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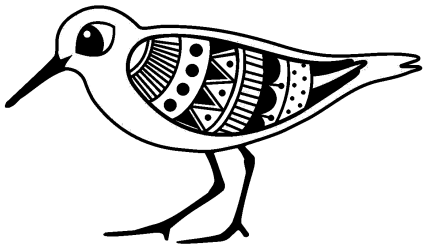

Alaska Bird
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THE ALASKA SWALLOW MONITORING NETWORK: A COMPARATIVE LOOK AT TREE SWALLOWS ACROSS THE STATE

Tricia Blake[1], **Melissa Cady**[2], Audrey Taylor[3], April Harding Scurr[1], and Alex Rose[4]

[1]Alaska Songbird Institute, P.O. Box 80235, Fairbanks, AK, 99708
[2]Alaska Peninsula/Becharof National Wildlife Refuge, PO Box 277, King Salmon, AK 99613; melissa_cady@fws.gov
[3]Department of Geography and Environmental Studies, UAA, 3211 Providence Drive, Anchorage, AK 99508
[4]University of Colorado Boulder Museum of Natural History, 15th and Broadway, Boulder, CO 80309

The Alaska Swallow Monitoring Network is a multi-entity effort to collect ecological data on climate-change impacts to Tree Swallows using artificial nest box colonies throughout Alaska. Although the network is centered around ecological research, an integral component of the network integrates a citizen science-based approach at most sites, with data being collected, interpreted, and shared by students, teachers, researchers, and community members. Another benefit of this network approach, whereby all sites collect ecological data using the same field methods, is our ability to directly compare Tree Swallow breeding phenology, nest success, and banded bird return rates across sites across the state. The summer of 2016 was the first season of data collection using the full network approach: researchers and student trainees from four sites (Fairbanks, Anchorage, King Salmon, and McCarthy) underwent a day-long training partway through the field season, and sites shared data collection and analysis protocols. We report on the successes and challenges of this first season, including the comparability of four site-specific parameters that are central to understanding how Tree Swallows are responding to climate change: first arrival date, nest initiation date, hatch date, and nest success rate. We will also discuss future plans for the network and opportunities for inclusion of additional sites.

DEPARTURE FOR AUTUMN MIGRATION IN THE WHITE-CROWNED SPARROW (*ZONOTRICHIA LEUCOPHRYS GAMBELII*) IS INFLUENCED BY LOCAL WEATHER AND REPRODUCTIVE TIMING

Helen E. Chmura, Jesse S. Krause, Jonathan H. Pérez, Caroline L. Newell, Jeffrey C. Cheah, Marilyn Ramenofsky, and John C. Wingfield,

Department of Neurobiology, Physiology and Behavior, University of California, Davis, One Shields Avenue, Davis, CA 95616; hechmura@ucdavis.edu

Arctic-breeding migratory birds have a very short window of time in which to breed, molt, and prepare for migration before winter weather arrives. At each stage of the breeding season, advances or delays in phenology may influence the subsequent timing and successful completion of successive life history stages ("carry-over effects"). While numerous studies have looked for carry-over effects of spring migration on reproduction, few have examined whether reproductive timing can influence autumn migratory departure; of these, none have been conducted in temporally constrained arctic systems. We used the White-crowned Sparrow *(Zonotrichia leucophrys gambelii)* to investigate the relationship between breeding and phenology of molt and migration in the post reproductive period. From 2014–2016, we located sparrow nests at the Toolik Field Station on the North Slope of Alaska and used an automated radio-telemetry system to track parents until they departed the breeding site. Results suggest that most adults remained within a few hundred meters of the nest site throughout molt and migratory preparation. Departure from the breeding site was influenced by both reproductive timing and local weather. We discuss these results in the context of current and future climate change projected for Arctic ecosystems.

REVEALING THE MIGRATORY PATH AND WINTERING AREAS OF OLIVE-SIDED FLYCATCHERS THAT BREED IN ALASKA

Julie C. Hagelin[1], James A. Johnson[2], and Michael T. Hallworth[3]

[1]Threatened, Endangered and Diversity Program, Alaska Department of Fish and Game, Fairbanks, AK 99701; julie.hagelin@alaska.gov
[2]Migratory Bird Management, U.S. Fish and Wildlife Service, Anchorage, AK 99503
[3]Migratory Bird Center, Smithsonian Conservation Biology Institute, Washington, DC 20013

The Olive-sided Flycatcher (OSFL; *Contopus cooperi*) is a neotropical migrant of long-standing concern, due to a 76% decline in North America over the last 40 years. Documenting the annual migratory path of OSFL is fundamental to understanding threats and taking appropriate conservation actions. In 2013 we began a multi-year effort to deploy light-level geolocators on adults breeding in central and southcentral Alaska. As of 2016, 15 recovered units have revealed the first information on OSFL migration, including linkages between breeding, stopover and wintering locations. Birds from both central and southcentral Alaska wintered in two general areas: Ecuador and Southern Peru. During spring migration, birds stopped more frequently for prolonged (6–13 day) periods in Central America, southern and eastern Mexico, the Pacific Northwest and western Canada. In contrast, fall migration involved rapid southward movement along the east side of the Rocky Mountains, with stops in southern Texas, southern Mexico and Central America. Recovery of Pinpoint GPS units in the future promises to reveal more specific geographic locations and habitats that support OSFL during their remarkable 22,000 km (~13,500 mi) annual migration.

INFLUENCES ON CAPTURE RATES OF THREE PASSERINE SPECIES OVER A 25 YEAR PERIOD IN INTERIOR ALASKA

April Harding Scurr and Tawna Morgan

Alaska Songbird Institute, P.O. Box 80235, Fairbanks, Alaska 99708;
April.HardingScurr@aksongbird.org

The Creamer's Field Migration Station, a songbird banding station in Fairbanks, Alaska, has monitored fall migratory ecology of passerines for 25 years. We examined the influences of weather and habitat variables to relative capture rates of three species of passerines, Yellow Warbler (*Setophaga petechial*), Yellow-rumped Warbler (*Setophaga coronate*), and American Tree Sparrow (*Spizelloides arborea*) over the 25 year period. Birds were captured using 6–12 m, 30 mm mist nets, and data was collected using a standardized protocol. Capture rates were calculated as number of captured individuals per 1,000 net hours, and a multivariate analysis was used to examine correlation of variables. Relative capture rates for Yellow Warbler ranged from 2.43–23.63 birds captured/1,000 net hours ($\overline{x}$=7.75, s^2=5.08, n=1,764), Yellow-rumped Warblers from 0.96–33.63 individuals captured/1,000 net hours ($\overline{x}$=9.32, s^2=6.69, n=13,292), and American Tree Sparrows 0.03–8.02 individuals captured/1,000 net hours ($\overline{x}$=1.09, s^2=1.65, n=9,513). We modeled non-correlated variables using Akaike Information Criterion (AIC_c) to determine the best model to predict capture rates from year to year. Results will help determine future objectives of our long-term monitoring station and the effectiveness of our current methods to monitor these species.

PREY AVAILABILITY AND PASSERINE NESTLING DIETS IN WESTERN ALASKA

Molly McDermott

USGS Alaska Science Center, Anchorage, AK 99508
Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775;
mtmcdermott@alaska.edu

Generalist passerine species should cope with fluctuations in food supply by varying their dietary intake in response to availability, making them resistant to climate change impacts such as phenological mismatch with arthropod prey. However, little is known about the diet of arctic passerine nestlings, which have a higher demand for protein to sustain rapid growth. I present next-generation sequence analysis of 74 nestling fecal samples from 6 migratory species that occupy an ecotone from open tundra to shrub thicket. Lapland Longspur (*Calcarius lapponicus*) and Savannah Sparrow (*Passerculus sandwichensis*) nest in open tundra, American Tree Sparrow (*Spizelloides arborea*) and Golden-crowned Sparrow (*Zonotrichia atricapilla*) nest in mixed shrub/tundra, and Gray-cheeked Thrush (*Catharus minimus*) and Yellow Warbler (*Setophaga petechia*) nest in shrub thickets. Prey availability is quantified using weekly arthropod collections in these habitats. Interspecific differences in diet diversity are related to differences in arthropod diversity across the ecotone. Prey selection is related to availability, but also depends on prey characteristics such as protein content, body size, and mobility. There is substantial overlap in nestling diet composition among the six species, but differences in nest timing may reduce competition for preferred prey. These results further our understanding of how generalist passerine species select prey for their young under fluctuating availability.

NOVEL PICORNAVIRUS ASSOCIATED WITH AVIAN KERATIN DISORDER IN ALASKAN BIRDS

Maxine Zylberberg[1,2], **Caroline Van Hemert[3]**, John P. Dumbacher[2], Colleen M. Handel[3], Tarik Tihan[4], and Joseph L. DeRisi[1,5]

[1]Department of Biochemistry and Biophysics, University of California, San Francisco, San Francisco, CA 94158
[2]California Academy of Sciences, San Francisco, CA 94118
[3] U.S. Geological Survey, Alaska Science Center, Anchorage, AK 99508, cvanhemert@usgs.gov
[4]Department of Pathology, University of California, San Francisco, San Francisco, CA 94143
[5]Howard Hughes Medical Institute, Chevy Chase, MD 20815

Avian keratin disorder (AKD), a disease characterized by debilitating beak overgrowth, was first detected in Black-capped Chickadees (*Poecile atricapillus*) in Alaska and has been spreading rapidly both geographically and in terms of host species affected. Despite its widespread distribution, the cause of AKD remains elusive and it is unknown whether the cases of AKD in the afflicted species are causally linked. We applied unbiased, metagenomic next-generation sequencing to search for candidate pathogens in birds affected with AKD. We identified and sequenced the complete coding region of a novel picornavirus, which we have called "Poecivirus." Subsequent screening of 19 AKD-affected Black-capped Chickadees and 9 control individuals for the presence of Poecivirus revealed that 19/19 (100%) of AKD-affected individuals were positive, compared to only 2/9 (22%) of control individuals. Additional testing of a larger number of birds using targeted primers confirmed this pattern. Additionally, two Northwestern Crows (*Corvus caurinus*), and two Red-breasted Nuthatches (*Sitta canadensis*) with AKD-consistent pathology tested positive for Poecivirus. We suggest that Poecivirus is a candidate etiological agent of AKD.

SALMON SUBSIDIZE FOREST BIRD COMMUNITIES AND NEST SUCCESS FOR AN OBLIGATE INSECTIVORE

Marlene A. Wagner[1,2] and John D. Reynolds[1,2]
[1]Earth2Ocean Research Group, Simon Fraser University, Burnaby, BC V5A 1S6; mawagner@sfu.ca
[2]Hakai Institute, Heriot Bay, BC V0P 1H0

Resource subsidies that cross ecosystem boundaries can have strong and unforeseen ecological impacts. Marine-derived nutrients from Pacific salmon can be transferred to streams and riparian forests through diverse food web pathways, fertilizing forests and increasing invertebrate abundance, which may in turn affect breeding birds. We collected point-count data spanning two years to quantify the influence of salmon on abundance and composition of songbird communities across a wide range of salmon-spawning biomass on 14 streams along a remote coastal region of British Columbia, Canada. We combined salmon biomass and 16 environmental covariates in riparian forests to test for correlates with bird abundance, foraging guilds, individual species, and avian diversity. Bird abundance and diversity increased with salmon biomass and watershed size and forest composition were less important predictors. To explore hypotheses surrounding this phenomenon, we measured prey abundance, and collected morphological and nesting data for an obligate insectivore, the Pacific wren, to examine how the salmon subsidy may influence songbird success. Nest density and invertebrate abundance within territories increased with salmon biomass, and individual wrens on streams with salmon were more likely to double-brood. We also compared nitrogen ($\delta^{15}N$) and carbon ($\delta^{13}C$) isotope ratios in feather and fecal samples to determine the contribution of marine-derived nutrients to wrens, and show that body condition increases with $\delta^{15}N$. Combined results suggest that fall spawning salmon provide significant benefits to songbirds during the spring breeding season. This work provides new evidence that salmon positively impact terrestrial ecosystems and emphasizes the need for ecosystem-based management.

ALEUTIAN TERN MIGRATORY AND BREEDING BIOLOGY IN ALEUTIANS AND GULF OF ALASKA

Douglas Causey[1], Veronica Padula[1], Shiway Wang[1], and Sanjay Pyare[2]

[1]Department of Biological Sciences, University of Alaska Anchorage, Anchorage, AK 99508
[2]Environmental Sciences, University of Alaska Southeast, Juneau, AK 99801

The Aleutian Tern (*Onychoprion aleuticus*) is a colonial nesting seabird of coastal Alaska that is very poorly understood. This species is cryptic and highly migratory and consequently therefore little is known about its ecology outside of the brief period when it appears at coastal breeding colonies in the Aleutians and coastal Alaska. The global population of approximately 32,000 individuals is believed to breed exclusively in Alaska and eastern Siberia. The Alaska population has been crudely estimated at 9,500 or 1/3rd of the global population estimate. Colonies of a few to many hundred individuals appear to be broadly distributed along the coasts of the Chukchi Sea, Seward Peninsula, the Yukon-Kuskokwim River delta, the Alaska Peninsula, the AleutianIslands, Kodiak Archipelago, and Kenai Peninsula. However, most individuals can be found in just a few large colonies of several thousand individuals, namely on the Copper River Delta and in the Yakutat area of northern Southeast Alaska. We report on the initial results of research utilizing stable isotope analysis of tissue collected from Yakutat, Aleutians, and from historic museum specimens to estimate diet, foraging behavior, and migration patterns. These data are being compared in context with geolocator data from transmitters, visual sightings, and colony-based observations. This study identifies the importance and need of accurate, updated population estimates to better conserve and manage for the persistence of summer breeding colonies of Aleutian Terns in Alaska.

BLACK OYSTERCATCHER (*HAEMATOPUS BACHMANI*) MONITORING IN PRINCE WILLIAM SOUND, ALASKA

Melissa Gabrielson

Chugach National Forest, Cordova Ranger District, Cordova AK 99574;
melissalgabrielson@fs.fed.us

Approximately 800 to 1,200 Black Oystercatchers (*Haematopus bachmani*) inhabit the rocky shorelines and islets of Prince William Sound (PWS). The dependence of the Black Oystercatcher on marine shorelines, for nesting and feeding, puts the PWS population at particular risk as tourism and recreation activities increase in this area. In addition, the PWS Black Oystercatcher population was affected by the 1989 Exxon Valdez Oil Spill (EVOS). The spill covered many of the shorelines and mussel beds used by Black Oystercatchers during the nesting season, reducing the populations by an estimated 20%. Residual contaminants from the spill may continue to affect the PWS Black Oystercatcher population, which is currently considered “recovering” from the oil spill. Black Oystercatchers are listed as a “species of high concern” in the U.S. National Shorebird Conservation Plan, a “focal species” for the U.S. Fish & Wildlife Service (USFWS), a “management indicator species” for the Chugach National Forest (CNF), and a “sensitive species” for the US Forest Service Alaska Region. The Chugach National Forest Plan calls for monitoring Black Oystercatcher population trends, habitat relationships, and habitat changes in PWS. The CNF has been monitoring Black Oystercatcher nest locations since 1999. Efforts under the Prince William Sound Framework are reevaluating patterns and intensity of human activity throughout the region, which will result in a comprehensive evaluation and recommendations for long-term monitoring of human activity in PWS. The spatially explicit (raster-based) distributions of human activity will be periodically analyzed with the Black Oystercatcher data collected through the CNF monitoring program.

Age, timing, and a variable environment affect double brooding of the Cassin's Auklet

Michael E. Johns[1], Pete Warzybok[2], Russell W. Bradley[2], Jaime Jahncke[2], Mark Lindberg[1], and Greg Breed[1]

[1]University of Alaska Fairbanks, Fairbanks, AK 99775; mejohns3@alaska.edu
[2]Point Blue Conservation Science, Petaluma, CA 94954

For marine birds using resources that vary on spatial and temporal scales, differences in individual reproductive output are driven by a combination of environmental, physiological, and behavioral cues. A common strategy for maximizing fecundity in birds is to produce two broods in a single season, known as double brooding. Cassin's Auklets (*Ptychoramphus aleuticus*) are among the relatively few seabirds that use this strategy, however, the proportion of breeding pairs that attempt double brooding is highly variable among years. We investigated the source of this variation using long-term monitoring data from Southeast Farallon Island off central California. Double brooding rates ranged from 0–90% over a 26-year period, with an overall rate of 32% (95% CI ± 4.16%). Parameter estimates from generalized linear-mixed models indicate that older females, earlier breeding initiation dates, stronger upwelling, and an interaction between age and upwelling increased the likelihood of double brooding in this population. Using a within-subject centering technique, the effects of age included both a within- and between-individual improvement in the likelihood of double brooding with age. Our findings show that females of higher quality and reproductive experience drive double brooding in this population, and that these individuals are especially able to adopt a more flexible breeding regime in years characterized by high marine productivity.

GEOGRAPHIC AND SEASONAL PATTERNS OF SEABIRD SUBSISTENCE HARVEST IN ALASKA

Liliana C. Naves

Alaska Department of Fish and Game, Division of Subsistence, Anchorage, AK;
liliana.naves@alaska.gov

Assessing seabird harvest sustainability is difficult because of limited information on harvest and its impacts on seabird populations. This study quantified seasonal harvest of seabirds and their eggs in Alaska, addressed current management and conservation questions, and identified topics where collaboration among stakeholders can support sustainable harvest opportunities and promote seabird conservation. In 2004–2013, the estimated subsistence harvest of seabirds was 23,209 birds/year. Murres (33%), auklets (28%), gulls (16%), and cormorants (14%) represented most of the harvest. Alaska-wide harvest patterns largely reflected harvest in the St. Lawrence-Diomede Islands region, which represented 78% of the total seabird harvest. The estimated egg harvest was 145,548 eggs/year and was largely composed of murre (54%) and gull (41%) eggs. The Alaska-wide seasonal distribution of harvest was 53% in spring, 21% summer, and 26% fall-winter. Harvest of most species, including species of conservation concern, was low relative to population sizes. However, harvest of tern eggs may be significant compared to coastal populations. A better understanding of the main threats to tern populations is needed to clarify conservation priorities and to engage subsistence users in conservation efforts. Despite indications of reduced subsistence uses, harvesting of seabirds and their eggs remains culturally important and is a food security component in remote Alaska communities.

MURRE UPDATE: WIDESPREAD BREEDING FAILURES FOLLOWING WINTER MORTALITY EVENT

Heather M. Renner[1], Mayumi L. Arimitsu[2], Donald E. Dragoo[1], Holly Goyert[3], John F. Piatt[2], Nora A. Rojek[1], Marc D. Romano[1], Sarah K. Schoen[2], and Leslie Slater[1]

[1]Alaska Maritime National Wildlife Refuge, U.S. Fish and Wildlife Service, Homer, AK 99603; heather_renner@fws.gov
[2]U.S. Geological Survey-Alaska Science Center, Anchorage, AK, 99508
[3] Idaho Cooperative Fish & Wildlife Research Unit, University of Idaho, College of Natural Resources, Dept. of Fish and Wildlife Sciences, Moscow, ID 83843

Common Murres (*Uria aalge*) experienced complete reproductive failure at nearly all monitored colonies in the Gulf of Alaska and Bering Sea in 2016. This unprecedented event came after an unusually widespread and prolonged winter mortality event in 2015–2016 and was presumably linked to anomalously high ocean temperatures throughout the North Pacific beginning in winter 2014. At many colonies, zero to few murres attended nesting cliffs during the typical breeding period, which limited our ability to detect population-level effects of the winter die-off. Colonies where murres attempted to breed in 2016 laid eggs later than normal, and many experienced high rates of predation. We hypothesize that the reproductive failure in murres resulted from poor body condition prior to the breeding season after multiple years of food stress. Murres in the Aleutian Islands and Chukchi Sea fledged chicks at normal rates. Preliminary results from forage fish work in coastal areas of the Gulf of Alaska suggest favorable conditions for young-of-the-year forage fish including sand lance, herring and pollock during summer 2016. These fish, while abundant, are of lower energetic value than older age classes and they become available to predators later in the breeding season, compared to older age classes. Broad-scale analyses of murre breeding population trends indicate a stable or increasing population in Alaska over the last four decades. Continued monitoring of population status, breeding success and prey availability at colonies in coming years will provide an understanding of the population-level effects of recent anomalous ocean conditions on murres in Alaska.

ACCELERATED ENERGY INTAKE INCREASES SURVIVAL RATES OF BLACK OYSTERCATCHER BROODS

Brian H. Robinson[1,2], Laura M. Phillips[3], and Abby N. Powell[1,4]

[1]Department of Biology and Wildlife, University of Alaska Fairbanks, PO Box 756100, Fairbanks, AK 99775
[2]U.S. Geological Survey, Alaska Science Center, Anchorage, AK 99508
[3]Denali National Park and Preserve, PO Box 9, Denali Park, AK 99775
[4]U.S. Geological Survey, Florida Cooperative Fish and Wildlife Research Unit, University of Florida, Gainesville, FL 32601

Black Oystercatchers, a species of conservation concern, depend on marine intertidal prey resources that are changing as a result global climate change. To understand the relationship between oystercatchers and the prey on which they depend, we conducted a study in southcentral Alaska in 2013 and 2014 examining diet, feeding rates, brood growth and survival. To determine the importance of diet on brood survival, we modeled daily survival rates of broods as a function of energy intake rate and other ecological factors. We hypothesized that broods fed at accelerated energy intake rates would grow faster and fly earlier, thereby being less vulnerable to predators and have higher survival rates. Consistent with our prediction, broods with higher intake rates had higher growth rates and daily survival rates. The best-supported model indicated that survival varied by energy intake rate, brood age, and daily precipitation. To understand how adults meet the increasing nutritional needs of developing chicks, we examined delivery rates, prey composition and size as a function of brood age. Delivery rates differed by age, however, the composition and size classes of prey fed to chicks by their parents did not, indicating that adults respond to the energetic needs of broods by increasing parental effort rather than switching prey. Collectively, these results demonstrate the importance of diet and provisioning to broods. Given the consequences of reduced energy intake on survival, changes in the abundance and composition of intertidal macroinvertebrates as a result of climate change may have significant impacts on Black Oystercatcher populations.

THE INFLUENCE OF OCEAN PRODUCTIVITY ON STRESS AND PARENTAL INVESTMENT IN A LONG-LIVED SEABIRD

Anne Schaefer[1,2], Paul Lukacs[1], Michelle Kissling[3], Stephen Lewis[3], Charline Parenteau[4], Olivier Chastel[4], Sara Berk[5], and Creagh Breuner[5]

[1]Wildlife Biology Program, College of Forestry, University of Montana, Missoula, MT 59812
[2]Prince William Sound Science Center, Cordova, AK 99574, USA; aschaefer@pwssc.org
[3]U.S. Fish and Wildlife Service, 3000 Vintage Boulevard, Suite 201, Juneau, AK 99801
[4]Centre d'Etudes Biologiques de Chizé, CNRS, Villiers-en-Bois, France
[5]Organismal Biology and Evolution, Division of Biological Sciences, University of Montana, Missoula, MT 59812

Seabird demographic rates are sensitive to changes in prey availability; thus, it is important for managers to understand the environmental conditions experienced by seabirds throughout the year. Direct measures of prey abundance and availability are difficult to assess, particularly in the marine environment. Instead, physiological measurements can be used to understand the environmental conditions experienced by individuals from which population demographics may be predicted or inferred. We measured corticosterone (the primary avian stress hormone, CORT) in plasma and feather samples and prolactin (involved in parental expression) in plasma samples of an elusive seabird, the Kittlitz's Murrelet (*Brachyramphus brevirostris*). We then evaluated relationships between measured hormone levels and breeding propensity and ocean productivity metrics (as proxies of food availability) during different times of the year. Higher feather CORT levels during the pre- and post-breeding seasons correlated with lower breeding propensity during the upcoming breeding season. In contrast, within the breeding season, higher levels of plasma CORT were associated with greater parental investment. Our results also suggest correlations between plasma CORT and environmental conditions, such as sea surface temperature, and individual-level characteristics, such as sex and body mass. Collectively, these results provide new insight regarding when Kittlitz's Murrelets may make breeding decisions and how stress may influence those decisions, with conditions during the non-breeding season seeming to drive future reproductive decisions of murrelets more so than conditions experienced within the breeding season.

EAST ASIAN-AUSTRALASIAN FLYWAY SITE NOMINATION IN THE NPR-A

Casey Burns[1], Rick Lanctot[2], and Debra Nigro[3]

[1] State Wildlife Biologist, Bureau of Land Management (BLM), Anchorage, AK 99513, ctburns@blm.gov
[2] Region 7 Shorebird Coordinator, U.S. Fish and Wildlife Service, Anchorage, AK 99503
[3] Wildlife Biologist, BLM-Arctic Office, Fairbanks, AK 99709

The East Asian-Australasian Flyway Partnership (EAAFP) is an informal and voluntary organization focusing on the protection of migratory waterbirds, their habitats, and the livelihoods of people dependent upon them. One objective of the EAAFP is to develop a network of flyway sites for the conservation of migratory waterbirds. During summer 2016, BLM Alaska presented the idea of nominating a portion of the National Petroleum Reserve in Alaska (NPR-A) as an EAAFP Flyway Site to a variety of stakeholders. Based on stakeholder feedback, BLM Alaska is proposing to nominate a small site (211 km^2) northeast of Teshekpuk Lake based on the presence of $\geq$1% of the world's Dunlin (*Calidris alpina*) population. The site is important to many other waterbird species as well. This site is within the Teshekpuk Lake Special Area, and within areas that are designated as "Unavailable for Leasing" and "No New Non-Subsistence Infrastructure," and is away from subsistence cabins. If designated, site managers are expected to ensure waterbird values of their site are maintained and enhanced where possible, which fits well into the existing management plan for the area. Subsistence use of the site is not only allowed, but encouraged to continue as part of the site management.

CONNECTING FESTIVALS

Erin Cooper

Chugach National Forest, Cordova Ranger District, Cordova AK 99574; ecooper@fs.fed.us

Millions of migratory birds fly along the Pacific Flyway each year in search of wintering and nesting grounds. The Pacific Flyway covers more than two thousand miles from the north slope of Alaska to Peru. Throughout the year, migratory birds rely on the resources provided by the different habitats found along the flyway. In order for migratory bird populations to be successful breeding grounds must offer sufficient food, nesting habitat, and nursery habitat for successful clutch rearing; stopover sites and staging areas must provide abundant, accessible, high-quality food; and wintering areas must have sufficient food and safe roosting areas for the birds to survive to the breeding season. An effective way to conserve these critical habitats across the flyway is to create partnerships. The Copper River International Migratory Bird Initiative (CRIMBI) is an example of one such partnership. The initiative seeks to strengthen conservation of migratory birds along the entire Pacific Flyway through effective international partnerships and action on the ground. Festivals are one way to connect people, birds, and habitats along the flyway. Festivals such as the Copper River Delta Shorebird Festival, Stikine River Birding Festival, Yakutat Tern Festival, and Festival de Aves Playeras are important in raising both local and international awareness of migratory birds and the habitats that they utilize throughout the year. In addition, these festivals provide conservation, educational, and economic benefits. With growing partner and sponsor support, these festivals can continue to develop and grow.

ALASKA SUBSISTENCE HARVEST OF BIRDS AND EGGS IN THE MIGRATORY BIRD TREATY CENTENNIAL

Liliana C. Naves

Alaska Department of Fish and Game, Division of Subsistence, Anchorage, AK;
liliana.naves@alaska.gov

In the 1800–1900s, the commercial overuse of migratory birds caused severe population declines and extinctions. Eventually, the conservation movement gained traction, leading to the Migratory Bird Treaty in 1916. To protect nesting birds, a hunting closure was established between 10 March– 1 September each year, but it did not account for the spring-summer subsistence harvest of migratory birds by indigenous peoples in Alaska and Canada. Enforcement of the treaty in Alaska resulted in hardship for subsistence communities and conflict between indigenous people and management agencies. In 1997, a treaty amendment legally recognized the spring-summer subsistence harvest and promoted bird conservation by including subsistence hunting in the management system. The Alaska Migratory Bird Co-Management Council was created in 2000 to include subsistence users in the management process. The first legal spring-summer subsistence season was in 2003. The amended treaty mandates that federal, state, and Native partners work together to support sustainable harvest opportunities and bird conservation. The amended treaty has promoted harvest data collection, outreach and communication, and inclusion of local and traditional knowledge to inform management and conservation. Now there is more awareness about subsistence harvest and different ways that people relate to birds. Together with bird watchers and sport hunters, subsistence users care about birds and are engaged in helping to conserve birds and the habitats they depend upon.

THE FEDERAL OPEN DATA POLICY AND YOU

John Pearce

U.S. Geological Survey, Alaska Science Center, 4210 University Drive, Anchorage, AK 99508; jpearce@usgs.gov

Beginning on October 1st, 2016, the U.S. Government now requires that all data collected with federal funding that supports scientific publications or reports, be released to the public at or before the time of publication. Additionally, scientific documents (papers and publications) must be made available to the public within 12 months of publication. These new requirements will result in large amounts of information being released to the public that can be used to verify or repeat the results of scientific investigations, to merge into other streams of information for larger meta-analyses, to compare with historical or more contemporary information to examine time series, or to act as a comparison group to a similar study being conducted elsewhere. What these data should not be used for by scientists is general data snooping when one does not have a particular question in mind. Data snooping is defined as "statistical analysis that a researcher decides to conduct without pre-knowledge of the data and its contents, in contrast to pre-planned analysis in which the researcher plans study questions and tests before looking at the data. This talk will review the new federal open data policy, how data and metadata are being released, and also offer a reminder about the proper steps to data discovery and use.

ENVIRONMENT FOR THE AMERICAS IN ALASKA

Christine Smith

10427 McNerney Ave., South Gate, CA 90280; christine.ronnie.smith@gmail.com

Environment for the Americas (EFTA) is an organization geared towards diversifying the bird conservation field. This summer in Alaska, EFTA had four Latino interns on the ground gaining experience as bird conservationists and educators with the goal of reaching out to the public to increase awareness of bird related issues. One of the primary focuses of these interns was the massive migration of shorebirds north along the Pacific Flyway. As a partnership with the California Avian Data Center (CADC), shorebirds were surveyed in Alaska for two weeks during the peak shorebird migration. Each intern along with a team of Citizen Science volunteers surveyed key migration stopovers for species abundance and environmental conditions. In Cordova, Alaska, alone 51,681 shorebirds were counted in the two-week period. As others may have experienced, these numbers were significantly lower than in previous years. These findings may be attributed to changes in climate conditions. In Cordova, Alaska, this may have been due to a change in migration timing because of an early spring. All of the shorebird data collected by EFTA interns was collated into the CADC website. The goal of this coalescence of bird and ecosystem data is to better inform current and future conservation efforts. EFTA interns used their experiences as conservationists to reach out to the community and motivate them to be aware and maybe even active participants in bird conservation efforts.

BUILDING BETTER BIRD MAPS: AUDUBON ALASKA'S 2017 ECOLOGICAL ATLAS OF THE BERING, CHUKCHI, AND BEAUFORT SEAS

Melanie A. Smith[1], Max S. Goldman[1], Erika J. Knight[1], and Daniel P. Huffman[2]

[1]Audubon Alaska, 431 West 7th Ave, Suite 101, Anchorage, AK 99508; masmith@audubon.org
[2]Department of Geography, University of Wisconsin-Madison, 550 North Park St, Madison, WI 53706

As the breadth of knowledge regarding Arctic marine ecology grows alongside increased development interest in the Arctic region, there is a need to synthesize and disseminate information in a format that is useful and accessible. The goal of Audubon Alaska's *Ecological Atlas of the Bering, Chukchi, and Beaufort Seas* is to create a comprehensive, trans-boundary atlas that represents the current state of knowledge on a wide array of subjects, including marine birds. The Ecological Atlas consists of many maps integrating disparate datasets into concise, cohesive, and complementary data layers that visually describe seasonal use, activity, and movement of birds through the project area over the course of a year. Through maps and written summaries, the atlas provides a cumulative picture of what is happening in the region to understand ecological patterns and inform decision-makers in communities; federal, state, and local governments; and other arenas. Our process involved intensive research and consultation with experts in order to gather and analyze the most recent and best data available. Along the way, we developed robust standards for data integration and cartographic design. We will introduce some of our new bird maps and discuss our data-to-design process.

RECONCILING SPATIAL SCALES IN BIRD CONSERVATION: THE KENAI BIRD HABITAT ASSESSMENT PROTOCOL

Ben Sullender, Erika Knight, and Melanie Smith

Audubon Alaska, 431 W. 7th Ave Suite 101, Anchorage, AK 99501; bsullender@audubon.org

Land trusts and environmental non-profit organizations both play key roles in conservation, but a scale mismatch can impede collaborative decision-making. Land trusts operate on a local scale, translating knowledge into tangible habitat restoration and protection through establishment of easements, property acquisition, and community engagement. In contrast, environmental non-profit organizations such as Audubon Alaska typically focus on landscape scales of conservation and develop data products accordingly. The Kenai Bird Habitat Assessment Protocol is a collaborative effort developed by Audubon Alaska and Kachemak Heritage Land Trust to integrate both perspectives into a cross-scale prioritization of bird habitat. As part of this process, we created 179 species distribution models using Kenai-specific data, converted suitability into predicted presence, and aggregated output by watershed to develop an interactive list of likely bird species. We also developed a list of site-specific habitat associations for 21 bird species of conservation concern. Land stewards can use these two products together to identify likely bird species and most valuable habitat at a given site, enabling inter-parcel comparison, biologically informed outreach, and targeted monitoring and restoration. By creating, synthesizing, and providing data products directly at the scale that will be used, the Kenai Bird Habitat Assessment Protocol aligns the mission of both land trusts and research-oriented partner organizations to enable informed, on-the-ground conservation.

RED KNOT *Calidris canutus roselaari* SPRING STOPOVER SITES IN ALASKA

Mary Anne Bishop[1], Joseph Buchanan[2], Brian McCaffery[3], and Jim Johnson[4]

[1]Prince William Sound Science Center, Cordova, AK 99574;mbishop@pwssc.org
[2]Washington Department of Fish and Wildlife, Olympia, WA
[3]Yukon Delta National Wildlife Refuge, Bethel, AK
[4]U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, AK

With an estimated population of 22,000 individuals, the Red Knot (*Calidris canutus roselaari*) is one of the smallest and least studied shorebird populations in North America. Historically, limited ground-based counts at the Copper River (CRD) and Yukon-Kuskokwim River deltas (YKD) suggested these areas are major stopovers in spring. We used radio telemetry during spring 2014 at CRD and spring 2015 at CRD and YKD to document Red Knot occurrence and space use. In 2014, 12 of 20 Red Knots radiotagged in Grays Harbor, Washington, on 13 May were detected during 7 d of aerial surveys on CRD. In spring 2015, 50 knots were radiotagged at Grays Harbor on 1 May (n = 3) and 6 May (n = 47). Ninety-four percent and 70% of the tagged knots were later detected on the CRD and YKD, respectively, signifying a high level of connectivity between Grays Harbor and the two Alaska sites during spring migration. We identified areas previously not known to be important for Red Knots, including Controller Bay on the Copper River Delta and the southern coast of the Yukon-Kuskokwim River Delta. Short length of stay suggests that both study areas function primarily as stopover areas.

PACIFIC AMERICAS SHOREBIRD CONSERVATION STRATEGY

River Gates[1]**,** Stan Senner[2], and Brad Andres[3]

[1]Pacifica Ecological Services, Anchorage, AK 99516; pacific.shorebirds@gmail.com
[2]National Audubon Society, Portland, OR 97201
[3]U.S. Fish and Wildlife Service, Lakewood, CO 80215

The Pacific Americas Shorebird Conservation Strategy is an international effort to identify priority threats and develop coordinated conservation action necessary to maintain and restore populations of shorebirds and their habitats across the entire Pacific Americas Flyway. Shorebirds are faced with many challenges due to their often long-distance migrations, reliance on coastal and wetlands habitats and vulnerability to environmental and anthropogenic perturbations. The Strategy focuses primarily on the Pacific coasts of the Americas and spans 120 degrees of latitude from northeastern Russia to southern Chile. During 2013–2016, more than 90 participants from 17 countries, representing 54 institutions participated in a series of four workshops at which the scope and contents of the Strategy were developed. We used the *Open Standards for the Practice of Conservation* to identify 21 target species, 7 major threats and 6 key action strategies across the project area. Thirteen target species occur within Alaska, where climate change, energy production and mining, and oil spills were identified as important regional threats. We aggregated a series of regional activities into a portfolio of actions that can be implemented to conserve shorebirds throughout the Flyway. The very process of developing the Strategy has already enabled partners to work together throughout the Flyway on a more coordinated basis.

STUDIES OF ALASKA'S BOREAL SHOREBIRDS: SAVING THE BEST FOR LAST

Christopher M. Harwood

Kanuti National Wildlife Refuge, U.S. Fish and Wildlife Service, 101 12th Ave., Room 206, Fairbanks, AK 99701; christopher_harwood@fws.gov

The Northwestern Interior Forest Bird Conservation Region (BCR 4) comprises half the land in Alaska and parts of 27 of the state's 32 ecoregions. It is in effect "Interior Alaska." Some 30 species of shorebirds regularly occur there, including at least 23 species as breeders. Despite BCR 4's enormous size, diverse habitats, and ample shorebird resources, it has hosted relatively few shorebird studies. From 2002–2015, only 13% of the shorebird studies annually reported (mean: 32/yr) in the Alaska Shorebird Group's project summary occurred in BCR 4. Most of these studies occurred in maritime portions of BCR 4, while studies in "interior" Alaska proper averaged only one per year and of a single species, the Whimbrel. This paucity of investigation in Alaska's Interior is likely due to its vastness, the challenging access to its varied habitats and physiography, and the more dispersed distribution of shorebirds breeding in and migrating through it. In late 2015, I recruited ornithological representatives and experts of BCR 4's ecoregions and shorebird species in an effort to document the state of knowledge for Alaska's "boreal" shorebirds. To date this has produced nearly 130 references, including 66 published articles or books, 6 dissertations or theses, and 56 unpublished reports. I present results of this burgeoning bibliography, including identifying strengths and deficiencies in species and eco-regional coverage.

ADAPTABILITY OF ARCTIC-BREEDING SHOREBIRDS TO EARLIER SUMMERS

Sarah Saalfeld and **Richard Lanctot**

U.S. Fish and Wildlife Service, Anchorage, AK 99503; richard_lanctot@fws.gov

Phenological advancement allows individuals to adapt to climate change by timing life-history events to key resources. However, different trophic levels may respond to changes at different rates, leading to a trophic mismatch. Shorebirds breeding in the Arctic may be especially vulnerable to phenological mismatch, as they time departure from wintering grounds using photoperiod length, but rely on a short pulse of invertebrates whose emergence on the breeding grounds is dictated by local climatic conditions. Thus, shorebirds should be under selective pressure to advance nest initiation dates so they coincide with earlier emergence of insects resulting from earlier summers. During a 14-year study near Barrow, we estimated phenological advancement in egg laying for eight Arctic-breeding shorebirds with different life-history characteristics and investigated potential mechanisms by which individuals adjusted egg laying. We found that six of the eight species exhibited phenological advancement in laying dates, nesting ~2–8 days earlier while an 11-day advancement in snow melt occurred. Species that advanced laying dates exhibited high phenotypic plasticity, an opportunistic settlement strategy (i.e., low site fidelity, non-territoriality, and polygamous mating system), and typically nested later. Migration strategy, previous site experience, and mate fidelity did not influence timing of egg-laying. As species that failed to advance egg-laying are more likely to have reduced recruitment, these species are most at risk to future climate change and long-term population declines.

INDIVIDUAL FLEXIBILITY OF MIGRATORY MOVEMENTS BY MARBLED GODWITS IN ALASKA

Dan Ruthrauff, Lee Tibbitts, and Robert Gill, Jr.

U.S. Geological Survey / Alaska Science Center, 4210 University Drive, Anchorage, AK 99508; druthrauff@usgs.gov

Marbled Godwits in Alaska are a subspecies (*Limosa fedoa beringiae*) whose breeding range is restricted to the central Alaska Peninsula. This little-studied subspecies has an estimated population size of ≤3,000 birds, ranking it among the smallest for shorebirds in North America. To better describe basic aspects of the subspecies' natural history, we deployed solar-powered satellite transmitters on nine birds in 2008. We obtained repeat migratory tracks on numerous individuals, including following three individuals through three complete annual cycles, another through four, and one individual through seven. Birds typically made one long 'jump' on both northward and southward migrations, and up to five additional 'hops' en route to their final destinations. Birds spent an average of 271.9 ±15.1 SD days at final nonbreeding destinations that extended between Willapa Bay, WA (46.7°N) and Moss Landing, CA (36.8°N). Birds showed a high degree of fidelity to their breeding and nonbreeding destinations, but across years often used different stopover sites, and varied the timing of their principal north and south departures on migration by up to three weeks. Controller Bay on the eastern Copper River Delta was a focal staging area during spring migration, where 14 of 18 unique northbound migrations involved stopovers there averaging 69.4 ±30.7 SD hours.

A MISSING PIECE OF THE PUZZLE: PRISM SHOREBIRD SURVEYS ON THE YUKON DELTA NATIONAL WILDLIFE REFUGE

Kristine Sowl[1], Brad Andres[2], Stephen Brown[3], Diane Granfors[4], Jim Johnson[4], Richard Lanctot[4], James Lyons[5], Sarah Saalfeld[4], and Brad Winn[3]

[1]Yukon Delta National Wildlife Refuge, Bethel, AK 99559, kristine_sowl@fws.gov
[2]U.S. Fish and Wildlife Service, Lakewood, CO 80215
[3]Manomet Center for Conservation Sciences, Manomet, MA 02345
[4]U.S. Fish and Wildlife Service, Region 7, Anchorage, AK 99503
[5]Patuxent Wildlife Research Center, Laurel, MD 20708

The Program for Regional and International Shorebird Monitoring (PRISM) is a broad-scale effort to estimate size and trend of North American shorebird populations. Since the late 1990s, PRISM surveys have been completed across much of Arctic Alaska and Canada. However, there has been one major and important gap in the data from these surveys. Except for a 853-km^2 portion of the central coast, the majority of the approximately 95,000-km^2 Yukon-Kuskokwim Delta (Delta) had not been surveyed. The Delta encompasses about 75% of Alaska's coastal wetlands and hosts a large proportion of the breeding grounds of many North American shorebird species as well as a unique Beringian breeding component. Accurate continental population sizes and trends cannot be estimated without completing surveys in this region. In 2015-16, we conducted breeding shorebird surveys across the Delta, surveying at least 300 randomly located plots per year. In 2016, we conducted intensive nest searching at two sites to determine detection rates. We will present results on species distribution and relative abundance and make comparisons to other surveys.

NOW YOU SEE ME, NOW YOU DON'T: SHIFTS IN BLACK TURNSTONE MIGRATION PATTERNS IN PRINCE WILLIAM SOUND, ALASKA

Audrey R. Taylor[1], Mary Anne Bishop[2], Anne Schaefer[2], Ron Porter[3], and Kristine Sowl[4]

[1]Department of Geography & Environmental Studies, University of Alaska Anchorage, 3211 Providence Drive, Anchorage, AK 99508; artaylor@alaska.edu.
[2]Prince William Sound Science Center, PO Box 705, Cordova AK 99574
[3]Delaware Bay Shorebird Project, Ambler PA 19002
[4]Kristine Sowl, Yukon Delta National Wildlife Refuge, PO Box 346, Bethel AK 99559

Black Turnstone is a rocky coast shorebird species that breeds in western Alaska and winters from southcentral Alaska south to the coast of Mexico. Counts of Black Turnstones stopping at Prince William Sound's Montague Island during spring migration have declined dramatically in the last 20 years, despite this area being designated as an Important Bird Area for the species. The overall goal of this project was to document current Black Turnstone migration patterns and connectivity, and to examine evidence for shifts from previously observed routes that included Prince William Sound. In 2013 we captured and equipped with geolocators 30 Black Turnstones breeding on the Yukon Delta (YD) in western Alaska and 5 turnstones breeding at Cape Krusenstern (CK) in northwestern Alaska. In 2014 and 2015 we recaptured and recovered 18 geolocators at YD and 2 geolocators at CK. We also analyzed three recovered geolocators from a pilot study conducted at Oak Harbor, WA, in 2011/2012. Wintering locations of these turnstones occurred only within the northern half of the known wintering range, from southcentral Alaska to the southern Oregon coast. Migration routes were similar in spring and fall, and we documented several high-use regions for migration stopovers during both north- and southbound migration. None of the 23 geolocator-tagged individuals stopped over at Montague Island itself and few were recorded in Prince William Sound, indicating that migration patterns may have changed and turnstones are no longer using this area as a major spring stopover site.

POPULATON DEMOGRAPHY AND MOVEMENTS OF BRISTLE-THIGHED CURLEWS WINTERING ON O'AHU, HAWAI'I

Lee Tibbitts[1], Jared Underwood[2], and Dan Ruthrauff[1]

[1]U.S. Geological Survey, Alaska Science Center, Anchorage, AK 99508; ltibbitts@usgs.gov
[2]U.S. Fish and Wildlife Service, Hawaiian and Pacific Islands NWR Complex, Honolulu, HI 96850

Historically, Bristle-thighed Curlews were considered an uncommon winter visitor on the main Hawaiian lslands. Therefore, an influx of wintering curlews to a national wildlife refuge on Oahu starting in the 1990s was unusual, and prompted us to investigate the origins, status, and space-use of this new population. Genetic assignment analysis indicated the curlews originated from both of the Alaskan breeding areas. Mark-resight analysis estimated that 125 birds were present on the refuge in winter 2013–2014 representing a 10-fold increase in numbers since the mid-1990s. Subadults (≤ 3 years old) constituted 15% of the winter population. From 2013 to 2016, satellite-tagged birds (n = 11) spent most of their time either on the 5 km^2 refuge or on private lands within ~4 km of refuge boundaries. Shallow ponds with predator-fences were particularly attractive to roosting curlews at night and predator control seems a key factor in the establishment of this population. Subadults remained year-round on Oahu while adults migrated to Alaska in early May and returned from mid-July to mid-August, thus adults were resident on Oahu for over 9 months per year. Future studies are planned to identify the features that make high islands, like Oahu, attractive to curlews given their usual propensity to winter on atolls.

PAST AND FUTURE CHANGES TO THE ONSET OF THE GROWING SEASON AND ITS EFFECT ON THE TIMING NESTING FOR ARCTIC MIGRANTS IN ALASKA

David Ward[1], Michael Budde[2], David Douglas[1], Jerry Hupp[1], Rick Lanctot[3], Steven Brown[4], Paul Duffy[5] and Matthew Leonawicz[5]

[1]U.S. Geological Survey, Alaska Science Center, Anchorage AK 99508; dward@usgs.gov
[2]U.S. Geological Survey, EROS, Sioux Falls, SD 57198
[3]U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage AK 99503
[4]Manomet Center for Conservation Sciences, 125 Manomet Pt Rd, Plymouth MA 02360
[5]University of Alaska-Fairbanks, SNAP, Fairbanks, AK 99709

We constructed a 29-year time series record (1982–2010) of satellite-derived estimates of Normalized Difference Vegetation Index (NDVI) to examine how the day of year for the start of the growing season (SOS) has changed across 9 ecoregions of Alaska and whether avian migrants have adapted to shifts in SOS by modifying their timing nesting at 4 sites in northern, 1 site in central and 2 sites in western Alaska. We also discuss how dates of SOS may change in the future across Alaska ecoregions using projections of future temperature data from 3 General Circulation Models. We detected an earlier trend (-0.24 days yr^{-1} [7 days]) in SOS across Alaska over the 29-year study period, but rates of advancement varied by ecoregions. Greatest advancements in SOS occurred in northern and western Alaska ecoregions. Based on 511 records of clutch initiation dates (CID) for 57 avian migrants, we detected a significant earlier trend in CID for 7 migrants and earlier nesting for another 39 migrants, but trends for these birds were not significant. There was no evidence of a significant difference in CID among species or across ecoregions, though the rates ranged nearly 4-fold across species. There was evidence that most avian migrants were unable to keep pace with advancing trends in phenology in Alaska. Future predictions of SOS indicate greatest rates of advancement will likely occur on the Seward Peninsula and along the Gulf of Alaska from Prince William Sound to southeast Alaska and least change in the boreal ecoregion.

TONGASS HUMMINGBIRD PROJECT: FOUR SEASONS OF BANDING RESULTS

Gwen Baluss

Tongass National Forest, 8510 Mendenhall Loop Road Juneau Alaska

The Rufous Hummingbird breeding range is tied to northwestern temperate forests. The species has been identified by Partners in Flight as a priority for monitoring, research and management in Bird Conservation Region 5. Recent data from the Breeding Bird Survey and Alaska Landbird Monitoring System suggest possible population decline. Hummingbirds, as pollinators, may be ecologically important to their habitat. Yet there are gaps in knowledge about population structure and life history of the Rufous Hummingbird, particularly in Alaska. In 2013 the Tongass National Forest in collaboration with the Western Hummingbird Partnership (WHP) sought gain insight into the habits, breeding chronology and demographics of Rufous Hummingbirds. This was the first full-season study of the species in Southeast Alaska. Two banding stations were established near Juneau using general WHP guidelines and data collection protocol similar to those in use by Rocky Point Bird Observatory. Also, foraging observations were sought from local citizen scientists. I present results from the first three years including data summary of over 400 birds banded, discussion of recaptures, and a general breeding season chronology hypothesized from those results. I will also list important natural forage plants.

BLOOD LEAD LEVELS OF GOLDEN EAGLES (*AQUILA CHRYSAETOS*) CAPTURED IN ALASKA, IMPLICATIONS AND POSSIBLE SOURCES

Christopher Barger[1], Travis Booms[1], Vincent Slabe[2], and Todd Katzner[3]

[1] Alaska Department of Fish and Game, Fairbanks, AK 99701; chris.barger@alaska.gov
[2] West Virginia University, Morgantown, WV 26506
[3] U. S. Geological Survey, Boise, ID 83706

Heavy metal contaminants in raptors, especially lead exposure, have been a growing concern for the past 30 years. There has been nationwide investment into describing lead levels in raptors and evaluating potential sources of lead exposure. We investigated blood lead levels of 66 free-ranging Golden Eagles (*Aquila chrysaetos*) that were captured as migrants (36 adults and 8 sub adults) at Gunsight Mountain, Alaska, or were banded as nestlings (22) on the Seward Peninsula, Alaska. We analyzed lead isotopes (^{206}Pb:^{207}Pb ratio) in these samples to evaluate potential sources of lead. Adult birds had the highest lead concentrations (mean = 0.0955 PPM, Max = 0.93, Min = 0), followed by sub adults (mean = 0.0448 PPM, Max = 0.3136, Min = 0), and lastly nestlings (mean = 0.0043 PPM, Max = 0.054, Min = 0). Lead isotope ratios in migrating eagles were closer to that of published values for rifle ammunition than for any other published source. Preliminary results demonstrate how life stages and geographic region may interact to influence lead exposure of eagles. Comparison of these results, especially the eagle chicks, with those from areas where shooting is more common may provide additional insight into sources of lead contamination of eagles.

PRELIMINARY OBSERVATIONS OF THE BEHAVIOR AND FORAGING ECOLOGY OF AMERICAN DIPPERS (CINCLUS MEXICANUS) IN SOUTHCENTRAL ALASKA

Veronica Padula, Abby Bell, Erin Ingle, Samuel Franklin, Sabre Hill, Kyna Lewis, Kenton Stephens, and **Douglas Causey**

Department of Biological Sciences, University of Alaska Anchorage, Anchorage, AK 99508

American Dippers (*Cinclus mexicanus*) are widespread throughout the northern tier of North America, but comparatively little is known about their behavior and foraging ecology in Southcentral Alaska. Detailed studies by Mary Willson and colleagues established baseline information on their distribution, abundance, and demography in Southeast Alaska, and provided new information on the similarities and differences compared to populations further south. Our studies were initiated in 2014, and centered on breeding populations in the Chugach National Forest and specifically Portage Valley. Our initial results indicate that this species is resident year round, and population abundance appears to be stable throughout the year. While there is annual variation in numbers, particularly during winter, post-breeding feeding flocks remained at approximately the same densities over the study period. American Dippers fed almost exclusively on aquatic invertebrates in glacier streams, which in the focus study area, were open yearround. In our region, they serve as ideal samplers and indicators of stream quality, and as target indicators for other insectivorous animals, such as Little Brown Bats (*Myotis lucifugus*).

INTEGRATING MIGRATION COUNTS AND TELEMETRY TO ESTIMATE THE DENSITY OF GOLDEN EAGLES IN SOUTHCENTRAL ALASKA

Joseph M. Eisaguirre[1,4], Neil Paprocki[2], Stephen B. Lewis[3], Chris P. Barger[4], Carol L. McIntyre[5], Dave Oleyar[2], Greg A. Breed[6], and Travis L. Booms[4]

[1]Department of Biology & Wildlife, University of Alaska Fairbanks, Fairbanks, AK 99775; jmeisaguirre@alaska.edu
[2]HawkWatch International, Salt Lake City, UT 84106
[3]U.S. Fish and Wildlife Service, Juneau, AK 99801
[4]Alaska Department of Fish & Game, Fairbanks, AK 99701.
[5]National Park Service, Fairbanks, AK 99709
[6]Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775

Despite efforts to understand Golden Eagle populations across North America, little is known about them in much of Alaska. We estimated the density of a population of Golden Eagles to help understand the size of the statewide population. We paired migration count data and tracking data from 50 eagles tagged near Gunsight Mountain, Alaska, Spring 2014-16. Using a dynamic Brownian bridge movement model, we determined that 83% of the tagged eagles were available to observers in Spring 2016, while 80–90% of those were detected. Pairing the raw count of 1,163 with availability/detectability estimates, we calculated an adjusted count of 1,818 ± 186 eagles. Kernel density estimates indicate the summer range of this population to be in Southcentral Alaska, covering 122,737.9 ± 13,793.4 km^2. This suggests that the density of Golden Eagles in a portion of Southcentral Alaska is 1.52 ± 0.10 eagles/100 km^2 (or 69.8 ± 4.3 km^2/eagle) and the statewide population might be substantially larger than current estimates.

SPATIO-TEMPORAL PATTERNS IN SURVIVAL OF WILLOW PTARMIGAN IN INTERIOR ALASKA

Graham G. Frye[1,2], Mark S. Lindberg[1], and Richard A. Merizon[3]

[1]Institute of Arctic Biology, Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, AK
[2]Department of Mathematics and Statistics, University of Alaska Fairbanks, Fairbanks, AK
[3]Small Game Program, Alaska Department of Fish and Game, Palmer, AK

Survival is a key demographic parameter governing the states and dynamics of animal populations. As such, estimation of survival is critical to understanding the population ecology of avian species. The Willow Ptarmigan is an ecologically and culturally important species that exhibits dramatic numeric fluctuations. However, the mechanisms driving these fluctuations are poorly understood, especially in Alaska. As part of a larger effort to elucidate details of ptarmigan population ecology, we studied the survival process of Willow Ptarmigan in the southern Alaska Range from 2013-2016. We radio-marked 243 Willow Ptarmigan using VHF radio-transmitters with integrated mortality switches. Transmitters were deployed at 4 sites, representing a gradient of human disturbance. Monthly telemetry flights were used to locate and assess survival status of radio-marked birds. We used telemetry data to fit binomial ("known-fate") survival models in a Bayesian framework. Survival varied temporally, spatially, and among demographic groups. Survival rates decreased each year during the study, whereas abundance increased during the same period. Adult males exhibited lower survival rates than adult females, with survival of first-year birds of both sexes intermediate between the two. Spatial variation in survival was evident in disparate survival rates among breeding sites. Survival of birds breeding in the high-disturbance area was lower than that of birds breeding in the low-disturbance areas. Results suggest that spatio-temporal and demographic variation in survival contribute to the complexity of Willow Ptarmigan numeric fluctuations, and that mortality can increase substantially in areas of high human disturbance.

THE ALASKA CONNECTION – LONG-DISTANCE RUFOUS HUMMINGBIRD RECAPTURES

Katherine McLaughlin

The Alaska Hummingbird Project, Inc., PO Box 561 Cordova, AK 99574;
alaskahummingbird@yahoo.com

The Alaska Hummingbird Project, Inc., (originally the Chenega Bay Hummingbird Banding Project), has been conducting research since 2007 on Rufous Hummingbirds in Prince William Sound, Alaska, banding 2,592 Rufous Hummingbirds to date. The project operates the northernmost hummingbird banding stations in the world. Foreign recaptures of Rufous Hummingbirds were first recorded in 2010, with a bird banded in Florida and recaptured at the Chenega Bay banding station. This recapture marks the first link between Rufous Hummingbird breeding grounds in southcentral Alaska and wintering grounds in the southeastern United States, and is the long-distance recapture record of any hummingbird species. Further records of banded Rufous Hummingbirds associated with the Alaska project are noted with a Rufous Hummingbird banded in Texas in 2012 and recaptured Alaska in 2013 and 2014. There are two records of Alaska banded hummingbirds recovered outside of the state. The first banded in 2014 was found in Colorado in 2014. The second, banded in 2009 was found in 2015 in California. This bird is also of note for her old age. The trajectories of these four recoveries suggests links between summering grounds in Alaska and wintering grounds both in Mexico and the southeastern United States.

WILLOW PTARMIGAN INVADING BOREAL FOREST BURNED HABITAT

D.H. Mossop

Northern Research Centre, Yukon College, Box 2799 Whitehorse, Yukon, Canada;
dmossop@yukoncollege.yk.ca

Continuing long-term survey of willow ptarmigan has suggested population anomalies correlated with climate change stressors. Distressing changes in northern Canadian ecology has involved a number of controversial features not the least of which is the advent of unusually huge forest fires. One large burn in the south central Yukon Territory, now 5 years in regeneration, has recently been found to be supporting territorial willow ptarmigan. The current field work is mostly descriptive in nature to gain an impression of the extent and nature of this un-heard-of event. Males are displaying and becking, well-spaced at a density estimated at about 15 territories per sq. km. Our survey of becking has covered about 10 km linearly and no broods have been observed to date. The area occupied is at least 20 km from the nearest tundra habitat where the birds are normally found. The habitat is apparently within 4–5 years of forming a closed shrub and spruce canopy. Our work in the upcoming seasons will be to explore the breeding success and other demographic features of these birds. I am particularly interested in the agonistic behavior of these birds compared to birds on our tundra study areas.

AN EXPERIMENT TO ASSESS DEVELOPMENT IMPACTS ON NESTING BIRDS

Rebecca Bentzen[1], Stephen Dinsmore[2], Joseph Liebezeit[1,3], Martin Robards[1], Bill Streever[4], and Steve Zack[1]

[1]Wildlife Conservation Society, Arctic Beringia Program, Fairbanks, AK; rbentzen@wcs.org
[2]Department of Natural Resource Ecology and Management, Iowa State University, Ames, IA
[3]Audubon Society of Portland, Portland, OR
[4]LAMA Ecological, Dallas, TX

Arctic Alaska is an important breeding ground for many migratory bird populations. However, a variety of factors associated with industrial development in the Arctic may impact nesting birds. We tested the indirect impact of oil development on nest survivorship in an artificial nest experiment at Prudhoe Bay, Alaska, 2012–2014, by monitoring 268 artificial shorebird nests, 221 artificial waterfowl nests, and 186 real shorebird nests. Distance to infrastructure and roads, and infrastructure density, did not significantly affect nest survival. Cameras deployed at a subset of artificial shorebird nests documented nest predation by Arctic Fox (*Vulpes lagopus*), Red Fox (*Vulpes vulpes*), Parasitic (*Stercorarius parasiticus*), Pomarine (*S. pomarinus*), and Long-tailed (*S. longicaudus*) jaegers, Northern Harrier (*Circus cyaneus*), and Glaucous Gull (*Larus hyperboreus*). The presence of a camera had a positive effect on artificial shorebird nest survival, possibly due to predator neophobia. In conclusion, we did not detect an effect of infrastructure on nest survival at the scale of our study. Our results suggest that artificial nests may not be appropriate for Arctic research, as nest survival patterns and the suite of nest predators varied between real and artificial nests. We urge caution when interpreting such data from future studies.

BARROW'S GOLDENEYE DEMOGRAPHIC RESPONSES TO CHANGING MUSSEL CONDITIONS ON WINTERING AREAS: A CONCEPTUAL MODEL EXERCISE

Daniel Esler[1], Lisa A. Sztukowski[2], Daniel H. Monson[1], Suresh A. Sethi[3], Heather A. Coletti[4], Ben P. Weitzman[1], Kimberly A. Kloecker[1], and Tuula E. Hollmen[2,5]

[1]U.S. Geological Survey, Alaska Biological Science Center, 4210 University Drive, Anchorage, AK 99508; desler@usgs.gov
[2]Alaska SeaLife Center, 301 Railway Avenue, Seward, AK 99664
[3] Alaska Pacific University, Anchorage, AK 99508
[4] U.S. National Park Service, 4175 Geist Road, Fairbanks, AK 99709
[5] University of Alaska Fairbanks, College of Fisheries and Ocean Sciences, 905 N. Koyukuk Drive, Fairbanks, AK 99775

Gulf of Alaska nearshore marine ecosystems are dynamic, varying across multiple spatial and temporal scales in response to both natural and anthropogenic influences. Variations in environmental conditions likely have relatively small direct effects on upper trophic levels, compared to indirect effects mediated through changes in prey availability. Few studies have evaluated demographic responses to varying benthic invertebrate prey for nearshore predators like sea ducks. We used Bayesian Belief Network models as a framework for considering Barrow's Goldeneye (*Bucephala islandica*) demographic responses to changes in Pacific blue mussel (*Mytilus trossulus*) abundance. Barrow's Goldeneyes are specialists, with their winter diet consisting of >85% mussels, making their trophic relationships simple, amenable for modeling, and, eventually, tractable for conducting empirical studies. Model results suggested that reproductive rates in Barrow's Goldeneye (number of ducklings produced per female) were more responsive to changes in nearshore marine prey availability than juvenile or adult winter survival. This finding indicates that cross-seasonal effects, expressed as demographic responses on breeding areas that are distant from wintering marine areas, might be more detectable than subtle changes in survival on marine wintering areas. The model implementation process was useful for identifying empirical data gaps that would improve understanding of the mechanisms by which environmental variation, mediated by prey, could affect population dynamics of top predators like Barrow's Goldeneyes. By extension, the combination of models and empirical data can be useful for predicting how bottom-up drivers, including those associated with climate change and ocean acidification, will affect other nearshore predators, too.

NUTRIENT ALLOCATION DURING REPRODUCTION IN THREE SYMPATRIC SPECIES OF ARCTIC-NESTING GEESE: IMPLICATIONS FOR A WARMING CLIMATE

Jerry Hupp[1], David Ward[1], Keith Hobson[2], and David X. Soto[2]

[1]U.S. Geological Survey, Alaska Science Center, Anchorage, AK 99508; jhupp@usgs.gov
[2]Environment Canada, Saskatoon, SK S7N 3H5

Based on stable isotope analyses, we examined the relative contributions of exogenous nutrients (derived from foods on the nesting area) versus endogenous nutrients (derived from body reserves) to the eggs of Black Brant, Lesser Snow Geese, and Greater White-fronted Geese on the Colville River Delta, Alaska. On average, 40–43% of yolk lipids, 40–56% of yolk protein, and 52–68% of albumen in Brant eggs were derived from exogenous sources. The exogenous component of Snow Goose yolk lipids and yolk protein was high (69% and 91%, respectively) in a warm spring, and lower (28% and 30%, respectively) in springs when there were cold snaps during egg development. Albumen of Snow Goose eggs was mainly derived ($\geq$94%) from exogenous nutrients. On average, 81–97% of yolk lipids, 77–93% of yolk protein, and $\geq$95% of albumen in White-fronted Goose eggs were derived from exogenous sources. Earlier arrival in the Arctic and longer prelaying intervals likely enabled Snow Geese and White-fronted Geese to secure more exogenous nutrients for egg production than Brant. Snow Geese fed on more underground foods than the other species, which provided access to nutrients prior to green-up and facilitated earlier nest initiation. But in cold years, sub-freezing temperatures that limited access to underground food may have caused Snow Geese to invest more endogenous nutrients in eggs. If climate warming improves early season resource abundance, species such as Snow Geese and White-fronted Geese that have long prelaying intervals and rely more on local nutrients during reproduction may benefit.

HOW ARE WATERFOWL RESPONDING TO WILDFIRES IN THE BOREAL FOREST?

Tyler Lewis, Joel Schmutz, and Courtney Amundson

Alaska Science Center, U.S. Geological Survey, Anchorage, AK 99508; tlewis@usgs.gov

Wildfires are the principal disturbance in the boreal forest, and their size and frequency are increasing as the climate warms. Impacts of fires on boreal wildlife are largely unknown, especially for the tens of millions of waterfowl that breed in the region. Waterfowl populations across the boreal forest have been monitored annually since 1955 by the Waterfowl Breeding Population and Habitat Survey (BPOP). Using these data, we examined impacts of fires on abundance of two waterfowl guilds – dabblers and divers. We modelled waterfowl abundance in relation to fire extent (i.e. amount of survey transect burned) and time since fire, examining both immediate and lagged fire impacts. From 1955–2014, >1100 fires intersected BPOP survey transects in the boreal forest, and many transects burned multiple times. Nonetheless, fires had no detectable impact on waterfowl abundance; annual transect counts of dabbler and diver pairs remained stable from the pre- to post-fire period. The absence of fire impacts on waterfowl abundance extended from the years immediately following the fire to those more than a decade afterward. Likewise, the amount of transect burned did not influence waterfowl abundance. Overall, waterfowl populations appeared largely resilient to forest fires, providing initial evidence that current policies of limited fire suppression, which predominate throughout much of the boreal forest, have not been detrimental to waterfowl populations.

INDUSTRIAL AND INVESTIGATOR EFFECTS ON INCUBATION CONSTANCY, NEST SURVIVAL, AND PREDATORS OF ARCTIC-NESTING GEESE

Brandt W. Meixell and Paul L. Flint

U.S. Geological Survey, Alaska Science Center, Anchorage, AK 99508; bmeixell@usgs.gov

Oil and gas development on the Arctic Coastal Plain (ACP) of Alaska raises questions about impacts of human activities on Arctic-nesting birds. To estimate effects of industrial activity on avian productivity, we monitored Greater White-fronted Goose nests with digital cameras over 2 years at 2 sites on the ACP: the 'disturbed' site was adjacent to industrial clean-up activities and man-made infrastructure, whereas the 'control' site was ≥ 3km from where industrial disturbance occurred. Undisturbed geese exhibited very high levels of nest attendance and initiated incubation breaks less than once per day. Geese were absent from nests more frequently in the disturbed site, and this frequency was higher for nests closer to industrial activity. In the year with high rates of predation, nest survival was positively related to distance from industrial activity and abandoned infrastructure, consistent with predictions of industry-mediated effects. However, this relationship was not evident in the year with reduced predation pressure, likely due to annual variation in fox behavior. Observer-induced incubation breaks averaged 37.8 minutes compared to 8.7 minutes for other sources of nest absence, demonstrating a differential response by geese to direct human encroachment versus indirect vehicular and aircraft traffic. Reductions to nest survival resulting from observer nest visits highlight the importance of minimizing, and controlling for, observer effects in studies of avian productivity.

MIDDLETON ISLAND – A BLESSING AND A CURSE FOR NESTING DUSKY CANADA GEESE (*BRANTA CANADENSIS OCCIDENTALIS*).

Michael J. Petrula, Daniel H. Rosenberg, Jason L. Schamber, and Kyle R. Smith

Alaska Dept. of Fish & Game, Division of Wildlife Conservation, Statewide Waterfowl Program, 525 W. 67 Ave, Anchorage, AK 99518; mike.petrula@alaska.gov

Canada geese were not observed nesting on Middleton Island (MI) prior to 1981. The 1964 earthquake raised MI by 15 feet creating suitable goose habitat. Once a breeding population became established the number of Canada geese grew rapidly. Biennial surveys in late June over the last 20 years indicate a stable adult population averaging 1,358 geese, yet gosling production remains very high averaging close to 1,000 goslings annually. Why was the population not continuing to grow? Monitoring with VHF radio-tagged neck collars revealed that goslings were either not migrating in the fall, or if they did, not surviving the journey. During a reconnaissance visit to the island in September, an alarming number of gosling carcasses were detected, and birds unable or reluctant to fly were encountered. A sample of birds were collected and sent to the National Wildlife Health Lab. The lab determined that all birds examined were emaciated, but maldigestion or malabsorption of foods could not be determined by their test results. Decreased food intake because of overpopulation by geese and/or competition with feral rabbits may be responsible for gosling death, lower adult survival, and the lack of recruitment and population growth on MI.

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Poster Presentations

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SITKA WINTER BIRD OBSERVATION PROJECT

Gwen Baluss [1], Kitty LaBounty [2], Matt Goff [3], and Scott Harris [4]

[1]Juneau Audubon Society, PO Box 21715, Juneau, AK
[2]University of Alaska Southeast, 1332 Seward Ave, Sitka, AK
[3]Sitkanature.org, 304 Park St. Sitka, AK
[4]Oregon State University, 321 Richardson Hall, Corvallis, OR

In 2012 we initiated a study of three species of common wintering birds in Sitka Alaska; Chestnut-backed Chickadee, thought to be a year-round resident; Dark-eyed (Oregon) Junco, considered resident but may be a regional or altitudinal migrant; and Song Sparrow, likely a mix of resident and migrants from farther northwest. Our research interests include: 1) learning more about the site fidelity of local over-wintering individuals, 2) gaining insight into dispersal patterns of resident individuals throughout the year and 3) population structure of wintering juncos. With this project we also sought to increase community interest in and knowledge of wintering songbirds by working with schools and encouraging community-wide participation in this study. Banding has taken place annually in November. Capture rates were much higher for juncos, and during the study period we have color-banded over 200 Dark-eyed Juncos over four years. Chestnut-backed Chickadees (<20) and Song Sparrows (<10) were banded in much smaller numbers. Sightings of color-banded birds are entered into a web based platform by the citizen and student observers. Wintering site or area fidelity appears to be high, with very few sightings more than .5km from the banding location, and the vast majority of sightings within the neighborhood where the birds were banded. A few banded birds observed in the summer, including juncos and chickadees. However, there were no Song Sparrows from May through August. This project is primarily an educational endeavor, but may yield results of greater ornithological interest regarding local movements of wintering birds in Southeast Alaska.

FACTORS LIMITING CASPIAN TERN COLONY GROWTH ON THE COPPER RIVER DELTA

Mary Anne Bishop[1], Yasuko Suzuki[2], and Daniel D. Roby[2]

[1]Prince William Sound Science Center, Cordova, AK 99574; mbishop@pwssc.org
[2]Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR 97331

The Caspian Tern breeding population in the Pacific Coast region has been rapidly expanding northward into Alaska. Currently, North America's northernmost, sizable colony is located on a low-lying barrier island in the Copper River Delta of southcentral Alaska. The number of active Caspian Tern nests doubled from 209 in 2008 to 423 in 2014. Based on resighting of color-banded individuals, connectivity of the Copper River Delta colony with other colonies in the Pacific Coast region of North America was documented as far south as 3,000 km from the Copper River Delta. Predation on Caspian Tern eggs and chicks appeared minimal until 2015 when heavy predation pressure by Glaucous-winged Gulls was observed. Flooding of the Caspian Tern colony area from storms has been evident since 2010. The Caspian Tern colony failed in 2016, presumably due to low food availability in unseasonably warm waters in the Gulf of Alaska. Considering current and projected changes in climate conditions, the long-term suitability of this barrier island as nesting habitat for Caspian Terns is questionable. Because of the transitional nature of their preferred nesting habitat and their high vagility, continued monitoring of the Copper River Delta colony is crucial for understanding the range expansion and growth of the Pacific Coast population of Caspian Terns.

ALASKA SWALLOW MONITORING NETWORK: ENGAGING ALASKA COMMUNITIES IN ECOLOGICAL RESEARCH

Tricia Blake[1], Audrey Taylor[2], April Harding Scurr[1], Melissa Cady[3], and Alexandra P. Rose[4]

[1] Alaska Songbird Institute, Fairbanks, AK 99708; tricia.blake@aksongbird.org
[2]Department of Geography and Environmental Studies, University of Alaska, Anchorage, AK 99508
[3]Alaska Peninsula/Becharof National Wildlife Refuge, King Salmon, AK 99613
[4] Museum of Natural History University of Colorado, Boulder, CO 80309-0265

The Alaska Swallow Monitoring Network is a partnership between researchers, students, and communities. The principal objectives are to monitor the phenology and success of nesting swallows across a broad geographic area over time, while developing ecological and climate literacy in participating communities. In 2016 the network connected and strengthened existing projects studying Tree Swallows (*Tachycineta bicolor*) in artificial nest box colonies, and built integral education, outreach, and training opportunities, especially for youth. The 2016 field sites included: Fairbanks, Anchorage, King Salmon, and Lost Lake (McCarthy). In 2016 network partners monitored 242 active nests and banded 1,309 Tree Swallows. A project website was developed, and a field training was held in Fairbanks to standardize protocols to allow for comparison of key parameters across sites over time. Network partners offered five internships; trained 24 volunteers who contributed 1,500 hours (including 17 youth/teens); and offered 19 public programs serving 1,388 people. Many thousands more Alaskans were reached via social media and at least 5 conventional media stories (newspaper, television, and radio). 2017 will include new citizen-based sites, additional training materials, downloadable data entry apps, and increased community outreach.

DNA BARCODING AND NEXT GENERATION SEQUENCING OF ARTHROPOD PREY IN SHOREBIRD FECES

Danielle Gerik[1], Richard B. Lanctot[2], Kirsty E. Gurney[3], Mark Spangler[4], and J. Andrés López[1,5]

[1]College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Fairbanks, AK 99775; degerik@alaska.edu
[2] U.S. Fish and Wildlife Service, Anchorage, AK 99503
[3]Environment and Climate Change Canada, Saskatoon, SK S7N0X4
[4]Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, AK 99775
[5]University of Alaska Museum, University of Alaska Fairbanks, Fairbanks, AK 99775

Climate change in the Arctic is affecting the timing of arthropod prey available for nesting shorebirds and their young. It is unclear whether shifts in arthropod availability may impact shorebird chick growth as a result of a trophic mismatch. Understanding the diet composition of shorebirds is crucial for evaluating whether a trophic mismatch exists and to assess its potential impact. In this study, DNA barcoding paired with next-generation sequencing will be used to identify arthropod remains in the feces of shorebirds breeding in Barrow, Alaska. Environmental DNA analysis of avian diets is a minimally invasive technique with the potential to provide finer scale and greater taxonomic coverage of diet components than traditional gut content diet analyses. To improve the accuracy of identifying arthropod prey in shorebird feces, we developed a reference DNA barcode library to supplement existing public database coverage of arthropods inhabiting the Arctic Coastal Plain. To evaluate biases in the recovery of prey DNA in avian feces, we conducted a diet study on captive shorebird chicks to determine how biological factors such as time since consumption of prey, prey body type (hard versus soft), and prey size affect the molecular detection of prey in feces. We present preliminary results related to the reference library, chick diet study, and efforts to sequence shorebird feces. The primary goals of this research are to test the efficacy of the fecal DNA barcoding technique and to produce valuable diet information for assessing climate impacts on shorebirds in the Arctic.

THE BARRIER ISLANDS OF THE COPPER RIVER DELTA (CRD), MONITORING A UNIQUE SYSTEM

Cody Davis, Robert Masolini, Christina Rinas, Matt Prinzing, and Melissa Gabrielson

Chugach National Forest, Cordova Ranger District, Cordova AK 99574;
melissalgabrielson@fs.fed.us

The barrier islands of the Copper River Delta (CRD) region preserve a unique, shifting island system that provides important habitat for sensitive waterfowl species and rare plant communities. Barrier islands are an uncommon landscape feature, occurring across < 10% of the world's coastlines (Schwartz, 1973). Barrier islands along the Pacific Coast are particularly rare. The CRD contains some of the most well-developed barrier islands on the North Pacific Coast (Hayes and Kana, 1976). Due to the unique status and importance of the CRD barrier islands, monitoring the extent and impact of human activities is imperative. With the addition of subsistence hunting and egg collecting permits, it is anticipated that all-terrain vehicle use on the islands will increase. Several surveys were conducted during the summer of 2016 to determine the effects of motorized vehicle use on important bird habitat and vegetation communities on the barrier islands. The results of these surveys will help U.S. Forest Service managers make future recommendations for this area.

HISTORY OF THE ARTIFICIAL NEST ISLAND PROGRAM FOR DUSKY CANADA GEESE ON THE COPPER RIVER DELTA, ALASKA

Nick Docken, Cody Davis, and Melissa Gabrielson

Chugach National Forest, Cordova Ranger District, Cordova AK 99574; ndocken@fs.fed.us

Dusky Canada Geese (*Branta canadensis occidentalis*) breed primarily on the Copper River Delta (CRD) in south-central Alaska. In 1964, an earthquake accelerated habitat changes on the CRD. With ongoing vegetation succession and associated predation, impaired production was anticipated to limit the population of Dusky Canada Geese over time (Pacific Flyway Council 2008). As a land management agency, the U.S. Forest Service (USFS) is responsible for assessing habitat-related changes on the CRD that may influence the breeding population of Dusky Canada Geese. In 1984, the Chugach National Forest and Ducks Unlimited initiated an artificial nest island program to address concerns about the decline in the Dusky Canada Goose population. The purpose of the nest island program is to provide alternative, safe nesting sites for Dusky Canada Geese. Since the initiation of the artificial nest island program in 1984, a variety of nest islands designs have been constructed and installed in ponds across the CRD. Nest islands are monitored to determine use and nest success of Dusky Canada Geese. From this data we can calculate an overall percentage of nest success and the overall use of the islands. In 2016, 377 nest islands were monitored, of which 369 were available (98%) for use by Dusky Canada Geese during the nesting season. This presentation will provide an overview of the nest island program and analysis on the history of individual nest islands and nest island locations across the CRD.

NON-BREEDING SITE FIDELITY AND MIGRATORY CONNECTIVITY OF *ARCTICOLA* DUNLIN REVEALED BY BAND RESIGHTINGS

Benjamin Lagasse[1], Richard Lanctot[2], Chung-Yu Chiang[3], Yoshimitsu Shigeta[4], and Mike Wunder[1]

[1]Department of Integrative Biology, University of Colorado Denver, Denver, CO 80204; benjamin.lagasse@ucdenver.edu
[2]United States Fish and Wildlife Service, Anchorage, AK 99503
[3]Taiwan Wader Study Group, Taichung City, Taiwan 40767
[4]Yamashina Institute for Ornithology, Abiko, Japan 270-1145

Individual site fidelity to breeding, wintering and migratory staging sites occurs in many arctic-breeding shorebirds. While breeding site fidelity has been shown to aid an individual's annual productivity, winter and migratory site fidelity may be important to maximize over-winter survival. Here we use incidental resightings of Dunlin banded at several breeding sites on Alaska's North Slope and observed wintering and migrating along the East Asian-Australasian Flyway (EAAF) to document 1) the extent of nonbreeding site fidelity within individuals, and 2) the level of migratory connectivity occurring within the *arcticola* subspecies of Dunlin on the EAAF. We analyzed 664 resights, 394 which were identifiable to 134 distinct individuals. Of the 134 individuals, 34 showed interannual site fidelity during the nonbreeding period for up to 7 distinct nonbreeding seasons (August–May). These data confirm this species has an affinity for returning to specific sites on the EAAF. Identifying nonbreeding site fidelity as a behavior that potentially increases annual survival is particularly relevant as intertidal habitats along the EAAF are being destroyed at an alarming rate. Preserving a network of important wintering and migratory staging sites throughout the flyway is critical for supporting robust populations of this migratory shorebird.

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

Melissa Gabrielson and Erin Cooper

Chugach National Forest, Cordova Ranger District, Cordova AK 99574;
melissalgabrielson@fs.fed.us

Little is known about the current status of the Red Knot (*Calidris canutus roselaari*). The Copper River Delta in south-central Alaska is one of the Western Hemisphere's most important shorebird stopover sites. Recently, thousands of Red Knots were observed on one of the more western barrier islands on the Copper River Delta (i.e. Little Egg Island). This led to questions about the Copper River Delta's importance as a stopover site for Red Knots. In 2013, the Copper River International Migratory Bird Initiative (CRIMBI) funded a small survey that documented the timing of the Red Knot migration and use of the Copper River Delta. In an effort to increase the knowledge about Red Knot stopover sites and use on the Copper River Delta, the 2013 surveys were expanded. Two observers were stationed on Little Egg Island in May 2014 and 2015 to document Red Knot numbers, behavior, arrival times, departures, and document flagged individuals. The information collected from this effort will be tied in with other surveys that are being conducted to determine the interconnectedness of the Red Knot and its use of stopover sites along its migration pathway.

THE PRIBILOF ISLAND SEABIRD YOUTH NETWORK

Ann Harding[1], **Carley Bourdukofsky**[2], **Destiny Kushin**[3], Tonia Kushin[3], Ram Papish[4], Kendra Bush-St. Loius[5], Karin Holser[6], Veronica Padula[7], Lauren Divine[8], Pamela Lestenkof[8], Marc Romano[5], Pam Goddard[9], Olga Belonovich[10], Natalya Fomina[11], Rachael Orben[12], and Priscilla Wohl[13]

[1]Auk Ecological Consulting, Cordova, AK 99574; a.ma.harding@gmail.com
[2]Dimond High School, Anchorage, AK 99502
[3]Pribilof School District, St. Paul Island, AK 99660
[4]Wildlife Illustrator, Newport, OR
[5]Alaska Maritime National Wildlife Refuge, Homer, AK 99603
[6]St. George Institute, St. George Island, AK 99591
[7]University of Alaska Anchorage, Alaska 99508
[8]Aleut Community of St. Paul Island, St. Paul Island 99660
[9]Thalassa Education and Outreach, Seattle, WA 98115
[10]Kamchatka Research Institute of Fisheries and Oceanography, Russia
[11]Administration of Aleutian Region, Russia
[12]Department of Fisheries and Wildlife, Oregon State University, Newport, OR 97365
[13]NORTAC, Yucca, CO 80125.

The Seabird Youth Network (SYN) is a partnership between the Alaska Maritime National Wildlife Refuge (AMNWR), the Pribilof School District, St. George Island Traditional Council, Aleut Community of St. Paul Island, St. George Institute, and the wider scientific community. This unique partnership provides youth (K-12 students on both Pribilof Islands) an incredible chance to learn about seabirds.

SYN has six main objectives:

1. Contribute to AMNWR's long-term data sets of breeding seabirds on the Pribilof Islands.
2. Promote science to Native Alaskan youth.
3. Build capacity in both field biology techniques and media skills.
4. Employ local people in research on traditional subsistence resources.
5. Facilitate student links with mentor scientists as they progress through the Network programs/camps.
6. Provide new experiences for students and encourage self-confidence.

We use a website as our main platform for education. Seabird Camps are held on the Pribilof Islands during the summer school break. Camps are designed to provide hands-on scientific experience and new skills, encourage critical thinking, increase understanding about local resources, and…. be fun! Kids from the Commander Islands will be joining the 2017 Seabird Camp on St. Paul.

VISUALIZING POPULATION DELINEATION AMONG NORTH AMERICAN SEA DUCKS: MAPS FOR FUTURE RESEARCH AND MANAGEMENT PLANNING

John Pearce[1], Mary Whalen[1], and Josh Stiller[2]

[1]U.S. Geological Survey, Alaska Science Center, 4210 University Drive, Anchorage, AK 99508, jpearce@usgs.gov
[2]New York State Department of Environmental Conservation, 625 Broadway, Albany, New York, 12233

Most sea duck species remained poorly-studied up until the mid-twentieth century and population declines were noted in many species beginning in the 1990s. In 1998, the North American Sea Duck Joint Venture (SDJV) was established to promote "the conservation of all North American sea ducks through partnerships by providing greater knowledge and understanding for effective management." A priority of the SDJV has been to complete assessments of migratory connectivity to inform population delineation of sea duck species across North America. The U.S. Geological Survey has participated on the Continental Technical Team and Management Board of the SDJV since its inception, and provides scientific information relevant to the mission and priorities of the SDJV. Continuing with that goal, here we provide an update on the status of current knowledge regarding geographic distribution, migratory connectivity, and population delineation of sea duck species in North America. We provide maps of all known band recovery, genetic, and telemetry data across the North American range of sea duck species and visually assess evidence for population delineation at the continental scale. Results from this exercise demonstrate consistency across different marker data sets in continental levels of population delineation for several species, a lack of basic information on population delineation for others, and evidence for where future research dollars would most efficiently be directed to enable hypothesis-driven research that addresses knowledge gaps.

DOCUMENTING ANNA'S HUMMINGBIRDS IN SOUTHCENTRAL ALASKA

Katherine McLaughlin

The Alaska Hummingbird Project, Inc., PO Box 561 Cordova, AK 99574;
alaskahummingbird@yahoo.com

Anna's Hummingbirds (*Calypte anna*) are listed as rare in southcentral Alaska. However, for over a decade there have been confirmed sightings, photographs, and Audubon Christmas Count notations of Anna's Hummingbirds in Cordova, Seward, Kenai, and Homer in the late fall and winter. An adult male Anna's Hummingbird was photo documented in Seward in May 2015. On October 21, 2016, two Anna's Hummingbirds, an immature male and an adult female, were captured and banded in Cordova. These captures mark the first time Anna's Hummingbirds have been banded in southcentral Alaska. These sightings, with the confirmation of an immature bird in the late fall, suggest that Anna's Hummingbirds may be extending their breeding range into southcentral Alaska.

ASSESSMENT OF BIOAVAILABLE HYDROCARBONS IN PRIBILOF ROCK SANDPIPER OVERWINTERING HABITAT IN COOK INLET, ALASKA.

Kelly Nesvacil[1], Mark Carls[2], Larry Holland[3], and Sadie Wright[4]

[1]Division of Wildlife Conservation, Alaska Department of Fish and Game, 1255 W. 8th Street, Juneau, AK 99802; kelly.nesvacil@alaska.gov
[2]Retired, NOAA/NMFS, Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, 17109 Pt. Lena Loop Road, Juneau, AK 99801
[3] NOAA/NMFS, Alaska Fisheries Science Center, Auke Bay Laboratories, Ted Stevens Marine Research Institute, 17109 Pt. Lena Loop Road, Juneau, AK 99801
[4]NOAA Fisheries, Alaska Regional Office, Protected Resources Division, 709 West 9th Street, Juneau, AK 99802

At present, significant adverse hydrocarbon influence on the Pribilof Island Rock Sandpiper (*Calidris ptilocnemis ptilocnemis*) is unlikely. Almost the entire population overwinters in Cook Inlet and breeds on four Bering Sea islands. Passive samplers deployed several times in a three year period and corresponding sediment and soft tissue samples on St. Paul Island and in Cook Inlet generally accumulated small quantities of polycyclic aromatic hydrocarbons (PAHs). Composition was consistent with oil in <15% of the passive samplers and rarely in soft tissue. Total PAH concentrations in corresponding sediment were very low (<42 ng/g dry weight); composition was consistent with oil in 39% of these samples and biomarker composition confirmed this on St. Paul Island. However, composition was dominated by normal alkanes from natural sources.

NEST REUSE IN ARCTIC BREEDING SHOREBIRDS: AN EXAMINATION OF COST, BENEFITS AND OCCURRENCE OF A RARE OBSERVED BEHAVIOR

Patrick Herzog[1], **Sarah Hoepfner**[2], Sarah Saalfeld[3], Hannes Kaatz[4], Richard Lanctot[3]

[1]Institut für Biologie, Molekulare Ökologie, Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany
[2]Humboldt State University, Arcata, CA 95521; sah688@humboldt.edu
[3]Migratory Bird Management, US Fish and Wildlife Service, Anchorage, AK 99503
[4]Institut für Biologie, Molekulare Ökologie, Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany

Nest reuse is typically found in bird species that construct complex nests or use cavities. Prior studies on shorebirds indicate nest reuse is rare, although few long-term, multi-species studies have been conducted. Reusing nests may provide benefits in terms of energy and time savings, nest success, and predator avoidance. We investigated this behavior using data from a 13-year study conducted at Barrow, Alaska, where eight species of shorebirds regularly breed. We monitored 3,544 nests and documented 208 cases of nest reuse, occurring within and between species. Compared to other nests, reused nests were initiated 1.4 days earlier on average, but did not show a difference in nest success. The date of snow melt did not affect the likelihood of nest reuse, however more were reused when nest density was higher. These results suggest that birds did not benefit in terms of saving time and energy. However, earlier nest initiation may allow birds to have a better chance of finding a nest site, and possibly lay a replacement clutch should the first fail. The reuse of nests by shorebirds suggests that there may be limited nest sites available on the arctic tundra, especially in high density years, and that human alteration of these nesting locations may affect shorebirds more than previously thought.

ESTIMATING THE NUMBER OF DUSKY CANADA GOOSE NESTS ON MIDDLETON ISLAND, 2015–2016

Grey W. Pendleton[1], Jason L. Schamber[2], Daniel H. Rosenberg[2], and Michael J. Petrula[2]

[1]Alaska Department of Fish and Game, Division of Wildlife Conservation, P.O. Box 115526, Juneau, AK 99811-5526; grey.pendleton@alaska.gov
[2]Alaska Department of Fish and Game, Division of Wildlife Conservation, Statewide Waterfowl Program, 525 W 67th Ave., Anchorage, AK 99518

Dusky Canada Geese (*Branta canadensis occidentalis*) have a restricted nesting distribution centered on the Copper River Delta and Prince William Sound. Middleton Island also has had a nesting population of Dusky Canada Geese since the 1980s; population size and gosling production has been monitored there using a standardized protocol since 1996. In May of 2015 and 2016 we used systematic ground surveys of randomly selected plots to find goose nests on the island. We also did repeat surveys of a subset of plots to estimate nest detection probability. We used a Bayesian model to estimate the total number of nests on the island accounting for nest density differences among habitats. We estimate the number of nests of all stages (i.e., active, hatched, depredated, abandoned) was 941 (95% credible interval 764–1204) in 2015 and 1398 (95% CI 1208–1608) in 2016; these estimates are not corrected for undetected nests. Estimated nest densities (nests/ha) for the 6 habitat types for each year were: upland tussock 0.20, 0.43; inner coast 0.85, 1.70; outer coast 0.92, 0.78, upland meadow 0.64, 2.73; intermediate meadow 1.05, 1.21; lower meadow 0.61, 0.72.

CRITICAL CONNECTIONS: CONSERVING MIGRATORY BIRDS IN ALASKA'S PARKLANDS

Laura M. Phillips[1], Carol McIntyre[1], Iain Stenhouse[2], Scott Weidensaul[3], and **Emily Williams**[1]

[1]National Park Service, Denali National Park and Preserve, AK 99755; emily_williams@nps.gov
[2]Biodiversity Research Institute, Portland, Maine 04101
[3]778 Schwartz Valley Road, Schuylkill Haven, PA 17972

Although Alaska's National Parklands encompass 54 million acres of wildlife habitats, animals are not constrained by jurisdictional lines and many move seasonally across a patchwork of protected and unprotected lands. NPS managers cannot meet their mission to conserve wildlife within parks without understanding the basic aspects of a species' life history, including movements that occur outside park boundaries. Many migratory birds range across extraordinary distances and encounter a wide range of risks to survival and reproduction throughout their lives. In many cases, causes of declines observed in populations on breeding grounds are found either along migration routes or on wintering grounds. We initiated the Critical Connections Program to expand our knowledge of the year-round needs of migratory birds breeding in Alaska's National Parklands and to provide park managers and others with information essential for implementing effective conservation strategies for these migratory species. In summer 2015, we deployed light-level geo-locators on 12 Gray-cheeked and 19 Swainson's Thrushes in Denali National Park and Preserve to identify migration routes, stopover areas, and wintering grounds. In 2016, we recaptured 5 Gray-cheeked and 7 Swainson's Thrushes and deployed 108 new geolocators on a suite of shrub nesting species including Fox Sparrows, Hermit Thrush, Blackpoll Warblers, and Arctic Warblers. Preliminary results indicate that at least one Swainson's Thrush wintered in central South America. These results will provide insight into important use areas throughout the non-breeding period as well as connectivity of breeding populations across North America.

SHOREBIRD USE OF MILITARY LANDS IN INTERIOR ALASKA

Ellen Martin[1,2], Kim Jochum[2], Calvin Bagley[2], and Paul F. Doherty, Jr.[1]

[1]Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO 80523; martinec@rams.colostate.edu
[2]Center for Environmental Management of Military Lands, Colorado State University, Fort Collins, CO 80523

Shorebird populations are declining globally and little is known about the use and distribution of breeding species in interior Alaska. The Program for Regional and International Shorebird Monitoring (PRISM) has developed shorebird survey methodology, with most effort in the Arctic and less effort in the boreal forest region. We fill this information void by using PRISM methods to estimate shorebird use of military lands in interior Alaska on Tanana Flats Training Area and Donnelley Training Areas (Fairbanks and Delta Junction, Alaska). We conducted surveys to (1) identify shorebird species using military lands, and (2) create occupancy/use models for these species and determine associated habitat covariates. We predicted species-specific covariate relationships (e.g., elevation, shrub height, distance to water). In general, we predict that shorebirds would more likely use open shrub and wet grassland Viereck habitat classifications. Using a stratified random sampling design, we surveyed 78 plots (400x400 m) twice. We found 6 shorebird species of moderate to high conservation concern as listed by the Alaska Shorebird Conservation Plan and 4 species of conservation concern as listed by the USFWS. For Lesser Yellowlegs, Wilson's Snipe, and Spotted Sandpiper we will present correlations of use with variables of interest derived from occupancy/use models.

ECOLOGY OF PEREGRINE FALCONS IN COASTAL ALASKA

Laura Phillips[1], Steve Lewis[2], **John Shook**[3], Angela Matz[4], and Elisa Weiss[5]

[1]National Park Service, Denali, AK; laura_phillips@nps.gov
[2]U.S. Fish and Wildlife Service, Juneau, AK
[3]ABR, Inc.–Environmental Research and Services, Fairbanks, AK; jshook@abrinc.com
[4]U.S. Fish and Wildlife Service, Fairbanks Field Office, AK
[5]National Park Service, Glacier Bay National Park, AK

Peale's Peregrine Falcons (*Falco peregrinus pealei*) are the marine-oriented and least migratory of the three subspecies of Peregrine Falcons found in Alaska. However, compared to the American (*F. p. anatum*) and Arctic (*F. p. tundrius*) races of the Peregrine Falcon, even basic life-history information about Peale's Peregrine Falcons is not understood. To better understand the ecology of Peregrine Falcons nesting in coastal Alaska, we initiated projects to evaluate breeding distribution, diet, contaminant burdens, and genetics of falcons nesting in Kenai Fjords National Park and adjacent Alaska Maritime National Wildlife Refuge Lands. The breeding distribution was both similar to historic locations (1990) and proximal to seabird colonies. Additionally, the analysis of prey remains also showed that seabirds are an important component of their diet. Contaminants examinations revealed relatively low concentrations of mercury in eggs, but hazardous concentrations in molted feathers, probably from a diet rich in seabirds. Behavioral and physiological data from an Icy Bay study suggests that the *anatum* subspecies use this coastline. However, genetic analyses on subspecies differences revealed inconclusive results, therefore more sampling is suggested to examine differences between subspecies.

THE IMPORTANT ROLE OF WILDLIFE REHABILITATION DURING A MAJOR MORTALITY EVENT

Guy Runco

Bird TLC, 7800 King St., Anchorage, AK 99518; director@birdtlc.net

During the 2015–2016 winter, Common Murres experienced the largest mass die-off in Alaska's recorded history. In response to this major mortality event, avian rehabilitators at Bird TLC provided emergency care for hundreds of emaciated seabirds. Rescued by concerned citizens, most were found grounded, far inland from water. Staff and volunteers worked tirelessly to inspect, feed, treat, and clean each Murre. Healthy individuals were quickly released back to the sea. Bird TLC also provided an important public service by fielding calls from the public and sharing information with news agencies. As this mortality event began to wind down, the USFWS and USGS confirmed a carcass count of 36,000, but are hesitant to offer an overall death toll. Estimates from previous events suggest that only 15% of birds that die at sea actually reach the shore. The cause of starvation and why these seabirds left the sea en masse remains unknown. This presentation emphasizes the important role of wildlife rehabilitation during a major mortality event. The presence of experienced, licensed professionals with the expertise and capacity to receive a high volume of birds resulted in fewer left to perish and decompose—a health risk to humans and animals. Widespread community awareness of our organization also reduced instances of well-meaning, yet inexperienced individuals attempting rehabilitation at home, which likewise threatens human health and often results in the death of the bird.

FACTORS INFLUENCING WATERBIRD ABUNDANCE AND DISTRIBUTION ON THE COPPER RIVER DELTA, ALASKA

Jillian Jablonski[1], Audrey Taylor[1], Erin Cooper[2], Martin B. Berg[3], Jennifer Piacente[3], Gary A. Lamberti[4], and Amelia McReynolds[4]

[1]Department of Geography & Environmental Studies, UAA, Anchorage, AK 99508; jcjablonski@alaska.edu
[2]Chugach National Forest, Cordova Ranger District, Cordova, AK 99574
[3]Department of Biology, Loyola University Chicago, Chicago, IL 60660
[4]Department of Biological Sciences, University of Notre Dame, Notre Dame, IN 46556

The Copper River Delta, Alaska, is a highly productive coastal wetland and an important breeding ground for waterbirds. We are investigating a suite of biological, chemical, and physical factors to understand what drives waterbird distribution and breeding chronology on the Delta, and how pond temperatures and the presence of the aquatic invasive plant *Elodea canadensis* may influence the aquatic food web supporting the waterbird community. This research is ongoing, with the first season of data collection in 2016. From May 24 to July 29, 2016, we recorded a total of 734 birds and 42 nests across eighteen study ponds. Other ecosystem variables measured at each pond included aquatic and terrestrial vegetation, water quality parameters, water column dissolved nutrients, physical pond characteristics, and aquatic invertebrate community structure. Five of the ponds were infested with *Elodea*. Pond size ranged from 1.6 acres to 31.0 acres, and water temperatures in early June ranged from 15.4°C to 22.9°C. We will report our preliminary analyses of individual pond characteristics. These analyses will be used to evaluate potentially significant relationships between pond attributes and waterbird distributions.

SPATIAL AND TEMPORAL PATTERNS OF WINTER MARINE BIRD DISTRIBUTION IN PRINCE WILLIAM SOUND, ALASKA

Mary Anne Bishop[1], Kathy Kuletz[2], Jessica Stocking[1], and **Anne Schaefer**[1]

[1]Prince William Sound Science Center, Cordova, AK 99574
[2]U.S. Fish and Wildlife Service, Anchorage, AK 99503

The non-breeding season may be a critical period for seabird survival because food is relatively scarce, weather is more extreme, light-levels are reduced, and water temperatures are cooler compared to the breeding season. Prince William Sound (PWS) provides protected, ice-free habitat for wintering marine birds. However, information regarding winter seabird abundance, composition, and habitat associations within PWS is limited. From November 2007–March 2014, we conducted 27 marine bird surveys from ships of opportunity. We found that marine bird assemblages are significantly different across early and late winter, with differences driven by variation in the densities of Common Murre (*Uria aalge*), Marbled Murrelet (*Brachyramphus marmoratus*), and gulls. Marbled Murrelets and gulls were recorded in significantly higher densities in early winter compared to late winter, while Common Murre were more abundant in late winter. From these surveys, we identified three general areas of high bird concentrations within PWS: northeast PWS, Montague Strait, and the Southwest Passages. Notably, these are also areas where Humpback Whales concentrate, suggesting that environmental drivers such as currents and nutrients are creating persistent, favorable foraging conditions for marine birds and mammals in these areas. Collectively, these results show that the non-breeding season cannot be characterized by a single time period when describing seabird abundance and distribution. Therefore, historical surveys conducted across PWS in March may have missed the winter peak in abundance for important winter seabird species, thus underestimating the importance of PWS as wintering habitat.

HABITAT USE BY SONGBIRDS ON THE FORT WAINWRIGHT TANANA FLATS TRAINING AREA

Justin Smith and Garrett Savory

Colorado State University: CEMML, Fort Wainwright, AK 99703

Different user groups and songbird species of concern often coexist in specific areas within Fort Wainwright Tanana Flats Training Area (TFTA) located in the interior of Alaska. However, identifying these areas has been difficult due to the lack of information describing the habitat preference of some songbird species. To identify which habitat types songbirds are selecting in early summer, we used an occupancy modeling framework to assign a value describing the use of songbird species to different habitats. We described general habitat characteristics across the 294,208 km^2 of our study area using a Viereck habitat coding system that was already in place for the TFTA. In addition, we collected songbird data by conducting auditory point counts from May through early July in 2016. Individual bird observations were recorded during 10 minute point counts, divided into 4 intervals, at randomly selected sites. From occupancy modeling and existing habitat maps, we developed species-specific maps that highlight differing levels of use in areas of Rusty blackbird, blackpoll warbler, and alder flycatcher habitat. We then overlaid species-specific habitat use maps with maps of human land use to visualize areas of overlap and potential conflict. As this is the first of a two year study, our preliminary results will help us evaluate and improve study methods and increase the accuracy of our occupancy estimates in successive years.

RESONSE OF LOONS TO OILFIELD DEVELOPMENT ACTIVITIES IN THE NATIONAL PETROLEUM RESERVE-ALASKA

Hannah Uher-Koch[1], Audrey Taylor[1], and Debora Nigro[2]

[1]Department of Geography & Environmental Studies, UAA, 3211 Providence Drive, Anchorage, AK 99508; hruherkoch@alaska.edu
[2]Bureau of Land Management, Arctic Office, 222 University Ave., Fairbanks, AK 99709

The National Petroleum Reserve-Alaska (NPR-A) is an area that will see continued oil and gas development in the future. Establishing an understanding of the effects of such development on the natural environment is crucial to successful management of resources such as Yellow-billed and Pacific Loons, which use the NPR-A for breeding. The goal of this project is to gather baseline data on loon behavior, evaluate loon response to disturbances, and determine whether there is a measurable effect of industrial disturbance on loon behavior and nest success. In the summer of 2016, we established two camps near Bureau of Land Management's Inigok Field Station and exposed nesting loons to helicopter disturbances in order to evaluate loon reaction to an imitation of this industrial activity. Additionally, we conducted behavioral observations to look at loon activity budgets in aircraft habituated vs unhabituated areas. Thirty-nine nests (combined Yellow-billed and Pacific Loon) were found in 2016 and 320 hours of behavioral observation were conducted. Our initial analysis indicates a high level of nest failure at both research sites with only 13 nests hatched and loons showing little to no response to helicopter overflights. Our poster will also describe a preliminary assessment of both species' activity budgets and the future direction for the project.

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

Audrey R. Taylor[1], Jeremy Mizel[2], and Stacia Backensto[2]

[1]Department of Geography & Environmental Studies, University of Alaska Anchorage, 3211 Providence Drive, Anchorage, AK 99508; artaylor@alaska.edu.
[2]Park Service I&M Program, Arctic Network, 4175 Geist Road, Fairbanks, AK 99709

Several local-scale studies conducted over the last few decades suggest that a number of shorebird species congregate in large numbers prior to fall migration along the coastline of Bering Land Bridge (BELA) National Preserve. Despite the vulnerability of the Chukchi coastline to effects of offshore energy development and increased shipping traffic, little is known regarding abundance, species composition, or distribution of staging shorebirds in these littoral habitats. Furthermore, protecting habitat for internationally significant populations of migratory birds is a mandate for Western Arctic Parklands. Our primary objectives were to document spatial variation in shorebird use along the BELA coastline prior to fall migration, and to identify potential hotspots for staging/migrating shorebirds. We conducted repeat aerial surveys in late July and early August 2014 along a systematic sample of transects in mudflat habitat. Over 26,000 shorebirds were counted from the aircraft between 28 July and 13 August, the majority of which were found at Cape Espenberg, Cowpack Lagoon, and the Arctic/Ikpek Lagoon complex. We used Bayesian hierarchical models to estimate spatial variation in shorebird use of mudflat habitat along the BELA coast. Density estimates were highest for Ikpek and Lopp Lagoons (50–100 shorebirds/ha), followed by Shishmaref Lagoon and Cape Espenberg (20–50 shorebirds/ha). Shorebird densities across all transects showed a pattern of peak numbers every 4–5 days, which may have been related to shorebirds using BELA mudflats as stopover habitat until weather conditions favorable to southbound migration arrived.

UPDATING AUDUBON ALASKA'S 2010 WATCHLIST

Nils Warnock, Erika Knight, and Melanie Smith

Audubon Alaska, 431 West Seventh Ave, Suite 101, Anchorage, AK 99501;
nwarnock@audubon.org

Audubon Alaska has been updating its 2010 Alaska WatchList, an analysis and ranking of vulnerable and declining birds in the state. The Alaska WatchList identifies birds at risk, those species that have the greatest conservation needs. Previously published in 2002 and 2005, the Alaska WatchList has been an effective tool for shaping public policy, prioritizing conservation initiatives, increasing public awareness and commitment, and informing research needs in Alaska and beyond. Based on updated information and input from numerous species experts, Audubon will present the draft results of the new Watchlist and seek review by participants of the conference.

WHAT'S EATING COMMON EIDER EGGS? NEST CAMERAS TELL THE REAL STORY.

Wilhelm L. Wiese[1], Christopher J. Latty[2], Tuula E. Hollmen[3], and Mark S. Lindberg[1]

[1]Institute of Arctic Biology, University of Alaska-Fairbanks, Fairbanks, AK, 99775; wlwiese@alaska.edu
[2]U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, Fairbanks, AK, 99701
[3]Institute of Marine Science, University of Alaska-Fairbanks, Fairbanks, AK, 99775; Alaska Sea-Life Center, Seward, AK 99664

Nest predation is a significant limiting factor to the reproductive success of Pacific Common Eiders (*Somateria mollissima v-nigrum*). Common Eider nests on barrier islands and spits in the Beaufort Sea may be at increasing risk of predation due to changes in predator densities and distributions. Relative importance of specific predators in limiting Common Eider breeding success is largely unknown. Identity of predators has traditionally been determined by evaluating evidence left at the nest site. Using a quantitative approach, by developing predator-evidence profiles from observed depredation events, has been proposed as a more objective method. During June-July 2015 and 2016, we used time-lapse cameras to record predator activity at approximately 150 Common Eider nest sites. Glaucous Gulls, Arctic Foxes, Polar Bears, Grizzly Bears, and Golden Eagles were the most common nest predators. In 2016, we used both traditional methods and quantitative predator profiles for evaluating evidence of nest predators and compared results to observations from time-lapse camera footage. Preliminary findings suggest that both the traditional and quantitative methods were unreliable for determining nest predators. Flooding events, wind erosion, and multiple predators at individual nests led to ambiguous or unclear evidence. These results suggest that use of nest cameras is important for quantifying impacts of specific nest predators on Common Eider reproductive success.

HOW TO CONDUCT AN AVIAN INVENTORY WITH AUDIO RECORDINGS: TECHNIQUES TO ESTIMATE DIVERSITY AT A LANDSCAPE SCALE

Davyd Betchkal, Carol McIntyre, Laura M. Phillips, **Emily Williams**, Melanie Roed, Jason Reppert, and Greg Colligan

National Park Service, Denali National Park and Preserve, Alaska 99755;
emily_williams@nps.gov

Staff at Denali National Park and Preserve recently developed a method to conduct an avian inventory by combining experimental audio methods and traditional methods, such as point counts. Traditionally, the National Park Service conducts avian inventories by sending research teams into the field where they use a variety of survey methods to collect data on species presence. Our audio methods used data collected by autonomous recording systems at a 20-km x 20-km resolution throughout the park. These systems are beneficial because they can provide both calibrated numeric measurements of sound pressure level and continuous digital audio recordings for over a month. In this study, we sub-sampled existing audio recordings that were collected during the Denali Soundscape Inventory from 2006–2015. After removing data outside the breeding season, we identified avian vocalizations in 25 recordings across a variety of habitats and elevations, ranging from 168 to 3327 m above sea level. To efficiently analyze such a large data set, we developed a computer-aided detection technique to direct species annotation. Skilled listeners used both audio and visual cues to identify birds in this software environment. A limitation of single-channel audio techniques is that they cannot provide direct estimates of abundance. However, the large sampling effort afforded by audio methods allows for fitting of robust species accumulation curves. These curves can accurately predict the number of species vocalizing within the detection area of a microphone. Availability of concurrent sound pressure level measurements also allowed us to study and control for the effects of variable detection environments across sites. We believe that wider implementation of such controls could lead to improvements in avian population estimates from both audio and traditional methodologies.