



Summaries of ongoing or new studies of Alaska shorebirds during 2008



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TABLE OF CONTENTS

<i>A note from the compiler:</i>	1
BROADER PERSPECTIVES	2
The Role of Art in Shorebird Conservation – An Example from Yukon Delta National Wildlife Refuge – By Brian McCaffery	2
PROJECT SUMMARIES	4
1. WINTER ECOLOGY OF BUFF-BREASTED SANDPIPERS IN BRAZIL: SEASONAL PATTERNS OF DENSITY – Almeida & Oring	4
2. CONNECTING DUNLIN BREEDING GROUNDS IN ALASKAN AND FAR EASTERN RUSSIAN WITH ASIAN WINTERING SITES – Barter et al.	4
3. ARE DUNLIN CALIDRIS ALPINA ARCTICOLA POTENTIAL VECTORS FOR AVIAN INFLUENZA VIRUSES BETWEEN MAINLAND CHINA AND ALASKA? – Barter et al.	6
4. MIGRANT SHOREBIRD SITE FIDELITY WITHIN THE COPPER RIVER DELTA, ALASKA – Bishop and Dawson	6
5. RUDDY TURNSTONE EXTRA PAIR MATING STUDIES AT WOOLLEY LAGOON, SEWARD PENINSULA, ALASKA – Bruner and Bruner	7
6. RECENT SHOREBIRD WORK DONE BY THE WRANGELL RANGER DISTRICT, TONGASS NATIONAL FOREST – Cady et al.	8
7. FOCUSING ON DIGITAL ASPECTS OF AVIAN INFLUENZA SAMPLING AND RELATED SHOREBIRD INVESTIGATIONS IN ALASKA AND THE RUSSIAN FAR EAST IN 2008 – Huettmann	9
8. EXPERIMENTAL CLUTCH REMOVAL AND RENESTING IN DUNLIN (CALIDRIS ALPINA ARCTICOLA) ON ALASKA’S NORTH SLOPE – Gates et al.	9
9. USGS ALASKA SCIENCE CENTER SHOREBIRD AVIAN INFLUENZA MONITORING EFFORTS – Gill & Ruthrauff	11
10. PACIFIC SHOREBIRD MIGRATION PROJECT – Gill et al.	12
11. TUNDRA-BREEDING SHOREBIRD RECONNAISSANCE NEAR KANUTI LAKE, KANUTI NWR, 2008 - Harwood	14
12. DETERMINING RATES OF AND FACTORS THAT AFFECT CHICK SURVIVAL OF DUNLIN NEAR BARROW, ALASKA – Hill et al.	15
13. COUNTS AND CAPTURES OF HUDSONIAN GODWITS AND WHIMBRELS ON CHILOÉ ISLAND, CHILE, 2008 – Johnson, J. & Andres	16
14. EVALUATION OF GENETIC MARKERS FOR TRACKING VIRUS MOVEMENT ACROSS CONTINENTS AND AMONG/WITHIN DUNLIN SUBSPECIES – Johnson M. et al.	17
15. INTER-SEASONAL MOVEMENTS, HABITAT USE AND MIGRATORY CONNECTIVITY OF BLACK OYSTERCATCHERS – Johnson M. et al.	18
16. RENESTING AND BETWEEN-CLUTCH PAIR FIDELITY OF PACIFIC GOLDEN-PLOVERS BREEDING NEAR NOME, ALASKA – Johnson W. et al.	19

17. DNA ANALYSES TO DETERMINE WHETHER EXTRA-PAIR MATING OCCURS IN AMERICAN AND PACIFIC GOLDEN-PLOVERS – Johnson, W. et al.	20
18. BEHAVIORAL ECOLOGY OF PECTORAL SANDPIPERS – Kempnaers et al.	21
19. POST-BREEDING SHOREBIRD STUDIES ON THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA – Kendall et al.	22
20. USE OF STABLE ISOTOPES TO DIFFERENTIATE DUNLIN SUBSPECIES BREEDING IN BERINGIA – Lanctot et al.	24
21. AVIAN INFLUENZA SAMPLING OF ARCTICOLA DUNLIN AND OTHER SHOREBIRDS IN TAIWAN – Lanctot et al.	25
22. REPRODUCTIVE ECOLOGY OF SHOREBIRDS: STUDIES AT BARROW, ALASKA, IN 2008 – Lanctot et al.	27
23. AVIAN INFLUENZA SAMPLING AND SHOREBIRD SURVEYS IN THE TESHEKPUK LAKE SPECIAL AREAS OF THE NATIONAL PETROLEUM RESERVE – ALASKA, IN 2008 – Lanctot et al.	29
24. MIGRATORY CONNECTIVITY OF WESTERN SANDPIPERS –Lank et al.	30
25. LONG-TERM MONITORING OF TUNDRA-NESTING BIRDS IN THE PRUDHOE BAY OILFIELD, NORTH SLOPE, ALASKA – Liebezeit & Zack	31
26. BREEDING BIRD DIVERSITY, DENSITY, NESTING SUCCESS AND NEST PREDATORS AT A STUDY SITE IN THE TESHEKPUK LAKE SPECIAL AREA, NORTH SLOPE, ALASKA – Liebezeit & Zack ...	32
27. SHOREBIRD MARATHON—CONNECTING STUDENTS WITH SCIENCE - McCaffery	34
28. OBSERVATIONS OF RED KNOTS (CALIDRIS CANUTUS) AT OLD CHEVAK, YUKON DELTA NATIONAL WILDLIFE REFUGE, ALASKA, SPRING 2008 – McCaffery et al.	35
29. SHOREBIRD OBSERVATIONS DURING FALL MIGRATION IN WESTERN ALASKA – Ruthrauff et al.	36
30. INVENTORY OF BREEDING BIRDS IN ANIAKCHAK NATIONAL MONUMENT AND PRESERVE – Ruthrauff & Tibbitts	38
31. INCUBATION PATTERNS, PARENTAL ROLES, AND NEST SURVIVAL OF BLACK OYSTERCATCHERS (HAEMATOPUS BACHMANI): INFLUENCES OF ENVIRONMENTAL PROCESSES AND NEST AREA STIMULI – Spiegel et al.	39
32. IDENTIFYING THE IMPORTANT BIRD AREAS OF ALASKA - Stenhouse	41
33. DISTRIBUTION, MOVEMENTS, AND PHYSIOLOGY OF POST-BREEDING SHOREBIRDS ON ALASKA’S ACP- Taylor et al.	42
34. SAMPLING SHOREBIRDS FOR AVIAN INFLUENZA (AI) AND DOCUMENTING MIGRATION PATTERNS OF DUNLIN IN THE REPUBLIC OF KOREA – Zack et al.	44
STUDY SITE MAP	45

A note from the compiler:

Welcome to the 2008 summary report of ongoing or new studies of Alaska shorebirds. This is the seventh consecutive report put together by the Alaska Shorebird Group aimed to summarize activities conducted by people on shorebirds that reside in Alaska at some time during their annual cycle. In this document I compiled summaries for 34 studies highlighting many interesting projects investigating Alaska shorebirds. A new addition to this report is an essay by Brian McCaffery that gives us a broader perspective on the role of education in shorebird conservation. We encourage similar essays in future reports. Such writings may include non-scientific material that gives unique insight into shorebirds that doesn't fit neatly into the "project summary" category. In addition, a figure was submitted along with one summary (#18); I encourage people to submit summary figures in the future. Finally, for the first time, I've included a map of our study site locations within Alaska. This map clearly shows that shorebirds live up to their name, with all study sites, except for one, located relatively close to the coastline.

There were 34 projects submitted in 2008. This compares to 35 in 2007 and an average of 31 over the seven year history of these reports. Among the 34 projects in 2008, there were a total of 87 investigators involved in these projects, 23 of which participated in more than one project. Women led six of the total studies (18%) and accounted for 29% of the total investigators. Government agencies led most of the studies (17 of the 34; 50%). Academic institutions came up second leading 11 of the 34 projects; 32%). For government agencies this included the U.S. Fish and Wildlife Service ($n = 9$), the U.S. Geological Survey ($n = 6$), the U.S. Forest Service ($n = 1$), and the Max Planck Institute for Ornithology ($n = 1$). Lead academic institutions included the University of Alaska – Fairbanks ($n = 4$), Montana State University ($n = 2$), Brigham Young University, Oregon State University, the University of Nevada, Simon Fraser University, and the University of Science and Technology of China. The remaining six principal investigators represented non-government organizations including the Wildlife Conservation Society ($n = 3$), Audubon Alaska, Prince of William Sound Science Center, and Wetlands International – Oceania.

As in the previous two years, in 2008 a significant number of projects had some component of Avian Influenza [H5N1] sampling involved (at least 10 of the 34 studies; 29%). The majority of the Alaska-based studies were conducted in four regions of the state including the Arctic Coastal Plain, Seward Peninsula, the Yukon-Kuskokwim Delta, and the Alaska Peninsula (22 of 25; 84%). Eight studies were conducted entirely or largely overseas at Alaska shorebird wintering grounds or at stopover points along their migration routes. These studies ranged far and wide including eight different countries / territories.

Unlike in the previous six annual summaries, I have decided to use color photos to "dress up" the document. I would like to acknowledge the photographers who graciously allowed the use of their superb images in this document. Photo credits are listed below the lower right-hand corner of each photo. I also thank Rick Lanctot for assisting me in obtaining many of the summaries for this report. Finally, thanks to all for the hard efforts of everyone involved in these important studies. We look forward to many more years of fruitful research on Alaska's shorebirds.

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BROADER PERSPECTIVES

The Role of Art in Shorebird Conservation – An Example from Yukon Delta National Wildlife Refuge – By Brian McCaffery

Within the context of shorebird conservation, scientific research is important because it can provide a rational basis for promoting changes in human behavior at both the societal and individual level, changes that can lead to the health and sustainability of shorebird populations. Conservation research *sensu strictu*, however, is of little value unless its potential audiences already value shorebirds, wetlands, or some other related resources. If people don't care about shorebird conservation, data indicating that shorebirds are at risk will have little or no impact on decision-making.

Fortunately, an intellectual/academic approach to conservation is not the only one available. Because of its evocative nature, art (e.g., visual art, music, literature) has the possibility of reaching people at an emotional level, the level at which values are often generated and fostered. Art can both promote the emergence of conservation values and enkindle values that are not yet translated into actions. In addition, it can directly complement scientific approaches to conservation via positive feedback, so that both the intellect and the emotions can be more readily brought into the service of the will, whence decision arise.

Because of the potential conservation value of art, Yukon Delta National Wildlife Refuge has hosted several artists at the historic Old Chevak field station over the last several years. In 2002, photographer and writer Michael Forsberg stayed there while collecting photographic images and experiences for his seminal work, *On Ancient Wings: The Sandhill Cranes of North America*. Two years later, author and Pulitzer Prize finalist Scott Weidensaul spent a week at the station as he retraced Roger Tory Peterson's continent-spanning journey a half-century earlier. Weidensaul's reflections on the Yukon Delta refuge were recounted in his 2005 book, *Return to Wild America: A Yearlong Search for the Continent's Natural Soul*. Also in 2004, British artist James McCallum worked as a refuge volunteer at Old Chevak. McCallum's watercolor images, including dozens from the refuge, were published in his 2007 book, *Arctic Flight: Adventures Amongst Northern Birds*.

In 2008, Keith Woodley, manager of the Miranda Shorebird Centre, and Jan van de Kam, professional wildlife photographer, spent several weeks at Old Chevak. Woodley, whose hand-painted murals adorn the visitor center at Miranda, is both an educator and an international shorebird aficionado, having joined expeditions to China and South Korea to study, capture and mark migrant shorebirds. Van de Kam's photographs form the visual core of recently published books such as *Shorebirds: An Illustrated Behavioural Ecology* and *Life along Land's Edge: Wildlife on the Shores of Roebuck Bay, Broome*. His images also grace the Web site of the Global Flyway Network, as well as numerous graduate theses and other scientific publications.

Separate but related projects brought Woodley and van de Kam to Yukon Delta Refuge. Woodley is currently writing a book about bar-tailed godwits, which annually migrate between Alaska and New Zealand. His experiences with godwits in New Zealand, Australia, China and South Korea illuminate his perspective, but he felt that his effort would be incomplete without a trip to their remote northern breeding grounds. Arriving at Old Chevak in late April, he witnessed the transformation of the tundra from a silent and snowy landscape to a vibrant mosaic of wetlands throbbing with bird and insect life. During his six-week stay, he documented re-nesting in a pair of bar-tailed godwits, a phenomenon not previously confirmed on the Yukon-

Kuskokwim Delta. Woodley then returned to New Zealand to continue writing in order to meet his publisher's December 2008 manuscript submission deadline.

Van de Kam journeyed to Old Chevak in mid-May to get the final images for a book on shorebird and wetland conservation in the East Asia/Australasian Flyway. He was particularly interested in photographing birds that use the Yellow Sea during migration, including Alaska's breeding bar-tailed godwits. During three weeks at Old Chevak, he captured images of godwits displaying, courting, fighting and incubating. Those images were incorporated into his book, *Invisible Connections: Why migrating shorebirds need the Yellow Sea*. In addition to supporting Jan's field work, Yukon Delta refuge contributed to the book in a more tangible way. Refuge Education Specialist Brian McCaffery served as one of eight international co-authors by writing both the book's introductory essay and its chapter about the tundra. Perhaps uniquely, the text of the book and all photo captions were presented in three languages: Chinese, English and Korean. *Invisible Connections* was released in October in Changwon, South Korea, at the 10th Meeting of the Conference of Contracting Parties to the Ramsar Convention on Wetlands.

As with most scientific research, the net conservation impact of these artistic projects is difficult to measure. In lieu of quantitative estimates of their value, however, art's potential for stirring both hearts and minds should at least foster consideration of similar shorebird conservation initiatives elsewhere.



Jan van de Kam

PROJECT SUMMARIES

1. WINTER ECOLOGY OF BUFF-BREASTED SANDPIPERS IN BRAZIL: SEASONAL PATTERNS OF DENSITY – Almeida & Oring

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

As part of a broader study on the winter ecology of Buff-breasted Sandpipers, we surveyed three potentially important wintering sites in Rio Grande do Sul State, Brazil. Our goal was to determine the effect of location (between study sites & pastures within sites), year, Julian date, and soil moisture on density. Surveys were conducted at three pastures within Lagoa do Peixe National Park (LPNP; 760 ha), one pasture at Ilha da Torotama (IT; 101 ha) and two pastures at Taim Ecological Station (TES; 77 ha). Distances between pastures ranged between 3 – 32 km and distance between sites ranged between 78 – 205 km. Double-observer strip censuses were conducted in the morning (0700 – 1030) once every 15 days during October – March of the 2002/2003, 2003/2004, and 2004/2005 seasons.

Maximum (19 ± 7 individuals/ha) and minimum (0 individuals/ha) densities were observed at IT and TES, respectively. Density was more variable at IT and more constant at LPNP and TES. Repeated-measures mixed-model analyses of variance indicated that density varied with a quadratic trend of Julian date and did not differ among pastures within LPNP, but did differ among sites. Models incorporating other effects (soil moisture, year, or pasture) received little support. Density trend at all pastures within LPNP, as well as density at IT and TES increased from October until mid-December/early-January and decreased thereafter. Predicted density was highest at IT, followed closely by LPNP, and was much lower for TES. Our results indicate that LPNP and IT are consistently used by Buff-breasted Sandpipers within and among years and, therefore, should be included in any management action directed towards conservation of the species. Detection of Buff-breasted Sandpipers at TES was hindered by problems in the study design. We intend to publish the results of this study in a peer reviewed journal.

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2. CONNECTING DUNLIN BREEDING GROUNDS IN ALASKAN AND FAR EASTERN RUSSIAN WITH ASIAN WINTERING SITES – Barter et al.

Investigators: Mark Barter, Wetlands International – Oceania; Richard Lanctot, U.S. Fish and Wildlife Service; and Robert Gill, U.S. Geological Survey

To connect the breeding and wintering areas of four Dunlin subspecies (*ssp. actites*, *arctica*, *sakhalina*, and *kistchinski*) we collated initial banding, resighting and recovery data from national organizations, banding groups and individuals known or believed to have caught Dunlin in breeding and wintering areas within the East Asian Australasian Flyway (EAAF). All data were entered into separate Excel spreadsheets for leg-flag sightings, dyed-bird sightings, band recoveries and numbers of Dunlin marked at the different banding locations. A table and a series

of maps were generated to show international movements of (1) birds of known subspecies banded on the breeding grounds and (2) birds banded on the non-breeding grounds.

To date, our ability to reach any firm conclusions about the migration pathway and area where the four subspecies spend the non-breeding season is limited by the patchy nature of the available data. This includes a relative lack of banding activity within the *sakhalina* and *kistchinski* breeding ranges; the relative lack of sighting effort in Mainland China and South Korea, and also along potential migration routes in Far East Russia; and the incomplete information on banding activity. Nonetheless, this project has, for the first time, enabled the collation of data on movements of marked Dunlin in the EAAF and allowed some preliminary conclusions to be drawn. The bases for these conclusions should improve as more data becomes available following checking of the files and from additional field work in the non-breeding and migration areas during the 2007/2008 non-breeding season and 2008 northward migration period.

Preliminary analyses suggest that the *sakhalina* and *kistchinski* subspecies occur mainly in China and are unlikely to occur in South Korea, Japan, or Taiwan during the non-breeding season. In addition, an analysis of the population estimates for the different regions within the non-breeding area show clearly that many *arctica* must spend the non-breeding period in China. Conclusions concerning migration routes and timing for the different subspecies are seriously limited by the lack of sighting/recovery activity within the key staging areas and along the putative migration routes.

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3. ARE DUNLIN *CALIDRIS ALPINA ARCTICOLA* POTENTIAL VECTORS FOR AVIAN INFLUENZA VIRUSES BETWEEN MAINLAND CHINA AND ALASKA? – Barter et al.

Investigators: Mark Barter, Wetlands International – Oceania; Lei Cao, University of Science and Technology of China; Richard Lanctot, U.S. Fish and Wildlife Service

The *arctica* subspecies of the Dunlin breeds in Alaska and spends the non-breeding season in East Asia where it may come into contact with low and high pathogenic avian influenza viruses. To determine the potential for this species to acquire the virus, we first documented the abundance and distribution of all Dunlin subspecies in mainland China. We counted 246,551 Dunlin at 338 sites in 81 different wetlands in eastern China during surveys conducted in the 2002/2003 to 2006/2007 non-breeding seasons. Extrapolation of this count data yielded an estimate of 490,000 Dunlin, of which 100,000 were located at interior wetlands and 390,000 occurred along the coast. The highest numbers were found in Jiangsu, located north of Shanghai, but there were also significant concentrations in the Provinces along the southeast coast and in the Yangtze River floodplain. A minimum of 170,000 of these birds are likely *arctica*; this represents about 57% of their estimated population. Areas of overlap between reported HPAI outbreaks and wetlands where Dunlin were detected were primarily in the middle reaches of the Yangtze River and throughout the coastal wetlands in Guangdong. There is a large degree of overlap between Dunlin and each of nine waterfowl and one gull species known to carry either high or low pathogenic avian influenza. In virtually all comparisons, Dunlin and the other waterbird species occurred together along the coast and the Huai and Yangtze River floodplains. Additional information is needed on how exactly *arctica* Dunlin distribute themselves in China to fully understand their potential to acquire avian influenza.

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4. MIGRANT SHOREBIRD SITE FIDELITY WITHIN THE COPPER RIVER DELTA, ALASKA – Bishop and Dawson

Investigators: Mary Anne Bishop and Neil Dawson, Prince William Sound Science Center

Migrant shorebirds are likely to exhibit fidelity in stopover site selection between years because coastal stopover sites are often widely spaced and limited in number. In 2008, we began a study on the Copper River Delta to determine if site fidelity between years to specific locations is a common behavior during spring migration. We selected Hartney Bay as our study site because of its road accessibility and high use by shorebirds. During May 2008 we mist-netted and color-banded three species of shorebirds: Western Sandpiper ($n = 239$), Least Sandpiper ($n = 48$), and Semipalmated Plover ($n = 5$). We also captured an additional 23 Semipalmated Sandpipers but our permit only allowed color-banding the first five individuals. We were unsuccessful in capturing Dunlin even though they are a common shorebird on the Delta.

All birds received a green flag on the lower right and a USFWS band on the upper left leg. Color bands on the lower left leg were used to distinguish year cohort (red for 2008) and age. Adults received one red band, while juveniles (based on molt) received two red bands. We

measured exposed culmen, flattened wing, and mass. We also scored fat visible in the furculum. In the spring of 2009 we will continue this study and will color-band more birds as well as search for returning shorebirds that were marked in 2008.

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5. RUDDY TURNSTONE EXTRA PAIR MATING STUDIES AT WOOLLEY LAGOON, SEWARD PENINSULA, ALASKA – Bruner and Bruner

Investigators: Phil and Andrea Bruner, Department of Biology, Brigham Young University Hawaii

Our 2008 field season (6-19 June) was challenged by unusual cold, snow, a record prolonged period of heavy fog, and intense red fox predation. These conditions resulted in an almost total loss of Ruddy Turnstone nests and an exceptionally delayed breeding season for Black-bellied Plover at our study site. Our colleague (O.W. Johnson) saw Black-bellied Plover on nests as late as 6 July. In our 20 years at Woolley Lagoon Black-bellied Plover typically hatch at least by mid-June. Despite these conditions we were able to salvage the 2008 field season by obtaining Ruddy Turnstone DNA samples from one pair and a male of another pair along with DNA from one clutch. The pair of this clutch was our first example of mate retention in the following season. Prior to this our only other mate retention was between a 2004 pair that reunited in 2007. Over the course of our four year Ruddy Turnstone work we have had both males and females skip one or two breeding seasons only to return in subsequent years. Skipping breeding seasons has never happened in the 20 years of our work on Pacific and American Golden-Plover and Black-bellied Plover breeding at Nome.

Ruddy Turnstone extra pair mating data from 2007 yielded a male which was not the father of three of the four chicks in his nest and another male which was not the father of one of his four chicks. These findings were not unexpected. We did, however, have one nest in 2007 in which surprisingly the female was not the mother of one of her four chicks. This begs the question of what she did with her fourth egg. Our 2008 results again produced a cuckold male. The previous season he was not the father of one chick in his nest and in 2008 two of the four chicks were not his. Although these data are based on a very small sample, cuckoldry in our insular population would appear to be fairly common. Over the next few seasons we hope to better resolve the frequency of this behavior.

In 2009 we will continue to expand our Ruddy Turnstone DNA data base and begin extra pair mating studies on sympatric Black-bellied Plover at Woolley lagoon. We will also commence the process of determining the percent cover of biotic and abiotic components in a 1m² area around all Ruddy Turnstone nest cups we have marked since 2004. This will later be followed by transect sampling of a 100m² area encompassing the nest site in order to look at the question of whether or not the location of nest cups are randomly selected. Our previous work on Pacific and American Golden-Plover and Black-bellied Plover found nest cup location was biased towards habitat with a high percentage of lichens.

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Steve Zack

6. RECENT SHOREBIRD WORK DONE BY THE WRANGELL RANGER DISTRICT, TONGASS NATIONAL FOREST – Cady et al.

Investigators: Melissa Cady and Erin Cooper, U.S. Forest Service; Tim Joyce, Mayor of Cordova, Alaska; Richard B. Lanctot, U.S. Fish and Wildlife Service

Wrangell Ranger District has been actively pursuing Important Bird Area (IBA) and Western Hemisphere Shorebird Reserve Network (WHSRN) designations for the Stikine River Delta during the past three years. After submitting an IBA nomination to Audubon late in 2006, the Stikine River Delta was identified as an IBA of State Significance by the Alaska IBA Technical Committee in November of 2007, and was accepted as an IBA of Global Significance by the U.S. IBA Technical Committee in August 2008. In 2007 and 2008 we garnered stakeholder support for a WHSRN nomination at the Stikine River Delta, including letters in support of the designation from the Cities of Wrangell and Petersburg, as well as a letter from the Petersburg Chamber of Commerce. We are currently working with the State of Alaska to incorporate state-owned, tidally submerged lands in the WHSRN designation proposal.

In April and May of 2008, we conducted a preliminary study to investigate methods for surveying shorebirds on the Stikine River Delta. This included conducting counts of migrating shorebirds in the vicinity of Cheliped Bay and working out methods for capturing birds that will aid in estimating site tenure in future years. During six days of surveys, between 5,000 and 50,000 shorebirds were counted at Cheliped Bay each day, shortly before the typical peak of migration in this area. This bay is located between the North Arm of the Stikine River and LeConte Bay and routinely hosts some of the highest densities of migrating shorebirds on the Delta. Most of the birds observed were Western Sandpipers, with much smaller numbers of *pacifica* Dunlin. We also captured and marked eight Western Sandpipers, all males, using mist

nets in Cheliped Bay. We collected blood and feather samples from these birds in support of Dov Lank's project Using Intrinsic Markers to Aid Migratory Bird Conservation (see his annual summary). Efforts are underway to generate funds to refine survey estimates, potentially with aerial videography, during the spring of 2009.

U.S. Forest Service International Programs provided funding for both of these efforts.

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7. FOCUSING ON DIGITAL ASPECTS OF AVIAN INFLUENZA SAMPLING AND RELATED SHOREBIRD INVESTIGATIONS IN ALASKA AND THE RUSSIAN FAR EAST IN 2008 – Huettmann

Investigator: Falk Huettmann, University of Alaska Fairbanks

The year 2008 brought much delightful work on shorebirds for the EWHALE lab and Falk Huettmann. In early July, Falk was able to carry out a BIODIVERSITY GRID (5*5 plots spaced 100m apart + 5 random plots) in Barrow, which includes geo-referenced Distance Sampling, Occupancy Modeling, and quantified habitat assessments for nesting shorebirds in the tundra in the vicinity of the new landfill. Additional work was done on shorebirds at several locations in the Russian Far East and China in the framework of UAF Avian Influenza investigations; whether these birds link to Alaska or not, is still to be assessed. However, the highlight of this season was the use of Handhelds for field data entry and processing. These Handhelds were designed by collaborators in the CEIRS (Center of Excellence in Influenza Research and Surveillance) based in Los Alamos and UCLA, and were field-tested by the EWHALE lab. During the IPY, digital issues play a major role in field projects, and the EWHALE lab was able to define database and metadata formats, and fine-tune the software entry mask and output. It is likely these gadgets, with online capability, will help projects worldwide to streamline field data processing and delivery time and include the automatic creation of Metadata while being fully compliant with ISO and U.S. governmental standards. After the first pilot season, a follow-up session is planned over winter with more Handheld applications coming forward.

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8. EXPERIMENTAL CLUTCH REMOVAL AND RENESTING IN DUNLIN (*CALIDRIS ALPINA ARCTICOLA*) ON ALASKA'S NORTH SLOPE – Gates et al.

Investigators: H. River Gates, Abby N. Powell, University of Alaska - Fairbanks; Richard B. Lanctot, U.S. Fish and Wildlife Service

In 2007, we initiated a study to evaluate how Dunlin (*ssp. arctica*) responded to experimental clutch removal examining renesting propensity, mate fidelity, nest site fidelity, and time required to lay replacement clutches. In this first year, we found that Dunlin whose clutches were

experimentally removed during early incubation usually (>85%) laid replacement clutches ($n = 20$). In 2008, we expanded our study by experimentally removing clutches during both early and late incubation. We captured 37 Dunlin pairs and four single adults and marked each individual with unique color band combinations and radio transmitters, for a total of 78 marked individuals. We controlled for initiation date across treatments (i.e., clutch removal during early and late incubation). We included nests where at least one adult was marked with a radio transmitter. Our early treatment utilized 21 clutches including 18 marked pairs, one nest where only the female was marked, two nests where mates abandoned and only males were radio marked, and one nest that was naturally depredated with only the male marked. Early treatment nests were initiated between 3-12 June and clutches were removed an average of 5.2 days into incubation ($n = 21$, range=3 -8 d). Our late treatment utilized 20 clutches where all pairs were marked except one female was color but not radio marked. Late treatment nests, were initiated between 2- 12 June and were collected between 21 -27 June 2008, an average of 13 days into incubation ($n = 20$, range = 12 -16 d).

Of the 21 clutches in the early treatment, Dunlin produced 91% replacement clutches: 16 pairs renested, 1 pair divorced and both members of the pair renested with new mates yielding two replacement clutches, and one female renested. Of the 20 pairs in the late treatment, only 35% or seven pairs renested, and all remained with their original mates. The average time between collection of the first clutch and initiation of the replacement clutch was 4.8 days (range 3-7 d) and 6.5 days (range 4-8 d) for early and late treatments, respectively. Most early-replacement clutches had four eggs, the rest had three eggs (5%, $n = 19$). Late replacement clutches were mostly 4-egg clutches, however a greater number of 3-egg clutches (28%, $n = 7$) were laid by the late treatment group. Early replacement clutches were laid on average 161 m from their initial clutch (range 22-451 m), late replacement clutches were laid on average 185 m from their initial clutch (range 84-549 m). One early treatment female divorced her mate and moved 2.04 km to lay her new clutch.

We showed an unexpectedly high rate of clutch replacement in Dunlin who lost their initial clutch during early incubation, but clutch replacement occurred less frequently for nests lost during late incubation. This suggests that a female's propensity to lay a replacement clutch is not likely due to physiological constraints, but may be more strongly related to when in the breeding season her first nest is lost. Indeed, females may assess (e.g. via environmental clues and physiological constraints) the ability to successfully lay, incubate, and raise young when deciding to replace a clutch. Studies focusing on arctic shorebird breeding ecology would benefit from investigating frequency and proportion of replacement clutches – the presence of such nests over-estimates nest density and population size. More studies are needed to evaluate how female characteristics (e.g. age) and environmental variables (e.g. predator numbers, food availability, seasonal weather patterns) affect propensity to replace clutches.

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Steve Zack

9. USGS ALASKA SCIENCE CENTER SHOREBIRD AVIAN INFLUENZA MONITORING EFFORTS – Gill & Ruthrauff

Investigators: Bob Gill and Dan Ruthrauff, U.S. Geological Survey

Since 2006, the USGS Alaska Science Center Shorebird Project has sampled a group of shorebird species for the presence of the Asian H5N1 subtype of highly pathogenic avian influenza (HPAI). In a continuation of efforts from 2006 and 2007, we focused our 2008 sample collection during the fall migration period at sites in western Alaska. Our field camp was located on the Yukon Delta National Wildlife Refuge near Punaorat Point in Angyoyaravak Bay. We were present at the site from 17 August to 20 September, and we collected 858 paired oral-pharyngeal and cloacal samples AI samples from 8 shorebird species that we live-captured utilizing rocket nets, whoosh nets, and mist nets. Most of the samples ($n = 816$; 95%) were from two target species (Dunlin and Rock Sandpiper). The remaining samples were from Sharp-tailed Sandpiper ($n = 21$), Bar-tailed Godwit ($n = 10$), Pacific Golden-Plover ($n = 3$), Long-billed Dowitcher ($n = 2$), Pectoral Sandpiper ($n = 2$), and Lesser Sand-Plover ($n = 1$). In addition to collecting AI samples, we collected blood, measurements, and wing photos from select Dunlin to attempt to differentiate between *pacifica* and *arctica* subspecies. This effort was spurred by the resight of Dunlin banded in Taiwan, Japan, and Teshekpuk Lake, as well as the capture of a Dunlin banded at Barrow, Alaska, the previous June.

In conjunction with sampling efforts at Punaorat Point, we captured and held 25 Dunlin for an evaluation of the effects of HPAI infection on shorebirds. Susceptibility of shorebirds to HPAI has largely been inferred from studies conducted on other bird species, but this study aims to establish the susceptibility, transmission patterns, and morbidity of Dunlin to experimental infection with HPAI. In August these birds were transported from the field to the National Wildlife Health Center in Madison, WI, where the experiments are currently underway.

We also collected fecal samples during spring and fall from Bar-tailed Godwits to determine if the prevalence of low-pathogenic avian influenza subtypes varied seasonally. Additionally, this study assessed the value of fecal samples in future avian influenza surveillance strategies. We collected samples from Bar-tailed Godwits at Cinder Lagoon on the Alaska Peninsula from 4–10 May ($n = 200$ samples), Egegik Bay on the Alaska Peninsula from 16–22 August ($n = 198$), and Cape Avinof on the Kuskokwim Delta from 2–6 September ($n = 199$). Our initial intent was to collect samples from known-age and known-gender godwits, but it quickly became clear that obtaining such samples would come at the expense of frequent disruptions to feeding birds that caused them to depart study sites. Thus, we opted to collect most fecal samples at roosting or foraging sites. Results from all the aforementioned sampling efforts were not available at the time of this submission.

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10. PACIFIC SHOREBIRD MIGRATION PROJECT – Gill et al.

Investigators in 2008: Bob Gill, Lee Tibbitts, Dan Ruthrauff, Dan Mulcahy, David Douglas, and Colleen Handel, U.S. Geological Survey; Brian McCaffery, U.S. Fish and Wildlife Service; Nils Warnock and Gary Page, PRBO Conservation Science; Phil Battley and Jesse Conklin, Massey University; Nathan Senner, Cornell University; Chris Hassell and Theunis Piersma, Global Flyway Network

Since its initiation in 2005, the Pacific Shorebird Migration Project (PSMP) has used satellite technology to better define migratory pathways, flight behavior, and breeding and non-breeding destinations of large shorebirds in the Pacific Basin. In 2008, studies focused on (1) comparing the migration strategies of two populations of Bar-tailed Godwit (ssp. *baueri* & *menzbieri*), (2) tracking individual Long-billed Curlews throughout their entire annual cycle, and (3) documenting the southbound migration routes and winter destinations of Alaska-breeding Marbled Godwits (ssp. *beringiae*).

In early February, we implanted satellite transmitters (hereafter PTTs, for platform transmitting terminals; 26 g units) in three male and six female *baueri* godwits on the North Island of New Zealand and 1 male and 14 female *menzbieri* godwits at Roebuck Bay in Western Australia. The PTTs provided positional data for the majority of birds across one or more seasons (i.e., northbound migration, spring staging, breeding, post-breeding, southbound migration). Highlights included northbound birds from both populations flying non-stop to China and North Korea, both populations staging for several weeks (Mar-May) at estuaries in the Yellow Sea that are highly impacted by human activities, and birds flying non-stop from staging areas in the Yellow Sea to breeding areas in Alaska (*baueri*) and Siberia (*menzbieri*). We were especially intrigued by the movements of post-breeding *menzbieri* godwits who traveled an additional 500–1,200 km north after breeding to stage on the New Siberian Islands (~75° N latitude). Seven of the transmitters lasted long enough for us to track *menzbieri* back to Roebuck Bay. The public continues to be fascinated with the migration of the godwits and their story has been told in a variety of venues including books, newspaper and magazine articles, radio and television programs, scientific and public presentations, as well as web-based media.

Throughout the year we tracked the movements of six of seven Long-billed Curlews that we had satellite-tagged in May 2007 on breeding areas in Oregon and Nevada. These individuals exhibited similar movement patterns across years and provided a huge amount of information on use of non-breeding areas. In May 2008 we deployed an additional eight of these particular solar-powered backpack PTTs (18 g units) on breeding birds (four males, four females) at the Oregon site. Birds departed Oregon and Nevada in late June-early July and most took unique routes to non-breeding areas in agricultural fields in the Central Valley of California, and coastal wetlands in Baja California and Sonora, Mexico. Graduate student Kristen Sesser (a former Alaskan shorebird biologist!) from Humboldt State University has just initiated an in-depth study of Long-billed Curlew habitat-use in the Central Valley and will incorporate the data from these tagged birds into her study.

In June, we tagged nine breeding Marbled Godwits with solar-powered backpack PTTs (9.5 g units). Birds were captured on their nests in dwarf-shrub tundra near Ugashik Bay on the Alaska Peninsula. During breeding and post-breeding, individual birds stayed in the general vicinity of their nests or traveled between coastal (Cinder Lagoon, Ugashik Bay) and inland sites. The godwits began to embark on their southbound migration flights in mid-July; their routes took them directly east of Ugashik across the Peninsula and then southeast across the Gulf of Alaska to landfall at sites on the Pacific coast in the U.S. and Canada. Birds have since settled in several bays scattered from Willapa Bay, Washington to Monterey Bay, California. These particular PTTs are not performing as consistently as the larger 18 g units that we deployed on the Long-billed Curlews, thus, detailed information on non-breeding movements of the godwits is limited at this time.

Next year we plan to study movements of Long-billed Curlews from additional breeding areas in the western and/or midwestern states and track the southbound migration of Whimbrels from Kanuti National Wildlife Refuge in Interior Alaska.

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Dan Ruthrauff

11. TUNDRA-BREEDING SHOREBIRD RECONNAISSANCE NEAR KANUTI LAKE, KANUTI NWR, 2008 - Harwood

Investigator: Christopher Harwood, Kanuti NWR, U.S. Fish and Wildlife Service

Situated in the heart of northern interior Alaska and the boreal forest ecosystem, Kanuti NWR not surprisingly is not renowned for its diversity and densities of breeding shorebirds. Motivation, timing, and locations of past field studies have been suboptimal for better clarifying the diversity, distribution, and abundance of shorebirds breeding on the refuge.

For the first time in 15 years, Kanuti staff “sprung out” on the refuge beginning in mid-April at an administrative cabin located on Kanuti Lake, adjacent to the Kanuti River. Project objectives included documenting spring phenomena such as breakup and bird arrivals in the local area (i.e., 8-km radius). Immediately south and southeast of Kanuti Lake and largely beyond the floodplain, a small area (<10 sq. km), likely contains the refuge’s most extensive, near-continuous swath of lichen-graminoid tundra. Despite its nearness to the southern part of the refuge’s base of operations since 1991 (i.e., Kanuti Lake Cabin), this tundra area has not been explored comprehensively.

Following local arrivals for Whimbrels and Hudsonian Godwits (May 6 and 8, respectively), breeding indicators (pairs, singing, flight displays) for both species began to be observed with greater regularity, particularly just south/southeast of Kanuti Lake. Although suspected breeding of Whimbrels had been documented regularly at a smaller (~ 0.5-km²) nearby tundra area 5 km east-northeast of the lake, no spring-early summer records for the refuge existed for the godwit, let alone any suggesting local breeding.

With evidence mounting for a greater local presence of Whimbrels than was documented heretofore, as well as the suggestion that these Hudsonian Godwits may not necessarily be migrants heading for western and northwestern Alaska, a 20-count point (>500m between points) circuit of the nearest 5-km² patch of tundra south/southeast of Kanuti Lake was surveyed on May 19. Whimbrels were detected at all 20 points (includes previously detected birds) and godwits at 6 of 20. Other suspected breeding shorebird species detected included Wilson’s Snipe and Least Sandpiper in the tundra, and Lesser Yellowlegs near floodplain waterbodies. Likely migrants (“fly-overs”) included Pectoral Sandpiper, Long-billed Dowitcher, and American Golden-Plover.

Given the unexpected local showing of Whimbrels and Hudsonian Godwits, USGS shorebird researchers at the Alaska Science Center were notified. Intrigued by the findings, they suggested that if sufficient numbers of breeders could be further substantiated, future intensive work in this area might be warranted. A post-hatch resurveying of the area mid-June suggested that at least 10-11 pairs of Whimbrels (excluding a transient flock of 11 birds) and 10 pairs (including 1 non-volant chick) of Hudsonian Godwits were breeding in the local area.

The refuge and USGS are currently finalizing study plans for the 2009 season to use satellite telemetry to track the southward migration of the Kanuti population of Whimbrels and, if technologically possible, to use data loggers in a longer term effort to study migration of the Hudsonian Godwits.

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12. DETERMINING RATES OF AND FACTORS THAT AFFECT CHICK SURVIVAL OF DUNLIN NEAR BARROW, ALASKA – Hill et al.

Investigators: Brooke Hill and Christine Hunter, University of Alaska – Fairbanks; Richard B. Lanctot, U.S. Fish and Wildlife Service

During the summer of 2008, we implemented a study to determine fledging success of Dunlin (*ssp. arcticola*) chicks and the factors that affect their survival. It is largely unknown how precocial shorebird chicks fare after hatching. Monitoring chick fates is logistically challenging because chicks are small, cryptic, and highly mobile. Several studies have found fledging success of waterbirds to be affected by hatch date, weight at hatch, weather, insect abundance, and lemming abundance. Working in conjunction with River Gates (Master's student, University of Alaska, Fairbanks – see Gates et al. in this report), we monitored chick survival for both first and replacement nests.

To evaluate chick survival, we put radio transmitters on at least one adult and two chicks from 20 initial clutches, 13 early replacement clutches (clutches laid after initial clutches were removed 3-8 days into incubation), and six late replacement clutches (clutches laid after initial clutches were removed 12-16 days into incubation). Broods were located every other day during which time we attempted to confirm the fate of chicks (fledged, missing, or dead). Searching stopped when the adult was not acting broody for two consecutive visits. During each visit we listened for radios, and when possible, counted the number of chicks present. When a chick with a radio was missing from a brood we searched the surrounding areas, and if possible, determined the cause of death. Chick deaths were primarily caused by predators or adverse environmental conditions. Chicks found in burrows were assumed killed by a mammalian species, either brown lemmings or weasels. Chicks found in pellets were assumed killed by an avian species, presumably snowy owls or jaegers. We also assessed food availability from the beginning of hatch until the last broods fledged using arthropod pitfall traps. This approach provided a crude measure of terrestrial insect abundance. We also collected data on mean hatch date, weather (mean temperature, wind, and rainfall), predator abundance (using point count surveys), lemmings (daily counts) and chick mass at hatch. These factors will be evaluated in the coming months to assess their impacts on individual and overall brood survival. We plan to continue this study in 2009.

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Brooke Hill

13. COUNTS AND CAPTURES OF HUDSONIAN GODWITS AND WHIMBRELS ON CHILOÉ ISLAND, CHILE, 2008 – Johnson, J. & Andres

Investigators: Jim Johnson and Brad Andres, U.S. Fish and Wildlife Service

This year marked our third field season studying Hudsonian Godwits and Whimbrels on Chiloé Island, Chile. We had three primary objectives this year: 1) complete the intensive ground survey and develop population estimates of Whimbrels and Hudsonian Godwits, 2) conduct an intensive resighting effort of birds banded on Chiloé Island in 2007, and 3) band additional Whimbrels and Hudsonian Godwits. Returning team members included Amanda Dey of New Jersey Division of Fish and Wildlife; Luis Espinosa, godwit enthusiast; Larry Niles of Conserve Wildlife New Jersey; Humprey Sitters, Wader Study Group; and Jorge Valenzuela of Centro de Estudios y Conservación del Patrimonio Natural. In addition, it was our good fortune to be joined by Lee Tibbitts of ASC, USGS; Steve Gates and Gerry Binsfield, Red Knot enthusiasts; and Nathan Senner, Eric Liner, and Ian Fein, of Cornell University.

Upon arrival, Andres and Johnson visited a number of sites in Seno de Reloncavi, a large embayment on the mainland north of Chiloé. Data collected during surveys of randomly selected shoreline segments and sites known to support Whimbrels and Hudsonian Godwits allowed us to estimate the number of both species in the region. During the boreal winter, 20,091 Whimbrels ($CI_{95\%} = 18,007 - 22,177$) are estimated to occur in the Chiloé Island region. Counts of Hudsonian Godwits on Chiloé totaled 21,161 individuals. Survey results increased published estimates of eastern Pacific Coast populations by 27% for Whimbrels and 51% for godwits. Bays and shorelines in the Chiloé Island region supported 99% of Hudsonian Godwits and 65% of Whimbrels estimated to occur along the eastern Pacific coast during the boreal winter. Seventeen individual bays would qualify for Ramsar designation as a Wetland of International Importance and as a Western Hemisphere Shorebird Reserve Network (WHSRN) site of regional

importance (1% of a biogeographic population). Two bays would qualify as WHSRN sites of hemispheric importance (30% of a biogeographic population) to shorebirds. A cluster of sites located near Chiloé's capitol Castro, supports >50% and 12% of the eastern Pacific Coast population of Hudsonian Godwits and Whimbrels, respectively.

Resighting marked birds from prior years and the additional captures of birds are needed to fulfill one of the primary research objectives on Chiloé — to estimate adult annual survival rates for Hudsonian Godwits and Whimbrels. Based on this year's encounter histories, it appears that we are off to a good start to accomplish this goal. Of 106 Hudsonian Godwits banded in 2007, we detected 42 (40%) this year. And, of the 93 Whimbrels we banded in 2007, we resighted 61 (65%). It appears, at this preliminary stage, that Hudsonian Godwits are prone to move from the site where they were caught; several were resighted at distances of up to 100 km from the capture site. In contrast, there were no resightings of Whimbrels at non-capture sites. This level of site fidelity is not surprising; Whimbrels are known to defend non-breeding territories, which on Chiloé are apparently influenced by the abundance and availability of their preferred prey, crabs. Also of note was the observation of a Whimbrel treated for myopathy in 2007, which appeared completely healthy at the site where it was caught in 2008.

Highlights of this year's cannon netting efforts included Sitters demonstration that his mastery of the animal world extends far beyond shorebirds. Sitters expertly redirected a very large sow and her four piglets away from the catch area and again, the stouthearted Sitters amazed onlookers by diverting a stampede of Chilote horses from trampling the net. Shorebird flocks at our catch sites, agitated by two Peregrine Falcons, added to our frustrations. Nevertheless, we managed to catch 217 godwits and 43 Whimbrels during four cannon net attempts.

Resightings of marked birds in North America increased dramatically this year. Within Alaska, marked godwits were seen at Kenai Flats (one), Westchester Lagoon (two), Egegik (two), Aropuk Lake (one). One other godwit was resighted at Mingan Island in Quebec. Additionally, a banded Whimbrel was observed at Naknek. Many thanks to the individuals who reported resightings the during the past two years.

We will continue our efforts on Chiloé Island in Dec 2008, with efforts focusing on resighting birds and increasing the number of individually marked godwits and Whimbrels. These efforts will enable us to generate more accurate and precise estimates of local and regional scale movements, turnover rates, and the first adult survival estimates for these two species. Additionally, to investigate migratory timing and routes of Whimbrels, we will attach solar-powered satellite transmitters to three individuals. Please contact the authors if you are interested in receiving updates on the movements of these individuals.

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14. EVALUATION OF GENETIC MARKERS FOR TRACKING VIRUS MOVEMENT ACROSS CONTINENTS AND AMONG/WITHIN DUNLIN SUBSPECIES – Johnson M. et al.

Investigators: Matthew Johnson, Susan M. Haig, Thomas D. Mullins, Robert E. Gill, U.S. Geological Survey; Richard B. Lanctot, U.S. Fish and Wildlife Service; Pavel S. Tomkovich, Zoological Museum of Moscow University

There is serious concern over the probability that migratory waterbirds might spread highly pathogenic avian influenza H5N1 (HPAI) from Asia to North America. For this to occur, infected, virus-shedding wild birds must cross the inter-continental boundary, and when these birds intermix with other wild bird populations, there must be successful intra- or inter-specific transmission of the virus. Dunlin should be an ideal candidate species for modeling the potential spread of HPAI across continents because two subspecies that occur in Alaska (ssp. *pacifica* and *arctica*) intermix in post-breeding flocks each fall before migrating to separate nonbreeding sites, one along the Pacific coast of North America (ssp. *pacifica*) and the other in East Asia (ssp. *arctica*). As part of a larger effort to document where the *arctica* subspecies winters (and hence it's likelihood to come into contact with HPAI), we conducted a population genetic subdivision study to determine if we could differentiate the five subspecies of Dunlin (*arctica*, *pacifica*, *sakhalina*, *actites*, and *kistchinski*) that reside in Beringia. Four of these subspecies (all but *pacifica*) winter in East Asia but the winter distribution is unknown. In 2007, we used PCR to amplify seven microsatellite loci for 79 individuals from two subspecies, *arctica* (3 breeding sites; Barrow, Prudhoe Bay, and Canning River, Alaska; $n = 60$) and *sakhalina* (breeding birds from Anadyr, Chukotka, Russia; $n = 19$). High allelic diversity and low probability of identity suggested the seven microsatellite loci used were robust and would detect population structure if present. Pairwise θ_{ST} between subspecies ($\theta_{ST} = 0.009$) and breeding areas (θ_{ST} range = 0.000–0.008) were low and non-significant indicating high gene flow between and within Dunlin subspecies. In 2008, we acquired samples from two additional Asian breeding subspecies (*kistchinski*, *actites*) and from *pacifica* which breeds and winters in North America. We also supplemented our sample of *sakhalina* through collecting on Wrangel Island and in Chaun Bay, Chukotka. Additional samples will be forthcoming from all subspecies this coming spring. During the fall 2009, we will expand our use of the microsatellite markers to the remaining three subspecies of Dunlin that reside in Beringia, and use mitochondrial DNA to investigate its usefulness in differentiating all five subspecies of Dunlin that breed in Beringia.

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15. INTER-SEASONAL MOVEMENTS, HABITAT USE AND MIGRATORY CONNECTIVITY OF BLACK OYSTERCATCHERS – Johnson M. et al.

Investigators: Matthew Johnson, U.S. Geological Survey; Peter Clarkson, Pacific Rim National Park Reserve of Canada; Michael I. Goldstein, USDA Forest Service; Susan M. Haig, U.S. Geological Survey; Richard B. Lanctot, U.S. Fish and Wildlife Service; David F. Tessler, Alaska Department of Fish and Game; Denny Zwiefelhofer, U.S. Fish and Wildlife Service

The Black Oystercatcher occurs along North America's Pacific coast from the Aleutian Islands to Baja California and is a species of high conservation concern throughout its range (population size between 8,900-11,000 individuals). Conservation of Black Oystercatchers is hindered by a lack of information on their nonbreeding distribution, inter-seasonal movements, and habitat connectivity. We used satellite ($n = 18$) and VHF ($n = 19$) radio transmitters to track Black

Oystercatchers from five breeding sites (Vancouver Island, British Columbia; Kodiak Island, Prince William Sound, Middleton Island, and Juneau Alaska) to nonbreeding sites, and back again (2007-2008). We observed variation in migration strategy among breeding populations. Preliminary results suggest long-distance migration in three populations (range of migration distances: Prince William Sound, 1218-1664 km; Middleton Island, 1031-1479 km; Juneau, 130-1033 km) and year-round residency in two others (Kodiak and Vancouver Islands). Preliminary findings indicate that the coasts of British Columbia and Southeast Alaska provide critical nonbreeding habitat for Black Oystercatchers, as all of the migratory birds we monitored wintered there. Further, four of the satellite transmitters we used continued to transmit location data through fall migration 2008 ($n = 1$ Juneau, $n = 3$ Middleton Island). All four of these birds exhibited fidelity to their previous wintering site. We are currently investigating which factors have the greatest effect on Black Oystercatcher space and habitat use throughout the annual cycle to better understand observed variation in migration strategy.

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Brian Guzzetti

16. *RENESTING AND BETWEEN-CLUTCH PAIR FIDELITY OF PACIFIC GOLDEN-PLOVERS BREEDING NEAR NOME, ALASKA – Johnson W. et al.*

Investigators: Wally and Patricia Johnson, Montana State University; Roger Goodwill and Roger Gold, Brigham Young University–Hawaii

Coincident to obtaining blood samples and eggs for DNA analyses of possible extra-pair paternity in Pacific Golden-Plovers, we marked both members in 12 pairs and collected their clutches. This provided an ideal opportunity to monitor subsequent replacement laying by banded females along with between-clutch mate fidelity. After loss of their eggs, six pairs plus

the male in a seventh pair remained on their nesting territories and five pairs disappeared. Each pair that continued to occupy its territory consisted of the same partners. At least four pairs re-nested with the females laying replacement clutches. The other two pairs were probably re-nesting, but we left the area before this could be confirmed. Distances between initial nests and new nests ranged from 74-457 m. Two of the replacement clutches were complete (four eggs), and two contained three eggs. The 3-egg nests were discovered near the end of our fieldwork, and because of time constraints we were unable to determine whether fourth eggs were laid. Females began replacement laying about one week after loss of an initial nest even when incubation of the preceding clutch was nearly complete. Four of the clutches collected from the five pairs that went missing were at early stages of incubation (3-5 days) in late June – a time when most other initial clutches in our sample group were close to hatching. Such disparity most likely indicated that these recently produced clutches had been laid in response to natural predation of first nests. We suspect that our removal of the clutches in question, thereby the second of two consecutive nest failures, exceeded the physiological ability of females for continued egg-laying and prompted abandonment of nesting sites. If the foregoing interpretation of clutches and events among missing pairs is correct, it follows that there were at least eight instances of re-nesting in our sample population of 12 pairs.

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17. DNA ANALYSES TO DETERMINE WHETHER EXTRA-PAIR MATING OCCURS IN AMERICAN AND PACIFIC GOLDEN-PLOVERS – Johnson, W. et al.

Investigators: Wally and Patricia Johnson, Montana State University; Roger Goodwill and Roger Gold, Brigham Young University–Hawaii; Sandra Talbot, U.S. Geological Survey; Richard B. Lanctot, U.S. Fish and Wildlife Service

There have been relatively few paternity studies on monogamous shorebird species, with much of the focus on species with lekking, polyandrous or polygynous mating systems. American Golden-Plovers and Pacific Golden-Plovers are generally considered to be seasonally monogamous. However, there is the possibility of extra-pair paternity, and we are exploring this question through genetic analyses of parents and their offspring. In both species, males tend to incubate during daytime hours and females at night. Notably, the females when off-duty (i.e., not incubating) spend considerable time foraging elsewhere often far removed from the nest. It is at these times that possible extra-pair copulation seems most likely to occur. During the 2008 breeding season, we captured and bled both adults and collected entire clutches from 15 nesting pairs of Pacific Golden-Plovers and five pairs of American Golden-Plovers in the Nome region. We also collected blood and tissue samples from 15 American Golden-plover families in the Barrow region. These materials were then hand-carried (the eggs in frozen condition) to the Molecular Ecology Laboratory at the USGS Alaska Science Center for DNA analyses. The latter are currently in progress, and we expect results to be available in 2009.

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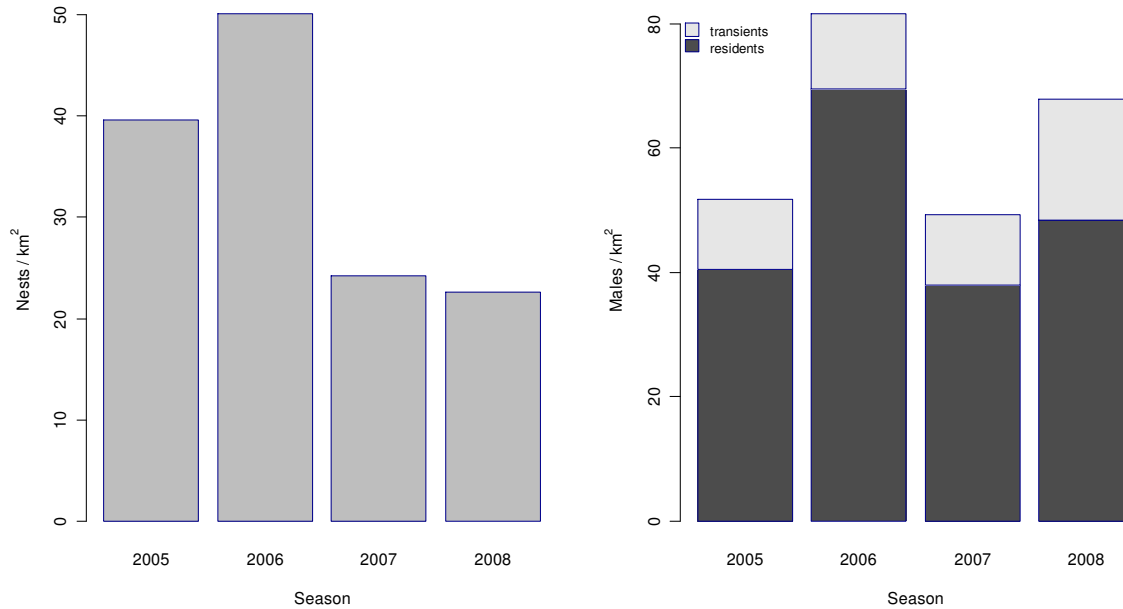
Will Goldenberg

18. BEHAVIORAL ECOLOGY OF PECTORAL SANDPIPERS – Kempenaers et al.

Investigators: Bart Kempenaers, Raimund Barth, Christina Muck, Holger Schielzeth, Silke Steiger, Mihai Valcu, Wolfgang Forstmeier, Sylvia Kuhn, Ariane Mutzel, Katja Temnow, Wolfgang Heidrich, Franz Kümme, Peter Loës, Max Planck Institute for Ornithology

In 2008 we continued our field study on the pectoral sandpipers at the same location near Barrow (71.32 N, 156.66 W) as in previous years (2005, 2006 and 2007). The study area was slightly different in size between years nevertheless we maintained a common core area of 1.24 square kilometers for all seasons. In 2008 we followed the same standardized field protocol and captured (using mistnets or nest-traps) 326 adult individuals (184 males and 142 females). All individuals were marked with a unique combination of color bands. We measured the tarsus, wing and culmen length of each captured bird and a small blood sample was collected for hormones and genetic analysis. The color bands allowed us to re-sight each individual present in the study area on a daily basis. For each re-sighting, the individual's GPS position and a set of standardized behavioral measures were recorded. Based on re-sightings we could then establish whether an individual remained to breed (was resident) or spend less than a day in the study area and then moved on (was transient). An inter-season comparison suggests 2008 as a low density

season in terms of both nest density and proportion of resident males relative to transients (see figure). However, the mean residency time in 2008 was 12.9 ± 1 days (mean \pm SE) very similar with the previous seasons: 12.1 ± 1.4 in 2007, 15.5 ± 0.9 in 2006 and 11.6 ± 0.7 in 2005.



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19. POST-BREEDING SHOREBIRD STUDIES ON THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA – Kendall et al.

Investigators: Steve Kendall, U.S. Fish and Wildlife Service; Stephen Brown, Manomet Center for Conservation Sciences; Audrey Taylor, University of Alaska, Fairbanks; and Roy Churchwell, University of Alaska, Fairbanks

Several species of shorebirds aggregate after their breeding season in coastal habitats on the Arctic Coastal Plain (ACP) of Alaska, including areas within the Arctic National Wildlife Refuge (Arctic Refuge). Staging in these habitats is believed to be critical for building energy reserves necessary for migration. Coastal areas are vulnerable to potential effects of offshore oil development in the eastern Beaufort Sea and to changing sea conditions associated with climate change. In 2005-07, we and several partners participated in cooperative studies of the use of coastal habitats by post-breeding shorebirds across the ACP. We identified several high-use areas on the Arctic Refuge coast, but other aspects of post-breeding shorebird ecology merit further study. For example, there was considerable inter-annual and within-season variability in use of coastal habitats, but the mechanisms for this observed variability are uncertain. They may include weather, wind, and water conditions, all of which likely affect food availability. In 2008

we continued studies to evaluate characteristics and determinants of shorebird use of near-shore marine habitats on the Arctic Refuge. Our specific objectives and methods included:

Assess the abundance, distribution, timing, species composition and habitat requirements of shorebirds staging on coastal areas. Multiple ground-based surveys were conducted on three of the largest river deltas on the refuge (Canning, Hulahula/Okpilak, and Jago) to better understand the habitat relationships and phenology of shorebirds in coastal areas. Additional surveys were conducted during the peak staging period on other major river deltas to document overall spatial distribution of post-breeding shorebirds on the Refuge. To quantify movement patterns within the staging period and residency times of pre-migratory shorebirds at staging sites, birds were captured and marked with color leg bands or paint. Since we had crews looking at post-breeding shorebirds in multiple coastal areas on the Arctic Refuge we hoped we could learn more about movement between staging areas.

Determine how environmental conditions such as food availability and wind, weather and water levels affect use of coastal habitats by post-breeding shorebirds. In conjunction with the surveys, we collected environmental data including wind speed and direction, temperature, precipitation, and tide stages to investigate how these factors affect the distribution and abundance of shorebirds. We also collaborated with researchers from the University of Texas to conduct pilot investigations on distribution of food sources (invertebrates) in shorebird habitats, by collecting samples at survey sites.

As with previous years, Semipalmated Sandpipers were by far the most abundant species on all surveys. Comparing data from the three sites with multiple surveys, we found the highest numbers of Semipalmated Sandpipers at the Jago. This site also had relatively high numbers of phalaropes and Dunlin. Previously we considered the Jago to be less important for post-breeding shorebirds than other Arctic Refuge deltas. Peak numbers of both Semipalmated Sandpipers and Dunlin were during the first week of August. At all deltas there was a peak in numbers of phalaropes in late July and there were secondary peaks in phalarope numbers in early August at the Hulahula/Okpilak and Jago Deltas.

We also conducted two comprehensive surveys of all the larger river deltas on the Refuge, one in late July and one in early August. There generally were higher numbers of birds during the July survey, but this was not the case on all of the deltas. In these spatial comparisons we found highest concentrations of shorebirds at the Canning, Hulahula/Okpilak and Jago River Deltas with relatively few birds utilizing other coastal areas of the Refuge. Only the Kongakut River Delta, another relatively large river, had concentrations approaching those of these other deltas and this only occurred during the July survey.

Most re-sights of color marked birds were within 1-2 days of their capture. However, at least 2 birds remained at staging sites for at least a week. No birds were re-sighted at sites other than where they were captured. Environmental conditions did appear to affect use of coastal areas by shorebirds in 2008. At the end of July there was a period with strong west winds, resulting in high water levels that flooded most coastal areas. All of the river deltas and many of the barrier islands were under water for several days. It is not clear where staging shorebirds went during this period, but one bird that was color marked prior to this event was subsequently re-sighted. It appears that at least some birds remained in the area and returned to coastal habitats when they became available again in early August. We identified invertebrates at the Jago and Okpilak River Deltas, but did not quantify these resources. At the Jago we found mostly amphipods and at the Okpilak chironomids (midges) and Tipulidae (crane flies).

Work thus far has shown coastal areas of the ACP to be important to pre-migratory shorebirds, but has left many questions unanswered. We are continuing investigations in 2009 and beyond with a PhD candidate student, Roy Churchwell, at the University of Alaska, Fairbanks.

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Steve Zack

20. USE OF STABLE ISOTOPES TO DIFFERENTIATE DUNLIN SUBSPECIES BREEDING IN BERINGIA –
Lancot et al.

Investigators: Richard Lancot, U.S. Fish and Wildlife Service; R. Gill, C. Ely, and C. Stricker, U.S. Geological Survey; P. Tomkovich, Moscow State University; L. Wassenaar, Environment Canada; and M. Wunder, University of Colorado Denver

There are five subspecies of Dunlin that breed in the Beringia region. In Alaska, the *pacifica* subspecies breeds on the Yukon Delta and the *arctica* subspecies breeds on the North Slope. The three other subspecies breed in Russia: the *sakhalina* race breeds on Wrangel Island and Chukotka, the *kistchinski* race breeds on the Kamchatka Peninsula, and the *actites* race breeds on the north end of Sakhalin Island. The three Russian-breeding subspecies and the *arctica* race of Dunlin migrate via the East Asian – Australasian Flyway to winter in South and East Asia. How these four subspecies distribute themselves during the winter is unknown, but their distribution has large ramifications due to the potential exposure to high pathogenic avian influenza viruses (HPAI). It is known that Dunlin do winter in areas known to have or previously had HPAI, and that the species uses freshwater and agricultural habitats that significantly increase their likelihood of coming into contact with domestic fowl or their wastes that may have the HPAI. Although the *pacifica* race of Dunlin does not winter in Asia where the

H5N1 is present, it does intermix with the *arctica* race when they stage on the Yukon Delta of Alaska. Thus there is also potential for transfer of viruses to this subspecies.

Currently, it is impossible to tell the Dunlin subspecies apart reliably using morphology, and thus it is impossible to determine where each subspecies winters in Asia. In 2006, we began a multi-pronged study to differentiate the various subspecies of Dunlin, including band resightings, genetic population subdivision, and stable isotopes. The latter effort began in 2008 and relies on the fact that (1) a bird's body tissues, including feathers, carry chemical markers that reflect its diet and habitat, and (2) that these chemical markers vary spatially across the surface of the earth according to well-defined geological processes. These two factors provide the ability to predict a bird's geographic origin by analyzing the chemical content of particular feathers. Dunlins are an ideal candidate for this methodology because the various subspecies breed in distinct locations across a large geographic area where stable isotopes are known to vary, and because the species is atypical among shorebirds in that they regularly molt their 1-5th primaries on the breeding grounds. Thus by collecting one of the first five primaries from Dunlin on the wintering grounds, we expect to be able to identify where that bird bred during the prior summer. Similarly Dunlins undergo a body molt into breeding plumage on the wintering grounds, and thus analysis of black breast feathers should indicate where that individual spent the winter.

Relying on a bank of feathers collected at seven distinct breeding locations over the past few years, we are conducting a preliminary analysis to validate the potential for this technique to reliably separate the subspecies. We also have many feather samples from Dunlins captured in China and Taiwan during the past year that are available should this technique prove successful on breeding birds. We hope to gather more feather samples from additional breeding locations, as well as migration/wintering sites in South Korea and Japan in the coming year. To date, we have analyzed 101 wing feathers from three populations (Barrow, Teshekpuk Lake, and Canning River) of *arctica* Dunlin, two populations (Yukon Delta and Alaska Peninsula) of *pacifica* Dunlin, one population (Wrangel Island) of *sakhalina* Dunlin, and a population of Dunlin residing on St. Lawrence Island whose putative subspecies is unknown. Our initial analysis of stable hydrogen isotope ratios (δD) indicated Wrangel Island Dunlin had the lowest ratios, followed by slightly higher values for the three *arctica* populations and the Yukon Delta *pacifica* subspecies, and higher values again for the remaining Alaska Peninsula population of the *pacifica* subspecies and the unknown population residing on St. Lawrence Island. Additional laboratory work is currently being conducted to obtain stable carbon and nitrogen isotope ratios. We hope that by combining the results from these three stable isotopes that we can reasonably distinguish an individual belonging to one of these three subspecies.

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21. AVIAN INFLUENZA SAMPLING OF ARCTICOLA DUNLIN AND OTHER SHOREBIRDS IN TAIWAN – Lanctot et al.

Investigators: Richard Lanctot, U.S. Fish and Wildlife Service; Chung-yu Chiang, Taiwan Wader Study Group; and Hon Ip, U.S. Geological Survey

To ascertain whether Dunlin on their nonbreeding grounds might carry the highly pathogenic H5N1 avian influenza (HPAI) virus, we captured Dunlin (as well as other shorebird species) at two coastal sites in Taiwan. Because four subspecies of Dunlin (i.e., *arctica*, *kitschinski*, *actitis*, *sakhalina*) that breed in the Beringia area migrate to Asia to winter, it is unknown where the Alaskan subspecies of Dunlin (i.e., *arctica*) winter, and whether this subspecies mixes with the other subspecies. Thus any samples collected from Dunlin in Asia can not be definitively linked to Alaska (i.e., captured Dunlin may not migrate to Alaska). Nevertheless, sampling birds in areas where H5N1 outbreaks have occurred can answer the most basic question -- are shorebirds, particularly Dunlin, susceptible to acquiring the virus. In December 2007, we captured 312 shorebirds of 13 species. From the 229 Dunlin captured, we obtained 162 esophageal swabs, 161 cloacal swabs, 167 whole blood samples, and 130 feather (1st or 2nd primary and breast) samples. Amongst the shorebirds were two other Alaska migrants: one Pacific Golden Plover and one Ruddy Turnstone.

Difficulties in obtaining and shipping nitrogen vapor shippers typically used to store virus samples required that we save our avian influenza samples in 100% ethanol. This change made preserving full-length nucleic acids and viable viruses difficult, preventing in some cases definitive identification of the hemagglutinin and neuraminidase subtypes. Ethanol samples represented our best opportunity to test birds for avian influenza in difficult field conditions. Samples were transferred to the National Wildlife Health Center in Madison, Wisconsin, where each sample was tested for the presence of avian influenza by RNA extraction and tested by the Matrix RT-PCR test. Of an initial round of 246 esophageal/cloacal paired samples, all came up "Negative" according to the National Animal Health Laboratory Network's test criteria. However, 5 samples were listed as Equivocal in the matrix RT-PCR test and are considered as "Positive" by some researchers. If these are all really positive, this would be a 0.02% detection rate. Since the samples were stored in ethanol, it is not possible to do further analysis on these samples to verify these findings. This detection rate compares to a 7.1% detection rate from samples collected from shorebirds in China in February 2007, and 0.16% and 0% detection rate in all shorebird species sampled in Alaska in 2006 ($n = 3180$) and 2007 ($n = 1476$), respectively. Our results suggest the prevalence rate in Taiwan is quite low, especially when compared to China and the 2006 samples from Alaska. It is also lower than the 0.5% and 14.2% infection rate in shorebirds sampled in northern Europe ($n > 3000$, Fouchier et al., 2003) and the Chesapeake Bay region of northeast North America ($n = 4,266$, Krauss et al., 2004), respectively.

During the spring of 2007, Chung-yu Chiang and his banding crew captured an additional 700 shorebirds belonging to 18 species. Among these, 442 Dunlin had their esophagus and cloaca swabbed. This time many of the samples were preserved in regular media and frozen in nitrogen vapor shippers, which will allow us to genotype any viruses found. These samples are awaiting an export permit from Taiwan, but upon receiving one, will be sent to the National Wildlife Health Lab for further analysis.



Kevin Pietrzak

22. REPRODUCTIVE ECOLOGY OF SHOREBIRDS: STUDIES AT BARROW, ALASKA, IN 2008 – Lanctot et al.

Investigators: Richard Lanctot, U.S. Fish and Wildlife Service; and H. River Gates and B. Hill, University of Alaska, Fairbanks

In 2008, we conducted the sixth year of a long-term shorebird study at Barrow, Alaska (71.29°N, 156.64°W). The objectives of this study are to collect baseline data on (1) temporal and spatial variability of shorebird diversity and abundance, (2) arrival date, nest initiation and effort, clutch and egg size, hatch and chick survival, and other demographic traits of arctic-breeding shorebirds, (3) to establish a marked population of as many shorebird species as possible that would allow us to estimate adult survival, mate and site fidelity, and natal philopatry, and (4) to relate weather, food availability, and predator and prey abundances to shorebird productivity. Data on demographic parameters are vitally needed to understand why many shorebird species are declining.

We located and monitored nests in six 36-ha plots in 2008. All six plots are the same as those sampled in 2005-2007. We used the same search intensity and methodology as between 2004 and 2007. The breeding density of all shorebird species on our study area averaged 88.1 nests/km² across all years. In 2008, the second highest density of shorebirds nested within our plots. As in 2005-2007, our ability to find nests was probably enhanced by a fox removal program that allowed many nests to survive through to hatching, giving us more time to find the

nests. Lemming numbers were very high in 2008, even higher than in 2006, which was the last high lemming year in previous years. Pomarine Jaegers and Snowy Owls nested in higher numbers in or near our plots than in any preceding year.

In 2008, we recorded the highest breeding density of American Golden-plovers, Baird's Sandpipers, Long-billed Dowitchers, Red-necked Phalaropes, Semipalmated Sandpipers, and Western Sandpipers during the five years of our study. Long-billed Dowitchers, with 22.2 nests/km², showed one of the most dramatic increases; nest densities were twice as high as the previous highs seen in 2006 and 2007, and three times higher than the six-year running average. Western Sandpiper densities reached 2.78 nests/km² (6 nests); no nests for this species had been found in 2003 and 2005-2007, and only a single nest was found in 2004. The most abundant species in the past (Red Phalaropes, Dunlin, Pectoral Sandpipers) occurred at near average levels based on our six-year average. A total of 233 nests were located on our plots and another 137 nests were found outside the plot boundaries. This was nearly 100 nests below the long-term high, which occurred in 2006, but more than in any other year. Nests on plots included 34 Pectoral Sandpiper, 59 Red Phalarope, 35 Dunlin, 27 Semipalmated Sandpiper, 48 Long-billed Dowitcher, 8 Red-necked Phalarope, and 13 American Golden-plover, 6 Western Sandpiper and 2 Baird's Sandpipers. Buff-breasted Sandpipers and White-rumped Sandpipers were not observed on our plots in 2008. A large effort was spent locating dunlin nests off plots as part of a continuing avian influenza sampling effort, and also for a clutch replacement experiment (see summary by H. R. Gates et al. in this report).

The first shorebird clutch was initiated on 6 June in 2008. This date was later than in prior years, which averaged about the 3 to 4 June. Peak initiation date was 10 June and median initiation date was the 16 June; these dates were later than in 2007 but about average compared to other years. Median nest initiation dates for the more abundant species were 12 June for Dunlin, 11 June for Semipalmated Sandpipers, 16 June for Red Phalarope, and 20 June for Pectoral Sandpipers. These dates are either the latest or tied with the latest dates of nest initiation documented during our 6-year study. Predators destroyed 24.1% of the nests in 2008 – a marked increase from the 11.1% in 2007, 8.3% in 2006, and 11.2% in 2005, but still much lower than the 67.9% and 42.6% recorded in 2004 and 2003, respectively. Across the more abundant species, hatching success (# hatching at least one young/total number of nests) was highest in Pectoral Sandpiper (91.9%, $n = 37$), followed by Semipalmated Sandpipers (78.1%, $n = 32$), Dunlin (70.0%, $n = 90$), Red Phalarope (59.7%, $n = 62$), and Long-billed Dowitchers (43.2%, $n = 37$). These numbers are slightly lower than in the prior three years (all of which had fox control), but were much higher than in 2003 and 2004 without fox control. A comparison across study plots indicated that hatching success was between 50 and 60% for all plots except plot 5 that had only 37% hatching success. We suspect that the relatively high hatching success in 2008 was due to the absence of fox on our study area. However, the percentage of successful nests was lower than in other years with fox control (i.e., 2005 – 2007). This difference is likely due to the high number of avian predators, combined with the lack of nesting cover resulting from intense grazing by lemmings on our plots.

In 2008, we captured and color-marked 358 adults. This is the greatest number of adults ever banded in a single year, eclipsing the 2006 high of 342 birds. Forty-two of these adults (36 Dunlin, five Semipalmated Sandpipers, and one American Golden-plover) had been banded in a prior year. Adults captured included 165 Dunlin, 46 Long-billed Dowitchers, 45 Semipalmated Sandpipers, 37 Pectoral Sandpipers, 24 Red Phalarope, 22 American Golden-plovers, 12 Western Sandpipers, three Baird's Sandpiper, two Red-necked Phalarope, and one each of

Semipalmated Plover and White-rumped Sandpiper. We captured and color marked 465 chicks in 2008. This was tied for the second highest number captured but far below the number banded in 2006 (707) —a reflection of the far fewer Pectoral Sandpiper and Red Phalarope nests in the study area.

We continue to conduct ancillary studies as time allows at Barrow. Avian influenza sampling was a prominent feature of our work in 2006-2008 during which all captured birds were swabbed to test for the highly pathogenic H5N1 avian influenza virus. Audrey Taylor (PhD candidate, UAF) continued analyzing data with the aim of documenting the distribution, movements, and physiology of post-breeding shorebirds on the entire Alaska Arctic Coast. Additional data were collected for Nathan Coutsoubos' PhD study (UAF), which is investigating how (1) the construction and operation of a landfill and (2) the experimental flooding/drainage of a wetland influence shorebirds. River Gates (MS candidate, UAF) completed her second field season in which she documented the rates of clutch replacement laying. Finally, Brooke Hill (MS candidate, UAF) conducted her first season of her masters in which she investigated the survival of dunlin chicks from control, and early and late replacement clutches (summaries for these four ancillary studies are included in this report).

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23. AVIAN INFLUENZA SAMPLING AND SHOREBIRD SURVEYS IN THE TESHEKPUK LAKE SPECIAL AREAS OF THE NATIONAL PETROLEUM RESERVE – ALASKA, IN 2008 – Lanctot et al.

Investigators: Richard Lanctot, Jim Johnson, and Brad Andres, U.S. Fish and Wildlife Service; Stephen Brown, Manomet Center for Conservation Sciences

Serious concerns surround the probability that migratory waterbirds might spread highly pathogenic H5N1 avian influenza (HPAI) from Asia to North America. Five of the 26 high target avian influenza species are shorebirds that breed on the North Slope of Alaska. These include the *arctica* subspecies of Dunlin, Pectoral Sandpiper, Long-billed Dowitcher, Ruddy Turnstone, and Buff-breasted Sandpiper. All five species have some or all of their population winter in Southeast Asia where exposure to the HPAI is likely. In 2008, we conducted a second year of captures and survey work on the Teshekpuk Lake Special Area of the National Petroleum Reserve – Alaska. This area is known to have high population densities of many of these key species, and parts of it have recently been leased for oil and gas development. These facts make the area very good for capturing birds and will the survey data will allow us to document the distribution and abundance of birds, providing valuable data for assessing potential impacts of proposed oil and gas development.

We relied on one R-44 helicopter to transport field crews to survey sites where they captured birds and conducted rapid surveys of plots. The use of a helicopter allowed us to gather samples over a large geographic area, which we hoped would increase our chances of detecting the virus. Field crews captured displaying birds with mist nets and incubating adults with bow nets. All individuals had a metal band placed on their legs, and, in the case of Dunlin, a unique set of color bands were placed on each bird. Birds were also weighed and measured so that we could determine age and sex (for some species). In addition, we recorded a fat index and the stage of

molt for their flight and tail feathers. We also collected a blood sample for use in genetic and hormone studies, and one or more feathers for use in stable isotope studies. While at these sites, we also conducted rapid surveys at a random selection of plots to develop maps depicting the distribution, diversity, and relative abundance of breeding shorebirds and other waterbirds in relation to their habitat use.

Field crews captured a total of 147 shorebirds (one American Golden-plover, 10 Black-bellied Plovers, one Buff-breasted Sandpiper, 67 Dunlin, 10 Long-billed Dowitchers, 29 Pectoral Sandpipers, six Red Phalaropes, one Red-necked Phalaropes, four Ruddy Turnstones, 15 Semipalmated Sandpipers, and three Stilt Sandpipers) at 119 sites between 9 and 22 June. From these birds, 146 cloacal avian influenza swabs, 145 esophageal avian influenza swabs, 20 fecal avian influenza swabs, and 142 feather samples were collected. To date, no positive cases of H₅N₁ avian influenza virus has been detected in shorebirds. Feathers from Dunlin are being used to assess movements of birds between breeding and wintering grounds using stable isotope markers. Resightings of captured birds are helping to document migration pathways to Southeast Asia.

During the 119 rapid surveys, a total of 1,881 shorebirds of 13 species were recorded. The most commonly observed species were the Semipalmated Sandpiper (417), Red Phalarope (382), Dunlin (310), Red-necked Phalarope (255), Pectoral Sandpiper (194), Long-billed Dowitcher (137), and Black-bellied Plover (111). The remaining species had <50 individuals observed each. A large number of other species were also observed off plot but not tallied here. The data obtained during this study and that in 2007 are presently being analyzed to document distribution, diversity, and relative abundance of shorebirds in the Teshekpuk Lake Special Area.

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24. MIGRATORY CONNECTIVITY OF WESTERN SANDPIPERS –Lank et al.

Investigators: David B. Lank, Samantha Franks, Birgit Schwarz, and Dave Hope, Simon Fraser University; Richard B. Lanctot U.S. Fish and Wildlife Service; Melissa Cady, US Forest Service; and many, many others throughout the species' range!

We have initiated a range-wide study of the migratory connectivity of Western Sandpipers, including population genetics, stable isotope and trace element compositional analyses of feathers and other tissues, and morphometrics. We are collecting samples from throughout breeding, migration, and non-breeding ranges, and will assess population structure and demography of birds wintering at different latitudes and breeding in different sites. The project is funded primarily by a Canadian NSERC grant and a Neotropical Migratory Bird Conservation Act grant involving collaborators in the US, Canada, Mexico, Panama, and Ecuador. Field work in Alaska in 2008 started with Melissa Cady and Rick Lanctot collecting samples from migrants in the Stikine Delta. Field work on the breeding grounds was conducted by long-time Alaska shorebird veterans Diane Tracy and Jay Schamel, and by a Simon Fraser University graduate student Dave Hope, who took time out from his thesis, which focuses on examining anti-predator behavior of Western Sandpipers on migration, to experience the birds on their breeding grounds. Blood and feather samples of nesting birds were collected at three sites on the Seward Peninsula:

east of Nome along Safety Sound (Brett Sandercock's old field site), Cape Espenberg (Doug Schamel and Diane Tracy's phalarope site), and just north of Wales. Dave Hope also collected samples from locally-grown juveniles at Nome. An unexpected bonus came from several Westerns nesting at Barrow, found by Rick Lanctot and his crew. We also received blood samples collected at Kanaryarmiut Field Station on the Yukon Delta by Dan Ruthrauff, Brian McCaffery and others, which were stored by Sandy Talbot at the Alaska Science Center. We lack feather samples from the Delta, however, and hope to obtain some from this area next season. Contributions will be welcome from any sites in Alaska!

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Jan van de Kam

25. LONG-TERM MONITORING OF TUNDRA-NESTING BIRDS IN THE PRUDHOE BAY OILFIELD, NORTH SLOPE, ALASKA – Liebezeit & Zack

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

Since 2003, the Wildlife Conservation Society (WCS), in cooperation with BP, has monitored nest survivorship, nest predator abundances and other parameters that may influence nesting success in the Prudhoe Bay Oilfield. This on-going monitoring effort will help us better understand potential impacts from industry, climate change, and other factors on the nest survivorship of breeding birds.

In 2008, we discovered and monitored 93 nests of 12 species from 7 June to 21 July on 12 10-ha study plots using both rope drag and behavioral nest search techniques. Lapland Longspur, Semipalmated Sandpiper, Pectoral Sandpiper, and Red-necked Phalarope nests accounted for the majority (67%) of those found. Among all species, 51 nests successfully hatched/fledged, 31 failed, and 11 nests were of unknown fate. Nest predation was the most important cause of nest failure (94%). Other sources of nest failure included abandonment for unknown reasons ($n = 1$) and accidental trampling by a field observer ($n = 1$). Overall nest density was 71.7 nests/km², noticeably lower than at this site in 2006 (101.6 nests/km²) but comparable to all other years monitored. Program MARK constant survivorship model (Mayfield) estimates of nesting success ranged from 30 to 100%, for the three most common breeding species ($n > 10$), and overall daily survival rate for shorebirds and longspurs returned to levels similar to previous years from the low observed in 2007 (2007: 0.954 ± 0.008 vs. 2008: 0.975 ± 0.005 ; mean \pm SE).

Lemming activity at this site was noticeably higher than last year (0.039 lemmings/30 min. count in 2008 vs. 0.002 in 2007), however levels were still less than half of that observed in the “high” lemming year of 2006 (0.085 lemmings/30 min. count). Pomarine Jaegers and Snowy Owls were rarely detected and, unlike in 2006, did not nest in the study area this year. Overall, six species of potential nest predators were detected during timed surveys in 2008 with the most common being Glaucous Gulls and Parasitic Jaegers (79% of detections).

Snow melt and subsequent tundra exposure occurred earlier in 2008 than all previous years monitored. Snow melt was essentially complete by the time we started conducting field work on 7 June (<0.5 snow cover on all study plots). In previous years the mean date for completion of snow melt was 12 June. Correspondingly, nest initiation dates for most species were noticeably earlier in 2008 compared to 2007 (and all other years). We continued our multi-year efforts in using remotely activated camera systems to identify nest predators at active shorebird nests. This year we monitored four nests with two Trailmaster[®] cameras. All monitored nests were successful and so no predation events were recorded.

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26. BREEDING BIRD DIVERSITY, DENSITY, NESTING SUCCESS AND NEST PREDATORS AT A STUDY SITE IN THE TESHEKPUK LAKE SPECIAL AREA, NORTH SLOPE, ALASKA – Liebezeit & Zack

Investigators: Joe Liebezeit and Steve Zack, Wildlife Conservation Society

Within the Arctic Coastal Plain region of Alaska, the Teshekpuk Lake Special Area in the National Petroleum Reserve – Alaska has been identified as a region of exceptional importance to wildlife including breeding shorebirds. Proposed expansion of oil development into this region may negatively impact these populations. However, no baseline studies have been conducted in the TLSA that evaluates the reproductive success for many of these species – a critical factor that is vital in understanding avian population trends. The Wildlife Conservation Society is investigating the importance of the TLSA as a breeding ground for migratory birds (focusing on shorebirds). Our objective is to collect baseline information on breeding biology of tundra-nesting birds, nest predator abundance, and other factors known to influence nest

survivorship and to compare the nest survivorship results with other sites on the North Slope to help evaluate the importance of this region for breeding birds.

In 2008, WCS continued in their fourth and final year of this study conducting field work on 16 10-ha study plots near the SE shore of Teshekpuk Lake. We discovered and monitored 181 nests of 17 species from 7 June to 18 July using both rope drag and behavioral nest search techniques. Lapland Longspurs, Semipalmated Sandpipers, Long-billed Dowitchers, and Red-necked Phalaropes accounted for the majority (67%) of those found. Among all species, 108 nests successfully hatched/fledged, 62 failed, and 11 nests were of unknown fate. Nest predation was the most important cause of nest failure (94%). Other sources of nest failure included abandonment for unknown reasons ($n = 3$) and predation due to observers ($n = 1$). Program MARK constant survivorship model (Mayfield) estimates of nesting success ranged from 22 to 92% for the four species with $n \geq 10$. Overall nest density was 98.8 nests/km², similar to all other years monitored except for the more productive 2006 season when we estimated 132.4 nests/km².

Few lemmings were detected this season contrasting with much higher numbers detected in 2006 (0.004 vs. 0.33 lemmings/30min. count). Correspondingly, Pomarine Jaegers and Snowy Owls were rarely detected and, unlike in 2006, did not nest in the study area in 2008. Overall, eight species of potential nest predators were detected during timed surveys with the most common being Parasitic Jaegers, Glaucous Gulls and Long-tailed Jaegers (91% of detections). The nesting success results from 2005-08 indicates high nest survivorship at Teshekpuk in seasons with both high and low abundances of lemmings.

Snow melt and subsequent tundra exposure occurred successively earlier at Teshekpuk (by up to five days) from 2005 to 2008. Correspondingly, nest initiation dates for most species were 3-4 days earlier compared to previous years. This positive correlation between nest initiation and snow melt was also observed at the nearby Prudhoe Bay study site.

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

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Suzanne Sanborn

27. SHOREBIRD MARATHON—CONNECTING STUDENTS WITH SCIENCE - McCaffery

Investigator: Brian J. McCaffery, U. S. Fish and Wildlife Service

In July 2008, the U. S. Fish and Wildlife Service collaborated with a suite of partners to implement a Challenge Cost Share project entitled “Shorebird Marathon—Connecting Students With Science.” The Shorebird Marathon project brought together students from the Bering Sea Yup’ik Eskimo village of Kwigillingok with students from both Anchorage and northern California. Together with their teachers and professional scientists, the six junior high students spent a week at a remote field camp on Yukon Delta National Wildlife Refuge, learning how shorebirds prepare for and then complete migrations that span the hemispheres.

The Shorebird Marathon team was based at Aropuk Lake, the most important post-breeding staging area for Hudsonian Godwits west of Hudson Bay. FWS biologist Jim Johnson (Migratory Bird Management—Anchorage) joined the expedition to share with the students his experiences capturing and banding Hudsonian Godwits in South America. Among the Hudsonian Godwits seen at Aropuk was one that Johnson had color-marked thousands of kilometers away in Chile just a few months earlier. Our other adult participants also brought a wealth of expertise to the project. The principal investigators of the Pacific Shorebird Migration Project, Robert E. Gill, Jr. (U.S. Geological Survey, Alaska Science Center) and Nils Warnock (formerly PRBO Conservation Science, now Univ. of California at Davis), taught students how to capture, band, and record data for shorebirds. Students learned how use both mist-nets and walk-in traps to catch turnstones, sandpipers, and phalaropes. One of the Western Sandpipers captured by the students had actually been banded by Warnock and his colleagues in California

several years earlier. Gill also gave a PowerPoint presentation in one of the camp's gazebo tents, using the back of the Fish and Wildlife Service's Connecting Kids with Nature banner as a screen. He summarized the work that the Pacific Shorebird Migration Project has done using satellite transmitters to track Bar-tailed Godwits and Bristle-thighed Curlews as they migrate for days across the middle of the Pacific Ocean. High school science teachers Andrea Pokrzywinski (Lower Kuskokwim School District, Bethel) and Ayme Johnson (Highland Tech, Anchorage) designed and led several exercises on topics such as wildlife observation, data collection, and data analysis.

Just as importantly, the students taught one another about many aspects of the culture in their respective communities. By swapping stories comparing Western and Native traditions, urban vs. rural life, and experiences in Alaska vs. the Lower 48, the students came to a better understanding of both the natural world and the human communities that depend on it. With the help of their high school teachers, the students teamed up to draft a brief video describing their experiences and what they learned during their Shorebird Marathon adventure. The first version of their video can be viewed on YouTube at <http://www.youtube.com/watch?v=Hv73J6-bRRM>

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28. OBSERVATIONS OF RED KNOTS (*CALIDRIS CANUTUS*) AT OLD CHEVAK, YUKON DELTA NATIONAL WILDLIFE REFUGE, ALASKA, SPRING 2008 – McCaffery et al.

Investigators Brian J. McCaffery, U. S. Fish and Wildlife Service; Jan van de Kam, freelance wildlife photographer; Keith Woodley, Miranda Shorebird Centre, New Zealand

Concern about the status of the western Atlantic race of the Red Knot (ssp. *rufa*) has led to heightened interest in the status of other races and populations. Along the eastern Pacific flyway, recent efforts involving color-marking and/or searching for marked knots have established connections among birds from Baja California, coastal Washington state, the Yukon-Kuskokwim Delta in southwest Alaska, and their breeding grounds on Wrangel Island in Russia. These studies provide the first empirical evidence that birds wintering and migrating along the Pacific coast of North America include members of *roselaari*. We contributed to this growing body of information by observing migrant knots during spring, 2008, at Old Chevak, Alaska.

Old Chevak (61.43° N, 165.45° W) is a permanent U. S. Fish and Wildlife Service camp near the junction of the Kashunuk and Keoklevik rivers on the central Yukon-Kuskokwim Delta. Twenty kilometers inland from the coast of the Bering Sea, the Old Chevak study area is characterized by a diversity of wetlands either embedded in, or surrounding, extensive patches of level uplands. Wetlands include tidal sloughs, tidal meadows, freshwater meadows, brackish marshes, and steep-sided lake basins.

We were at Old Chevak from 25 April to 6 June. We observed Red Knots between 8 and 29 May. Daily totals peaked during the third week of May. Other than the gradual rise and fall of numbers across the migration season, we had very little evidence of birds actually passing through our study area. The largest single flock included 90 birds roosting in a frozen marsh at dawn on 19 May. The highest daily count occurred on 18 May. In portions of the western third

of a large (> 400 ha) meadow along the Kashunuk River, we checked 307 knots for leg flags. We suspect that the entire meadow may have supported about 1,000 Red Knots on 18 May.

Three flagged birds were detected between 17 and 21 May. All had yellow flags on the left tibia, and a red flag on the left tarsus, indicating that they had been banded at the Guerrero Negro—Ojo de Liebre coastal lagoon complex in Baja California, Mexico, by R. Carmona and his colleagues. Each of the three yellow flags had a black numeric inscription. Numbers 144, 291, and 012 were seen on 17, 18, and 21 May, respectively. None were seen after the date of their initial detection.

Knots foraged in a variety of habitats at Old Chevak in 2008. The three primary foraging habitats included riparian sedge meadows, tidal marshes partially enclosed by upland tundra, and rotting river ice. They did not feed on river ice that was immediately adjacent to upland tundra, meadows above high water, or meadows separated from the river by natural levees. We also did not find them feeding in wetlands (either lakes or marshes) that were either completely surrounded by uplands or isolated from daily tidal action during the ice-free season.

Foraging techniques varied, ranging from extensive probing in vegetation or mud, to pecking items from the surface of pools, snow, or river ice. Many prey items were too small to identify, but large crane-fly (Tipulid) larvae were frequently taken from all three major foraging habitats

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29. SHOREBIRD OBSERVATIONS DURING FALL MIGRATION IN WESTERN ALASKA – Ruthrauff et al.

Investigators: Dan Ruthrauff and Lee Tibbitts, U.S. Geological Survey; Jim Johnson, U.S. Fish and Wildlife Service

While sampling shorebirds for avian influenza-related studies, we spent from one day to just over one month at sites in western Alaska during the fall migration period. We visited the coast north of the mouth of the Naknek River at the base of the Alaska Peninsula from July 16 to 22, the mouth of Big Creek north of Egegik Bay on the Alaska Peninsula from July 19 to 20 and again from August 16 to 22, and Cape Avinof and Punaorat Point along the Yukon-Kuskokwim Delta coast from September 2 to 6 and August 17 to September 20, respectively. All of these areas were previously recognized to be important staging sites for shorebirds, but our timing at the Naknek River and Big Creek coincided with the tail-end of the Sockeye salmon run in Bristol Bay, providing the setting for novel behavioral observations. Additionally, our relatively early timing at these sites enabled the detection of previously unrecognized (to us, that is—see further) concentrations of species like Ruddy Turnstones, Hudsonian Godwits, and Whimbrel. Finally, the opportunity to visit all these sites in the same season within a relatively brief timeframe allowed us to note intriguing site differences in the foraging and behavioral ecology of Bar-tailed Godwits.

Bristol Bay supports the world's largest harvested Sockeye salmon run, and numerous studies have detailed the important role that salmon play in the deposition of marine-derived nutrients at inland sites. During the summer months, coastlines in western Alaska are often strewn with stranded salmon carcasses, and observations at Naknek and Big Creek indicate that these fish likely serve as an important food resource for Black and Ruddy Turnstones, Hudsonian

Godwits, and Whimbrel. All of the aforementioned species were observed foraging extensively on salmon carcasses deposited along the high tide line. Birds were observed feeding on salmon eggs and salmon flesh, as well as upon the maggots exploiting the rotting fish. While Ruddy Turnstones in particular are renowned for their omnivorous habits, we are unaware of previous mention of this type of piscivory behavior in shorebirds. We observed birds feeding on salmon remains during all daylight hours, but they concentrated their efforts during high tide when adjoining mudflats were inaccessible. Thus, although salmon carcasses may not be the preferred food item during this time period, they undoubtedly represent an important and relatively ubiquitous food source at sites throughout western Alaska.

In conjunction with these novel foraging observations, we also made noteworthy counts of concentrations of shorebirds. Peak counts included 745 Black-bellied Plovers on July 18 at Libbyville (approximately 10 km north of the mouth of the Naknek River), 180 Black-bellied Plovers on July 20 at Big Creek, 160 Ruddy Turnstones on July 20 at Big Creek, 350 Whimbrel on July 20 at Big Creek, 900 Whimbrel on July 18 on a 5 km stretch of coastline north of the Naknek River, 400 Hudsonian Godwits on July 20 at Big Creek, and 150 Bar-tailed Godwits on July 20 at Big Creek. The majority of Black-bellied Plovers, Ruddy Turnstones, and Whimbrel were adults, while the majority of Hudsonian Godwits were juvenile birds. These observations represent some of the greatest concentrations in Alaska that we are aware of for these species, but from discussions with locals we discovered that these congregations apparently occur annually. For instance, while in Naknek we made the acquaintance of Richard Russell, a retired Alaska Department of Fish and Game biologist living in King Salmon. Richard shared with us his 30+ years of similar observations collected in the Naknek area. It was fortuitous (and humbling) to meet Richard and explore his wealth of knowledge, and our time with Richard left us wondering how many other valuable local resources we had overlooked elsewhere.

DR revisited Big Creek from August 16 to 22 and observed a very different shorebird community compared to July. All salmon remains were gone from the beach, and Whimbrel had largely disappeared as well (maximum daily count of 10 birds). Hudsonian Godwit and Ruddy Turnstone numbers were similar to July counts (450 and 200 birds, respectively), but Bar-tailed Godwits had increased to approximately 2,000 birds (nearly all adults), and approximately 60 Marbled Godwits were now present as well (all juveniles). During 4 previous fall observation periods at a site on Egegik Bay approximately 3 miles south of Big Creek, no more than 10 Hudsonian Godwits had ever been observed. Thus, visits to both Naknek and Big Creek demonstrated the need for observations conducted over a greater spatial extent and broader temporal period to improve our knowledge of the timing and abundance of fall migration at sites across Alaska. Further reinforcing this belief was the discovery of 2 Hudsonian Godwits and 1 Whimbrel banded this past winter by JJ on Chiloé Island, Chile.

Finally, DR collected benthic samples during tenures at Big Creek, Cape Avinof, and Punaorat Point. These collections offer insight into site-specific differences perceived in the feeding behavior and abundance of Bar-tailed Godwits across sites. At coastal sites across Alaska, Bar-tailed Godwits primarily feed on molluscs (*Macoma* and *Mya* spp.) and nereid worms (primarily *Arenicola* sp.). The distribution of these prey items across sites, however, reflected differences in foraging behavior and bird abundance. At Big Creek, medium to large *Macoma* and *Arenicola* were abundant, but small *Macoma* were scarce and *Mya* nearly absent. Larger *Macoma* and *Arenicola* require washing and handling prior to consumption, providing Mew and Glaucous-winged gulls the opportunity to kleptoparasitize prey items from godwits. These gulls were an abundant and persistent distraction to godwits, and godwits were observed

losing many prey items to ever-present gulls. In contrast, the abundance of small *Macoma* at Cape Avinof was extremely high, but larger size classes were absent, as were *Mya* and *Arenicola* altogether. These small prey items require little or no handling by godwits, and as such gulls were uncommon at the site, presumably because kleptoparasitism was not viable in the absence of prey-handling godwits. Additionally, up to 20,000 Bar-tailed Godwits were present at the site during our stay, perhaps a reflection both of the site's abundant food supplies and relatively few opportunities for kleptoparasites. At Punaorat Point, benthic samples were abundant but almost entirely comprised of various nereid worm species; *Mya* were scant, and *Macoma* nearly absent. Essentially no Bar-tailed Godwits were present at this site, perhaps reflecting a preference for molluscs or unwillingness to suffer the kleptoparasitism that capturing and handling large Nereid worms invites.

Most of the observations detailed in this summary were collected anecdotally in the course of projects related to other topics. The wealth of information gleaned by visiting new sites, old sites at new times, and many sites in one season, however, opened our eyes to the many opportunities that exist to better inform our understanding of shorebirds in Alaska. We hope to further pursue these topics at these sites in the future.

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Dan Ruthrauff

30. INVENTORY OF BREEDING BIRDS IN ANIAKCHAK NATIONAL MONUMENT AND PRESERVE – Ruthrauff & Tibbitts

Investigators: Dan Ruthrauff and Lee Tibbitts, U.S. Geological Survey

In a continuation of National Park Service-sponsored survey efforts conducted from 2004–2006 in Katmai and Lake Clark National Parks and Preserves, researchers from USGS Alaska Science

Center and the NPS' Southwest Alaska Network conducted an inventory of breeding birds in Aniakchak National Monument and Preserve (ANIA). Scientific research in ANIA has primarily focused on the geology of the region, but the region was believed to support an intriguing avifauna by virtue of its proximity to marine waters, relatively broad range of elevations, and geographic position along major migratory pathways. To date, no Monument-wide systematic inventory of landbird resources had been completed in ANIA, and bird investigations in the region had primarily focused on coastal estuaries.

We deployed three, two-person crews from 31 May–8 June, 2008. Crews visited nine 10-km x 10-km study plots, as well as five additional sites believed to contain relatively unique habitats potentially supporting unusual or rare bird species. We conducted 136 point transects across these sites at elevations ranging from sea level to nearly 700 meters. Extensive snow cover and persistent foul weather marked our time in the field, but our efforts yielded the detection of 68 bird species, including seven (Gadwall, Golden Eagle, Merlin, Marbled Godwit, Downy Woodpecker, Horned Lark, and Hoary Redpoll) not previously detected in ANIA. The detection of Marbled Godwit was confirmed by the discovery of a 4-egg nest, the first active nest ever discovered for this subspecies. Other noteworthy findings included the absence of breeding Surfbirds and Wandering Tattlers. These results, when combined with previous survey efforts in Katmai National Park and Preserve, suggest that neither species likely breeds on the Alaska Peninsula south of the Katmai region. In ANIA, Rock Sandpipers and Semipalmated Plovers were detected breeding at high elevations in dwarf shrub tundra similar to sites that support breeding Surfbirds and Wandering Tattlers elsewhere in Alaska.

These efforts complement surveys conducted across nearly the entire Alaska Peninsula from 2004–2007 by Susan Savage of the Alaska Peninsula / Becharof National Wildlife Refuge, and provide basic information on the occurrence and distribution of breeding landbirds in ANIA. Results from this inventory will be published in a NPS report, available in February, 2009.

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31. INCUBATION PATTERNS, PARENTAL ROLES, AND NEST SURVIVAL OF BLACK OYSTERCATCHERS (HAEMATOPUS BACHMANI): INFLUENCES OF ENVIRONMENTAL PROCESSES AND NEST AREA STIMULI – Spiegel et al.

Investigators: Caleb S. Spiegel, Oregon State University; Susan M. Haig, U.S. Geological Survey; Michael I. Goldstein, USDA Forest Service; Manuela Huso, Oregon State University

Shorebirds display great variation in mating systems and breed in dynamic environments that are increasingly subject to human threats worldwide. In order to adequately assess productivity and demography of shorebird populations it is important to understand factors that influence patterns of parental care and reproductive success. The Black Oystercatcher is a shorebird species of concern and an indicator of the health of intertidal ecosystems. Much information on breeding biology is lacking for the species, though it is reported to regularly experience low reproductive success and may be vulnerable to human disturbance during nesting. Our work examined relationships among natural and human processes related to incubation and nest success of Black Oystercatchers in Harriman Fjord, Prince William Sound; a high density breeding area of Alaska

experiencing regular human recreational activity. In November 2008 results were presented as a M.S. thesis at Oregon State University and successfully defended. This research is part of a multi-year Black Oystercatcher demography study being conducted by several cooperators including the U.S. Forest Service, Alaska Department of Fish and Game, Oregon State University, USGS Forest and Rangeland Ecosystem Science Center, U.S. Fish and Wildlife Service and University of Alaska Fairbanks. Here we summarize our work and major findings.

In 2005 and 2006, oystercatcher nests were continuously monitored with video cameras to investigate the association of cyclical (time of day, tide stage, ambient temperature, season) and stochastic (natural/human disturbances) processes with incubation patterns (nest attendance, incubation bout length, incubation recess rate) and sex roles. Review of over 3,000 hours of footage from 13 molecularly sexed nesting pairs revealed complimentary bi-parental care with differing roles between sexes. Females allocated more to nest attendance and had longer incubation bout lengths, indicating a greater investment in incubation compared to males. Males responded more frequently to nest area disturbance stimuli compared to females, indicating that males invest more in nest defense. Incubation patterns were also influenced by tide stage, ambient temperature, and disturbance stimuli. Incubation bout lengths nearly doubled at night, independent of sex. Longer nocturnal bouts may minimize parental activity near the nest during periods of increased predation risk when incubation duty changes could reveal the presence of nests to nocturnal predators.

Video footage was also used to document the types and frequencies of human and predator activities, and extreme weather and tide episodes encountered within oystercatcher nest areas and the effect of these potential disturbance stimuli on incubation behavior and nest success. Over 3,500 potential disturbance events were documented at 22 video monitored nests. Presence of other bird species were the most frequently detected type of potential disturbance, but were largely ignored by incubating oystercatchers. Oystercatchers were most frequently disturbed (as evidenced by displacement from a nest) by encounters with conspecifics and humans, with nests left unattended for longer periods following human disturbance compared to other disturbance types. Although infrequent, a high proportion of mammal encounters also resulted in oystercatchers flushing from their nests. The incidence of mammal encounters was slightly higher at night. Changes in incubation behavior due to disturbance were not found to affect nest success, nor did nest success decrease with proximity to areas of frequent human recreational activity. Nocturnal nest predation by mustelids and night-time flood tide events accounted for six of seven nest failure events recorded on video, even though nights were disproportionately short during the study. Thus, future shorebird breeding studies should assess causes of nest failure from latent nocturnal causes, rather than just obvious diurnal causes.

With the analysis of extensive nest observation data this study identified natural and anthropogenic processes that affected incubation patterns of an uncommon shorebird species, adapted to a dynamic nesting environment. Results elucidate factors influencing Black Oystercatcher life history and lay the groundwork for further investigation into the effects of human disturbance on nest success and demography of the species. Future research should investigate nest success in breeding areas experiencing higher levels of disturbance, include post-hatching breeding stages, and be conducted over multiple breeding seasons.

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32. IDENTIFYING THE IMPORTANT BIRD AREAS OF ALASKA - Stenhouse

Investigator: Iain Stenhouse, National Audubon Society

Important Bird Areas (IBAs) are critical places for bird conservation and therefore biodiversity. The aim of the IBA Program is to identify and conserve a network of sites that maintains the long-term viability of wild bird populations. BirdLife International initiated the IBA concept in the 1980s, and now IBA programs are active in nearly 200 countries, with over 10,000 sites identified worldwide. As the U.S. Partner of BirdLife, Audubon has identified more than 2,100 IBAs across the United States, covering over 300 million acres.

To qualify as an IBA, sites must satisfy at least one of a series of strict criteria: they must support (1) species of conservation concern, (2) species with restricted ranges, (3) species with particular habitat requirements, and/or (4) species, or groups of species, which are vulnerable because they congregate at only a few sites. Identification of a site as an IBA indicates its unique importance for birds. Nonetheless, some IBAs are of greater significance than others. A site may be important at the global, continental, or state level. The IBA identification process provides a data-driven means for cataloging the most important sites for birds throughout the country and the world.

To date, Audubon Alaska has identified 145 IBAs across the state. Of these, 8 IBAs are based solely on the presence of shorebird ‘trigger’ species (i.e. species that meet criteria), and a further 20 IBAs include shorebirds among the trigger species.

Identifying IBAs is only the first in a series of essential steps towards habitat conservation for birds and biodiversity. The power of the IBA network is not fully realized, however, until we know where these special places are *and* what is happening to them. Knowing how IBAs are changing over time, and how successful the conservation community has been in protecting them, allows us to determine, track, and prioritize developing issues, and adapt conservation planning and management.

Iain Stenhouse (now at National Audubon’s Science Office) is developing Audubon’s IBA assessment approach and an Advisory Committee is currently being formed to review draft assessment protocols. A pilot project will test the approved IBA assessment protocols in at least three states in 2009, with the aim of carrying out assessments across the IBA network in 2010.

The success of the IBA program is highly dependent on the collaboration and cooperation of a range of partnering organizations and communities across Alaska, including the Alaska Shorebird Group. We thank all the dedicated individuals who have contributed to this truly global project thus far.

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Will Goldenberg

33. DISTRIBUTION, MOVEMENTS, AND PHYSIOLOGY OF POST-BREEDING SHOREBIRDS ON ALASKA'S ACP- Taylor et al.

Investigators: Audrey Taylor, Abby Powell, University of Alaska, Fairbanks; Richard B. Lanctot, U.S. Fish and Wildlife Service

Little current, quantitative information exists to assess pre-migratory shorebird abundance and distribution across Alaska's North Slope or how site selection, movement patterns, or residency times may vary across time, space, and species. This project was initiated to gain a better understanding of when and how post-breeding shorebirds utilize vulnerable coastal habitats across the Arctic Coastal Plain during the staging period, and to provide baseline data to aid in predicting how future industrial activity and environmental change may affect shorebird populations. The specific objectives for this research were (1) to assess the geographic distribution, species composition, and phenology of shorebirds staging along ACP coastlines prior to the fall migration, (2) to quantify residency times and movement patterns of staging shorebirds, and (3) to examine differences in measures of physiological condition (fattening rates and stress hormone concentrations) among species and sites, which may lend insight into the function and quality of different staging areas.

Fieldwork for this project officially ended in 2006, although we conducted one additional aerial survey along the coast of the Arctic National Wildlife Refuge on 7-8 August 2007. We found hot spots of staging shorebird abundance at Peard Bay, Elson Lagoon, Cape Simpson, and Pitt Point/Pogik Bay. Several lagoon/river delta systems in the Arctic National Wildlife Refuge supported large concentrations of staging birds during one or more survey periods: Camden Bay/East Canning Delta, and Beaufort Lagoon/Kongakut Delta. In general, however, large river deltas had fewer than expected counts of staging shorebirds compared to other coastal areas. Adult shorebirds were less common than juveniles for most species, and typically left coastal

areas earlier in the staging period. Semipalmated Sandpipers peaked in abundance earlier than other species, whereas Dunlin peaked in abundance later and staged longer. Species diversity and evenness were higher on the Beaufort Sea coast than the Chukchi, mostly due to dominance by Red Phalaropes at Peard Bay and Barrow. Baird's Sandpipers appeared to be less common now than during postbreeding shorebird studies conducted in the 1970's across the ACP. Western Sandpipers were more abundant along the Chukchi Sea coastline than at the Colville River Delta in our study, in contrast to work done at the Colville Delta during the late 1980's. We determined that shorebirds fell into three distinct foraging guilds during the staging period: gravel beach species (Red Phalaropes, Black-bellied Plovers, Sanderlings, and Ruddy Turnstones), salt marsh species (American Golden-plovers, Long-billed Dowitchers, Pectoral Sandpipers, and Western Sandpipers), and mudflat species (Dunlin and Semipalmated Sandpipers). Red-necked Phalaropes and Stilt Sandpipers both showed preference for pond edges, although Red-necked Phalaropes also used gravel beaches extensively.

Using mark-recapture methodology to analyze radio telemetry data, we determined there were interspecific differences in the length of time staging shorebirds remained at their capture site before moving to a different staging site or migrating (residency time). Residency times were: Semipalmated Sandpipers ~ 4.3 days, Red and Red-necked Phalaropes (species combined) ~ 4.5 days, Western Sandpipers ~7.9 days, and Dunlin ~ 12.9 days. Radio-equipped shorebirds moved widely across the ACP during the staging period, thus concentrations of birds at a given staging location may represent birds from beyond the local breeding community. Semipalmated Sandpipers typically moved north along the Chukchi coast and east along the Beaufort coast to the Canning River; we suspect they may use the river as a migration corridor south across the Brooks Range. Dunlin moved both east and west along the ACP coast, but several individuals radio-equipped on the ACP in July and August 2005 were later detected on the Yukon-Kuskokwim Delta between late August and early October 2005, indicating that Dunlin from northern Alaska do stage in western Alaska prior to migrating to Asia. Red and Red-necked Phalaropes showed little directionality in movement patterns, although our sample sizes for these species were small.

Because corticosterone is thought to play a role in both pre-migratory fattening and in postnuptial molt, we tested whether Dunlin (which undertake both processes prior to leaving northern Alaska) show reduced corticosterone levels during the staging period to prevent deleterious effects on feather growth. Our results indicate that Dunlin do not down-regulate corticosterone during the staging period and thus their physiological profiles may be compared to other shorebird species (Semipalmated Sandpipers and Western Sandpipers, in our case) that are also preparing for migration on the ACP. Triglyceride (fat metabolite) concentrations varied by species and by location. Semipalmated Sandpipers exhibited the highest triglyceride concentrations, and Dunlin the lowest. Western Sandpiper triglyceride levels were intermediate in 2005 but similar to Semipalmated Sandpipers in 2006. This pattern of fattening rates across species fits with predictions based on species-specific molt and migration schedules. Semipalmated Sandpipers exhibited the shortest length of stay at ACP staging areas, moved quickly across the coast once they left their capture site, and appeared to be fattening faster than Dunlin, which exhibited long residency times and delayed movements south from the ACP. The relationship between triglyceride concentrations and corticosterone levels for staging shorebirds is currently being investigated.

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34. SAMPLING SHOREBIRDS FOR AVIAN INFLUENZA (AI) AND DOCUMENTING MIGRATION PATTERNS OF DUNLIN IN THE REPUBLIC OF KOREA – Zack et al.

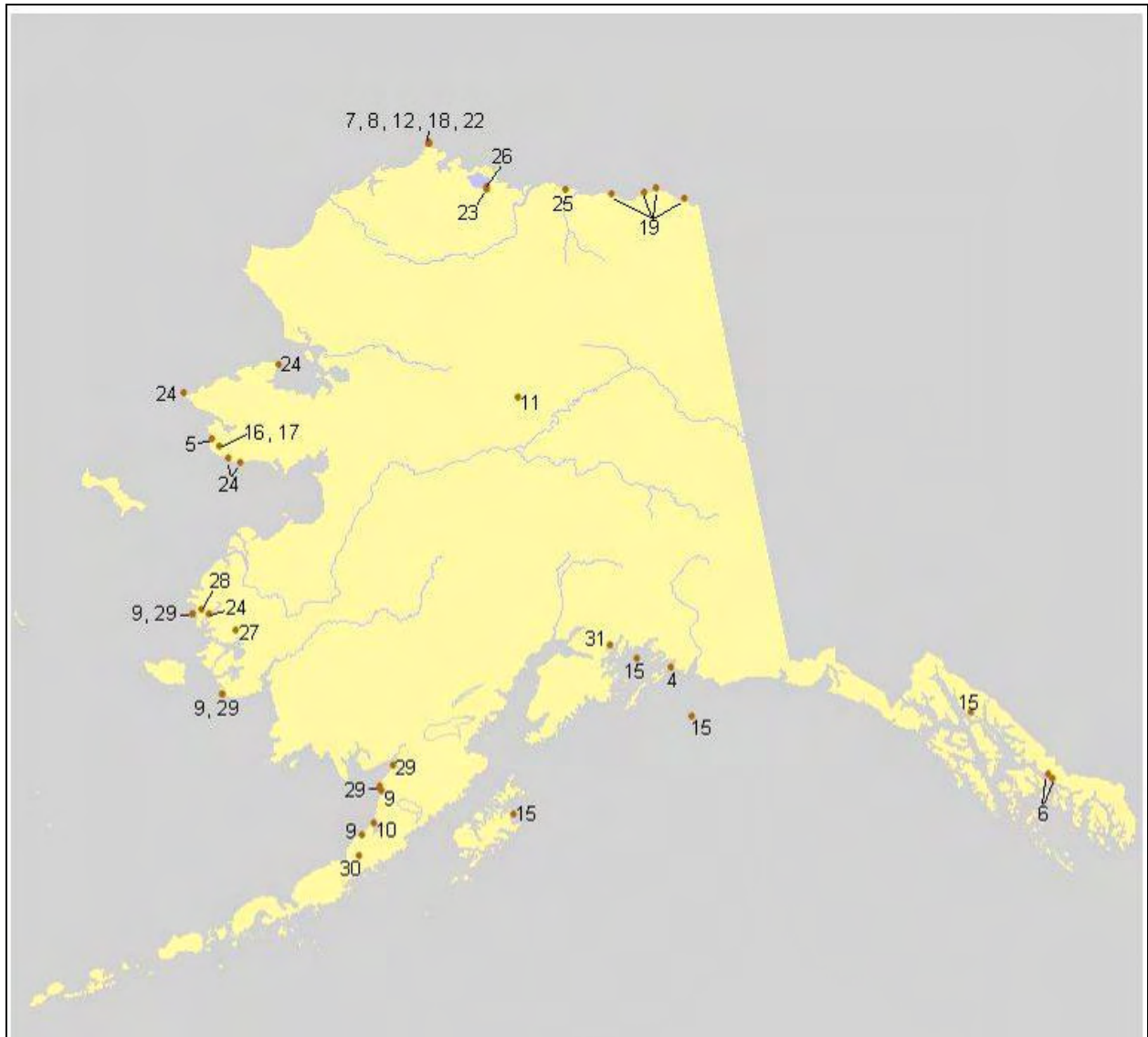
Investigators: Steve Zack, Joe Liebezeit, Kristine Smith, Damien Joly, Wildlife Conservation Society; Young Jun Kim, Conservation Genome Resource Bank for Korean wildlife; Hyen-Mi Chung, Jeong-Yeon Yi, National Institute of Environmental Research, Republic of Korea; Youn-Jeong Lee, National Veterinary Research & Quarantine Service, Republic of Korea

As part of an initiative by GAINS (Global Avian Influenza Network for Surveillance) we sampled shorebirds for presence of avian influenza highly pathogenic H5N1 virus in the Republic of Korea. This effort was undertaken because this region has been a focal point for H5N1 outbreaks and because many of these shorebirds migrate to North America (mostly to Alaska) to breed and could potential bring the disease to the western hemisphere. Between 16-23 April, 2008 we captured and sampled 36 shorebirds (26 Dunlin, three each of Bar-tailed Godwit, Terek Sandpiper, Great Knot, and one Whimbrel) and one Little Tern using walk-in traps and (or) mist nets at two locations in the Saemangeum region on the central west coast of the Republic of Korea. We also collected fecal samples from three individual Eurasian Oystercatchers. All told, 40 individual birds were sampled for AI. A duplicate set of swabs was taken from both the cloaca and the oropharynx from each captured bird. One set of swabs was placed in lysis buffer for RT-PCR testing. The other set of was placed in viral transport media and frozen in liquid nitrogen prior to testing.

We placed a metal band on the upper right leg (provided by National Institute of Environmental Research, Republic of Korea) on all captured birds. On both Dunlin and Bar-tailed Godwit we placed color flags on the lower left leg (white over orange for Korea). We individually marked all Dunlin with three color bands on the lower right leg. From Dunlin we also collected approximately 100µl of blood from the brachial vein and also the first primary on each wing and 10-15 black breast feathers. Blood samples will be used to help differentiate Dunlin subspecies (see M. Johnson et al. – genetic markers). Feather samples will be used to determine whether stable isotope signatures from feathers grown on the winter and breeding grounds can be used to determine where subspecies winter (see R. Lanctot et al. – isotopes).

All AI samples were tested for presence of AI H5N1 in the Republic of Korea at the National Veterinary Research & Quarantine Service laboratory in May 2008. All test results were negative. It is interesting to note that during our sampling period, there were multiple outbreaks of AI H5N1 at domestic poultry farms within 25km of our one of our capture sites. These outbreaks resulted in the culling of over five million domestic poultry.

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STUDY SITE MAP

This map displays the location of shorebird study sites summarized in this report. Each site is represented with a brown dot and an accompanying number. The number corresponds to the numbered project title for each summary in the report. This map *does not* display sites outside of Alaska (Projects 1-3, 13, 21, 34), studies that had no field data collection in 2008 (Project 33), and studies that had no field component and/or relied on data from other studies (Project 14, 20, 32).

