from 29 May to 29 June and Hall Island on 21 June. We walked a total of 182 km distributed across 34 transects on St. Matthew and 20 km across 12 transects on Hall Island. Transects bisected the islands and were located from north to south at 1.5-km (St. Matthew) and 500-m (Hall) intervals. We conducted variable distance line transects and recorded numbers and locations of all sandpipers detected. Within a single suite of replicates, we detected 1,105 Rock Sandpipers on St. Matthew and 106 on Hall.

Most detections were of single birds (74%) or groups of two (23%). Behavior at the time of initial detection included birds engaged in breeding displays (e.g., flight displays, stationary announcements; 36%), standing/feeding (34%), flying (19%), and aerial chasing (11%). In contrast to the present reindeer-modified habitats on the Pribilof Islands, reindeer last occurred on St. Matthew and Hall islands almost 40 years ago and the ground cover there is again rich in lichens. On St. Matthew and Hall islands, Rock Sandpipers were most commonly detected in forb tundra habitats (18% of all detections), but a similar proportion (15%) of detections occurred in lichen-dominated habitats. Future plans include: a) generating sex- and habitat-specific density functions using the distance data from transects; b) extrapolating density estimates to calculate island-specific population sizes; c) refining the existing habitat map of St. Paul and creating habitat maps for St. George, St. Matthew, and Hall islands; and d) analyzing spatial data to assess bird use in relation to habitat and topography.

Contact: Dan Ruthrauff, Alaska Science Center, U.S. Geological Survey, 1011 E. Tudor Road, Anchorage, Alaska 99503. Phone: (907) 786-3432; email: druthrauff@usgs.gov.

Project: Nonbreeding ecology of Rock Sandpipers in Cook Inlet, Alaska

Investigators: Robert Gill and Lee Tibbitts, U.S. Geological Survey, and Theunis Piersma, Netherlands Institute for Ocean Science

Numbers of Rock Sandpipers using upper Cook Inlet (CI) in winter 2002–2003 peaked at about 17,500 birds during November 2002; the average count was 14,400 ± 2,500 SD (range 11,000–17,500; $n = 6$). During winter 2003–2004 (through February 2004; data uncorrected for observer bias), large numbers (16,000) occurred in November, fell dramatically to only 7,100 birds in late December, and then none was found on each of three complete surveys during January 2004. By mid-February, however, the population was again at about 17,000 birds (98.1% *C. p. ptilocnemis* and 1.9% *C. p. tschuktschorum*). This pattern has been documented on two other occasions, both winters with extended periods of sub-zero temperatures and extensive accretion of ice on intertidal flats that precluded birds from any feeding over a large portion of upper CI and greatly reduced low-water feeding times over much of the rest of the inlet. How birds respond to these events is unclear, but a large segment of the population appears to leave the inlet and not return until conditions ameliorate. Previous assessments indicated that during these events birds had not moved to areas (e.g., Kachemak Bay or south to at least Iliamna Bay along the west side of CI) immediately south of their normal winter range. Recent ancillary observations in February 2004, however, suggest birds responded to the most recent cold event by moving to southern CI (Kamishak Bay, C. Dau pers. comm.) and even out of CI to the Kodiak Archipelago (R. MacIntosh, pers. comm.). For a detailed history of this project see last year's project summaries of the Alaska Shorebird Group.

Contact: Bob Gill, U.S. Geological Survey, Alaska Science Center, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3514; email: robert_gill@usgs.gov.

Project: Reproductive ecology and demography of Western Sandpipers

Investigators: Brian McCaffery, U.S. Fish and Wildlife Service; Dan Ruthrauff, U.S. Geological Survey; and Matthew Johnson, University of North Carolina

In 2003, we completed the sixth consecutive year of shorebird studies at our long-term study site (Kanaryarmiut Field Station) on the central Yukon-Kuskokwim Delta (62°13'N, 164°47'W). As in past years, Western Sandpipers were the focus of our investigation. Spring break-up in this region was early compared to the long-term (15-year) average. Temperatures were mild throughout the spring, and the limited winter snow pack melted early.

Shorebird clutch initiations were the earliest on record. The first clutches of Black-bellied Plovers, Rock Sandpipers, and Western Sandpipers were all initiated in the second week of May. The first Western Sandpiper clutch was initiated on 11 May, nearly a week earlier than the previous early date of 17 May 2002. Overall, however, nesting chronology was not unusually early in 2003. Among Western Sandpipers at our study site, the date of the earliest clutch initiation in a given year is not correlated with mean, median, or peak clutch initiation dates. Mean clutch initiation in 2003 was 1 June (five days later than in 2002, and just one day earlier than the long-term mean), median clutch initiation was 31 May (8 days later than in 2002, and identical to the long-term mean), and peak was 24 May (the same as 2002).

Prior to 2002, nest density was calculated as simply the number of nests found divided by the study area size (= 16 ha). By this measure, nest density in 2003 was the second lowest recorded to date, 2.81 nests/ha versus a mean of 2.89 nests/ha (range 2.63–3.06) for 1999–2003. The number of nests found, however, is at least partially a function of nest predation (i.e., fewer nests found when predation rates are high). As in 2002, nest predation in 2003 was very high; Mayfield nest success was only 0.13 in 2003, just slightly higher than the value of 0.11 in 2002, and only half of the six-year mean of 0.27 (range 0.11–0.55). When rates of nest loss are considered, nest density in 2003 may have been as high as 3.37/ha. Excluding re-nests, the calculated density of first nests was 2.77/ha, which may approximate the density of pairs.

High rates of nest loss led to high rates of re-nesting; 29% of pairs that lost nests eventually re-nested (very similar to the value of 35% in 2002). Among clutches that hatched, fledging success (defined as a clutch fledging one or more young) was 43%, compared to 58% and 39% in 2001 and 2002, respectively. As in 2002, when only 4% of clutches produced fledged young, overall productivity on our plot was very poor in 2003. Only 3 of 45 Western Sandpiper nests initiated on our plot (7%) resulted in fledged young.

Contact: Brian McCaffery, U.S. Fish and Wildlife Service, P.O. Box 346, Bethel, AK 99559. Phone: (907) 543-1014; email: brian_mccaffery@fws.gov; Dan Ruthrauff, USGS, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3432; email: druthrauff@usgs.gov.

Project: Factors affecting the timing of wader breeding in western Alaska

Investigators: Brian McCaffery, U.S. Fish and Wildlife Service, and Craig Ely, U.S. Geological Survey

Many current models of global climate change suggest that impacts will be most dramatic at higher latitudes; such changes could dramatically affect the timing of breeding events in arctic and subarctic waders. In this study, we used correlational analyses to explore the relationships between environmental variables and the timing of breeding events for waders on the Yukon-Kuskokwim Delta in western Alaska.

Is there evidence for climate change in this region? Long-term temperature increases have been documented for average surface temperature in the North American arctic, mean annual temperature in Alaska, and mean annual temperature in western Alaska. Spring temperature increases may have the most dramatic effects on the timing of reproductive events in waders. A significant spring warming trend has been documented over the last 30 years in western Alaska. In addition, the primary first-order weather reporting station at Bethel on the Yukon-Kuskokwim Delta has documented the highest single-season change in mean temperature among 20 first-order stations in Alaska, a spring increase of 3.7°C between 1971 and 2000.

At the local level, however, there is a discrepancy between long-term patterns of temperature change and certain conspicuous phenological benchmarks. Although there is a significant 40-year warming trend in April temperatures in Bethel, there is no such significant trend for May over the same period. There is no trend in the break-up date of the Kuskokwim River at Bethel, nor are there trends in the timing of river break-up, lake break-up, or snow-free dates at field study sites near the Bering Sea coast of the Yukon-Kuskokwim Delta.

Are there temporal trends in spring arrival dates for waders on the Yukon-Kuskokwim Delta? There are no temporal trends in spring arrival dates at Bethel between 1987 and 2003 for five common species of waders; similarly, there are no trends on the outer Delta over the last quarter-century (1977–2003) for 14 species of waders.

Are environmental conditions correlated with wader arrival dates in the spring? For four of five wader species at Bethel, there are no significant correlations between spring arrival dates and three potential indices of spring timing (mean April temperature, mean May temperature, Kuskokwim River break-up). All three indices, however, are significantly correlated with the Bethel arrival date of Pacific Golden-Plovers. On the outer Delta, arrival dates for 9 of 14 species are significantly correlated with mean April temperature and mean May temperature, as well as local patterns of snow-melt and river break-up. Among the species lacking such correlations, three of five are either exclusively or predominantly migrants, rather than local breeders. In this region, arrival dates predict the precision of migration timing, both among years and relative to local environmental conditions. Surprisingly, arrival dates are not correlated between Bethel and the outer Yukon-Kuskokwim Delta for the two species common to both sites, Western Sandpiper and Wilson's Snipe.

Is there evidence for a shift in the timing of breeding in Western Sandpipers between 1966–1968 and 1998–2003? Richard Holmes studied Western Sandpipers on the outer Yukon-Kuskokwim Delta from 1966 to 1968 and we have studied the same species at a nearby study site since 1998 (see project summary). To evaluate differences in the timing of breeding between the two periods, we first compared 16 spring weather variables (8 each in April and May). The only significant difference was that the latter period was snowier during April. Next we compared laying chronology between the two periods. There were no differences in the median or peak clutch initiation dates, but the seasonal duration of laying was longer during the more recent years.

Do Western Sandpipers gain an advantage by nesting early? The timing of clutch initiation and the timing of clutch depredations both exhibit significant annual variation. The mean initiation dates for all clutches as well as just first clutches are significantly correlated with the timing of clutch depredation. Despite this correlation, the length of the time lag between peaks in initiation and depredation varies annually, and ranges from 9 to 20 days. The length of the lag predicts late season nest success (the greater the lag, the lower the late season nest success). The daily survival rate of nests initiated prior to the mean initiation date was greater than those initiated after the mean date in only two of six years; the six-year means of early vs. late nest survival did not differ. Although early nesting may not always lead to higher nest success *per se*, other potential advantages of nesting early include: 1) increased opportunities for re-nesting, 2) increased fledging success and/or post-fledging survival, and 3) increased survival for adults able to leave the breeding grounds earlier. Further analysis of our data should allow for at least partial tests of all three of these hypotheses.

Contact: Brian McCaffery, U.S. Fish and Wildlife Service, P.O. Box 346, Bethel, AK 99559. Phone: (907) 543-1014; email: brian_mccaffery@fws.gov; Craig Ely, U.S. Geological Survey, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3526; email: craig_ely@usgs.gov.

Project: Nonbreeding destinations and productivity of Bar-tailed Godwits staging on the outer Yukon-Kuskokwim Delta

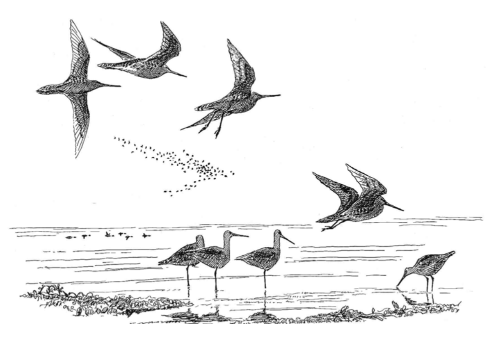
Investigators: Brian J. McCaffery, U.S. Fish and Wildlife Service; Robert E. Gill, Jr. and Dan R. Ruthrauff, U.S. Geological Survey

The Bar-tailed Godwit is the most abundant large shorebird in the East Asian–Australasian Flyway. Each fall, about 100,000 head south from the coast of western Alaska and fly 11,000 km to Australia and New Zealand. This is apparently the longest non-stop bird migration in the world. At least 60,000 of these godwits stage on the outer coast of the Yukon Delta refuge in August and September. Since 1999, refuge staff in collaboration with the Alaska Science Center (USGS) have studied these staging flocks to a) determine the nonbreeding grounds, migration routes, and racial identity of godwits staging on the Yukon-Kuskokwim Delta, and b) determine the proportion of juveniles in the staging flocks in order to estimate annual reproductive success.

By reading site-specific color-flags on the birds' legs, field crews have been able to identify godwits that have spent the nonbreeding season in northeastern and southeastern Australia, as well as on the North and South islands of New Zealand. Godwits banded on northward migration in both China and Japan have also been detected. No godwits flagged in northwest Australia (*menzbieri* subspecies) have been observed on the Delta, indicating that all of the godwits staging on the Delta belong to the Alaska-breeding race, *L. l. baueri*.

The proportion of juveniles in the fall staging flocks has been consistently low since the study began. In annual samples ranging from 1,500 to 40,000 birds, the proportion of juveniles has never exceeded 3%. Current research is proceeding on three fronts. First, although comparable percentages of juveniles have been detected in recent years in late fall godwit flocks in both Queensland and New Zealand, our estimates average considerably lower than those derived from age ratios among small samples of birds captured during the winter in Victoria. Therefore, we are evaluating hypotheses to explain this discrepancy. Second, a population model to assess the impact of such chronically low productivity on population growth is being developed in collaboration with colleagues from the Alaska Science Center. Finally, the refuge plans to initiate a pilot study of godwit breeding biology in 2004 to begin exploring the factors contributing to the apparently low reproductive success.

Contact: Brian McCaffery, U.S. Fish and Wildlife Service, P.O. Box 346, Bethel, AK 99559. Phone: (907) 543-1014; email: brian_mccaffery@fws.gov.



Project: Ongoing studies of Pacific and American Golden-Plovers in Alaska and Hawaii

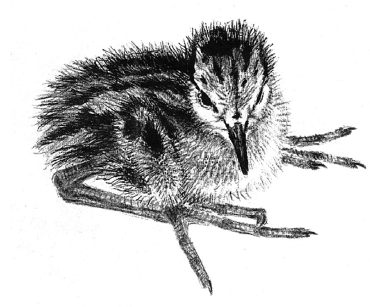
Investigators: Wally Johnson, Department of Ecology, Montana State University; Mark Johnson, Bozeman; Paul Brusseau, Anchorage

From 15–23 June 2003, we studied American Golden-Plovers at three sites along the Nome-Teller Road. We located previously marked individuals and banded additional nesting birds. Of six marked pairs last monitored in June '02, three males and two females were found in '03. All of the returnees were mated to new partners, and both females nested at considerable distances from their '02 nest sites. One female (her '02 mate was present) paired with an unbanded male about 1,600 m from last season's nest; the other female (her '02 partner was not found) moved approximately 550 m and nested with a marked male whose '02 mate was missing. Notably, the latter male (banded in '02) made a dramatic switch in his choice of nesting habitat from one season to the next. His '02 nest was on a moist lower slope amidst dense grassy vegetation; from there, he moved about 500 m upslope in '03 and nested along the edge of an abandoned gravel pit on a dry stony substrate nearly devoid of vegetation. In effect, this male went from one extreme to another spanning the entire range of potential nesting habitat on the study site. One of the other returning males, originally captured in 1993, re-used his '01 nest cup last season. The minimum age of this bird in June '03 was 10 yr 11mo—a new longevity record for the species.

We have shown in previous studies that male American and Pacific Golden-Plovers typically return each spring to the same nesting territories, whereas females are much less site-faithful and often are never found again after the season of banding. The '03 findings support our earlier speculation that missing females may actually be homing back to a general nesting locale, but once there they are not site-specific enough to be detected. We were able to find the two returning females in '03 because their shifts to new nest sites were within the study area. Had the same movements been directed away from the site, it is doubtful we would have located the birds.

We plan more radio-tagging of Pacific Golden-Plovers on Oahu in April '04, followed by aerial surveys in various regions of Alaska. During five previous seasons of telemetry, we radio-tagged 100 plovers in Hawaii. Of these, USFWS and NPS biologists in Alaska located 28 of them. These data indicate that *fulva* migrating from nonbreeding grounds on Oahu probably nest throughout the known Alaska breeding range of the species.

Contact: Oscar W. Johnson, Department of Ecology, Montana State University, Bozeman, MT 59717. Phone: (406) 587-7305; email: owjohnson2105@aol.com.



Project: Black-bellied Plover studies at Nome, Alaska

Investigators: Phil and Andrea Bruner, Brigham Young University Hawaii, and Whitney Nekoba, Kurtistown, Island of Hawaii, Hawaii

The 2003 field season was devoted to two primary tasks. First, we completed data collection of the percent cover of six ecological variables in the 20 breeding territories at our Woolley Lagoon study site, 40 miles NW of Nome. These data were used to compare the territories of Black-bellied Plover with Pacific and American Golden-Plover. These findings allowed for a comparison of these variables with the percent cover in 1-m^2 plots surrounding the nest cups of these species. In general, all three plover species actively selected the location of their nest cups based on the presence of abundant non-vascular vegetation.

The second task was Nekoba's investigation of changes in egg and chick weights of Black-bellied Plover. This was the first study to monitor daily changes during the latter stages of incubation and the first few days following hatch. Eggs were individually marked and then measured daily over a two-week period to determine changes in mass and to quantify their movement in the nest cup by adults. With all of the constant visits to the nests we were fortunate not to lose a single nest to predators. Black-bellied chicks were also color-banded to help assess natal philopatry. One Black-bellied chick was subsequently reported on 13–14 October at Totten Inlet (south end of Puget Sound, Washington).

We will return to Nome in June 2004 and will commence a long-term study of Ruddy Turnstones. We seek to determine the degree of site fidelity and mate retention in this region of the breeding range. We eventually will also address the question of nest site selection using the protocol employed on plovers.

Contact: Phil Bruner, Biology Dept. BYU-H, 55–220 Kulanuit St., Laie, HI 96762. Email: brunerp@byuh.edu.

Project: Pre-migratory behavior and demographics of Bar-tailed Godwits

Investigators: Robert Gill and Dan Ruthrauff, U.S. Geological Survey, and Brian McCaffery, U.S. Fish and Wildlife Service

During an early September 1998 aerial survey of Bristol Bay estuaries a concentration of about 32,000 Bar-tailed Godwits (*baueri* subspecies) was found at Egegik Bay. This represented approximately 25% of the entire population of this subspecies. Beginning about this same time, USFWS and USGS biologists initiated annual assessments (see summary by B. McCaffery) of autumn-staging godwits in Alaska to help clarify (at the subspecies level) migration routes and nonbreeding areas, and to determine the proportion of juveniles in the staging flocks in order to estimate annual reproductive success. Work on the Yukon Delta revealed low proportions (< 3%) of juveniles among birds using that area, but, without an assessment over the entire staging grounds, the population-level implications of these values remained unclear.

Between 2–6 September 2003 we were present on the southern spit of Egegik Bay and had daily access to a principal high-tide roost used by godwits (average roost size 2,000–5,000 birds). During the first two days of observation we recorded almost 11% juveniles in the population, but quickly discovered that godwits—entirely adults that we could determine—were departing the area on southward migration. By the third day the proportion of juveniles had increased to 62%. We can't rule out that juveniles were arriving during this period, possibly from staging areas farther north (e.g., Yukon Delta), but we saw no evidence of this and in fact only observed mass departures, all occurring during evening high tides. Since it appeared departures may have been in progress 24–36 h prior to our first assessment of age ratios, and that these departures also likely involved all adults (based on observations of arriving birds in New Zealand), the proportion of juveniles in the Egegik population was considerably lower than the 11% initial assessment.

For this study we also monitored the behavior of godwits as roosts formed and/or disbanded—the intent being to identify behaviors that suggest departure is imminent and to assess predator-avoidance strategies and their energetic costs. For example, during one 90-minute period a roost was disrupted on six occasions—four times by Peregrine Falcons and once each by a Gyrfalcon and Parasitic Jaeger—forcing birds to remain in the air for 21 minutes. The amount of time birds remained airborne just prior to departure was also considerable, with one flock of about 1,800 birds milling over the bay and adjacent uplands for 64 minutes before breaking into multiple single skeins of 20–100 birds and climbing out over the Bering Sea until out of sight.

Contact: Robert Gill, U.S. Geological Survey, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3514; email: robert_gill@usgs.gov.

Project: Incidental observation of shorebirds on Togiak National Wildlife Refuge

Investigator: Rob MacDonald, U.S. Fish and Wildlife Service

During our annual Harlequin Duck breeding pair survey in late May 2003, I recorded all yellowlegs (*Tringa* spp.) observed. We used a Robinson R-44 helicopter to survey 618 km of river, including the mainstream Togiak, Goodnews, and Kanektok rivers, some of their tributaries, and other smaller drainages of the upper Bristol Bay and Kuskokwim Bay watersheds. Surveys were flown at an altitude of 10–30 m above the water at speeds ranging from 30–50 knots. Similar data were collected in 2001 and 2002 along the same sections of each river. In 2004, effort will be made to determine species of yellowlegs, although it is believed that Greater Yellowlegs will predominate here.

Contact: Rob MacDonald, Togiak National Wildlife Refuge, P.O. Box 270, Dillingham, Alaska 99576. Phone: (907) 842-1966 ext. 314; email: rob_macdonald@fws.gov.

Project: Nesting habitat and breeding distribution of Marbled Godwits on the Alaska Peninsula: a preliminary assessment using GIS land cover data

Investigators: Julie Morse and Abby Powell, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska, Fairbanks

The Marled Godwit (*beringiae* subspecies) is listed as a "Species of High Concern" in the Alaska Shorebird Conservation Plan because of its small, isolated population that is restricted to a small breeding area on the Alaska Peninsula. In 2003, we completed a GIS analysis and preliminary assessment of the potential breeding range of this population. This analysis highlights all potentially suitable nesting habitats between Egegik Bay and Nelson Lagoon. The assessment will be used to direct future field efforts to better define the breeding range of this population. Anyone interested in a copy of the report or the GIS land cover maps created for this project should contact Bob Gill (USGS).

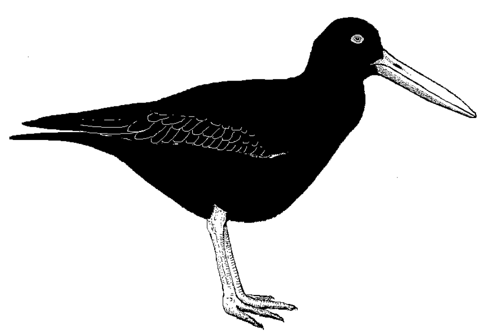
Contact: Julie Morse, Alaska Cooperative Fish and Wildlife Research Unit, 209 Irving 1 Bldg., Univ. of Alaska, Fairbanks AK 99775. Phone: (907) 474-6051; email: julie.morse@uaf.edu.

Project: Black Oystercatcher surveys in the western Aleutian Islands

Investigator: Verena Gill, John Haddix, and Angela Doroff, U.S. Fish and Wildlife Service

In July 2003, with logistical support from the Alaska Maritime NWR, we conducted surveys of Black Oystercatchers, marine birds, and northern sea otters (*Enhydra lutris kenyoni*) in the Near Islands (Attu, Agattu, Shemya, Alaid, and Nizki islands). All islands were circumnavigated in skiffs from a distance of about 100 m off-shore. As expected, no oystercatchers were observed on these the most western of the Aleutian Islands. In September, we surveyed the Rat Islands (Amchitka, Kiska, Little Kiska, and Rat) with assistance from Kim Kloecker (USGS Alaska) and Carl Kava (Alaska Sea Otter and Steller Sea Lion Commission). The number of oystercatchers on the Rat Islands appears to be stable or to have increased slightly since last counted in the late 1970s and early 1980s. Any increase can probably be attributed to an ongoing program to remove foxes from this group of islands.

Contact: Verena Gill, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3584; email: verena_gill@fws.gov.



Project: Assessing the effects of recreational disturbance on productivity of Black Oystercatchers in Kenai Fjords National Park

Investigators: Julie Morse and Abby Powell, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska, Fairbanks

In response to increasing recreational use in coastal habitats of Alaska, the Black Oystercatcher has become a species of high conservation concern. In 2003, we completed our first of three field seasons studying the breeding ecology of oystercatchers in Kenai Fjords National Park. We identified 35 breeding territories in Aialik Bay and Northwestern Lagoon and monitored the survival of 48 nests on those territories. Nest success in 2003 was high (Mayfield estimate of 41%) compared to an average of 23% during 2001 and 2002 (National Park Service data). The daily survival rate of nests declined with season date. Chick survival was lower than previous years (Mayfield estimate of 38% survival to 40 days) and remained constant across the season.

We captured and banded 42 adult and 31 chicks during our first season. About half the adults were captured on their breeding territories using a decoy, tape recording of territorial calls, and noose mats. Other, much more aggressive adults were captured with a dipnet. Observations of this marked population in subsequent years will provide estimates of site fidelity, breeding propensity, and individual productivity that we will analyze in relation to levels of human disturbance. They will also hopefully allow us to identify where these birds spend the nonbreeding season. Very little is known of the movement and distribution of Black Oystercatchers during the nonbreeding season, thus we encourage researchers in coastal environments to look for banded birds.

Contact: Julie Morse, Alaska Cooperative Fish and Wildlife Research Unit, 209 Irving 1 Bldg., Univ. of Alaska, Fairbanks AK 99775. Phone: (907) 474-6051; email: julie.morse@uaf.edu.

Project: Inventory and productivity of nesting Black Oystercatchers in Prince William Sound

Investigators: Aaron Poe and Bridget Brown, U.S. Forest Service

Black Oystercatchers have been designated as a Management Indicator Species under the preferred alternative of the 2002 Chugach National Forest Plan. This requires that a plan be developed to monitor their population and distribution. In other parts of its range the species has been shown to be sensitive to disturbance caused by recreational use of shorelines. Given that human use in Prince William Sound is projected to increase significantly, it is important for Forest Service managers to identify areas key to the persistence of this species and better understand the potential effects of shoreline recreation. In 2000, we began an initial inventory of Prince William Sound to characterize shorelines that are used by oystercatchers for nesting and feeding.

This year's inventory focused on the northern areas of Prince William Sound between Columbia Glacier and College Fiord. We conducted 300 km of shoreline surveys and identified a total of 63 nesting and feeding areas being used by Black Oystercatchers. Approximately 40% of these locations were previously undocumented. A single return visit was conducted to each identified nest to evaluate apparent nest success. We also conducted a series of flight surveys to collect data on human use in the same areas inventoried for oystercatchers. The information collected during these initial inventories will help in the selection of index sites for future oystercatcher population monitoring as well as refine information on habitat associations and the potential for human disturbance of nesting grounds.

Contact: Aaron J. Poe, Wildlife Biologist, U.S. Forest Service, Glacier Ranger District, Chugach National Forest, Girdwood, Alaska 99587. Phone: (907) 754-2345; email: apoe@fs.fed.us.

Project: Breeding biology, chick growth and provisioning, and paternity of the Black Oystercatcher on Middleton Island, Alaska

Investigators: Brian Guzetti, University of Alaska, Fairbanks; Verena Gill, U.S. Fish and Wildlife Service; Douglas Schamel, University of Alaska, Fairbanks

We summarize here a proposed project that will begin in spring 2004.

Black Oystercatchers are listed as a species of high concern within the United States and Canadian shorebird conservation plans. Despite the overall low population size and general decline, the oystercather is doing exceptionally well on Middleton Island, Alaska, where the population has grown from 2 birds in 1976 to more than 700 in 2001. The high nesting success and nesting density of oystercatchers residing on this mostly predator-free island, provide a unique opportunity to examine chick growth rates, chick provisioning, and genetic paternity near the northern limit of this species' breeding range. Our banding and blood-collection program will also help document mate and site fidelity of adults, assess the degree of chick philopatry, as well as lay the foundation for a future population genetics study. We will capture adults using a variety of methods, and band them for individual recognition. About 100 microliters of blood will be taken from all adults and chicks banded. Nests will be monitored for adult attendance every five days; chicks will be weighed and measured every five days; and provisioning rates will be estimated using focal bird observations on a five-day rotation. Paternity will be determined using microsatellites. We predict that extra-pair fertilizations will be more prevalent in areas of high nesting density. We further predict that provisioning should be greater for first-hatched chicks, and that their growth rates should be higher than for later-hatched chicks. Data collected in this study should prove useful for understanding factors affecting fledging success in a potential "source" population for this species.

Contact: Brian Guzett, Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, AK 99775. Email: shoobadedo@hotmail.com; Verena Gill, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3584; email: verena_gill@fws.gov.

Project: Evolution and phylogeny of acoustic displays of snipe

Investigators: Edward H. Miller, Biology Department, Memorial University of Newfoundland; Allan J. Baker, Center for Biodiversity and Conservation Biology, Royal Ontario Museum, Toronto, Ontario

Our understanding of display evolution is incomplete: Why do some displays evolve quickly and others slowly? How fast can displays evolve? Do different displays in a species' repertoire and anatomy of display production evolve together? Such questions can be answered through studies of display repertoires and anatomy of related species with known phylogenetic relationships and times of divergence. The purpose of this study is to investigate trends and rates of evolution of acoustic displays in snipe (*Gallinago*). Most of the world's ~15 species of snipe have complex aerial displays with conspicuous vocal and nonvocal acoustic components. They also have diverse vocalizations used in other circumstances. Over three years, we will study vocalizations, vocal behavior, and syringeal anatomy in selected species of snipe, and interpret the results based on a phylogeny developed from genetic analysis. In 2003, we made extensive tape recordings of Wilson's Snipe on Middleton Island, Alaska, and dissected fluid-preserved specimens from several museum collections; results are being analyzed.

Contact: Edward H. Miller, Biology Department, Memorial University of Newfoundland, St. John's NL A1B 3X9 Canada. Phone: (709) 737-4563; email: tmiller@mun.ca.

Project: Digital aerial photography to survey shorebirds on the Copper River Flats

Investigators: R. Michael Anthony, U.S. Geological Survey; Paul Meyers and Dan Logan, U.S. Forest Service; and Richard Lanctot, U.S. Fish and Wildlife Service

The Copper and Bering River deltas form critical habitat for shorebirds migrating along the Pacific Flyway. The extensive coastal mudflats of the Delta comprise the single most important stopover site in the world for Western Sandpipers and Pacific subspecies of Dunlin. Indeed, as many as five million shorebirds stop on the Delta during four weeks of spring migration. Up to 80% of all Western Sandpipers and nearly all Dunlin refuel here in route to breeding grounds in western Alaska. With more than 30 species of shorebirds nesting or stopping on the Delta, the site has been designated both a hemispheric site in the Western Hemisphere Shorebird Reserve Network and a State of Alaska Critical Habitat Area.

Because most populations occur in high densities over broad areas and individuals use the Delta for relatively short periods, estimating the population size of birds stopping on the Delta is problematic. Bishop et al. (2000) attempted to estimate the stopover population using systematic surveys with visual estimation. The accuracy of visual estimation with such large numbers of moving birds, however, has not been tested and is likely to contain considerable observer bias. In the spring of 2003, we began testing whether digital aerial photography could be used to count shorebirds roosting along the Copper and Bering River deltas. We were specifically concerned with potential problems in discerning individual birds, both because of their small size and their propensity to cluster in high densities when roosting and feeding. Successful development of a technique that would overcome these concerns could provide a valuable tool for biologists counting shorebirds that congregate along coastal areas during any season.

Aerial digital photographs were taken from a Cessna-185 airplane with a vertically mounted Nikon digital camera. Flights were conducted at several altitudes using different lens focal lengths, and the camera was connected to a GPS receiver so latitude and longitude plus photographic data were recorded in each image file. Difficulties associated with weather, flying directly over flocks, flushing birds, and other mechanical issues resulted in only 9 good images (1 with a large flock and 8 with smaller flocks) out of an estimated 265 images taken during three days of flying. Shorebirds on these images were counted manually in Photoshop using a pencil tool, and automatically using a custom program written in MatLab Image-processing Toolbox. Image quality was sufficient to discriminate between birds and background, and automated detection routines had high accuracy. For example, the manual estimate for the large flock image was 1,891 and the automated count was 1,913. The automated detection routine had trouble detecting flying birds and tight clusters of birds at the edge of the image (vignetting effect) and/or when birds occurred on a dark background. The associated contrast problems could be corrected for, however, with a software manipulation. The detection routine also occasionally mistook clumps of mud as birds.

To determine the precision of various sampling efforts, we used MatLab software to construct pseudo-populations of shorebird flocks that were subsequently repeatedly counted using Monte Carlo sampling techniques. Artificial flocks of about 100,000 birds were constructed to meet two general distributions: large flocks of ≤ 15,000 with occasional flocks of ≤ 200, and more dispersed flocks of 400–15,000 birds. As might be expected, greater sampling effort (i.e., more survey transects) was required to obtain similar precision in simulations with more dispersed flocks relative to concentrated flocks. Simulated sampling resulted in a precision of ±10%.

More study is needed to determine how these methods could be applied to larger areas, and additional information on how birds distribute themselves in relation to tide cycles is needed to more accurately conduct simulation tests. Finally, further photographic experiments are needed to determine (1) the effects of low light and various feeding substrates on the visibility of birds, and (2) the optimum image scale for automated counting of birds with the least sampling effort and greatest precision. While the application of this technique to count shorebirds on the Copper and Bering River deltas is years away, information learned this past summer may allow aerial digital photography to be used on species that frequent more restricted staging areas, especially locations where favorable weather conditions would allow more predictable flight schedules.

Contact: Mike Anthony, U.S. Geological Survey, Alaska Science Center, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3508; email: mike_anthony@usgs.gov.

Project: Ground-nesting marine bird distribution and potential for human impacts in Glacier Bay National Park, Alaska

Investigators: Mayumi Arimitsu, Marc Romano, and John Piatt, U.S. Geological Survey.

Except for a few large colonies, the distribution of ground-nesting marine birds in Glacier Bay National Park is largely unknown. There is growing concern about the potential for impact from human disturbance to breeding birds as visitor use increases in backcountry areas. During the first year of a three-year study, we surveyed areas known to be important to ground-nesting birds and areas with significant visitor use. We used land-based beach surveys and kayak-based shoreline surveys to determine the distribution of nesting birds. We mapped 298 nests at 94 different sites belonging to eight different bird species. In 2003, we focused our effort on determining the distribution of four species: Black Oystercatcher, Arctic Tern, Mew Gull, and Glaucous-winged Gull. We also recorded observations of nests of other ground nesting birds we encountered such as Parasitic Jaeger, Semipalmated Plover, Spotted Sandpiper, and Pigeon Guillemot. We will continue to survey beaches in Glacier Bay in 2004 and 2005 to provide a broad assessment of marine bird distribution and breeding sites in the park. This baseline information will be used to assess impacts of human disturbance and changes in bird populations over time.

Contact: Mayumi Arimitsu, USGS-Glacier Bay Field Station, 3100 National Park Rd., Juneau, AK 99801. Email: MArimitsu@usgs.gov.

Project: Assessment of contaminants in Alaskan shorebird eggs

Investigators: Angela Matz and Richard Lanctot, U.S. Fish and Wildlife Service

Contaminants may affect survival and reproduction of shorebirds, but information on contaminant exposure in shorebirds is limited. Detectable concentrations of DDE, PCBs, and other organochlorines have been found in shorebirds from the coastal continental United States (e.g. White et al. 1980, Custer and Myers 1990, Fair et al. 1994, Hui et al. 2001). In Alaska, limited data (Ambrose et al. 2000) from several shorebird species (Lesser Yellowlegs, Solitary Sandpiper, Spotted Sandpiper, Semipalmated Plover, American Golden-Plover, Red-necked Phalarope, Semipalmated Sandpiper, and Pectoral Sandpiper) collected in 1984 indicated that shorebirds had higher body burdens of organochlorine contaminants such as p,p-DDE and dieldrin than non-shorebirds (e.g., American Robin, Violet-green Swallow).

Bird eggs are efficient indicators of persistent organic pollutants and heavy metals, especially mercury. To evaluate current concentrations of contaminants in shorebirds breeding in Alaska, we collected eggs from seven species during the breeding season of 2002 (American Golden-Plover, Pacific Golden-Plover, Red-necked Phalarope, Western Sandpiper, Semipalmated Sandpiper, Pectoral Sandpiper, and Rock Sandpiper). Eggs (10 composite samples of 2–5 eggs per species) were collected by collaborators from the Yukon-Kuskokwim Delta NWR, the Pribilof Islands (St. George), the North Slope (Arctic NWR, Canning River Camp), and the Seward Peninsula.

In general across all species, there were very low or non-detectable concentrations of persistent organic contaminants (including organochlorine pesticides and PCBs), with concentrations generally below toxic thresholds, although threshold levels do not exist for every chemical measured. Since lipophilic-persistent organic contaminants are often concentrated in eggs, the low levels we found indicate little cause for concern. We did find more detections of heavy metals (e.g., cadmium) and metalloids (e.g., arsenic), but the concentrations were low, and many of the detected metals were expected trace elements (e.g., copper and iron). As with persistent organic contaminants, few toxicity threshold levels have been established for heavy metals, but none of the levels we found was exceptionally high compared to those reported from other studies. Levels of strontium were slightly elevated (1.95–12.1 ppm dry weight)—as has been found in other Alaska data sets—which requires further study to determine toxicity and possible sources.

Small sample sizes among all species prevented us from testing for differences between species or areas and from concluding that the contaminants we measured (persistent organic pollutants and metals) were unlikely to be affecting populations. Lastly, because shorebirds are highly migratory with separate breeding and nonbreeding areas on which they spend varying amounts of time, samples will have to be collected from throughout the annual cycle to help determine the source point(s) of contamination. For example, the greatest contaminant threat to shorebirds nesting in Alaska likely comes from exposure to agricultural pesticides (e.g., organophosphates and carbamates) on the nonbreeding and staging areas, which affect populations through illness and death of individuals including breeding adults.

We continue to search for ways to evaluate threats of agricultural chemicals to shorebird populations. We propose collecting more eggs in 2004 to increase sample sizes and ensure reliability of these results. Nevertheless, the relatively low concentrations of the measured contaminants are reassuring and may allow us to eliminate exposure to these contaminants as a cause for general population decreases (with additional data and allowances for site-specific exposures, e.g., near contaminated sites).

Contact: Angela C. Matz, U.S. Fish and Wildlife Service, 101-12th Ave., Box 19, Room 110, Fairbanks, AK 99701. Phone: (907) 456-0442; email: angela_matz@fws.gov. Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: richard_lanctot@fws.gov.

Project: Shorebird Sister Schools Program*: workshop summary, *2003 Northwest Territories Teacher Conference*, *Yellowknife, Northwest Territories*, *Canada*, *November 27–28, 2003

Investigator: Tamara Mills, U.S. Fish and Wildlife Service

The Shorebird Sister Schools Program (SSSP) is an internet-based environmental education program that connects students, educators, biologists, and birding enthusiasts along migratory flyways. The three key components included a curriculum (grades 2–12), an e-mail network, and a web site. Partnerships with numerous organizations, schools, volunteer birders, and youth groups make this program possible. The shear magnitude of what shorebirds accomplish in their seasonal migrations is truly amazing and a great tie into numerous subjects like math, geography, social studies, the arts, and writing. The lessons in the SSSP curricula also teach a broad range of scientific concepts and offer a global connection to other students, scientists, and educators.

Northern Canada—Nunavut and Northwest Territories (NWT)—is an important area for many shorebirds. These amazing migrants often stop to rest and feed in the lower latitudes of this region en route to nesting areas in the arctic and high arctic portions of Canada. By learning about shorebirds and the habitats these birds rely on, students can participate in hands-on conservation and help protect entire ecosystems and natural areas on which all flora and fauna depend.

Two, full-day (repeated) workshops were offered to introduce primary and secondary school teachers from NWT to the SSSP. The workshops were attended by a total of five educators with varying backgrounds ranging from a business and accounting teacher to a substitute teacher with a geography degree. All participants seemed highly interested in the program and were eager to learn. Participants were provided an introduction to shorebird biology and local species identification, went on a curriculum "scavenger hunt," turned a fellow teacher into a "shorebird," explored the SSSP website, and went on a virtual field trip.

Posters, student activity guides, and SSSP brochures were provided to all participants. A copy of the current *Arctic Nesting Shorebirds* curriculum will be sent to each participant and a CD with the new curriculum *Explore the World of Shorebirds* will be sent when completed in February 2004. Each participant completed an evaluation of the workshop.

The small number of participants presented both challenges and opportunities. For example, several activities are hands-on and interactive (i.e., the curriculum scavenger hunt) and thus better suited for large groups. On the other hand, the small number of participants provided an intimate and enjoyable atmosphere and enabled me to answer questions and provide ideas specific to each educator's needs.

Contact: Tamara Mills, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK. Phone: (907) 786-3517; email: tamara_mills@fws.gov.

Project: Assessing habitat availability and use by Buff-breasted Sandpipers during the nonbreeding season in South America

Investigators: Richard Lanctot, U.S. Fish and Wildlife Service; Daniel Blanco, Wetlands International, Argentina; Rodrigo Balbueno, Biolaw Consultoria Ambiental, Brazil; and Martín Oesterheld, University of Buenos Aires

We conducted ground surveys of Buff-breasted Sandpipers at 285, 128 and 171 locations in Argentina, Uruguay, and Brazil, respectively, during 1999 and 2001 (Lanctot et al. 2002). Using these data, we associated bird distribution with both vegetation heterogeneity and unsupervised classifications of satellite imagery. Buff-breasted Sandpipers were found primarily in pasturelands that were heavily grazed by livestock. In all countries the species was positively associated with halophytic steppes, but for some countries a negative correlation was found with humid mesophytic meadows, mesophytic prairies, and rice fields. Satellite image analysis indicated that 38% (Brazil), 53% (Uruguay), and 64% (Argentina) of the main nonbreeding range was suitable for the species. These estimates surely overestimate the real area used by the species as the habitat-bird associations were weak, the heterogeneity of unsupervised image classes were either too fine or too coarse, and not all unsupervised classes were sampled relative to their availability. Future efforts to estimate habitats used by Buff-breasted Sandpipers need finer resolution of types so that, for example, tall and short grass pastures can be differentiated. The large population decline during the past century also makes it likely that Buff-breasted Sandpipers no longer use all the areas that are suitable. Additional study is needed to determine how the species distributes itself and moves throughout its nonbreeding range. Also, additional ground surveys are needed in vegetation units and in poorly sampled unsupervised satellite imagery classes to adequately assess their use by Buff-breasted Sandpipers. Image analyses that include geological formations are continuing and may more accurately determine the amount of land area suitable for the species. Once this is accomplished, we will extrapolate population density data to derive an estimate of overall population size for each country.

Contact: Richard Lanctot, Shorebird Coordinator, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: richard_lanctot@fws.gov.

Project: Buff-Breasted sandpipers in Brazil: numbers, movement, and fidelity

Investigators: Juliana Bose de Almeida and Lewis Oring, University of Nevada Reno, and Richard Lanctot, U.S. Fish and Wildlife Service

In January and February of 2003, we began our first field season of studies on the nonbreeding ecology of Buff-breasted Sandpipers in southern Brazil. The goals of this project were to document within- and between-season site-fidelity and estimate density of Buff-breasted Sandpipers at three major nonbreeding sites in Brazil. A secondary objective was to monitor molt and changes in body mass of captured birds throughout the austral summer. Surveys were conducted at Lagoa do Peixe National Park, Ilha da Torotama, and Taim Ecological Station located in Rio Grande do Sul State, Brazil. Sandpipers were captured, color-banded and equipped with radio-transmitters at the first and last sites. Density of birds at Lagoa do Peixe

National Park increased from 6.9/ha on 17 January 2003 to 12.6/ha on 23 February 2003. A similar pattern, with overall lower densities, was observed at Ilha da Torotama. At Taim Ecological Station, however, the density of birds over this same period plummeted from 14.9/ha to 0/ha. These changes in density suggest the first two sites may act as staging areas and the latter site as a nonbreeding area for Buff-breasted Sandpipers. Nineteen females and six males were captured and color marked, of which five females and one male were also radio-marked. Based on resightings, the average length of residence time was 4 ± 2.7 days (± SE) for two color-marked and four radio-marked sandpipers. From a small sample of birds captured in December 2003, the between-year site fidelity at Taim Ecological Station was only 6.7%. Based on captures of mostly females, sandpipers had nearly completed wing molt and replaced about half of their tail feathers by the end of January. Changes in body mass differed between sexes, with males losing and females gaining mass throughout the study period. Small sample sizes and differences in migration timing between sexes are possible explanations for observed differences in these trends. Additional fieldwork encompassing the entire nonbreeding season (October–March) is necessary to understand spatial use patterns within sites, as well as to obtain seasonal trends of body mass and molt. Two more field seasons are planned, with the second beginning in October 2003.

Contact: Juliana Almeida, Ecology, Evolution and Conservation Biology, Univ. of Nevada Reno, Reno, NV 89557. Phone: (775) 784-6393; email: jalmeida@unr.nevada.edu.

Project: Conservation of Dunlins in the East Asian-Australasian Flyway

Investigators: Yoshi Shigeta, Yamashina Institute for Ornithology; Kent Wohl and Richard Lanctot, U.S. Fish and Wildlife Service; and Robert Gill, U.S. Geological Survey

Among the 10 recognized subspecies of Dunlin, 5 breed in the North Pacific region (*arcticola, pacifica, sakhalina, kistchinskii,* and *actites*). During the nonbreeding season the species regularly occurs along the coast of the North Pacific, but genetic studies, which indicate considerable mixing of populations, need further assessment. North Pacific Dunlins are excellent candidates for an international cooperative project for at least three reasons. First, local counts throughout both nonbreeding and breeding areas indicate that some populations are declining. Second, wetlands in Japan, Korean Peninsula (Republic of Korea and People's Democratic Republic of Korea), Republic of China (Taiwan), and eastern People's Republic of China (China) are under grave threats from development activities. For instance, in China alone over 800 km^2 of intertidal wetlands were reclaimed between 1987 and 1998. In perspective, this is over twice the amount of similar habitat that occurs along the coast of the central Yukon Delta. Establishing the international importance of nonbreeding habitats and identifying the breeding areas of populations that use these habitats will aid in conservation of these wetlands. Third, the U. S. Shorebird Conservation Plan places high priority on monitoring shorebird numbers and assumes that northern nesting species will be monitored primarily at staging, stopover, or nonbreeding sites.

Heretofore, a relatively small number of observations of marked birds has linked northern Alaska Dunlin (*arcticola* subspecies) to nonbreeding areas in East Asia (Japan, Korean Peninsula, Taiwan, and China), but little is known about their length of stay at or interchange among specific wetlands in this region. For other subspecific populations the connection between breeding and nonbreeding areas is less well understood and trends in their population sizes are virtually unknown, making effective monitoring and conservation of North Pacific Dunlins problematic at present. And for at least the *arcticola* population there is concern that the overall population has declined—dramatically in places—over the past couple of decades.

To improve the knowledge of migration pathways and nonbreeding sites of Dunlin nesting in Chukotka, on Sakhalin Island, and in northern Alaska, a multi-national color-flagging and resighting program was established in 1999. In Alaska, Japanese biologists have joined American biologists in capturing and banding Dunlin breeding on the North Slope in 1999–2001 and 2003. This year, biologists captured 16 adults, 4 yearlings, and 55 chicks near Barrow between 30 June and 3 July. One adult was later seen at Ohtsuka, on the island of Kyushu (33°40'N, 131°14'E) and one yearling was seen at the mouth of the Kamo River, on Shikoku (33°56'N, 133° 10'E). An "Action Plan for Dunlin *Calidris alpina* in the East Asian-Australasian Flyway" was recently drafted that identified 10 major gaps in our knowledge of the species and provided potential actions to fill these gaps, including surveys, banding studies and population monitoring activities. Efforts are now underway within the East Asian-Australasian Flyway Shorebird Working Group to implement this plan.

Contact: Richard Lanctot, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3609; email: Richard_Lanctot@fws.gov.

Project: Survey for Arctic-breeding shorebirds in the Tuamotu Archipelago, French Polynesia, March 2003

Investigators: Lee Tibbitts, U.S. Geological Survey; Richard Lanctot, Eric VanderWerf, and Verena Gill, U.S. Fish and Wildlife Service

In March 2003, biologists from the U.S. Fish and Wildlife Service and U.S. Geological Survey joined an international expedition headed by biologists from La Société d'Ornithologie de Polynésie and Wildland Consultants of New Zealand, and traveled to remote atolls in the Tuamotu Archipelago, French Polynesia. The objectives of this venture were to (1) determine the presence and approximate numbers of resident and migratory birds and mammalian pests on several, mostly uninhabited atolls in the central and southern Tuamotu Archipelago, (2) search for color-marked Bristle-thighed Curlews and, where possible, capture and collect blood samples from them, (3) conduct pelagic surveys for seabirds, and (4) promote cooperative bird research in the Central Pacific.

We visited one island group and nine atolls spread across 1,400 km of ocean between Mangareva (23.12°S 134.97°W) and Fakarava (16.19°S 145.75°W). We conducted surveys over a total of about 60 linear kilometers of atoll and island shoreline during which we detected 30 species of birds and 3 species of introduced mammals (i.e., Pacific Rat [*Rattus exulans*], Ship Rat [*R. rattus*], and feral House Cat [*Felis catus*]). Four shorebird species were detected: Bristle-thighed Curlew, Wandering Tattler, Pacific Golden-Plover, and Tuamotu Sandpiper.

We counted a total of 268 curlews but did not encounter any banded individuals. This prevented us from directly linking nonbreeding sites in the Tuamotu Archipelago with breeding, staging, or other nonbreeding sites where this species has been banded. Curlews were found on all atolls, whether dominated by native vegetation or altered habitats, or with or without rats. We captured and collected blood samples from three curlews—all slightly heavier than expected for birds in mid-March, but well within the range of weight for individuals at the conclusion of the pre-migratory fattening period. All captured birds had very bright breeding plumage with molt scores indicative of a recently completed wing, tail, and body molt. We tested several capture methods and gained insight on how to capture curlews more effectively in the future.

Most (59.4%) of the 64 Pacific Golden-Plovers detected during surveys were on Haraiki Atoll. The remaining atolls had between one and nine birds each. Plovers did not appear to be territorial and some birds were beginning to molt into breeding plumage. We counted a total of 339 Wandering Tattlers spread across all atolls. Our observations indicated that tattlers on the nonbreeding grounds occur alone or in pairs, and that they frequently establish territories. We observed tattlers in natural (e.g., reef flats and beaches) as well as man-made habitats (e.g., lawns, telephone poles, and abandoned buildings). Some tattlers had begun molting into breeding plumage.

The information collected during this expedition will assist La Société d'Ornithologie de Polynésie, the local non-governmental organization in French Polynesia, to move towards its primary goal of understanding distributions of birds and pests in the Tuamotu Archipelago. This information will help determine which atolls should (1) be designated as conservation sites, (2) undergo mammal eradication to protect endangered species and nesting seabirds and, (3) be used as reintroduction or relocation sites for endangered Tuamotu Sandpipers and Polynesian Ground-Doves. Migrant shorebirds will likely benefit from future efforts to conserve terrestrial endemic species. A full report of this study is available from Rick Lanctot.

Contact: Lee Tibbitts, U.S. Geological Survey, 1011 E. Tudor Road, Anchorage, AK 99503. Phone: (907) 786-3340; email: lee_tibbitts@usgs.gov.

Avian taxa mentioned in this summary. Common and scientific names follow *The A.O.U. Check-list of North American Birds* (7th ed., 1998) and supplements, and *Handbook of Australian, New Zealand, and Antarctic Birds* (Higgins and Davies 1996).

COMMON NAME	SCIENTIFIC NAME
Greater White-fronted Goose	*Anser albifrons*
King Eider	*Somateria spectabilis*
Harlequin Duck	*Histrionicus histrionicus*
Rock Ptarmigan	*Lagopus mutus*
Gyrfalcon	*Falco rusticolus*
Peregrine Falcon	*F. peregrinus*
Black-bellied Plover	*Pluvialis squatarola*
American Golden-Plover	*P. dominica*
Pacific Golden-Plover	*P. fulva*
Semipalmated Plover	*Charadrius semipalmatus*
Black Oystercatcher	*Haematopus bachmani*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*T. flavipes*
Solitary Sandpiper	*T. solitaria cinnamomea*
Spotted Sandpiper	*Actitis macularia*
Wandering Tattler	*Heteroscelus incanus*
Tuamotu Sandpiper	*Prosobonia cancellatus*
Eskimo Curlew	*Numenius borealis*
Whimbrel	*N. phaeopus*
Bristle-thighed Curlew	*N. tahitiensis*
Bar-tailed Godwit	*Limosa lapponica baueri*
Marbled Godwit	*L. fedoa beringiae*
Ruddy Turnstone	*Arenaria interpres*
Semipalmated Sandpiper	*Calidris pusilla*
Western Sandpiper	*C. mauri*
Baird's Sandpiper	*C. bairdii*
Pectoral Sandpiper	*C. melanotos*
Rock Sandpiper	*C. ptilocnemis*
Dunlin	*C. alpina*
Stilt Sandpiper	*C. himantopus*
Buff-breasted Sandpiper	*Tryngites subruficollis*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Wilson's Snipe	*Gallinago delicata*
Red-necked Phalarope	*Phalaropus lobatus*
Red Phalarope	*P. fulicarius*
Parasitic Jaeger	*Stercorarius parasiticus*
Long-tailed Jaeger	*S. longicaudus*
Glaucous-winged Gull	*Larus glaucescens*
Glaucous Gull	*Larus hyperboreus*
Arctic Tern	*Sterna paradisaea*
Pigeon Guillemot	*Cepphus columba*
Polynesian Ground-dove	*Gallicolumba erthroptera*
Common Raven	*Corvus corax*
Violet-green Swallow	*Tachycineta thalassina*
Northern Wheatear	*Oenanthe oenanthe*
American Robin	*Turdus migratorius*
Horned Lark	*Eremophila alp`estris*
American Tree Sparrow	*Spizella arborea*
Lapland Longspur	*Calcarius lapponicus*