Map to Anchorage Marriott Downtown. 820 West 7th Avenue, Anchorage, AK 99501  907-279-8000
Floor plan of meeting rooms on the second floor of the Anchorage Marriott Downtown.
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ANNUAL MEETING OF THE ALASKA CHAPTER
OF THE WILDLIFE SOCIETY

ANCHORAGE MARRIOTT DOWNTOWN
ANCHORAGE, ALASKA
MARCH 31 - APRIL 3, 2014

CONFERENCE COMMITTEE

Organization: Grant Hilderbrand and Jerry Hupp

Program: Lance McNew, Nate Svoboda, and James MacCracken

Logistics: Cara Staab, Matt Sexson, and Carole Jorgenson

Special Sessions and Workshops: Stephen Arthur, Gretchen Roffler, Sophie Gilbert, Dave Gregovich, Falk Huettmann, and Courtney Amundson

Registration and Support: Liz Solomon and Leigh Honig

Cover and Program Design: Mary Whalen

Cover Photos: Brian Uher-Koch, Layne Adams, Carol Ann Woody, Ryan Kingsbery, Andy Ramey and Steve Partridge
# Conference-at-a-Glance

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday, March 31, 2014</th>
<th>Tuesday, April 01, 2014</th>
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<tbody>
<tr>
<td></td>
<td>Juneau Room</td>
<td>Anchorage Room</td>
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<tr>
<td>7:00-8:00</td>
<td>Breakfast on own</td>
<td>Breakfast on own / Roundtables</td>
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<td>8:00-8:10</td>
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<td>Welcome and Opening Remarks, Jerry Hupp</td>
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<td>8:10-8:30</td>
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<td>Plenary Address, Mark Boyce</td>
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<td>8:30-8:50</td>
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<td>Devin Johnson</td>
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<td>8:50-9:10</td>
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<td>Jon Horne</td>
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<td>Lance McNew</td>
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<td>Break</td>
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<td>George Durner</td>
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<td>10:10-10:30</td>
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<td>Tammy Wilson</td>
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<td>10:30-10:50</td>
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<td>Dave Gregovich</td>
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<td>10:50-11:10</td>
<td>Resource Selection Workshop</td>
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<td>11:10-12:50</td>
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<td>12:50-1:10</td>
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<td>Welcome back, Housekeeping</td>
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<tr>
<td>1:00-1:20</td>
<td>Anderson - bear surveys</td>
<td>Anderson - bear surveys</td>
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<tr>
<td>1:20-1:40</td>
<td>Jochum - bear/human</td>
<td>Jochum - bear/human</td>
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<td>1:40-2:00</td>
<td>Seaton - wood bison</td>
<td>Seaton - wood bison</td>
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<td>2:00-2:20</td>
<td>MacCracken - walrus</td>
<td>MacCracken - walrus</td>
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<td>2:20-2:40</td>
<td>Borg - wolf behavior</td>
<td>Borg - wolf behavior</td>
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<td>2:40-3:00</td>
<td>Cobb - mtn. goat</td>
<td>Cobb - mtn. goat</td>
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<td>3:00-3:20</td>
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<td>Break</td>
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<tr>
<td>3:20-3:40</td>
<td>Amundson - bird surveys</td>
<td>Amundson - bird surveys</td>
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<tr>
<td>3:40-4:00</td>
<td>Churchwell - CRD shorebirds</td>
<td>Churchwell - CRD shorebirds</td>
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<tr>
<td>4:00-4:20</td>
<td>Hupp - arctic geese</td>
<td>Hupp - arctic geese</td>
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<tr>
<td>4:20-4:40</td>
<td>Naves - YBL harvest</td>
<td>Naves - YBL harvest</td>
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<td>4:40-5:00</td>
<td>Dinner on own</td>
<td>Saalfeld - waterbird nesting</td>
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<td>5:00-6:00</td>
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<td>Poster Session / Mixer / Cash Bar (Common Area)</td>
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<td>6:00-7:30</td>
<td>Opening Reception</td>
<td>Banquet</td>
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<td>7:30-9:00</td>
<td>Effective Communication, Tom Kalous</td>
<td>Effective Communication, Tom Kalous</td>
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# Conference-at-a-Glance (continued)

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<th>Time</th>
<th>Wednesday, April 02, 2014</th>
<th>Thursday, April 03, 2014</th>
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<tbody>
<tr>
<td>7:00-8:00</td>
<td>Breakfast on own / Roundtables</td>
<td>Breakfast on own</td>
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<tr>
<td>8:00-8:10</td>
<td>Welcome and Opening Remarks, Grant Hilderbrand</td>
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<td>8:10-8:30</td>
<td>Stephen Arthur</td>
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<td>8:30-8:50</td>
<td>Laura Prugh</td>
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<td>8:50-9:10</td>
<td>Kumi Rattenbury</td>
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<td>Tom Lohuis</td>
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<td>10:10-10:30</td>
<td>Gretchen Roffler</td>
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<td>10:30-10:50</td>
<td>Tony Kavalok</td>
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<td>10:50-11:10</td>
<td>Discussion - agency actions</td>
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<td>11:10-12:50</td>
<td>Lunch</td>
<td>TWS Business Meeting / Luncheon</td>
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<tr>
<td>12:50-1:00</td>
<td>Welcome back, Housekeeping</td>
<td>Program R Workshop</td>
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<td>1:00-1:20</td>
<td>Beckman - caribou drug</td>
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<td>1:20-1:40</td>
<td>Barboza - caribou forage</td>
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<td>1:40-2:00</td>
<td>Colson - moose</td>
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<td>2:00-2:20</td>
<td>VanSomeren - caribou forage</td>
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<td>2:20-2:40</td>
<td>Christie - willow browsing impacts</td>
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<td>2:40-3:00</td>
<td>Baltensperger - small mammals</td>
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<td>3:00-3:20</td>
<td>Break</td>
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<td>3:20-3:40</td>
<td>Huettmann - shrew</td>
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<td>3:40-4:00</td>
<td>Welker - diets &amp; isotopes</td>
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<td>4:00-4:20</td>
<td>Paragi - habitat BMPs</td>
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<td>4:20-4:40</td>
<td>Wall - private lands</td>
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<td>4:40-5:00</td>
<td>Spathelf - CHAT tool</td>
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<td>5:00-5:20</td>
<td>Hundertmark - fox rabies</td>
<td>Adjourn</td>
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<td>5:20-6:00</td>
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* - student
Monday, March 31
Anchorage Marriott Downtown

8:00 am - 4:40 pm: Resource Selection Workshop
Juneau Room

MODELING FINE-SCALE MOVEMENT BEHAVIOR OF MOOSE IN RELATION TO WILDFIRE CHARACTERISTICS
Casey Brown*, Knut Kielland, and Eugénie Euskirchen

INTEGRATING LANDCOVER CLASSIFICATION AND BROWNIAN BRIDGE MOVEMENTS INTO RESOURCE SELECTION FUNCTION MODELS TO PREDICT ANIMAL MOVEMENT
Anthony Crupi, David Gregovich, Rodney Flynn, and Kathy Smikrud

FORAGE OR FAWN SURVIVAL: TRADE-OFFS BETWEEN NUTRITION AND RISK TO OFFSPRING ARE MEDIATED BY RELATIVE REPRODUCTIVE INVESTMENT FOR FEMALE DEER
Sophie Gilbert*, Kris Hundertmark, Mark Boyce, and David Person

INTERRELATIONSHIPS IN SPACE USE OF WILDLIFE SPECIES AS INFERRED FROM RESOURCE SELECTION FUNCTIONS: MOUNTAIN GOATS VS. WOLVERINES AND BROWN BEARS VS. MOOSE
Dave Gregovich, Kevin White, and Rod Flynn

MOOSE DISTRIBUTION IN RIPARIAN CORRIDORS DURING SEVERE WINTERS: IMPLICATIONS FOR HABITAT MANIPULATION
Kalin Seaton, Thomas Paragi, Martha Ellis, and Mark Keech

LINKING RESOURCE SELECTION TO OVER-WINTER BODY CONDITION IN A COASTAL ALASKA MOOSE POPULATION
Kevin White, Dave Gregovich, and John Crouse

4:40 Dinner on your own

6:00 Opening Reception

7:30 Effective Communication
Tom Kalous
Tuesday, April 1
Anchorage Marriott Downtown
Anchorage Room

8:00 am - 5:00 pm: Resource Selection and Contributed Talks

8:00 WELCOME AND OPENING REMARKS
Jerry Hupp

8:10 PLENARY SESSION, TROPHIC CASCADES AND MANAGEMENT OF LARGE CARNIVORES
Mark Boyce, Department of Biological Sciences, University of Alberta

8:50 ESTIMATING ANIMAL RESOURCE SELECTION FROM TELEMETRY DATA USING POINT PROCESS MODELS
Devin Johnson, Mevin Hooten, and Carey Kuhn

9:10 MODELING SPACE USE AND RESOURCE SELECTION AT MULTIPLE SPATIO-TEMPORAL SCALES: AN INTEGRATED APPROACH
Jon Horne

9:30 SPATIAL HETEROGENEITY IN HABITAT SELECTION: NEST SITE SELECTION BY PRAIRIE GROUSE AS AN EXAMPLE
Lance McNew

9:50 BREAK

10:10 POLAR BEAR MOVEMENTS RELATIVE TO SEA ICE DRIFT DIFFER BETWEEN TWO BIOGEOGRAPHIC PROVINCES: THE BEAUFORT AND CHUKCHI SEAS
George Durner, Shannon E. Albeke, David C. Douglas, and Ryan R. Wilson

10:30 HOW DOES SAMPLE UNIT SIZE AFFECT OCCUPANCY MODELS?
Tammy Wilson

10:50 COMPARISON OF RESULTS OF WILDLIFE RESOURCE SELECTION FUNCTIONS ACROSS METHODOLOGIES AND SPECIES: LESSONS LEARNED FROM MOUNTAIN GOATS, MOOSE, AND BROWN BEARS IN BERNERS BAY, SOUTHEASTERN ALASKA
Dave Gregovich, Kevin White, and Rod Flynn

11:10 Lunch
Student/Professional Event, Glacier Brewhouse Restaurant

1:00 SURVEY ASSESSMENT DETERMINING BROWN BEAR (URUS ARCTOS) POPULATIONS IN KATMAI NATIONAL PARK AND PRESERVE, ALASKA
Sherri Anderson and Troy Hamon

1:20 BUILDING SOCIAL-ECOLOGICAL MODELS OF HUMAN-BEAR ENCOUNTER PERCEPTIONS
Kim Jochum*, Todd Brinkman, Kris Hundertmark, and Andrew Kliskey

* - student
Tuesday, April 1

1:40 ALASKA WOOD BISON REINTRODUCTION PROGRAM UPDATE
Tom Seaton and Robert Stephenson

2:00 PACIFIC WALRUS TUSK ASYMMETRY AND SEA ICE EXTENT
Jim MacCracken and Brad Benter

2:20 IMPACTS OF BREEDER LOSS ON SOCIAL STRUCTURE, REPRODUCTION AND POPULATION GROWTH IN A SOCIAL CANID
Bridget Borg*, Scott Brainerd, and Laura Prugh

2:40 DIET AND FEEDING SITE SELECTION PATTERNS OF AN IRRUPTING MOUNTAIN GOAT POPULATION
McCrea Cobb

3:00 BREAK

3:20 DETECTION OF CHANGING AVIAN POPULATIONS ON THE ARCTIC COASTAL PLAIN, ALASKA
Courtney Amundson, Robert Stehn, Robert Platte, and Paul Flint

3:40 SHOREBIRD USE OF RIVER DELTA HABITAT ON THE EASTERN BEAUFORT SEA COAST, ALASKA
Roy Churchwell*, Abby Powell, Steve Kendall, and Stephen Brown

4:00 COMPARATIVE REPRODUCTIVE SUCCESS OF ARCTIC GEESE IN NORTHERN ALASKA
Jerry Hupp, David Ward, Ty Donnelly, and Kyle Hogrefe

4:20 SUBSISTENCE BIRD HARVESTS ON SAINT LAWRENCE ISLAND, ALASKA: ADDRESSING YELLOW-BILLED LOON CONSERVATION CONCERNS
Liliana Naves and Tamara Zeller

4:40 PREDICTING WATERBIRD NEST DISTRIBUTIONS ON THE YUKON-KUSKOKWIM DELTA OF ALASKA
Sarah Saalfeld, Julian Fischer, Robert Stehn, and Robert Platte

5:00 Adjourn

5:15 Poster Session/ Mixer/ Cash Bar
Common Area

7:00 Banquet
Tuesday, April 1

Student-Professional Mixer and Poster Session

CHARACTERIZATION AND DELINEATION OF CARIBOU HABITAT ON UNIMAK ISLAND USING REMOTE SENSING TECHNIQUES
Brian Atkinson*, Norman Harris, and Donald Spalinger

EVALUATING HABITAT USE OF AN ALASKAN DALL SHEEP (*OVIS DALLI DALLI*) POPULATION VIA CAMERA TRAPS
Jeremy Dertien*, Calvin Bagley, John Haddix, and Aleya Brinkman

THROWING OUR WEIGHT AROUND: ADVANCING A STEADY STATE ECONOMY FOR EARTH HEALTH
Jimmy Fox, Julianne Warren, and Brian Czech

BODY COMPOSITION OF FREE-RANGING WOLVES (*CANIS LUPUS*)
Grant Hilderbrand and Howard Golden

EVALUATING COMPETITION BETWEEN HUMANS AND WOLVES BY EXAMINING LANDSCAPE USE
Ian Johnson*, Todd Brinkman, Kris Hundertmark, and Bryce Lake

AMERICAN KESTREL POPULATION DYNAMICS ON THE UNIVERSITY OF ALASKA FAIRBANKS CAMPUS: INITIATION OF A NEW STUDY
Alexandra Lewis*, Sarah Barcalow, Brandon Elkins, Adam Haberski, Victoria Hartanovich, Haley Heniff, Annyssa Interrante, Jessica McLaughlin, Jamie Rose, Mahaut Sorlin, Victoria Tenney, Laura Prugh and Travis Booms

TRENDS IN AVIAN COMMUNITY STRUCTURE IN RESPONSE TO WOODLAND ENCROACHMENT IN THE GREATER SERENGETI ECOSYSTEM, TANZANIA
Jessica McLaughlin*

ECOLOGICAL INERENCE OF SPECIES RICHNESS: BIAS IN THE EVALUATION OF COMMUNITY – ENVIRONMENT RELATIONSHIPS
Lance McNew and Colleen Handel

SERUM STABLE ISOTOPES (δ13C AND δ15N) OF A DECLINING CARIBOU HERD AND THEIR RELATIONSHIP TO HISTORICAL PATTERNS IN DIET AND CLIMATE.
Matthew O’Dell*, Don Spalinger, Bill Collins, and Jeff Welker

BROWN LEMMING (*LEMMUS TRIMUCRONATUS*) ABUNDANCE AND DISTRIBUTION NEAR BARROW, ALASKA: ESTABLISHING A LONG-TERM STUDY
Kaithrny Ott and Ryan Klimstra

CHICK PROVISIONING AND NUTRITIONAL QUALITY OF BLACK OYSTERCATCHER PREY
Brian Robinson*, Abby Powell, and Laura Phillips

* - student
Wednesday, April 2
Anchorage Marriott Downtown
Anchorage Room

8:00 am - 5:00 pm: Dall’s Sheep Ecology and Management and Contributed Talks

8:00 WELCOME AND OPENING REMARKS
Grant Hildebrand

8:10 RATES AND CAUSES OF MORTALITY OF DALL’S SHEEP IN ALASKA: A COMPARISON AMONG MOUNTAIN RANGES
Stephen Arthur and Tom Lohuis

8:30 OPTIMAL PREDATOR MANAGEMENT FOR DALL’S SHEEP CONSERVATION DEPENDS ON THE STRENGTH OF MESOPREDATOR RELEASE
Laura Prugh and Stephen Arthur

8:50 RECENT DALL’S SHEEP TRENDS, MONITORING PROGRAMS AND RESEARCH IN ALASKA AND THE YUKON TERRITORY
Kumi Rattenbury, Bridget Borg, Aleya Brinkman, and Troy Hegel

9:10 PREGNANCY RATES IN DALL’S SHEEP IN THE CHUGACH MOUNTAINS, ALASKA
Tom Lohuis

9:30 RECENT DALL’S SHEEP TRENDS AND MONITORING PROGRAMS IN ALASKA, PART B
Tom Lohuis

9:50 BREAK

10:10 USING HABITAT SELECTION MODELS TO IDENTIFY LANDSCAPE FEATURES INFLUENCING DALL’S SHEEP GENE FLOW
Gretchen Roffler*, Layne G. Adams, Sandra L. Talbot, and Michael K. Schwartz
Wednesday, April 2

10:30 INCREASING SHEEP HUNTER INTEREST IN SHEEP MANAGEMENT AND ALASKA DEPARTMENT OF FISH AND GAME (ADF&G) EFFORTS TO ADDRESS THE RELATED ISSUES
Tony Kavalok

10:50 DISCUSSION - AGENCY ACTIONS

11:10 Lunch - TWS Business Meeting (Valdez Room)

1:00 EVALUATION OF THIAFENTANIL DOSING IN MIXTURES FOR CHEMICAL CAPTURE OF FREE-RANGING CARIBOU (RANGIFER TARANDUS GRANTI)
Lian Marianne, Torsten W. Bentzen, Dominic J. Demma, and Kimberlee B. Beckmen

1:20 SIMULATED RANGES INDICATE THE IMPORTANCE OF SEASONAL HABITAT FOR FEMALE CARIBOU
Perry Barboza, Daniel Thompson, and Rachel Hart

1:40 POPULATION BOUNDARIES AND THE SUBSPECIFIC DIVIDE IN SOUTH-EAST ALASKAN MOOSE
Kevin Colson, Kevin White, and Kris Hundertmark

2:00 MONITORING DIGESTIBILITY OF FORAGES FOR CARIBOU: A NEW APPLICATION FOR AN OLD APPROACH
Lindsay VanSomeren*, Perry Barboza, Daniel Thompson, and David Gustine

2:20 WIDESPREAD BROWSING BY ARCTIC HERBIVORES CONSTRAINS VERTICAL GROWTH AND REPRODUCTION OF WILLOWS WHILE INCREASING FOOD AVAILABILITY FOR PTARMIGAN
Katie Christie*, Roger Ruess, Mark Lindberg, and Christa Mulder

2:40 PREDICTIVE SPATIAL NICHE AND BIODIVERSITY HOTSPOT MODELS FOR THE SMALL MAMMAL FAUNA OF ALASKA: APPLYING MACHINE LEARNING TO ENVIRONMENTAL AND CONSERVATION PLANNING
Andy Baltensperger* and Falk Huettmann

3:00 BREAK

3:20 MEGASCIENCE AND THE ALASKAN TINY SHREW: CONFIRMED PRESENCE/ABSENCE MONITORING, OPEN ACCESS DATA, PREDICTIVE RESOURCE SELECTION MODELING, SUSTAINABLE LAND MANAGEMENT AND CLIMATE CHANGE
Falk Huettmann and Andrew Baltensperger

3:40 NEW WILDLIFE DIET FORENSICS AND MIGRATION ECOLOGY DISCOVERIES USING TISSUE AND LANDSCAPE ISOTOPE (δ2H, δ13C, δ15N, δ18O) PATTERNS
Jeff Welker*, Ashley Stanek, Matt Rogers, and Craig Ely

* - student
Wednesday, April 2
Anchorage Marriott Downtown
Valdez Room

11:10 am - 3:00 pm:  TWS Business Meeting and Open Access Panel Discussion

11:10  The Wildlife Society (TWS) Business Meeting and Luncheon

1:00-3:00  OPEN ACCESS PANEL DISCUSSION

3:00  BREAK

5:00  Adjourn

Thursday, April 3
National Park Service
240 W. 5th Ave., Room 309

8:00 am - 5:00 pm:  Program R Workshop
ABSTRACTS
SPECIAL SESSIONS AND CONTRIBUTED PAPERS AND POSTERS

Monday, March 31

RESOURCE SELECTION WORKSHOP (8:00 AM - 4:40 PM)

MODELING FINE-SCALE MOVEMENT BEHAVIOR OF MOOSE IN RELATION TO WILDFIRE CHARACTERISTICS
Casey Brown*, Knut Kielland, and Eugénie Euskirchen

University of Alaska Fairbanks. Contact: caseylynnbrown@gmail.com

Wildfire is the most common ecological disturbance in the boreal forest and recent studies predict an increase in frequency, extent, and severity of fire in Interior Alaska under a changing climate regime. Fire severity, in particular, is an important driver for post-fire succession in boreal forests. High-severity fires have been shown to be favorable for seeding deciduous shrubs and trees affecting the overall production of palatable browse species for herbivores such as moose (Alces alces). However, it is unknown whether moose preferentially select for high severity habitat patches in relation to low/medium severity patches or other landscape features that may occur across their home range. We investigated whether fire severity influences the movement of 15 bull moose equipped with GPS radio collars in a regenerating burn in interior Alaska. We developed a step selection function to model the effects of fire severity on individual animal movements. Although we are still in the preliminary stages of analysis, we hope our results will contribute to the understanding of fire impacts on wildlife resources in Alaska.
INCORPORATING LANDCOVER CLASSIFICATION AND BROWNIAN BRIDGE MOVEMENTS INTO RESOURCE SELECTION FUNCTION MODELS TO PREDICT ANIMAL MOVEMENT
Anthony Crupi, David Gregovich, Rodney Flynn, and Kathy Smikrud

Alaska Department of Fish and Game. Contact: anthony.crupi@alaska.gov

Implementing effective wildlife mitigation strategies is important to reduce the negative effects of road development. Road impacts increase risks to population connectivity and survival, as roads function as barriers to animal movement and gene flow, and can result in direct mortality from vehicle collisions. The State of Alaska has proposed the construction of a 78 km road to the capital city, Juneau in Southeast Alaska. From 2006 to 2010, we studied brown bear (Ursus arctos) spatial use and habitat selection in Berners Bay, a diverse and productive ecosystem along the proposed road corridor. The objective of this study was to assess spatial movement patterns to identify habitats where brown bears exhibit higher probabilities of road crossing to improve the placement of road mitigation structures. We captured 30 brown bears (17 males, 13 females) and recorded animal space use data using GPS radiocollars. Using brownian bridge movement models, we generated movement paths between successive locations resulting in 2407 predicted road crossing locations. We developed a landcover classification from high resolution satellite imagery, segmented with eCognition, and classified via random forests, yielding an accuracy assessment of 84%. We integrated the landcover classification with landscape factors to develop a resource selection function model to predict the relative probability of brown bears crossing at specific locations. We depict how movement paths and resource selection can be used to identify and predict brown bear crossing locations that are biologically important and ultimately should assist in designing mitigation strategies that maintain landscape connectivity and population sustainability.

FORAGE OR FAWN SURVIVAL: TRADE-OFFS BETWEEN NUTRITION AND RISK TO OFFSPRING ARE MEDIATED BY RELATIVE REPRODUCTIVE INVESTMENT FOR FEMALE DEER
Sophie Gilbert*, Kris Hundertmark †, Mark Boyce ‡, and David Person §

†University of Alaska Fairbanks, ‡University of Alberta, and §Alaska Department of Fish and Game, Retired. Contact: slgilbert@alaska.edu

Behavior of animals can be strongly influenced by both fear and hunger as animals seek to optimize fitness outcomes. Reproductive animals must balance nutritional demands against predation risk, creating potential trade-offs between foraging, avoiding predation to offspring, and avoiding predation for the animal itself. Adult female ungulates provide an excellent system in which to explore these complex fitness trade-offs. Reproductive female ungulates provision offspring without the assistance of males, and experience high nutritional demands from pregnancy and lactation. We examined fitness trade-offs for 52 adult female Sitka black-tailed deer by developing resource selection functions for each individual during time periods corresponding to pre-reproduction, post-reproduction with live offspring, and post-reproduction with offspring mortality. We found that both reproductive stage and number of living offspring affected adult female deer resource selection. In addition, found that risk to fawns was predicted by maternal habitat selection. Risk to fawns was increased by overlap with black bear resource selection, with interactive effects of fawn age and calendar date.
INTERRELATIONSHIPS IN SPACE USE OF WILDLIFE SPECIES AS INFERRED FROM RESOURCE SELECTION FUNCTIONS: MOUNTAIN GOATS VS. WOLVERINES AND BROWN BEARS VS. MOOSE
Dave Gregovich, Kevin White, and Rod Flynn

Alaska Department of Fish and Game, Division of Wildlife Conservation. Contact: dave.gregovich@alaska.gov

Resource selection functions (RSFs) are seeing wide use as a means to gain insight into species-environment relationships. Oftentimes, environmental factors investigated are time-invariant physical or vegetation (landcover) factors. Relationships between the space use of large mammals have been less studied via the RSF framework. Here, we present results from RSF models constructed for one species using the RSF surface of another species as a covariate. The species pairs represent scavenger-carrion and predator-prey ecological relationships. An RSF for wolverine (n = 8) was constructed with a mountain goat (n = 82) RSF surface as a covariate, and similarly a moose (n = 33) RSF was constructed using a brown bear (n = 29) RSF surface covariate. These RSF models were constructed at a coarse, study-area scale. Additionally, fine-scale RSFs were explored using step-selection functions (SSFs). Coefficients were hypothesized to be positive in one case (mountain goat RSF factor in wolverine model) and negative in the other (brown bear RSF factor in moose model). The mountain goat RSF was indeed strongly positive in the wolverine RSF model at the study-area scale, but the brown bear factor was not significant in the moose model. These results show utility in considering interspecies relationships when constructing RSFs.

MOOSE DISTRIBUTION IN RIPARIAN CORRIDORS DURING SEVERE WINTERS: IMPLICATIONS FOR HABITAT MANIPULATION
Kalin Seaton, Thomas Paragi, Martha Ellis, and Mark Keech

Alaska Department of Fish and Game. Contact: kalin.seaton@alaska.gov

Quantifying animal movement relative to habitat is critical to effective habitat improvement. Ideally, analysis should focus on habitats used when availability is most limiting. In practice, analyses should be truncated to areas accessible for habitat manipulation. We examined the effect of severe winter weather on the distribution of moose browse removal and adult female locations (n = 1,261) relative to major rivers near McGrath, Alaska from 2001 to 2008. During 2004-2005, severe weather increased non-predation calf mortality from >3% to 40%. Within 200 m of the river, 93% (n = 45) of plots were browsed versus 58% (n = 48) > 1,000 m from the river. The probability of browsing increased with snow depth. Moose were closer to the river at higher daily snow depths, during warmer winters and as winter progressed. For example, our model predicted that moose would be 1,369 m (± 408 m) from the river early in a cold winter with shallow snow. In contrast, late in a warm winter with deep snow, moose would be 137 m (± 46 m) from the river bank. When the rivers are buffered by these estimates, moose distribution changed from 16% (± 3.8%) to 2.6% (± 0.8%) of the study area: a six-fold reduction. We suggest that mechanical regeneration of decadent willow stands within 200 m of rivers in this area may increase the available biomass of preferred forage when and where energetic requirements are highest. We recommend pre-consideration of management action to improve applicability of wildlife habitat analyses.
LINKING RESOURCE SELECTION TO OVER-WINTER BODY CONDITION IN A COASTAL ALASKA MOOSE POPULATION
Kevin White, Dave Gregovich, and John Crouse

Alaska Department of Fish and Game, Division of Wildlife Conservation. Contact: kevin.white@alaska.gov

Understanding the relationship between habitat selection and animal performance is of fundamental importance to wildlife ecology. Unfortunately, resource selection patterns are not necessarily linked to individual or population performance and further examination of such relationships are needed. In this study, we examined the linkage between resource selection and nutritional condition in adult female moose during winter. Specifically, we examined how individual variation in resource selection is correlated with loss of overwinter reserves of body fat. Initially, we developed a forage-based resource selection function (RSF) model (i.e. a model that yields values proportional to the probability of use of a given resource unit) using GPS-radio telemetry data (n = 27) and remote sensing data to describe resource selection patterns at the population-level. We then examined how individual variation in resource selection, relative to the population, influenced individual over-winter change in body fat. Overall, RSF modeling results indicated that moose selected for areas with low snow depth and high forage biomass of willow and horsetail. Further, we determined that utilization of over-winter fat reserves was correlated with use of the RSF modeling surface. Specifically, animals that spent more time in areas with high RSF scores (i.e. locations with low snow and high forage biomass) lost less body fat over winter than would be expected for the overall population. Since nutritional condition in spring is positively related to the probability of pregnancy, these findings provide an empirical basis for understanding the nutritional and demographic implications of moose resource selection patterns in coastal Alaska.
Tuesday, April 1

8:00 am
WELCOME AND OPENING REMARKS
Jerry Hupp

8:10 pm
PLENARY SESSION: TROPHIC CASCADES AND MANAGEMENT OF LARGE CARNIVORES
Mark Boyce, Department of Biological Sciences, University of Alberta

RESOURCE SELECTION SPECIAL SESSION (8:50 AM - 11:10 AM)

8:50 am
ESTIMATING ANIMAL RESOURCE SELECTION FROM TELEMETRY DATA USING POINT PROCESS MODELS
Devin Johnson¹, Mevin Hooten², and Carey Kuhn¹

¹National Marine Fisheries Service and ²US Geological Survey. Contact: devin.johnson@noaa.gov

Analyses of animal resource selection functions (RSF) using data collected from relocations of individuals via remote telemetry devices have become commonplace. Increasing technological advances, however, have produced statistical challenges in analysing such highly autocorrelated data. Weighted distribution methods have been proposed for analysing RSFs with telemetry data. However, they can be computationally challenging due to an intractable normalizing constant and cannot be aggregated (i.e. collapsed) over time to make space-only inference. We take a conceptually different approach to modelling animal telemetry data for making RSF inference. We consider the telemetry data to be a realization of a space–time point process. Under the point process paradigm, the times of the relocations are also considered to be random rather than fixed. The point process models we propose are a generalization of the weighted distribution telemetry models. By generalizing the weighted model, we can access several numerical techniques for evaluating point process likelihoods that make use of common statistical software. Thus, the analysis methods can be readily implemented by animal ecologists. In addition to ease of computation, the point process models can be aggregated over time by marginalizing over the temporal component of the model. This allows a full range of models to be constructed for RSF analysis at the individual movement level up to the study area level. To demonstrate the analysis of telemetry data with the point process approach, we analysed a data set of telemetry locations from northern fur seals (Callorhinus ursinus) in the Pribilof Islands, Alaska. Both a space–time and an aggregated space-only model were fitted. At the individual level, the space–time analysis showed little selection relative to the habitat covariates. However, at the study area level, the space-only model showed strong selection relative to the covariates.
9:10 am
MODELING SPACE USE AND RESOURCE SELECTION AT MULTIPLE SPATIO-TEMPORAL SCALES: AN INTEGRATED APPROACH
Jon Horne

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Animal space use is the result of several interacting physiological and ecological processes including an individual’s mobility, home range behavior, resource selection, and avoidance or attraction to other animals, among others. Understanding these relationships and processes are a significant component of wildlife research and management. A promising new approach to analyze animal space use seeks to combine these multiple processes into a single parsimonious model. The approach, based on modeling space use as a weighted distribution, allows researchers to mitigate several issues that have plagued traditional approaches. Issues such as choosing an appropriate model for home range analysis; defining an availability distribution for analyzing resource selection; accommodating temporally dynamic habitat conditions or selection behavior; and analyzing space use and resource selection at multiple scales. We describe this new approach and illustrate its benefits using several examples from a diversity of taxa and geographic locales (e.g., white rhinos in Africa, fish owls in Russia, caribou on the North Slope, and polar bears in the Chukchi Sea).

9:30 am
SPATIAL HETEROGENEITY IN HABITAT SELECTION: NEST SITE SELECTION OF PRAIRIE GROUSE AS AN EXAMPLE
Lance McNew

US Geological Survey, Alaska Science Center. Contact: lmcn@usgs.gov

Ecological relationships of animals and their environments are known to vary spatially and temporally across scales. However, common approaches for evaluating resource selection by animals assume that the processes of habitat selection are stationary across space. The assumption that habitat selection is spatially homogeneous may lead to biased inference and ineffective management. I present the first application of geographically-weighted logistic regression to habitat selection by a wildlife species. As a case study, I examined nest site selection by greater prairie-chickens at three sites with different ecological conditions in Kansas to assess whether the relative importance of habitat features varied across space. I found that (1) nest sites were associated with habitat conditions at multiple spatial scales, (2) habitat associations across spatial scales were correlated, and (3) the importance of habitat conditions on nest site selection was spatially explicit. Post hoc analyses revealed that much of the spatial variability in habitat selection processes was explained at a regional scale. Moreover, habitat features at local spatial scales were more strongly associated with nest site selection in unfragmented grasslands managed intensively for cattle production than they were in fragmented grasslands within a matrix of farmland. Female prairie-chickens exhibited spatial variability in nest site selection at multiple spatial scales, suggesting plasticity in habitat selection behavior. The results highlight the importance of accounting for spatial heterogeneity when evaluating the ecological importance of habitat components on resource selection.
10:10 am

POLAR BEAR MOVEMENTS RELATIVE TO SEA ICE DRIFT DIFFER BETWEEN TWO BIOGEOGRAPHIC PROVINCES: THE BEAUFORT AND CHUKCHI SEAS

George Durner¹, Shannon E. Albeke², David C. Douglas³, Ryan R. Wilson⁴, Steven C. Amstrup⁵, Evan S. Richardson⁶, and Merav Ben-David⁷


Polar bears (Ursus maritimus) depend on drifting Arctic sea ice to access their seal prey. Because sea ice dynamics vary regionally we hypothesized that ice drift among biogeographic provinces will vary in their impact on activity and energy expenditure of bears for accessing habitats. To improve our understanding of how sea ice change will affect their energy budgets and habitat quality in different regions, we used satellite radio-telemetry data from polar bears in the Beaufort (BS) and Chukchi (CS) seas, 1985-2013, and daily estimates of ice drift, to develop drift-corrected estimates of polar bear movements. The movement direction of bears differed from a uniform distribution during all months in the BS and CS. Additionally, movement direction differed from ice drift direction in all months, especially for bears in the BS from November-May when movements were opposite of ice drift. Annual movement rates (km/day; mean ± sd) were slightly lower for 367 BS bears (13.65 ± 0.26) than 333 CS bears (14.77 ± 0.26) and much higher than ice drift rates of 4.51 ± 0.10 (BS) and 4.41 ± 0.12 (CS). BS bears were more likely to compensate for ice drift through movement direction whereas CS bears compensated by greater movement rates. Our results suggest that 1) energetic costs and benefits for polar bears may vary among different regions due to ice drift, and 2) that multiregional habitat models can be improved by including regional-specific estimates of the effort required by bears to occupy otherwise similar habitats.
10:30 am
HOW DOES SAMPLE UNIT SIZE AFFECT OCCUPANCY MODELS?
Tammy Wilson

National Park Service. Contact: tlwilson@nps.gov

Within the last decade, methods for estimating incomplete detection of field observations have been gaining popularity. Although it is widely recognized that choice sample unit size affects nearly every type of spatial model, very little attention has been given to how unit size affects detection estimates, or how scale dependency in the observation model affects process model parameters (e.g., occupancy). We used occupancy models of brown bear dens in Katmai National Park to examine the effects of sample unit size (grain) on detection, occupancy, and covariate relationships. By using surveys of fixed objects we could safely assume closure, and could control for all other factors that may be confounded with unit size. We chose the base unit size (12.500 km²) to roughly match our best estimate of brown bear density in Katmai. We combined, or split sample units to obtain three datasets with varying unit size: 2X, 0.5X, and 0.25X, and fit den occupancy models at all scales. We found that as unit size increased, both detection and occupancy parameters increased. At a scale two times greater than the expected bear density, the occupancy parameter approached one. However, the use of covariates somewhat moderated observed scale effects. As sample unit size increased, covariate slope parameters on the observation, and process model components were similar, but variances and model selection uncertainty increased. When designing occupancy surveys, the sample unit size should closely match the biology of the organism, expected object density, study objectives, and analytical assumptions (closure). Further, the use of covariates in both observation and process models can help moderate scale effects over a biologically-relevant range of scales.
10:50 am
COMPARISON OF RESULTS OF WILDLIFE RESOURCE SELECTION FUNCTIONS ACROSS METHODOLOGIES AND SPECIES: LESSONS LEARNED FROM MOUNTAIN GOATS, MOOSE, AND BROWN BEARS IN BERNERS BAY, SOUTHEASTERN ALASKA
Dave Gregovich, Kevin White, and Rod Flynn

Alaska Department of Fish and Game, Division of Wildlife Conservation. Contact: dave.gregovich@alaska.gov

The advent of GPS technology has resulted in an unprecedented amount of location data for wildlife populations. Concurrently there has been a proliferation of published resource selection function (RSF) methodologies available to analyze this data. The wildlife biologist must choose from this array of varying methods, often without clear guidance on which is best suited for the study at hand. Additionally, the consequences of methodology choice with regard to ecological and management conclusions have not been thoroughly investigated to date. Here we compare and contrast four RSF approaches—mixed-effects, generalized estimating equations, ‘two-stage’, and pooled logistic regression—using data collected from GPS-marked mountain goats (n = 82), brown bears (n = 29), and moose (n = 33) in Berners Bay, southeastern Alaska. Specifically, we compare coefficient and variance estimates, top selected models, and output RSF surfaces to examine how analytical results and biological interpretations differ with respect to the methodology used. Additionally, we assess impacts of proposed development on each species as predicted by each methodology, as measured by the quality (magnitude of RSF score) of habitat in pixels directly affected by the development. Results suggest that strong species-landscape relationships result in similar coefficients (sign and magnitude) across methods, but weaker relationships may result in greater contrast between methods. Each method largely concurred in predicting impact of development, with some exceptions. Overall, our analyses provide guidance for biologists interested in analyzing GPS telemetry data sets in order to model resource selection patterns of wildlife species for conservation and management purposes.
CONTRIBUTED TALKS (12:50 PM - 5:00 PM)

1:00 pm
SURVEY ASSESSMENT DETERMINING BROWN BEAR (*URSUS ARCTOS*) POPULATIONS IN KATMAI NATIONAL PARK AND PRESERVE, ALASKA
Sherri Anderson and Troy Hamon

*National Park Service, Katmai National Park. Contact: sherri_anderson@nps.gov*

Katmai National Park and Preserve (KNPP) serves as home to more brown bears than any other National Park, including many dense seasonal aggregations (National Park Service 2009). Being opportunistic feeders bears move as resource availability shifts throughout the different seasons (Sellers and Aumiller 1994). This constant movement and the dispersion of bears across a large landscape makes determining population size a difficult challenge for park managers. A number of population surveys have been developed over the years to determine population size but choosing which one to use when surveying 4.1 million acres is a multifaceted decision. A number of factors must be taken into account to make such a decision; cost, what information will be collected, and at what risk level is the information gathered. This study compared survey methods performed from 1999 through 2012 within KNPP. We specifically compare two areas, the preserve in the northwest portion of the unit, and the coastal area along Shelikof Strait. We compare the type of data obtained, information about the quality of the data, the project costs, and the operational risks involved in each method. The results show that stream and sedge meadow surveys were less expensive and had lower overall risk profiles, but provide results that are not calibrated to population levels due to not including an estimate of sightability. Despite these limitations, surveys flown with different pilots and observers tend to produce similar results, indicating some inherent consistency. The value of these surveys would be enhanced by including periodic efforts involving collared animals in order to assess sightability and to indicate the landscape extent that the inferences can be made to.
1:20 pm
BUILDING SOCIAL-ECOLOGICAL MODELS OF HUMAN-BEAR ENCOUNTER PERCEPTIONS
Kim Jochum*1, Todd Brinkman 2, Kris Hundertmark 1, Andrew Kliskey1 and Lilian Alessa3

1University of Alaska Fairbanks, Biology and Wildlife Department, 2Scenarios Network for Alaska and Arctic Planning, Fairbanks, and 3Resilience and Adaptive Management Group, Biological Sciences, University of Alaska Anchorage. Contact: kajochum@alaska.edu

Wildlife management is challenged with an increasing human population encroaching upon wildlife habitat. Not only people living close to wildlands, but also increased access, resource demands and recreational activities on wildlands have to be addressed. Therefore, not only ecological but also social factors influence human-wildlife encounters and need to be considered when analyzing human-wildlife systems. We present a unique approach integrating ecological and social data to examine spatial distribution of positively and negatively perceived human-bear encounters (*Ursus arctos* and *U. americanus*) across urbanizing regions in South-central Alaska. Data was collected using quantitative social-science surveys in 2010-2012. Encounter locations were geo-referenced and analyzed using GIS. Kernel density estimators display heat maps of encounter densities. General liner models were applied to rank and evaluate the relevance of social and ecological predictors on positively and negatively perceived human-bear encounters. Results reveal clustering of two human-bear encounter hot-spots. Alaskan residents described to have majorly positive human-bear encounters (53%) and only few negative encounters (11%). Social and ecological predictors have an impact on positive and negative bear encounter perceptions, but vary for each perception type. Bear encounter experience, the time of the year, peoples’ location, and people’s education level significantly influence positive perceptions toward bear encounters (social predictors). Further, the distance to coastline and the management unit where the encounter occurred impact positively perceived human-bear encounters (ecological predictors). Results inform local capacity to change, enabling the development of pathways for increasing resilience within human-wildlife systems.
1:40 pm
ALASKA WOOD BISON REINTRODUCTION PROGRAM UPDATE
Tom Seaton and Robert Stephenson

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The historic presence of wood bison in Alaska was documented through paleontological evidence and oral history from Alaska Native Athabascan elders. Habitat studies showed that interior Alaska could support at least 3,000 wood bison. After many years of public planning and broad public support, the Alaska Department of Fish and Game moved 53 wood bison from Elk Island National Park in Alberta, Canada to Alaska in 2008. Several years of disease quarantine and testing ensued, and the bison remain free of disease. By 2013 the population had grown to more than 130 bison. Delays have affected the reintroduction effort for several years, and have been mainly related to concerns among oil, gas, and mineral interests that the status of wood bison under the Endangered Species Act (ESA) could affect development of these resources. In 2012, the status of wood bison under the ESA was changed from Endangered to Threatened. In 2013, a draft section 10(j) rule to designate wood bison in Alaska as a nonessential, experimental population was published in the Federal Register. Public comments on the draft 10(j) rule were received and a final rule is scheduled to be published in 2014. If the final rule provides adequate protection for other resource development in Alaska, the state will: 1) proceed with a site-specific planning effort to establish guidelines and a cooperative agreement outlining how wood bison will be managed, 2) initiate a release in the lower Innoko/Yukon River area in Western Alaska.

2:20 pm
PACIFIC WALRUS TUSK ASYMMETRY AND SEA ICE EXTENT
Jim MacCracken and Brad Benter

US Fish and Wildlife Service. Contact: james_maccracken@fws.gov

Asymmetry of bilateral morphological traits (a.k.a. fluctuating asymmetry [FA]) has been related to habitat changes, nutritional status, body condition, genetic diversity, predation levels, pollution exposure, fitness, etc. in a variety of taxa. The U.S. Fish and Wildlife Service implemented a tusk tagging program under the Marine Mammal Protection Act for Pacific walruses (Odobenus rosmarus divergens) harvested by subsistence hunters in 1990. Since then over 40,000 tusks have been tagged and measured for length and basal circumference. We analyzed this data to: (1) determine which tusk measurement was least variable, (2) assign tusks of unknown sex as male or female, (3) estimate the amount of measurement error (ME), and (4) examine tusk FA in relation to recent habitat changes associated with climate change. Tusk basal circumference was least variable and normally distributed with females having a narrower range than males. Discriminant classification functions had an overall accuracy of 89% assigning unknown tusks to sex. ME was about 9% of mean FA estimates. FA in circumference of female tusks was inversely related (r = –0.75) to minimum Arctic Ocean sea ice extent when lagged by 4 years supporting the assumption that recent habitat changes may be affecting individual condition. However, the individual fitness and population level consequences of this are unknown. FA may be useful in tracking walrus response to habitat changes and potential adaptation.
2:40 pm
IMPACTS OF BREEDER LOSS ON SOCIAL STRUCTURE, REPRODUCTION AND POPULATION GROWTH IN A SOCIAL CANID
Bridget Borg*, 1, Scott Brainerd 2, and Laura Prugh 3

1 University of Alaska Fairbanks, National Park Service, 2 Alaska Department of Fish and Game, and 3 University of Alaska Fairbanks. Contact: borg.bridget@gmail.com

Individual heterogeneity is often ignored in population ecology and rarely considered when developing conservation and management plans. However, the importance of specific individuals to the dynamics of animal populations may vary widely, especially for species with complex social structure. Loss of reproductive individuals in socially complex species could disproportionately affect population dynamics by destabilizing social structure and reducing population growth but this relationship remains poorly understood. We evaluated the effect of breeder loss on social stability, recruitment and population growth of grey wolves (Canis lupus) in Denali National Park and Preserve, Alaska using a 26-year dataset of radiocollared wolves. Breeder loss preceded 37% of cases (n = 57) of pack dissolution from 1986 to 2012. Packs were more likely to dissolve if a female or both breeders were lost and pack size was small (< 7). Harvest of breeders increased the probability of pack dissolution, likely because the timing of harvest coincided with the late breeding season of wolves. Rates of denning and successful recruitment were uniformly high for packs that did not experience breeder loss; however, packs that lost breeders exhibited lower recruitment rates. Breeder mortality and pack dissolution had only minor negative impacts on population growth in the same year and no detectible effects on longer-term dynamics. Our results indicate the importance of breeding individuals may be context-dependent. The impact of breeder loss on social group persistence, reproduction, and population growth may be greatest when average group sizes are small and mortality occurs during the late breeding season.
3:20 pm
DIET AND FEEDING SITE SELECTION PATTERNS OF AN IRRUPTING MOUNTAIN GOAT POPULATION
McCrea Cobb

US Fish and Wildlife Service, Kodiak National Wildlife Refuge. Contact: mccrea_cobb@fws.gov

Introduced mountain goats (Oreamnus americanus) on Kodiak Island have followed an irruptive population growth pattern. In response to concerns over potential impacts to native flora and fauna from a high density goat population and to improve harvest management, we sought to quantify goat summer diets, feeding site selection, and available forage resources. We collected fecal pellets from goat groups (primarily nanny groups) in three subpopulations at different densities and durations of site occupancy. Microhistological analyses of the pellets revealed that diets were largely composed of fern rhizomes and grasses in early summer (June), and sedges and forbs later in the summer (July to mid-August). The proportion of forage in goat diets varied across subpopulation, but dietary differences among subpopulations were uncorrelated with subpopulation density or duration of occupancy. Goats selectively used sites with abundant sedge, rush, and moss on south-facing slopes close to escape terrain (slopes >33 degrees). Forage quality, measured as digestible protein and dry matter digestibility, of primary goat forage classes that composed more than 5% of their diets, varied among forage classes, according to sequential fiber analyses. Digestible protein content declined over the summer season, but dry matter digestibility did not vary over time or between study sites. We found no evidence that forage biomass differed between feeding and random sites, suggesting that goats did not select feeding sites based on forage biomass. This study was the first to quantify mountain goat diets, feeding site selection, and forage resources on Kodiak Island.
3:40 pm
DETECTION OF CHANGING AVIAN POPULATIONS ON THE ARCTIC COASTAL PLAIN, ALASKA
Courtney Amundson¹, Robert Stehn², Robert Platte², and Paul Flint¹

¹US Geological Survey, Alaska Science Center, ²US Fish and Wildlife Service. Contact: camundson@usgs.gov

The Arctic Coastal Plain, Alaska (ACP) is one of the most important and diverse breeding areas for migratory waterbirds in the state. It is managed by numerous public and private stakeholders tasked with balancing the needs of wildlife and resource development on their respective lands. Because avian distributions and population trends are heterogeneous across the landscape, managers need spatially explicit estimates of avian population size and trends to effectively guide development activities. To address this need, we examined long-term (> 25 years) aerial survey data of breeding waterfowl and waterbirds on the ACP to determine where and how populations have changed in recent history and possible mechanisms behind observed trends. Collected by the U.S. Fish and Wildlife Service (USFWS), these data are summarized annually in terms of total population size and spatial extent, but until recent advances in computing, logistical constraints and changes in methodology over time made more in-depth analysis of the dataset difficult. Here we will present results of our ongoing hierarchical Bayesian modeling effort for two species with differing distributions and trends: white-fronted goose and black brant. When completed, our results will identify areas of the ACP undergoing rapid population change for a suite of wetland-dependent birds, as well as provide insight into possible climatic and environmental variables associated with observed change. Furthermore, results will facilitate predicting population trends into the future under down-scaled climate change scenarios and inform future study designs and comprehensive analysis of aerial surveys by the USFWS across Alaska.
4:00 pm
SHOREBIRD USE OF RIVER DELTA HABITAT ON THE EASTERN BEAUFORT SEA COAST, ALASKA
Roy Churchwell*, Abby Powell, Steve Kendall, and Stephen Brown

1University of Alaska Fairbanks, 2US Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit, and Department of Biology and Wildlife, University of Alaska Fairbanks, 3US Fish and Wildlife Service, Hakalau Forest National Wildlife Refuge, and 4Manomet Center for Conservation Science. Contact: rchurchw@alaska.edu

Although previous research found shorebirds congregated on river deltas during the post breeding season along the eastern Beaufort Sea Coast, little is known about how and why they use these sites. We used a combination of color-banding, bird surveys, and blood sampling for triglyceride levels at three river deltas 2009-2012. We found two general strategies for delta shorebird use: hatch-year migration stopover and pre-migration staging for adults and hatch-year birds. Shorebird use was highest 26 July – 3 August and flocks were composed primarily of semipalmated sandpipers. Shorebirds started using the western most delta two days before eastern deltas, suggesting a front of birds migrating west to east. Numbers of shorebirds on the two eastern deltas were similar throughout the migration period, and because of close proximity of these sites shorebird flocks move through the sites at the same time. Banded semipalmated sandpipers were only observed on the delta where they were captured but not at other deltas, suggesting birds migrate beyond the extent of our study area after being banded. The fattening rate of semipalmated sandpipers, based on triglyceride levels, was similar at all deltas. Changes in delta habitats from climate change or anthropogenic causes may impact shorebird use, and impacts may differ by age class. Shorebirds that stop over at deltas as hatch-year birds need feeding habitats distributed along the coast, but may be able to choose among deltas close together. In contrast, shorebirds staging on deltas prior to migration may be restricted to habitats close to nesting areas.

4:20 pm
COMPARATIVE REPRODUCTIVE SUCCESS OF ARCTIC GEESE IN NORTHERN ALASKA
Jerry Hupp, David Ward, Ty Donnelly, and Kyle Hogue

US Geological Survey, Alaska Science Center. Contact: jhupp@usgs.gov

Populations of snow geese (Chen caerulescens), black brant (Branta bernicla), and white-fronted geese (Anser albifrons) are increasing on the Arctic Coastal Plain of Alaska. Rate of increase for snow geese appears to be higher than for the other species. Since 2011, we have contrasted nest chronology and nest survival of these three species on the Colville River Delta, Alaska. We have also banded >6000 brant and snow geese to estimate hunter harvest on migration and wintering areas. Due to earlier nest initiation and a slightly shorter incubation interval, peak hatch for snow geese was 4 – 7 days earlier than for other species of geese. Per capita, snow geese hatched at least 25% more goslings than brant (all years) or white-fronted geese (two of three years). Harvest rates of adult snow geese and brant were low (<0.03). Low hunter harvest and high productivity are likely contributing to the rapid increase of snow geese in northern Alaska. We discuss how this research can inform management decisions regarding the expanding snow goose population in northern Alaska.
4:20 pm
SUBSISTENCE BIRD HARVESTS ON SAINT LAWRENCE ISLAND, ALASKA:
ADDRESSING YELLOW-BILLED LOON CONSERVATION CONCERNS
Liliana Naves¹ and Tamara Zeller²

¹Alaska Department of Fish and Game, Division of Subsistence and ²US Fish and Wildlife Service, Division of Migratory Bird Management. Contact: liliana.naves@alaska.gov

The yellow-billed loon Gavia adamsii is a candidate species for listing under the Endangered Species Act. Subsistence harvest in Alaska, estimated at several hundred birds/year, was identified as a threat in 2009. In 2011–2012, bird counts, harvest surveys, and ethnographic research were conducted on St. Lawrence Island to clarify loon species identification and harvest amounts. The average species composition in fall bird counts was: Pacific G. pacifica (94.5%), yellow-billed (4.2%), red-throated G. stellata (0.5%), and Arctic G. arctica (0.4%) loon. Estimated total bird harvests were 10,663 birds in 2011 and 7,754 birds in 2012. 2011 harvest estimates included 151 loons reported as common (53.6%), Pacific-Arctic (27.8%), yellow-billed (11.3%), and red-throated (7.3%) loon. Following modifications to survey design, 2012 harvest estimates included 180 loons reported as nonbreeding unidentified (64.2%), Pacific-Arctic (26.3%), red-throated (4.4%), common (3.4%), and yellow-billed (1.7%) loon. Loon harvests occurred mainly in fall, during seal hunting. Loons were taken with shotguns and were used for food. There was harvest preference for young birds. The St. Lawrence Island Yupik ethnotaxonomy identifies loons based on size and plumage. Reports of common loons in harvest surveys likely referred to the locally most common loon, the Pacific loon. Based on plumage and species composition in bird counts, adjusted yellow-billed loon harvest estimates were 5 birds in 2011 and 2012 each. By addressing difficulties with previous harvest surveys and providing data on usual harvest levels and local species composition, this study much alleviated yellow-billed loon conservation concerns related to subsistence harvests in Alaska.
4:40 pm
PREDICTING WATERBIRD NEST DISTRIBUTIONS ON THE YUKON-KUSKOKWIM DELTA OF ALASKA
Sarah Saalfeld\textsuperscript{1}, Julian Fischer\textsuperscript{2}, Robert Stehn\textsuperscript{2}, and Robert Platte\textsuperscript{2}

\textsuperscript{1}Manomet Center for Conservation Sciences and U.S. Fish and Wildlife Service, \textsuperscript{2}US Fish and Wildlife Service, and \textsuperscript{5}Manomet Center for Conservation Sciences. Contact: saalfeldst@gmail.com

The Yukon-Kuskokwim Delta of Alaska is a globally important region for millions of migrating and nesting waterbirds. Climate change effects such as sea level rise and increased storm frequency and intensity have the potential to impact waterbird populations and breeding habitat in the near future. In order to determine the potential impacts of these climate-mediated changes, it is important to monitor the current spatial distribution of important nesting areas and understand the importance of environmental variables in the selection of nest locations. To do this, we modeled nest density for 15 species or composite species of waterbirds that commonly breed on the Yukon-Kuskokwim Delta, including Cackling Goose, Emperor Goose, Black Brant, Greater White-fronted Goose, Tundra Swan, Sandhill Crane, Spectacled Eider, Common Eider, Northern Pintail, Greater Scaup, Pacific and Red-throated Loon, Glaucous Gull, Mew Gull, Sabine’s Gull, and Arctic Tern. The data used were from single-visit nest searches on 2,338 plots sampled during 29 years, 1985–2013. Nest density was modeled for each species using negative binomial regression and landscape environmental variables. For most species, nest density was greatest near the coast and within lowland habitat types. When compared to a withheld portion of the data, predicted nest densities were highly correlated (i.e., Spearman’s rank correlation coefficient, $r_s = 0.52–0.77$) for 6 of the 15 species, but less correlated ($r_s = 0.24–0.49$) for the remaining 9 species. Predicted nest densities mapped across the coastal zone of Yukon-Kuskokwim Delta for each species revealed areas of high and low densities that can be used to inform management and conservation decisions.
Tuesday, April 1

Student-Professional Mixer and Poster Session (5:00 pm - 7:30 pm)

CHARACTERIZATION AND DELINEATION OF CARIBOU HABITAT ON UNIMAK ISLAND USING REMOTE SENSING TECHNIQUES

Brian Atkinson*, Norman Harris, and Donald Spalinger

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The assessment of herbivore habitat quality is traditionally based on quantifying the foods available to the animal across their home range through ground-based techniques. While these methods are highly accurate, they can be time-consuming and highly expensive, especially for herbivores that occupy vast spatial landscapes. The Unimak Island caribou herd has been decreasing in the last decade at rates that have prompted discussion of management intervention. Frequent inclement weather in this region of Alaska has provided for little opportunity to study the caribou forage habitat on Unimak Island. The overall objectives of this study were 2-fold 1) to assess the feasibility of using high-resolution color and near-infrared aerial imagery to map the forage distribution of caribou habitat on Unimak Island and 2) to assess the use of a new high-resolution multispectral satellite imagery platform, RapidEye, and the use of the “red-edge” spectral band on vegetation classification accuracy. Maximum likelihood classification algorithms were used to create land cover maps in aerial and satellite imagery. Accuracy assessments and transformed divergence values were produced to assess vegetative spectral information and classification accuracy. By using RapidEye and aerial digital imagery in a hierarchical supervised classification technique, we were able to produce a high resolution land cover map of Unimak Island. We obtained overall accuracy rates of 71.5%, comparable to other land cover maps using RapidEye imagery. The “red-edge” spectral band included in the RapidEye imagery provides additional spectral information that allows for a more accurate overall classification, raising overall accuracy 3.5%.
EVALUATING HABITAT USE OF AN ALASKAN DALL’S SHEEP (OVIS DALLI DALLI) POPULATION VIA CAMERA TRAPS
Jeremy Dertien*, Calvin Bagley2, John Haddix3, Aleya Brinkman2 and Elizabeth Neipert2

1Colorado State University, 2Center for the Environmental Management of Military Lands, Fort Wainwright, and 3United States Army Garrison, Fort Wainwright. Contact: jdertien1@gmail.com

The study of Dall’s sheep (Ovis dalli dalli) is often constrained by the variable terrain, extreme climate, and at times cryptic nature of the species. Studies of these mountain ungulates often rely upon aerial or road-based surveys to assess population size and regional habitat use. Infrequently, camera traps have been employed to estimate population size and presence of mountain ungulates, but little use has been directed towards Dall’s sheep. Camera traps are an increasingly utilized tool for the management and study of numerous taxa of wildlife. My study will utilize camera traps to determine the occupancy of Dall’s sheep within the U.S. Army’s Donnelly and Black Rapids Training Areas of Fort Wainwright, Alaska. An assessment of the local sheep population’s habitat use has been deemed necessary by the U.S. Army due to the expansion of military exercises. A system of camera traps, installed via a spatially balanced design will assess the seasonality and habitat use of sheep in the military training area beginning August 2013 through August 2016. These data, in concert with aerial and scat surveys surrounding camera locations, will allow for occupancy modeling using multiple detection methods. Results will determine recommendations to the U.S. Army as to the most appropriate time to conduct military exercises in the training areas as it pertains to sheep presence. In addition, novel techniques of camera trap installation and use in mountainous tundra may inform other researchers conducting wildlife investigations in similar environments.

THROWING OUR WEIGHT AROUND: ADVANCING A STEADY STATE ECONOMY FOR EARTH HEALTH
Jimmy Fox1, Julianne Warren2, and Brian Czech3

1US Fish and Wildlife Service, 2New York University, and 3Center for the Advancement of the Steady State Economy. Contact: jimmy_fox@fws.gov

There is growing awareness we are in a new geological epoch - the Anthropocene. Human economic activities are dominating the ecosphere with rippling consequences of global soil loss, mass extinction, climate change, and others. The problem is rooted in the desires of a consumer culture focused on growing the economy. Today, if every human on our planet lived the lifestyle of the average American, humanity would require five Earths’ worth of biocapacity each year. This unsustainable ecological footprint must shrink if we are to foster the ongoing survival of wildlife whose future is hitched to our own. It is all the more urgent today that The Wildlife Society expand what one of our guiding lights, Aldo Leopold, described as humanity’s greatest and most enduring challenge: to live “on a piece of land without spoiling it,” in ways that enrich its “capacity for self-renewal” or, in other words, its “health.” Looking ahead, he wrote: “The direction is clear, and the first step is to throw your weight around on matters of right and wrong in land-use. Cease being intimidated by the argument that a right action is impossible because it does not yield maximum profits.” In 2011 TWS published a position statement describing the fundamental conflict between economic growth and wildlife conservation. Eight strategies are identified to address the problem. It is time for a steady state economy. It is time to join others in writing an Earth ethic for humanity, for Earth health. Disclaimer: The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.
BODY COMPOSITION OF FREE-RANGING WOLVES (CANIS LUPUS)
Grant Hilderbrand1 and Howard Golden2

1National Park Service and 2Alaska Department of Fish and Game. Contact: grant_hilderbrand@nps.gov

We used deuterium water dilution to estimate body composition of free-ranging wolves (Canis lupus) in the Nelchina Basin, Alaska. Body mass differed between sexes throughout the year but did not vary within sex. Mean fat mass and mean energy content were highest in both sexes in the spring. Mean lean mass was lowest in both sexes in the spring. Body mass and lean body mass were positively related to animal age in both males and females up to age 6–8 years. There was no relationship between body fat content and animal age in either sex except in older animals. Thus, growth beyond age 2 consists primarily of lean mass. Body mass of reproductively active females was greater than non-reproductively active females in the spring but not in summer or fall. Deuterium should be allowed to circulate in the wolf for at least 120 minutes to ensure complete equilibration regardless of season, sex, age, or reproductive status.

EVALUATING COMPETITION BETWEEN HUMANS AND WOLVES BY EXAMING LANDSCAPE USE
Ian Johnson*1, Todd Brinkman2, Kris Hundertmark 1, and Bryce Lake3

1University of Alaska Fairbanks - Wildlife Conservation and Biology, 2Research Assistant Professor – Scenarios Network for Alaska & Arctic Planning, and 3US Fish and Wildlife Service - Yukon Flats National Wildlife Refuge. Contact: iajohnson4@alaska.edu

In the Yukon Flats of Alaska, moose (Alces alces) are at some of the lowest densities in the world. This is likely due to strong top down limitation from wolves (Canis lupus), and black (Ursus americanas) and grizzly (Ursus arctos) bears. Despite low densities, moose are an important resource for subsistence. The first phase of this research is to create a conceptual model that evaluates the spatial relationship between moose, wolves, and subsistence hunters occupying the same landscape. Wolf data for the model is comprised of five collared packs which are focused in the Beaver, AK region. GPS and Doppler fixes for individuals in the wolf packs extend through the fall and winters of 2009 – 2010 (n = 9) and 2010 – 2011 (n=2). These wolf data overlay with human landscape usage (e.g. moose harvest, travel corridors, traplines) from twelve interviews conducted with local villagers in the Beaver region; the human landscape usage data will help us create a human home range. To examine landscape usage by wolves and humans this research model will include landscape classification type, elevation, slope, and travel corridors including known trails or waterways. Feedback and discussions on the conceptual model will help me identify appropriate techniques to analyze empirical data which consist of the moose-hunter use maps and locations of radio collared wolves. Ultimately, I hope this research advances understanding on human-wolf competition, via landscape use, for a common resource: moose.
AMERICAN KESTREL POPULATION DYNAMICS ON THE UNIVERSITY OF ALASKA FAIRBANKS CAMPUS: INITIATION OF A NEW STUDY
Alexandra Lewis*, Sarah Barcalow, Brandon Elkins, Adam Haberski, Victoria Hartanovich, Haley Heniff, Annyssa Interrante, Jessica McLaughlin, Jamie Rose, Mahaut Sorlin, Victoria Tenney, Laura Prugh and Travis Booms

University of Alaska Fairbanks, Student Chapter. Contact: aalewis3@alaska.edu

The American kestrel (*Falco sparverius*) population has been on a steady decline throughout North America, and kestrels have not been extensively studied in Alaska. In accordance with The Peregrine Fund, the UAF Student Chapter of The Wildlife Society will take part in the American Kestrel Partnership, a nation-wide American kestrel monitoring program. Fourteen nest boxes will be built according to the American Kestrel Partnership's specifications. In March 2014, the nest boxes will be installed at fourteen different sites around the UAF campus. These sites were chosen due to proximity of feeding habitat (open fields and meadows) and placed at least one half mile apart to avoid home range conflicts. During spring and summer 2014, these nest boxes will be monitored by observers and remote cameras to collect data on occupancy and reproductive success. This project will be on-going for the student chapter, steadily progressing to incorporate more data including genetic sampling and mark-recapture methods. It is a significant first step in learning about the kestrel populations in interior Alaska. This will be the first independent research project the UAF Student Chapter of the Wildlife Society has initiated on free-ranging wildlife.

TRENDS IN AVIAN COMMUNITY STRUCTURE IN RESPONSE TO WOODLAND ENCROACHMENT IN THE GREATER SERENGETI ECOSYSTEM, TANZANIA
Jessica McLaughlin*

University of Alaska Fairbanks. Contact: jfmclaughlin@alaska.edu

Enashiva Nature Refuge is a privately-owned nature reserve in the Loliondo area of Tanzania. Seven studies have been conducted between 2008 and 2013 focusing on the avian community of the refuge. This study utilizes these data and those collected from 10-30 November 2013 to determine what impacts woodland encroachment is having on avian community structure, particularly the proportion of foraging guilds present in the five study habitats. Previous studies of vegetation in Enashiva have concluded that woodland encroachment into grassland areas is occurring, as predicted by the Multiple Steady States (MSS) model of savanna ecosystem dynamics. The purpose of this study is to determine if woodland encroachment is having a significant impact on several indicators: the proportions of foraging guilds represented in each habitat, species diversity, and community similarity. Data was collected at 8 different transects, including four transects in sites identified in 2009-10, and four in habitat interfaces selected in 2012. Index of diversity and index of community similarity values were calculated for each transect, as were the proportions of each foraging guild, then compared to previous data. Community similarity has increased significantly over time in the wooded grassland and woodland in respect to the grassland, while foraging guild diversity decreased significantly in the wooded grassland and woodland. No trends were observed for any indicators in the interface points. This study identifies trends that can be the focus of future studies, which will further understanding of this globally important landscape.
ECOLOGICAL INFERENCE OF SPECIES RICHNESS: BIAS IN THE EVALUATION OF COMMUNITY – ENVIRONMENT RELATIONSHIPS
Lance McNew and Colleen Handel

US Geological Survey, Alaska Science Center. Contact: lmcnew@usgs.gov

Accurate estimates of species richness are necessary to test predictions of ecological theory and evaluate biodiversity for conservation purposes. However, species richness is difficult to measure in the field because some species will almost always be overlooked. Common measures of species richness that treat imperfect detection as a sampling effort problem are inviting because they may require only a single count of species at a site. However, single-visit estimation methods ignore spatial and temporal variation in detection probabilities related to survey or site conditions which may confound estimates of species richness. We evaluated the bias of raw species counts, the limiting forms of jackknife and Chao estimators, and multispecies occupancy models when estimating species richness to determine whether the choice of estimator can affect inferences about the relationships between environmental conditions and community size under variable detection processes. Results of simulations indicated that (1) raw species counts were always biased downward, (2) single-visit jackknife and Chao estimators were significantly biased regardless of detection process, (3) multispecies occupancy models were more precise and generally less biased than the jackknife and Chao estimators, and (4) spatial heterogeneity resulting from the effects of a site covariate on species detection probabilities had significant impacts on the inferred relationships between species richness and a spatially-explicit environmental condition. Application of the four estimation methods to a real dataset of bird observations in northwestern Alaska confirmed that neglecting the effects of site covariates on species detection probabilities leads to significant bias in species richness estimation.

SERUM STABLE ISOTOPES (δ13C AND δ15N) OF A DECLINING CARIBOU HERD AND THEIR RELATIONSHIP TO HISTORICAL PATTERNS IN DIET AND CLIMATE.
Matthew O’Dell*1, Don Spalinger1, Bill Collins2, and Jeff Welker1

1University of Alaska Anchorage and 2Alaska Department of Fish and Game. Contact: mbodell@uaa.alaska.edu

Caribou (Rangifer tarandus) are an important ecological and subsistence resource across much of Alaska. The Mulchatna Caribou Herd has been declining over much of the past decade similar to those patterns documented for Rangifer across much of the circumpolar north. The consequences of global warming and changes in precipitation regimes in Alaska will likely affect the availability and quality of forages available to caribou. Thus, understanding how caribou have historically changed their diet in response to climate will be important for understanding how caribou utilize their home ranges in light of expected climate change. In this project we reconstruct historical winter diet trends in the MCH by analyzing the isotope ratios of 13C and 15N of serum and blood clots. An isotope mixing model is used to estimate caribou diets and linear modeling is used to assess how winter climate has influenced historical diet trends.
BROWN LEMMING (*LEMMUS TRIMUCRONATUS*) ABUNDANCE AND DISTRIBUTION NEAR BARROW, ALASKA: ESTABLISHING A LONG-TERM STUDY

Kaithryn Ott¹ and Ryan Klimstra²

¹US Fish and Wildlife Service and ²North Slope Borough Department of Wildlife Management. Contact: kaithryn_ott@fws.gov

Lemmings are a keystone species in the high Arctic. Many predators (e.g., owls, foxes, and jaegers) prey almost exclusively on lemmings during high abundance years. When lemmings are scarce, predators shift their diet to more abundant prey, such as ground-nesting birds, their eggs, or other small mammals. Traditional ecological knowledge (TEK) and some studies indicate lemming populations fluctuate greatly. Additionally, Quakenbush et al. (2004) suggest peak abundance often corresponds with increased reproductive effort and success of Steller’s eiders near Barrow, Alaska. It is likely that other ground-nesting birds also have improved success during years of abundant lemmings. Given uncertainty regarding the effects of climate change and a lack of robust data, we began monitoring lemming abundance near Barrow in 2011. Our goals are to develop a long-term dataset and further understand the ecological role of lemmings by:

1. Estimating variation in lemming abundance using mark-recapture techniques at 12 research plots;
2. Involving local students in “next-door” science; and

In 2011 and 2012, we used program MARK to estimate abundance for June and August. Overall, those years were ones of moderate lemming abundance. Over 5 trap nights at each plot, a total of 282 and 328 lemmings were marked in 2011 and 2012 respectively. Preliminary results suggest 2013 was a low year (only 28 animals marked). Continuation of this study will produce long-term abundance trends and help identify the ecological significance of lemmings in the Arctic.
CHICK PROVISIONING AND NUTRITIONAL QUALITY OF BLACK OYSTERCATCHER PREY
Brian Robinson*, 1, Abby Powell1, and Laura Phillips3

1University of Alaska Fairbanks, 2US Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit, and University of Alaska Fairbanks, and 3National Park Service, Kenai Fjords National Park. Contact: bhrobinson@alska.edu

The Black Oystercatcher (Haematopus bachmani) is an important member of intertidal communities of eastern Pacific shorelines and is recognized as a species of conservation and management concern. Despite substantial research on Black Oystercatchers, accurate data on the diet of chicks in Alaska is lacking. We completed the first year of a two-year study of oystercatchers at Kenai Fjords National Park aimed to fill information gaps on chick provisioning and nutritional quality of prey. We conducted behavioral observations of chick provisioning by adults to visually identify prey consumed by chicks. We also collected prey items and determined their nutritional quality in the lab. We hypothesized that parents would optimize energy expenditure and allocation of time and thereby provision chicks with prey items that would maximize energetic gain to chicks per time spent searching and handling prey. We observed adults delivering a variety of invertebrate prey to chicks but Pacific blue mussels (Mytilus trossulus), limpets (Lottia spp.), thatched barnacles (Semibalanus cariosus) and black katy chitons (Katharina tunicata) were the most common. Preliminary findings supported our hypothesis; mussels and limpets had higher ratios of energy content to search and handing time and likewise were provisioned with greater frequency than barnacles and chitons. We are currently conducting stable isotope analyses of δ13C and δ15N in chick blood and prey samples as a secondary method to characterize chick diet. Our results will identify important prey items to Black Oystercatcher chicks and highlight vital trophic linkages within nearshore marine systems in south-central Alaska.

DIVERGING FORAGING STRATEGIES IN RESPONSE TO ENVIRONMENTAL CHANGE: POLAR BEAR DIETS IN THE SOUTHERN BEAUFORT SEA
Matthew Rogers1, Elizabeth Peacock2, Kristin Simac2, Matthew O’Dell1, and Jeffrey Welker1

1University of Alaska Anchorage and 2US Geological Survey, Alaska Science Center. Contact: mcrogers@alaska.edu

Diets of polar bears (Ursus maritimus) have changed in some regions due to altered sea ice habitat and a warming Arctic. We surveyed stable isotope profiles of five types of polar bear tissues sampled from the southern Beaufort Sea, USA, to determine the most informative tissue type to detect recent changes in diet. Hair samples showed the most variation in δ15N compared to other tissue types. A comparison of fine-scale hair isotope profiles and telemetry movement data indicates that polar bears that spent time near subsistence-harvested bowhead whale (Balaena mysticetus) carcasses on land had lower hair δ15N values and spent more time near the shore compared to bears that had not been located near bowhead whale carcasses. Large variation at the root end of the hair suggests the highest diet variability among individuals occurs during fall and early winter, when bowhead whale carcasses are most plentiful. These results indicate a possible divergence of foraging strategies within this population into pelagic and coastal bears. Using an isotopic mixing model to determine diet proportions, we estimate that bowhead whale may comprise as much as 70% of the coastal bears’ diet in the fall. Additionally, one quarter of the South Beaufort Sea subpopulation may be utilizing bowhead carcasses as a food source.
ASSESSMENT OF SELENIUM STATUS AND SUSCEPTIBILITY TO CAPTURE MORTALITY IN FIVE POPULATIONS OF DALL’S SHEEP
Hilary Schwafel*1 and Kimberlee Beckmen²

1Tufts Cummings School of Veterinary Medicine and 2Alaska Department of Fish and Game. Contact: hschwafel@gmail.com

Dall’s sheep (Ovis dalli dalli) inhabit areas in Alaska with low nutrient availability and may be susceptible to trace mineral imbalances negatively impacting their health. Adequate selenium and antioxidant activity may play a role in preventing capture myopathy and reducing subsequent mortality. Blood samples were collected from five populations Dall’s sheep over seven years. Mortality within 30 days of capture was compared to blood selenium concentration in ewes. The White Mountains population experienced a higher rate of mortality associated with capture compared to other populations. Modeling analysis via QAICc suggested that lower blood selenium concentration was associated with a higher risk of capture mortality in White Mountain ewes (R² = 0.30, p = 0.055). A sharply increased risk of capture mortality was associated with a blood selenium concentration at or below 0.2 ppm, suggesting that this may be the adequacy threshold in White Mountain ewes. This blood selenium concentration falls within the range considered adequate for domestic sheep. There was also significant difference in blood selenium concentration between herds (p < 0.0001, R² = 0.53, AICc = -73.35), but blood selenium concentration did not predict capture mortality across all herds (p = 0.11, R² = 0.09). This suggests that some populations of Dall’s sheep may be at greater risk than others of capture mortality influenced by low blood selenium. Sheep supplemented at capture with vitamin E and selenium are probably less likely to suffer from capture myopathy and mortality.

GUIDELINES FOR SNP AND MSAT PANELS TO AVOID ERRORS IN GENETIC MARK RECAPTURE STUDIES: PACIFIC WALRUS CASE STUDY
Suresh Sethi, Geoffrey Cook, Patrick Lemons, and John Wenburg

US Fish and Wildlife Service. Contact: suresh_sethi@fws.gov

Genetic mark recapture studies use individuals’ genotypes as identifying marks for subsequent statistical modeling to estimate abundance, survival, movement, and other population parameters. Molecular markers with inadequate power to discriminate amongst individuals can lead to false recaptures (shadows), and inaccurate genotyping can lead to missed recaptures (ghosts), potentially biasing genetic mark recapture estimates. We used genotyping simulations to generate guidance on the specifications for MSAT and SNP marker panels, and sample matching protocols necessary to produce high quality data. Shadow events are controllable by increasing the number of markers, or by selecting markers with high discriminatory power; reasonably sized marker sets (e.g. ≥ 9 MSATs or ≥32 SNPs) of moderate allelic diversity lead to low probabilities of shadow errors. Ghost events are more challenging to control and low allelic dropout or false allele error rates produced high rates of erroneous mismatches in mark recapture sampling. Fortunately, error-tolerant matching protocols which use information from positively matching loci between comparisons of samples, and multitubes protocols to achieve consensus genotypes are effective at eliminating ghost events. We present a case study on Pacific walrus, Odobenus rosmarus divergens, using simulation results to inform genetic marker choices.
Wednesday, April 2

8:00 am
WELCOME AND OPENING REMARKS
Grant Hilderbrand

DALL’S SHEEP ECOLOGY AND MANAGEMENT SPECIAL SESSION (8:10 AM - 11:10 AM)

8:10 am
RATES AND CAUSES OF MORTALITY OF DALL’S SHEEP IN ALASKA: A COMPARISON AMONG MOUNTAIN RANGES
Stephen Arthur1 and Tom Lohuis2

1National Park Service, and 2Alaska Department of Fish and Game. Contact: steve_arthur@nps.gov

Annual survival rates and causes of mortality of Dall’s sheep lambs and ewes were estimated in Alaska’s Chugach Mountains (CHU) from 2010—2014, central Alaska Range (CAR) from 1999—2005, and eastern Brooks Range (EBR) from 2009—2012. Survival of ewes ranged from 0.88 in the CHU to 0.91 in the EBR. Lamb survival was both lower and more variable over time and among areas. Lamb survival was lowest in the CHU (mean = 0.27) and highest in the EBR (mean = 0.48). Wolves were the most common cause of ewe mortality in the CAR and EBR (80 and 83% of deaths, respectively). Other deaths in these areas were caused by grizzly bears (8 and 20%, respectively) and wolverines (8% in CAR only). Predation of ewes was less common in the CHU, where wolves killed 4.5% and wolverines 9% of ewes, whereas 77% of CHU ewes died of accidents, disease, starvation, or other non-predation causes. Predation was the leading cause of lamb deaths in the CAR and EBR (95 and 75% of deaths, respectively). In the CHU, only 46% of lamb deaths were due to predation, whereas avalanches caused 12.5% of all lamb deaths and 27% of nonpredation deaths. Golden eagles were responsible for 28, 33, and 44% of lamb predation in the CHU, CAR, and EBR, respectively. Wolverine predation was common in the CHU (20% of predation) and EBR (33%) but less important in the CAR (9%). Coyote predation was a significant cause of mortality only in the CAR (53% of predation deaths), whereas bear predation (by both black and grizzly bears) was common only in the CHU (24% of predation). Differences among areas in predator community composition, particularly the abundance of coyotes, could explain many of the differences we observed in species-specific predation rates. However, differences between the CHU and CAR were more likely due to weather and topography, because predator communities were relatively similar in these areas. These results suggest that the relative importance of predation, and of specific predators, as drivers of sheep population dynamics differs among areas within Alaska. Thus, managers should obtain information specific to a particular area before adopting predator management plans intended to benefit sheep.
8:30 am
OPTIMAL PREDATOR MANAGEMENT FOR DALL’S SHEEP CONSERVATION DEPENDS ON THE STRENGTH OF MESOPREDATOR RELEASE
Laura Prugh¹ and Stephen Arthur²

¹University of Alaska Fairbanks and ²National Park Service. Contact: lprugh@alaska.edu

Large predators often suppress ungulate population growth, but they may also suppress the abundance of smaller predators that prey on neonatal ungulates. We present a modeling framework that examines the potential net impact wolf control on Dall’s sheep, accounting for the direct effect of wolves on sheep and their indirect effect via coyotes. Coyotes and Dall’s sheep ewes and lambs were radiocollared in the Alaska Range from 1999-2005 to estimate fecundity, age-specific survival rates, and causes of mortality in an area without wolf control. We used stochastic stage-structured population models to simulate the net effect of wolf control on Dall’s sheep population growth (λ). Our models accounted for stage-specific predation rates by wolves and coyotes, compensatory mortality, and the potential release of coyote populations due to wolf control. Wolves were the main predators of ewes, coyotes were the main predators of lambs, and wolves were the main source of mortality for coyotes. Population models predicted that wolf control could increase sheep λ by as much as 7% per year in the absence of mesopredator release. However, if wolf control released coyote populations, our models predicted that sheep λ could decrease by as much as 7% per year. These results highlight the importance of considering antagonistic interactions among predators when managing prey such as Dall’s sheep, because the net effect of predator management on shared prey can depend critically on the strength of mesopredator release.

8:50 am
RECENT DALL’S SHEEP TRENDS, MONITORING PROGRAMS AND RESEARCH IN ALASKA AND THE YUKON TERRITORY
Kumi Rattenbury¹, Bridget Borg¹, Aleya Brinkman², Troy Hegel³, Jim Lawler¹, Jennifer McMillan, Elizabeth Neipert, Laura Phillips, Judy Putera, Gretchen Roffler and Joshua Schmidt

¹National Park Service, ²Center for Environmental Management of Military Lands, and ³Environment Yukon, Fish and Wildlife. Contact: kumi_rattenbury@nps.gov

Several Dall’s sheep populations in Alaska and the Yukon Territory experienced lower-than-average lamb productivity in 2013. A handful of these populations have also declined in total numbers over the last few years. Although Dall’s sheep recovered somewhat following regional declines in the early 1990s, numbers never fully rebounded, and these recent data suggest a need for long-term monitoring and investigation of environmental factors affecting population dynamics. This presentation summarizes recent trends in abundance and composition for Dall’s sheep on Bureau of Land Management, Fish and Wildlife Service, National Park Service, US military and adjacent lands in the Brooks, Alaska, Wrangell, and Chugach Ranges in Alaska and 2013, productivity information from the Yukon Territory. It also highlights ongoing monitoring and research efforts conducted by federal agencies in collaboration with the Alaska Department of Fish and Game.
9:10 am
PREGNANCY RATES IN DALL'S SHEEP IN THE CHUGACH MOUNTAINS, ALASKA
Tom Lohuis

Alaska Department of Fish and Game. Contact: thomas.lohuis@alaska.gov

Dall's sheep populations in southcentral Alaska's Chugach range have declined between 30-50% over the past 20 years. In an effort to obtain demographic data on these populations and to obtain insight into the causes of the declines, 30-40 ewe Dall's sheep were captured annually in Alaska's Chugach Mountains between 2009—2013. Pregnancy rates in ewes were measured via serum levels of pregnancy specific protein B (PSPB), and appear to be an effective method of assessing pregnancy rates in wild sheep, as most (95%+) ewes that showed a positive pregnancy test were later observed with lambs. Population pregnancy rates in Chugach ewes were variable but lower than expected, and generally lower than comparative measures obtained from other thinhorn sheep populations, ranging from a low of 21% in winter 2011-2012 to a high of 94% in winter 2012-2013. Age at first reproduction, and individual reproductive histories, in conjunction with qualitative measures of body condition conducted at capture, suggest that female sheep in this population are nutritionally stressed and may be delaying age at first reproduction and/ or experiencing a reproductive pause that could allow them to build fat and protein reserves prior to or between pregnancies.

9:30 am
RECENT DALL'S SHEEP TRENDS AND MONITORING PROGRAMS IN ALASKA, PART B

1Alaska Department of Fish and Game. Contact: thomas.lohuis@alaska.gov

Many Dall's sheep populations in Alaska and the Yukon Territory experienced poor lamb productivity in 2013, presumably as a result of a cold, late spring. This effect appears widespread, and poor productivity in many ranges may have contributed to declines in total numbers over the last 20-30 years. Although Dall's sheep populations in some areas recovered somewhat following regional declines in the early 1990s, numbers never fully rebounded. These recent data suggest a need for long-term monitoring and investigation of environmental and other factors affecting population dynamics. This presentation summarizes recent trends in abundance and composition for Dall's sheep on state-and federally owned lands in the Brooks, Alaska, Kenai and Chugach Ranges in Alaska. It also highlights ongoing monitoring and research efforts conducted by federal agencies in collaboration with the Alaska Department of Fish and Game.
10:10 am
USING HABITAT SELECTION MODELS TO IDENTIFY LANDSCAPE FEATURES INFLUENCING DALL’S SHEEP GENE FLOW
Gretchen Roffler*, Layne G. Adams¹, Sandra L. Talbot¹, Michael K. Schwartz², and Gordon Luikart³

¹US Geological Survey, Alaska Science Center; ²US Forest Service Rocky Mountain Research Station, and ³University of Montana. Contact: groffler@usgs.gov

Landscape heterogeneity influences the spatial distribution of wildlife populations through species-specific dispersal abilities and the distribution of preferred habitats. Because ecological factors that drive habitat selection may be different from those that influence dispersal, we combined resource selection functions (RSF) and landscape genetics modeling to predict patterns of gene flow across heterogeneous landscapes for Dall’s sheep (*Ovis dalli dalli*) in Wrangell-St. Elias National Park and Preserve. We created sex-specific RSFs based on summer aerial survey data (1983 – 2011) and determined 301 adult sheep genotypes (15 microsatellite loci) obtained from fresh feces collected via an intensive, non-invasive sampling effort. We used resulting RSF values to develop genetic resistance surfaces, and tested the correlation between pairwise geographic-cost distances and pairwise genetic distances. The top habitat models for males and females contained open vegetation, steep mid-elevation slopes, and areas of low annual precipitation, although females were more likely to use rugged terrain than males. We determined that preferred habitats predicted patterns of gene flow, and habitats avoided by sheep (e.g., icefields, large valleys) functioned as partial barriers to dispersal in landscape genetics models. Our results suggest that habitat selection models can be useful for assessing the relative importance of landscape attributes on genetic structuring and population connectivity.

10:30 am
INCREASING SHEEP HUNTER INTEREST IN SHEEP MANAGEMENT AND ALASKA DEPARTMENT OF FISH AND GAME (ADF&G) EFFORTS TO ADDRESS THE RELATED ISSUES
Tony Kavalok

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Interest in sheep hunting and sheep management in Alaska appears to have increased over the last few years. Several proposals presented at Board of Game meetings and near record dollar amounts for Chugach Sheep Auction Permits are indicative of this trend. Recent efforts by the Department of Natural Resources to establish a Guide Concession Program was partially in response to real and/or perceived conflicts between resident sheep hunters, hunting guides, and transporters. In addition, allocation and access issues have dominated discussions on sheep hunting forums, at Fish and Game Advisory committee meetings, and in discussions with sheep hunters and others at sport shows and ADF&G offices. Much of what has been said can be attributed to public perception and opinion. Because of this, the Board of Game and ADF&G have commissioned an independent survey of sheep hunters, guides, and others to be conducted by Dr. Todd Brinkman at the University of Alaska Fairbanks. The results of this study along with harvest, population, and research information provided by ADF&G will be provided to the Sheep Sub-committee of the Board of Game in order to inform the larger Board for their meeting in Anchorage, March 2015, where they will be discussing several sheep management proposals.
CONTRIBUTED TALKS (12:50 PM - 5:20 PM)

1:00 pm
EVALUATION OF THIAFENTANIL DOSING IN MIXTURES FOR CHEMICAL CAPTURE OF FREE-RANGING CARIBOU (RANGIFER TARANDUS GRANTI)
Lian Marianne¹, Torsten W. Bentzen², Dominic J. Demma², and Kimberlee B. Beckmen²

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For many years, carfentanil/xylazine (CX) has been the drug combination used for immobilizing free-ranging ungulates in Alaska. However, carfentanil is extremely hazardous for humans. The new drug of choice is expected to be thiafentanil (A-3080), which has a higher safety index. This motivated a drug trial to determine efficacious doses for free-ranging caribou calves (Rangifer tarandus granti). Data collected in April 2010, on free-ranging calves darted with thiafentanil/azaperone, suggested the addition of a sedative for muscle relaxation. Subsequent trials on captive adult caribou indicated thiafentanil/azaperone/medetomidine provided good levels of immobilization. However, field trials conducted in October 2013 on free-ranging caribou calves, found the combination too potent, causing respiratory arrest and one mortality. The protocol was changed to thiafentanil (5 mg), azaperone (25 mg) and xylazine (20 mg) (TAX), with good results. The mean ± SD (range) induction time for TAX was 3.3±1.6 (2.0 - 7.0) minutes vs 2.8±1.5 (1.5-5.2) for CX. To further compare TAX with the previous CX protocol, a physiological evaluation was performed on 5 animals immobilized on CX and 8 animals on TAX. Arterial blood was collected after induction, and again after 10 minutes of nasal O₂ supplement (1 L/min). Both groups had a significant (P < 0.001) increase in PaO₂ after oxygen treatment. However, only the CX group had a significant (P = 0.019) increase in PaCO₂, suggesting better ventilation in the TAX group. Based on our results, we found that TAX proved to be a safe and efficient drug protocol for free-ranging caribou calves.
1:20 pm
SIMULATED RANGES INDICATE THE IMPORTANCE OF SEASONAL HABITAT FOR FEMALE CARIBOU
Perry Barboza¹, Daniel Thompson², and Rachel Hart¹

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We varied digestible energy (16 vs. 12 kJ/g dry matter) and protein (15.2 vs. 7.6% of dry matter) of diets for captive caribou to simulate forages consumed in the wild: high energy and protein (browse); low energy and protein (senescent sedge); low energy high protein (emergent sedge with forbs). Mothers (n=14) lost body mass while their calves gained mass over the first 4 weeks from birth in spring. Suckling frequencies declined after 4 weeks as calves transitioned to solid foods in summer. Maternal intakes of dry matter from all diets were high and increased from 4 to 6% of body mass between 4 and 9 weeks of lactation. Mass gains on the simulated sedge diets were lower than those on the simulated browse diet for both calves and their mothers from 4 to 14 weeks from birth. However, low mass gains of mothers and calves in summer were compensated when all animals were provided with the simulated browse diet after weaning in the fall. Calves are sensitive to the quality of emerging plants in summer as they transition from mother’s milk after 4 weeks of age. Mothers use body stores in the first 4 weeks from birth but rely on abundant forage to regain body mass at high intakes in late summer and fall. Forage quality and biomass on summer and fall ranges may drive populations by supporting the growth of calves, and the mass gains required by adult cows to survive winter and complete the next reproductive cycle.

1:40 pm
POPULATION BOUNDARIES AND THE SUBSPECIFIC DIVIDE IN SOUTH-EAST ALASKAN MOOSE
Kevin Colson¹, Kevin White², and Kris Hundertmark¹

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Moose (Alces alces) are a recent arrival to southeastern Alaska, having only colonized this topographically complex region in the last 100 years. While previous studies in Alaska have found little to no population genetic structure across the northern regions of the state, the southeastern region of Alaska has not previously been examined using intensive sampling and nuclear DNA markers. Here, we sample moose from Alaska and British Columbia to examine region-wide population structure, examine what factors may lead to its formation, and attempt to identify any subspecific divides in the area. We find that the area has extensive population structuring, with all of our sampled locations being differentiated from each other. Analyses reveal few effective migrants between population pairs, and an assignment test only found 2 potential migrants among the identified populations. We also find large or serial founder effects may account for creating initial genetic differentiation between populations, where after very low levels of dispersal prevent homogenization. Finally, we identify moose in the northernmost part of southeastern Alaska as belonging to A. a. andersoni, and not A. a. gigas as previously indicated, suggesting the subspecific boundary is further north than previously thought.

2:00 pm
MONITORING DIGESTIBILITY OF FORAGES FOR CARIBOU: A NEW APPLICATION FOR AN OLD APPROACH
Lindsay VanSomeren*, Perry Barboza², Daniel Thompson³, and David Gustine⁴

¹Department of Biology and Wildlife, University of Alaska, Fairbanks, ²Institute of Arctic Biology, Department of Biology and Wildlife, University of Alaska, Fairbanks, ³Alaska Department of Fish and Game, Division of Wildlife Conservation Kenai Moose Research Center, and ⁴U. S. Geological Survey, Alaska Science Center. Contact: lindsayvansomeren@gmail.com

Caribou populations may be limited by how well individuals are able to digest forage plants. Forage digestibility is usually measured by an in sacco method that relies on incubation of a plant sample within the rumen of a fistulated animal. It is not possible to measure digestive effects on specific dietary components using animal-based measures of digestibility because digested residues are contaminated with endogenous material. We tested an in vitro method consisting of a two-stage procedure that used purified enzymes. The first stage consisted of an acid/pepsin treatment, while the second stage consisted of a treatment with enzymes for carbohydrate digestion. Estimates of dry matter digestibility from the in vitro method were similar to those made with lignin in 4 female reindeer fed 3 formulated diets. Unlike the traditional in sacco method, this in vitro approach is more reproducible, less costly, and does not require fistulated ruminants.

In addition, it can be used to measure digestibility of biologically relevant nutrients as well as effects of digestion on stable isotope signatures. This in vitro method of digestibility indicates that N digestion is limited by fiber in both graminoids and browse but is further reduced by inhibition of enzymes in browse. Furthermore, the N available to the animal is biased to lighter isotopes of N in browse as the digestibility of the N changed through the season. In vitro measures can be used to track sources of N and other nutrients for wild caribou.
2:20 pm
WIDESPREAD BROWSING BY ARCTIC HERBIVORES CONSTRAINS VERTICAL GROWTH AND REPRODUCTION OF WILLOWS WHILE INCREASING FOOD AVAILABILITY FOR PTARMIGAN
Katie Christie*, Roger Ruess, Mark Lindberg, and Christa Mulder

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Shrubs have expanded in Arctic ecosystems over the past century, resulting in significant changes to albedo, ecosystem function, and plant community composition. Willow and Rock Ptarmigan (Lagopus lagopus, L. muta) and moose (Alces alces) extensively browse Arctic shrubs, and may significantly influence their architecture, growth, and reproduction. Furthermore, these herbivores may alter forage plants in such a way as to increase the quantity and accessibility of their own food source. We estimated the effect of winter browsing by ptarmigan and moose on an abundant, early-successional willow (Salix alaxensis) in northern Alaska in 2011 and 2012. Ptarmigan browsed 82-89% of willows and removed 30-39% of buds, depending on study area and year. Moose browsed 17-44% of willows and removed 39-55% of stems. Ptarmigan- and moose-browsed willows produced twice the volume of stem growth but significantly fewer catkins the following summer compared with un-browsed willows. Browsing stimulated the recruitment of dormant buds at the base of branches to produce new vegetative shoots. These shoots were longer and produced 40-60% more buds compared to un-browsed shoots. The production of shoots at the base of stems produces a highly complex “broomed” architecture after several consecutive years of browsing. Broomed willows were shorter and more likely to be re-browsed by ptarmigan, but not moose. Ptarmigan likely benefit from the greater quantity and accessibility of buds on previously browsed willows and may thus increase the carrying capacity of their own habitat. Despite the observed tolerance of willows to browsing, their vertical growth and reproduction was strongly inhibited by moose and ptarmigan. Browsing by these herbivores therefore needs to be considered in future models of shrub expansion in the Arctic.
2:40 pm
PREDICTIVE SPATIAL NICHE AND BIODIVERSITY HOTSPOT MODELS FOR THE
SMALL MAMMAL FAUNA OF ALASKA: APPLYING MACHINE LEARNING TO
ENVIRONMENTAL AND CONSERVATION PLANNING
Andy Baltensperger* and Falk Huettmann

University of Alaska Fairbanks. Contact: abaltens@alaska.edu

Changing environmental conditions at northern latitudes are acting to alter the distributions of species and
the arrangements of wildlife communities. Mapping the extent of spatial overlap between co-occurring
species and identifying newly emerging species interactions will be of particular conservation concern for
the persistence of small mammal species in the future. In Alaska, descriptions of small mammal baseline
distributions and biodiversity hotspot delineations are outdated, and lack accuracy and detail. We used a
comprehensive set of over 4,400 archived museum and other records intersected with 33 publically available
environmental predictor layers as training data to create spatial niche models in RandomForests for 17
species of rodents and shrews in Alaska. Individual models were validated using independent trapping
results from 20 field-sampled locations stratified across latitudinal, longitudinal, and elevational gradients
throughout Alaska. Community cluster analyses were used to identify geographic patterns of co-occurrence
between species, and distribution models were overlaid with one another to create the first small mammal
biodiversity hotspot map for Alaska. Important environmental variables driving distribution patterns, and
implications of species and hotspot model predictions for trophic cascades, wildlife conservation, and
management are addressed.
3:20 pm
MEGASCIENCE AND THE ALASKAN TINY SHREW: CONFIRMED PRESENCE/ABSENCE MONITORING, OPEN ACCESS DATA, PREDICTIVE RESOURCE SELECTION MODELING, SUSTAINABLE LAND MANAGEMENT AND CLIMATE CHANGE
Falk Huettmann and Andrew Baltensperger

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The Alaska tiny shrew (Sorex yukonicus/minutissimus) stands in large contrast to moose, bears, walrus and whales as one of the smallest, and poorest-known wildlife species in Alaska. Its rare occurrence and unknown abundance presents us with a conservation management dilemma. Reliable decisions pertaining to this species community relationships and ecology are difficult, and require science-based management that stands up in the public eye. Here we show the best-possible spatial prediction and abundance estimates for Alaska for this species of conservation interest using ‘the best publicly available’ data. We also present a resource selection function based on machine-learning methods, as well as a GIS analysis showing statewide land management responsibilities for this species. We elaborate on the relevance of taxonomic uncertainties and ‘confirmed absence’ monitoring. We compare how Canada, Russia and Norway deal with such species in the context of endangered species listings and climate change. We conclude that the tiny shrew is iconic indeed, presenting us with many features faced by numerous other non-game species, e.g. minuscule budget allocations, poor management considerations, scarce expertise, and widespread public ignorance. The tiny shrew example demonstrates how unrealistic current single-species management and ESA policies can lead to difficulties in managing biodiversity, wildlife, and food webs for effective conservation in a time of climate and other change in Alaska.
3:40 pm

NEW WILDLIFE DIET FORENSICS AND MIGRATION ECOLOGY DISCOVERIES USING TISSUE AND LANDSCAPE ISOTOPE ($\delta^{2}H, \delta^{13}C, \delta^{15}N, \delta^{18}O$) PATTERNS.
Jeff Welker*, Ashley Stanek 1, Matt Rogers 1, Craig Ely2, and Doug Causey1

1University of Alaska Anchorage, and 2US Geological Survey, Alaska Science Center. Contact: jmwelker@ uaa.alaska.edu

Understanding the diets of carnivores, herbivores, sea and migratory birds in polar regions as well as understanding the migration ecology of waterfowl to and from Alaska has been a continuous challenge to ecologists. However, new tools have made it possible to reconstruct diets based on food web isotope delineations and developing maps that define the temporal and spatial patterns of the isotopes in precipitation-isoscapes. Over the past 8 years the Anchorage wildlife and isotope biogeochemistry community has been using the new UAA Stable Isotope Lab to undertake a series of forensic studies aimed at resolving diets of wolves, polar bears, brown bears, caribou, small mammals, sea birds, and the breeding and wintering locations of geese and tundra swans. These migration studies and the retrospective assignment of breeding and winter habitats have been made possible in part by two UAA-lead water cycle isotope networks, AKWIN-Alaska Water Isotope Network and USNIP-the US Network for Isotopes in Precipitation. This presentation will share highlights of our recent discoveries that: a) gray wolves exhibit intra-annual shifting diets between terrestrial and marine prey, b) some polar bears are switching to lower trophic level feeding, c) intra-annual diet shifts of High Arctic sea birds occur in N Baffin Bay, d) long-term changes in caribou diets from lichens to shrubs correspond with abundance and reduced herd populations and e) precipitation isocape maps assist in sourcing the breeding grounds of divergent subpopulations of southward migrating geese.
4:00 pm

DESIGN OF BEST MANAGEMENT PRACTICES FOR WILDLIFE HABITAT IN ALASKA BOREAL FOREST
Thomas Paragi and Julie Hagelin

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Rising cost of heat and electricity in central Alaska is prompting feasibility assessments of wood biomass as a commercial fuel. Increased wood harvest can impact wildlife habitat via new roads, forest fragmentation, and dead wood salvage. Our goal is to aid land managers and inform public and agency discourse in planning and evaluation of forest practices. Resilience theory emphasizes that maintaining species diversity and complex trophic interactions enables an ecosystem to adapt more rapidly to stress (e.g. climate trend) or rebound from disturbance. We are planning a literature review to guide research design aimed at understanding wildlife patterns relative to silvicultural prescriptions in Alaska boreal forest. Some wildlife interactions can positively impact forest regeneration, such as songbird or small mammal communities mitigating irruptions of defoliating insects. By contrast, hare or moose herbivory of tree seedlings can hinder regeneration. Our first step is to identify habitat gradients within the existing landscape that includes managed forest of the Tanana Valley. We will then design a pilot study aimed at describing wildlife patterns (e.g. songbird diversity, herbivore damage) at gradient extremes. Our goal is to discern the magnitude of effects and design “best management practices” that could act as testable hypotheses of how to attain silvicultural objectives while maintaining ecosystem diversity and emulating natural disturbance. Pragmatic considerations for research and monitoring of both forests and wildlife are essential to maintain agency engagement with adaptive management. We are seeking input from forestry and wildlife professionals in this endeavor.

4:20 pm

WILDLIFE MANAGEMENT ON PRIVATE LANDS: OPPORTUNITIES FOR ALASKA
Bill Wall

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The concept of Private Lands Wildlife Management invokes a lot of different definitions relative biological and policy aspects of wildlife management in Alaska. The base concept was defined by Aldo Leopold in the development of the American Game Policy and is recognized as a key component of the North American Model for Wildlife Conservation as well as a basic component in the international implementation of Community-based Natural Resource Management. Although the idea of working with private landowners on wildlife management is in the ADF&G Strategic Plan produced in 2002, there has been resistance in implementation in the state. At the 3rd International Wildlife Management Congress in Christchurch, NZ (2003), the author hosted a symposium on the components of global Conservation Hunting Programs all of which engaged indigenous peoples or local landowners. The review of the programs demonstrated a basic construct similar to the one proposed by Leopold, which states the following: “Recognize the landowner as the custodian of public game on all [private] land, protect him from the irresponsible shooter, and compensate him for putting his land in productive condition… In short, make game management a partnership enterprise to which the landowner, the sportsman, and the public each contributes appropriate services, and from which each derives appropriate rewards” (WMI, 1971, Game Management Committee, 1936). Alaska needs to understand the concept of management wildlife on private lands and develop a policy and programmatic approach to implementation for indigenous private landowners in the state that meets the needs of the private landowner and public.
4:40 pm
A CHAT ON CRUCIAL HABITAT ASSESSMENT TOOLS
Miles Spathelf, Sue Rodman, Kim Titus, and Kelly Nesvacil

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A Crucial Habitat Assessment Tool (CHAT) provides a non-regulatory method to identify and conserve crucial wildlife habitat. It gives project planners, the general public, NGO’s, and federal agencies easy access to scientific data on a broad scale both within and across state boundaries. Here we discuss the development and future of both the multi-state Western Governors’ Crucial Habitat Assessment Tool and the Alaska specific Crucial Habitat Assessment Tool. CHATs examine a variety of topics from species specific resources to large scale habitat linkages and corridors and native and unfragmented landscapes. The Alaska CHAT includes data and analyses on terrestrial and aquatic game and non-game species. Efforts are underway to develop connectivity and linkage assessments for species that undergo migration within and across the state of Alaska. Landscape integrity and wetland/riparian habitat are other data layers that will be rolled into the Alaska CHAT in the near future. The WGA and Alaska CHATs benefit from stakeholder input both in terms of the methods and types of analyses as well as how the end products are delivered. Currently the Alaska CHAT uses a 10-square mile hexagon coverage for the entire state. Future iterations will use smaller hexagons for coverage to enhance usability but still provide appropriate context and prevent false confidence of derived products. This ongoing project strives to better inform land use decisions in the context of wildlife habitat in and across states.

5:00 pm
ARCTIC FOX POPULATION STRUCTURE PREDICTS DISTRIBUTION OF STRAINS OF RABIES IN ALASKA
Kris Hundertmark, Elizabeth Goldsmith, and Karsten Hueffer

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Arctic foxes (Vulpes lagopus) are a circumpolar species associated with coastal areas characterized by winter sea ice, over which they are known to travel long distances. The species is considered to be a reservoir for rabies throughout its range. Evidence for population structure over large spatial scales is equivocal in Arctic foxes, and population structure within Alaska has not been addressed until recently. Last year we presented preliminary data on population structure of foxes in Alaska but those results relied on a priori assignment of individuals to populations; we now present more sophisticated Bayesian analyses. A non-spatial method assigned foxes to 2 groups, North Slope and western Alaska, and corresponds to our preliminary results. However, a method that accounts for spatial genetic variation divides foxes into 3 populations: North Slope, Seward Peninsula, and southwestern Alaska. This is the first evidence that Seward Peninsula foxes comprise a distinct population. This indicates that long-distance movements documented for Alaska’s Arctic foxes do not necessarily result in dispersal or gene flow. Moreover, those 3 geographic areas correspond to the distributions of the 3 strains of rabies virus present in Alaska. We hypothesize that lack of movement of foxes among populations serves to keep rabies strains geographically restricted and represents a long-term equilibrium. Replacement of Arctic foxes by red foxes (Vulpes vulpes) throughout their mainland range in Alaska, likely due to climate change, may serve to change the host-pathogen dynamics of rabies in Alaska and potentially could change the geographical distribution of the virus.