5:10 The carnival of monarchs: Mapping the North American migration of the monarch butterfly from 2001-2015

The monarch butterfly migration across North America is arguably one of nature's most fascinating and beautiful spectacles. The butterflies complete the longest known migration of any insect on the planet. They travel thousands of kilometres from their wintering grounds in central Mexico to their breeding grounds in the northern US and southern Canada and return to Mexico to hibernate over the following winter. The monarch migration consists of 4-5 generation cycles being born, reaching maturity, laying eggs, then dying over a single migration season. Monarch numbers have plummeted since the mid 1990's. Fifteen years of monarch sighting data from 2001 to 2015 was used to create interpolation maps of changing distributions of adult monarchs, eggs, and milkweed throughout the fifteen years of data. Least cost path and corridor analyses were conducted to give insight into future management practices to conserve the North American monarch migration.

Mr. Boyce is currently working on his MSc in conservation biology in the University of Alberta's biodiversity and landscape modelling lab. His research consists of comparing greenhouse gas emissions between sectors (i.e. residential, industrial, etc.) across Edmonton. He has a professional background in conservation biology, environmental sociology, and environmental education.

5:25 Going in circles: Quantifying observer search pattern in vascular plant surveys

Observers do not perfectly detect vascular plants during surveys, despite the belief that their lack of legs makes them easy to find. Imperfect detection can lead to unreliable survey data and limit our ability to conserve rare species. We used decoy plant species and GPS data loggers in two field trials to determine how survey conditions and observer search patterns may influence detection of target species. Using ARC GIS, we explored the relationship between the search paths of 29 individuals and their success at locating 4 plant species across 18 plots.

Ms. Dennett is a 3rd year Ph.D student with Dr. Scott Nielsen in the Applied Conservation Ecology (ACE) Lab. Her research includes projects on Carex spp. detectability across habitats, detection trials using decoy plants and a little bit of deception, and mitigative translocation of peatland species.

5:40 The changing migration patterns of the Ya Ha Tinda elk herd

Migratory ungulates have extensive impacts on the ecosystems that they inhabit through their effects on nutrient cycles, habitat structure and predator-prey dynamics. However, there is increasing evidence that the migratory behaviour of ungulates is in decline worldwide. The Ya Ha Tinda elk herd, located along the eastern slopes of the Rocky Mountains in western Alberta, is a partially migratory population which has seen rapid and dramatic changes in migratory behaviour over the past 40 years. In this study we are examining how the use of different migration routes has changed in recent years and investigating the reasons for the declines in some routes and gains in others. We use telemetry data from collared elk and wolves, as well as remote sensing data, to determine how and why changes are occurring, using a variety of GIS tools.

Mr. Killeen completed his M.Sc. in Ecology and Evolutionary Biology in 2014 at the University of Groningen, The Netherlands. Since then he has worked as a research assistant with the Boyce and Merrill labs, working on a number of projects involving extensive use of GIS and statistical analysis tools.

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UofA GIS Day

Friday, November 18, 2016

GIS day

A Showcase of GIS Applications at the University of Alberta

UNIVERSITY OF ALBERTA
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Agenda

3:00	**Welcome**	*CCIS 1-160*
3:10	Esri Canada support for ArcGIS users at UofA	**David Parry** Esri Canada
3:30	The role of consumer drones in Alberta's commercial GeoSpatial sector	**Cassidy Rankine** EAS Graduate Alumni
3:50	The Alberta Hail Data Project	**Sandra Schwab** Humanities Computing and LIS
4:10	The use of Collector for ArcGIS in EAS 333 Advanced Geological Field School	**Chris Herd, John Waldron, and Charlene Nielsen** Earth & Atmospheric Sciences
4:30	**Break**	
4:40	How well can remote sensing detect biodiversity?	**Ran Wang** EAS and Biological Sciences
4:55	Long term effects of wildfire on permafrost stability in northern peatlands	**Carolyn Gibson and Jessi Steinke** Renewable Resources
5:10	The carnival of monarchs: Mapping the North American migration of the monarch butterfly from 2001-2015	**Scott Boyce** Renewable Resources
5:25	Going in circles: Quantifying observer search pattern in vascular plant surveys	**Jacqueline Dennett** Renewable Resources
5:40	The changing migration patterns of the Ya Ha Tinda elk herd	**Joshua Killeen** Biological Sciences
5:55	**Door prizes**	*Join us at the Faculty Club for free food and socializing!*

www.ualberta.ca/~gis

3:10 Esri Canada support for ArcGIS users at UofA

A brief overview of Esri GIS technology and online learning program:
- Webinars, training, MOOCs
- New products & technological improvements in GIS available to UofA
- Examples of ArcGIS use from other Canadian research programs

Mr. Parry is an alumnus of the University of Alberta graduating in 1989, BSc with Specialization in Geology, furthering his Studies at NAIT in GIS. Mr. Parry has been working in Mineral Geology and IT Professional Services for 23 years with clients across Canada. His focus in the past 15 years has been in applying Geographical Sciences especially Remote Sensing, GPS, and Information Technology to many facets of Natural Resources, Energy, Transportation, Public Safety, and Commercial & Government Policy Analysis and Decision Support.

3:30 The role of consumer drones in Alberta's commercial GeoSpatial sector

Sophisticated yet affordable unmanned aerial vehicle technology has been brought to the consumer masses in recent years, and with it has come a large variety of new and exciting commercial applications for both big and small applied geospatial groups. From aerial imaging for inspections, to detailed topographic surveys, consumer drones provide powerful insights for asset management that were previously difficult or impossible to obtain via manned aircraft systems. But how much of the current hype about consumer drones is true? What are their limitations? How accurate is the spatial data they produce? And what are the current barriers to their widespread use in the commercial geospatial sector? In this presentation I address such questions regarding the use of consumer drones for applied geomatics from the perspective of both a geospatial data scientist and a drone-tech entrepreneur in Alberta.

Dr. Rankine has a Ph.D. in remote sensing and Earth science from the University of Alberta and has conducted research around the world using emerging remote sensing technologies, from satellites to soil sensors, for monitoring vegetation productivity in response to global change dynamics. He is a co-founder and the current chief technology officer of Skymatics, an industrial drone service company located in Calgary, Alberta. His current research explores the use of geospatial data from consumer drones for improving land management and sustainable farming practices to combat economic risks brought on by rapidly changing climate in the Canadian prairies.

3:50 The Alberta Hail Data Project

Between 1957-'91, the Alberta Research Council (ARC) collected valuable meteorological data in central Alberta as part of a research project investigating cloud seeding. Some of this data included hail and rainfall reports collected by farmers via mail-in cards and telephone reports. After 30 years of data collection the project was defunded, putting the data, which had been stored on magnetic tape, at risk of being forgotten or lost forever. The U of A Data Library and the ARC embarked on a project to rescue and preserve this "Hail Data". The data were archived, documented, and made accessible through a dedicated webpage. However, in 2015, the host server was shutting down, and the CDs holding the archived data had been stored in boxes for almost 15 years, putting the data at risk again. A new data re-rescue and reuse effort was undertaken. This presentation will trace the history of the Alberta Hail Data Project and describe the data cleaning, geo-coding, and visualization techniques that allowed the 'Hail Data' to be used and re-used in ways that were unimaginable when the project began.

Ms. Schwab just completed a double Masters in Humanities Computing and Library and Information Studies at the University of Alberta. She also holds a B.Ed. from the same institution. Her education, coupled with her recent work in the University of Alberta Libraries Digital Initiatives unit, has instilled within her a deep passion for emerging issues in the areas of technology, education, and research.

4:10 The use of Collector for ArcGIS in EAS 333 Advanced Geological Field School

Tablet-based tools are increasingly being used for geological and other types of mapping. As such, it is important for students to be trained in the use of these methods as part of their undergraduate degree in the geological sciences. The challenge is to implement the use of tablet-based mapping tools while keeping the focus more on the mapping than on the tool. With the financial support of ConocoPhilips Canada, we have successfully incorporated a tablet-based mapping component to EAS 333 Advanced Geological Field School, which makes use of Collector for ArcGIS on ruggedized iPads. The overarching goal is to complement several pen-and-paper-based methods of data recording, including transparent overlays on air photos and field-notebook data records, with tablet-based GIS tools for the final mapping portion of the field school, and to enhance the mapping by providing a variety of remotely sensed base-maps to student geologists working in the field.

Dr. Herd is a Professor in Earth and Atmospheric Sciences (EAS). Although his research involves the study of meteorites from as-yet unreachable places such as asteroids and Mars, he keeps his geological feet firmly on the ground, knowing that planetary geology requires a good understanding of geological processes active on Earth.

Dr. Waldron is a Professor in EAS, studying structural and sedimentary geology of deformed sedimentary basins in orogens (mountain belts). He is also a McCalla Professor due to his outstanding efforts in fully integrating research with teaching.

Ms. Nielsen is officially an interdisciplinary PhD candidate in EAS and Pediatrics, and unofficially the sharer of all things GIS at the UofA.

4:40 How well can remote sensing detect biodiversity?

Biodiversity affects ecosystem health in terms of production and stability, with many studies suggesting a positive relationship between diversity, productivity and stability. Traditional measurements require extensive field work. Remote sensing has the potential to detect plant biodiversity based on optical properties, which vary with species or functional groups. We tested the optical diversity hypothesis using ground measurements and airborne campaigns at a prairie ecosystem experiment and a natural prairie grassland. Both studies showed positive relationships between biodiversity and productivity, although the relationship varied with time. Optical diversity showed positive correlations with conventional diversity metrics, but the optical detectability of biodiversity was greatly reduced with decreasing spatial resolution. Airborne studies of prairie landscapes at a 1-m pixel size revealed that optical diversity was still detectable, suggesting that airborne remote sensing can be used to map biodiversity and assess ecosystem health. These experimental studies are helping us to develop an operational approach that can be applied to detect biodiversity and assess ecosystem function over large landscapes with airborne remote sensing.

Mr. Wang is a 4th year PhD student in EAS, supervised by Dr. John Gamon. His research mainly focuses on applying remote sensing and GIS on prairie ecosystems in Alberta and Minnesota, US, to detect biodiversity.

4:55 Long term effects of wildfire on permafrost stability in northern peatlands

Wildfire can act as an important trigger of permafrost thaw (laterally through thermokarst development and vertically though active layer deepening), and due to increasing fire frequency and more severe fires with a changing climate, rates of permafrost thaw are expected to accelerate in the future. This study aims to assess the role of wildfire on future permafrost stability by using satellite imagery to determine the area of recent permafrost thaw within fire scars and adjoining unburned areas. We show that using remote sensing and GIS approaches, the rate of new thermokarst development approximately doubled over 30 years following fire.

Ms. Gibson is currently a Master's of Science student in Renewable Resources working with Dr. David Olefeldt. Her research focuses on understanding how wildfire affects rates of permafrost thaw and the impacts to the carbon cycle.
Jessi Steinke is currently an undergraduate student in EAS doing an undergraduate research course with Dr. Olefelt.