

15:20 Using GPS technology to predict elk birth site selection and calf survival

Changes in movement behavior can be used to infer reproductive success remotely. Cow elk (*Cervus elaphus*) isolate themselves from the herd to give birth and calves follow a “hider” strategy where calves remain stationary to avoid predators during the initial period after birth. We illustrate a method (DeMars et al. 2013) that uses changes in fine-scale movement rates of cow elk to identify parturition and survival of elk calves through a change point analysis. We assessed the movement of GPS-collared elk on the eastern slopes of west-central Alberta over the period 2002-2012 and tested it with known fates of intensively-monitored calves in the field in 2013. We expanded the approach to compare the reproductive rates of migrant and resident elk, and selection of birth sites, during a period when there has been a loss of migratory behavior in the population and to determine whether calf loss is related to the habitats used by the migratory and residential herd segments.

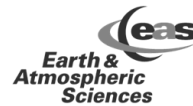
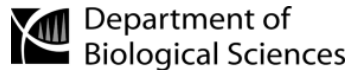
Ms. Berg focuses on landscape-level processes, including predator-prey dynamics and human influences on wildlife. She received her BSc from Northland College in Wisconsin, and her MSc from the University of Montana, where she researched prey availability and selection by a carnivore assemblage in Patagonia, Argentina.

15:40 Investigating ecological patterns and processes in tropical forests using GIS and remote sensing

Biogeographers and ecologists have a long-standing interest in the distribution of biodiversity over different spatial and temporal scales. This interest has been driven either by the necessity to understand the basic ecological principles that govern patterns of species diversity or by the urgency to establish protected areas that preserve the majority of species in a region in the face of the global biodiversity crisis. Since GIS software and airborne/spaceborne remote sensing data has become readily available for public and scientific use, there has been an increased interest from remote sensing researchers to measure and model ecosystem variables from space. The talk will explain the current use of GIS and remote sensing tools to measure ecosystem patterns and processes within the conceptual framework of biodiversity science as seen by ecologists and biogeographers. I will introduce some of the innovations in deforestation monitoring and ecosystem mapping currently in the published scientific literature and the challenges for the future.

Dr. Portillo-Quintero is a biologist from Venezuela who joined the University of Alberta as a PhD student in 2005. He obtained his PhD in Earth and Atmospheric Sciences performing an integral assessment of the Conservation Status of Neotropical Dry Forests using Geographic Information Systems & Remote Sensing. His work includes land cover and land use mapping, tropical forest cover change detection and deforestation rate estimation, and monitoring ecosystem dynamics using GIS and remote sensing. He is currently a postdoctoral research fellow of the Center for Earth Observation Sciences at UofA, where he works in the implementation of wireless sensor networks for hypertemporal monitoring of ecosystem dynamics.

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UofA GIS Day Tuesday, November 12, 2013

GISday

A Showcase of GIS Applications
at the
University of Alberta



AGENDA

13:00	Welcome	Presentations in CCIS 1-160
13:10	Digital bonebeds: Turning field maps into a searchable digital platform, using the Danek Bonebed (Edmonton, Alberta) as an example	Katherine Bramble Biological Sciences
13:30	Habitat factors influencing the movements of female Arctic grizzly bears (<i>Ursus arctos</i>) after den emergence	Kerri Krawchuk Biological Sciences
13:50	An analysis of site selection behaviours and landscape use in the Prince Rupert Harbour Area	Corey Cookson Anthropology
14:10	Geographic Information Systems: Finding the spatial parameters of public health	Jennifer Ann McGetrick Public Health
14:30	Refreshments Break	
15:00	Modeling the impacts of long-term warming trends on ecosystem productivity across North America	Zelalem Mekonnen Renewable Resources
15:20	Using GPS technology to predict elk birth site selection and calf survival	Jodi Berg Biological Sciences
15:40	Investigating ecological patterns and processes in tropical forests using GIS and remote sensing	Carlos Portillo-Quintero EAS
16:00	What's new in ArcGIS 10.2: Tips, Tricks, and Story Maps	David Parry Esri Canada
16:30	Closing	

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13:10 Digital bonebeds: Turning field maps into a searchable digital platform, using the Danek Bonebed (Edmonton, Alberta) as an example

The Danek Bonebed was first excavated in 1989, and again in 1991, by the Royal Tyrrell Museum of Palaeontology (TMP), and then by the University of Alberta Laboratory for Vertebrate Paleontology (UALVP) starting in 2006. It is a largely monospecific *Edmontosaurus* bonebed with over 1600 predominantly disarticulated elements being uncovered. Because many of these elements are small, unidentifiable fragments, approximately 700 of the 1600 marked elements have been catalogued and added to the TMP and UALVP collections. The bonebed is located in the Upper Campanian Horseshoe Canyon Formation within the city limits of Edmonton, Alberta Canada. To date, at least six taxa have been determined: Ceratopsidae, Dromaeosauridae, Hadrosauridae, Ornithomimidae, Troodontidae, and Tyrannosauridae. Quarry maps produced on site have been scanned and traced into Adobe Illustrator® CS4 14.0.0 using a tablet. The completed digital map was then uploaded into ArcMap 10.1 where it was transformed into a searchable platform. Each element is tagged with its catalogue number, identification, family, and quarry coordinate, although some specimens lack some information. Users can now locate specific elements within the bonebed by searching for the catalogue number, or for all elements of one kind by using a term such as “humerus” to locate all humeri within the bonebed. Additionally, users can click on an element within the map and all known information for the element will appear. A searchable bonebed map can aid researchers by allowing information to be visible that may not be obvious in regular hand-drawn maps.

Ms. Bramble is in her final year of an undergraduate degree at the University of Alberta, where she is working on an honors in Paleontology. So far, much of her research has revolved around the study of dinosaur bonebeds in Alberta.

13:30 Habitat factors influencing the movements of female Arctic grizzly bears (*Ursus arctos*) after den emergence

With few studies providing descriptive details of Arctic grizzly bear movements, this study will provide a baseline for examining behavioural responses to changes in the landscape related to climate change and increasing oil and gas development. The main goal of our study was to examine factors influencing the temporal and spatial movements of female grizzly bears of different reproductive classes in the early active season in the Mackenzie Delta region of the Northwest Territories, in Canada's western Arctic. Reproductive classes included females with cubs < 1 year old, females with cubs > 1 year old, and solitary females. We ran a step selection function using conditional fixed effects logistic regression to determine what habitat characteristics the bears were selecting for their steps, the straight line path between two consecutive GPS fixes. Variables included were different topographic, terrestrial vegetation and vegetation diversity characteristics. During the early active season grizzly bears of different reproductive classes moved to similar places but the routes they took to get there differed slightly, as females with cubs chose to move along areas of different topographic characteristics, and all three reproductive classes selected slightly different terrestrial vegetation characteristics to move along.

Ms. Krawchuk is a MSc student in the Department of Biological Sciences. She is currently studying the niche separation of cougars and wolves in the Rocky Mountains with her supervisor Dr. Evelyn Merrill. The grizzly bear movement study fulfilled the requirements for a Biology 499 research project, a course offered at the University of Alberta designed to introduce research to undergraduate biology students. Kerri was awarded the Biological Sciences Undergraduate Research Award for this study. Co-authors include Drs. Mark Edwards, Evelyn Merrill and Andrew Derocher

13:50 An analysis of site selection behaviours and landscape use in the Prince Rupert Harbour Area

The coastal occupation history of the Coast Tsimshian is discussed in terms of the distribution of known archaeological sites in the Prince Rupert Harbour, located on the northern coast of British Columbia. I identify patterns in site selection behaviours that emerged over the past 5000 years since sea level stabilization. These observations are analyzed using Geographic Information Systems (GIS) to understand how these past human populations used and organized themselves on the landscape. This spatial analysis provides information on the development of certain subsistence practices and the environmental factors that

influenced the placement of sites in the landscape. These factors are considered in relation to non-environmental factors such as defensibility, visibility, and proximity to other sites, which would have directed site location decisions during times of increased conflict. These patterns in site characteristics are used to understand the agency of the settlement history in the Prince Rupert harbour area.

Mr. Cookson received a BA in Anthropology from Grant MacEwan University, and an MA in Anthropology from University of Alberta. He currently works as an archaeologist for Treetime Services Ltd. He received the ESRI Canada GIS Scholarship in 2013.

14:10 Geographic Information Systems: Finding the spatial parameters of public health

Public health consists of population-level efforts to prevent disease, promote health, reduce inequity, and increase quality of life. Recently, Geographic Information Systems (GIS) have extended public health capacity in its spatial dimensions of research, disease surveillance, risk analysis, health care planning and policy, demographics, and public outreach communication. The presentation will provide an overview of advancements in public health GIS, current challenges, the institutions, and the academic literature contributing to the field. Community-based participatory research will be highlighted as an important area of development in public health GIS.

Ms. McGetrick is completing a Master of Science in Public Health at the University of Alberta focused on the use of Geographic Information Systems (GIS) in health communication with indigenous and aboriginal people facing natural resource development in the circumpolar arctic. She is also a research assistant in the Policy, Location, and Access in Community Environments (PLACE) research lab, where she currently helping to lead a GIS analysis of micro-scale community observation data collected as part of the Community Health in the Built Environment (CHBE) project.

15:00 Modeling the impacts of long-term warming trends on ecosystem productivity across North America

Evidences show a higher warming over recent decades in most regions of North America and the last decade has included the warmest years since instrumental record of global surface temperature. The amount by which temperature has changed varies in different regions: greater at northern higher latitudes than lower latitudes. One of the fundamental questions is how do plants respond to these changes in surface air temperature over time. In this study, we first examined the spatial and temporal variability and long-term (1979 – 2010) trends of warming using climate data from the North American Regional Reanalysis (NARR) with 3-hourly time step at spatial resolution of 0.25 degrees. A comprehensive mathematical process model, *ecosys* was used to simulate impacts of long term temperature change on land-atmosphere carbon exchange in North America at selected sites using site level model drivers and at continental level using gridded climate data (NARR), soil (SSURGO (US) + SLC v3.2 (Canada) + HWSD v1.1 (Mexico)), land use/ land cover dynamics (Hurtt's + RCP4.5), CO2 concentration (Enhanced GLOBALVIEW), nitrogen deposition (Enhanced Dentener) and disturbance to drive *ecosys*. Simulation results have shown that most parts of mid and high latitude zones of North America had a positive trend of warming and a slight increase in precipitation over the last three decades. Gross primary productivity (GPP) and leaf area index (LAI) increased in higher latitudes and declined in southwestern part of the continent corroborating the hypothesis that higher latitudes and cooler regions tend to have greater gains in GPP and net ecosystem primary productivity (NEP) attributed to warming over the last three decades than lower latitudes and warmer regions. Major drought events (Eg. 1988, 2002 drought in the great plains of Alberta and Manitoba ad southwest US) attributed to less precipitation and higher temperature were captured by the model and the result was validated against a satellite product (AVHRR – NDVI) that has shown a very good agreement (geographically weighted regression R2 = 0.8). This demonstrated that we could capture the processes that control drought events and estimate productivity losses at a continental scale.

Mr. Mekonnen received a BSc in Forestry from Debub University, and an MSc in Remote Sensing and Geographical Information Systems (GIS) from Addis Ababa University. He is currently working on his PhD at the University of Alberta. He received the ESRI Canada GIS Scholarship in 2011.