THE UNIVERSITY OF WINNIPEG | Faculty of Graduate Studies

The 9th Annual

3MT® THREE MINUTE THESIS

FOUNDED BY THE UNIVERSITY OF QUEENSLAND

One slide.
No props.
Three minutes.

March 3, 2022 | 2:00 PM
Zoom Webinar
Audience may register here.

PRESENTATION ORDER

1 - Anouska Agarwal, Bioscience, Technology and Public Policy

2 - Haven Soto, Environmental and Social Change

3 - Bradley Howell, Bioscience, Technology and Public Policy

4 - Tara Faye Myran, Development Practice: Indigenous Development

5 - Ershiya Bagheri, Bioscience, Technology and Public Policy

6 - Nathalie Turenne, Environmental and Social Change

7 - Natassia D'Sena, Criminal Justice

8 - Aimee Lynn Louis, Indigenous Governance

9 - Nooshin Noshiri, Applied Computer Science and Society

10 - Shayla Jackson, Bioscience, Technology and Public Policy

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12 - Kirstin Witwicki, Environmental and Social Change

13 - Sophia Brown, Bioscience, Technology and Public Policy

JUDGES

Dr. Alain Beaudry, MA, MD, Chair: Indigenous Admissions Stream, University of Manitoba College of Medicine

Dr. Jason Hannan, Associate Professor, University of Winnipeg Department of Writing and Rhetoric

Stacey Wowchuk, Assistant Auditor General, Office of the Auditor General of Manitoba

ABSTRACTS

(in order of presentation)

Anouska Agarwal

Bioscience, Technology and Public Policy

Molecular Predictors for the Management of White-nose Syndrome in Bats

In the past 15 years, white-nose syndrome (WNS), caused by the fungus Pseudogymnoascus destructans (Pd), has killed millions of hibernating little brown bats (Myotis lucifugus) in North America. This invasive fungal pathogen causes hibernating bats to deplete winter fat reserves too quickly leading to starvation. The potential for bats to survive the winter with WNS could reflect their ability to enhance pre-winter fat reserves, withstand starvation during winter or mount an immune response to Pd. My study focuses on understanding molecular mechanisms underlying WNS progression in little brown bats. I will test the hypothesis that molecular connections between metabolic pathways related to fat storage and expenditure, and the immune system, drive progression and pathogenesis of WNS. Understanding these connections will help identify molecular markers that can predict WNS progression and potential survival of bats. This has implications for understanding the potential of different bat colonies and/or population to persist which is important for prioritizing management responses to this conservation crisis.

Haven Soto

Environmental and Social Change

Where's the manure? Transport and fate of antibiotics and estrogens during snowmelt

Veterinary antibiotics are used to maintain animal health, but there are concerns about antibiotic runoff in manure amended fields because up to 90% of the initial antibiotic dosage is excreted from the animal. Liquid swine manure is widely used as fertilizer on the Canadian Prairies, leading to a high risk of soil and freshwater contamination. In this region, an average of 75% of annual runoff occurs during the brief snowmelt period in the spring, when soils are frozen. The transport of antibiotics and their degradation products are not well understood but is critical to understand the fate of these contaminants. Our study aims to quantify the concentration and load of dissolved sulfamethoxazole and its metabolites in spring-thaw snowmelt runoff based on two different manure application methods: surface-applied, and soil injected. Understanding antibiotic transport via snowmelt from manure application will help minimize antibiotic loss into the environment during land application.

Bradley Howell

Bioscience, Technology and Public Policy

Fishing for GIANTS: Response Cues for Survival

Catch-and-release (C&R) angling is commonly used to promote survival of fish caught using rod and reels. While this method is considered effective in preserving wild stocks of fish, it relies on the assumption of high fish survival after release. Lake Trout are susceptible to recreational angling, which can induce stress during different parts of the process and compound with other factors to potentially lead to delayed mortality. I plan to examine how trophy-sized fish respond behaviourally and physiologically to C&R angling by monitoring them over a series of fixed timepoints. This will allow me to determine the tolerance of trophy-sized fish to C&R, and the risk that it poses to their populations. Lake trout provide economic support to northern communities, so the persistence of C&R fisheries is vital. This study will allow fisheries managers to tailor management decisions for these fisheries and enhance them for the fish, anglers, and community.

Tara Faye Myran

Development Practice: Indigenous Development

Integrating Indigenous Philosophies and Western Approaches Surrounding Mental Health and Well-Being

This paper explores key aspects of Indigenous Philosophies that have been adopted in one post-secondary plan to address mental health challenges and issues on campus. Drawing on research from Indigenous-guided methodology framed by qualitative interviews with students, faculty, staff and community, specific programs and services were re-envisioned and adapted to recognize the importance and relevance of providing a holistic and inclusive approach to mental health and well-being. Using the Seven Sacred Teachings, these universal principles or values provided an overarching guide for the redevelopment of our student support services delivery. In addition, the Medicine Wheel represents a circle of life and identifies the importance of achieving balance within ones mental, physical, emotional, and spiritual life. Together, these Indigenous Philosophies informed our work and guided our inquiry and process of learning and healing together. Guided by the spirit of the Mikinak, the research team worked with Elders and Knowledge Keepers to inform and influence the journey towards healing and to develop culturally responsive approaches to better meet the mental health needs of our students.

Ershiya Bagheri

Bioscience, Technology and Public Policy

Can Climate Affect Summer Nightly Activity in Endangered Little Brown Bats (Myotis lucifugus)?

Climate change threatens biodiversity and understanding how animals respond is important for determining impacts on ecosystems. Most studies focus on direct effects of climate change on populations (e.g., climate envelope analyses) but indirect effects may also cause impacts. In Canada, three bat species are endangered by an invasive disease but they face other threats which could slow population recoveries. My thesis addresses the hypothesis that wildfire smoke (predicted to increase with climate change), affects access to food and water for little brown bats (Myotis lucifugus). I predicted that bats would forage less, and have smaller home ranges, on nights with low air quality from wildfire smoke. I attached radio-tags to 15 bats and used telemetry to follow individuals during the active phase at night. I found that smoke dramatically reduced bat foraging time and home range size with bats remaining in their roosts on nights with especially poor air quality. My results highlight an indirect effect of climate change on endangered bats.

Nathalie Turenne

Environmental and Social Change

Reflectance Spectroscopy of Microbially-Precipitated Mg-Carbonates from Atlin Lake, British Columbia, Canada

The landing site of the Perseverance rover - Jezero crater - contains several units with evidence of Mg-rich carbonates which provides a unique opportunity to investigate carbonates with a possible fluvio-lacustrine origin. Carbonates have implications with microbial life as they are known to preserve and entomb microfossils known as biosignatures on Earth. Low temperature microbially precipitated playa sediments were collected near Atlin. Within the reflectance spectra C-O associated features associated with Mg-carbonates specifically magnesite in the ATP, ATM and ATA samples and hydromagnesite in the ATH sample. The samples are likely a mixture of magnesite (2300 nm) and aragonite (2331 nm). The X-ray Diffraction spectra is conclusive with the reflectance of the samples. Using the Atlin playa as an analogue site will advance our understanding of processes under which Mg-carbonate minerals form and precipitate with microbial interactions in low-temperature mafic lacustrine environments similar to the paleoenvironment of Jezero crater, Mars.

Natassia D'Sena

Criminal Justice

Virtual Drive Thrus: Is OnlyFans the McDonalds of the Sex Industry?

Evolution of technology has allowed for various industries to adapt to an online platform, including education, retail, and even medicine. With this shift to an online realm, society has grown to expect efficiency and predictability from these industries, exemplified by reduced delivery times, increased accessibility to various products and resources, all while conducting this business from the comfort of the consumers own home. Sex work is no stranger to this shift to the online realm with the rise of websites for purchasing and viewing of porn, camming, erotica, etc. Similar to the ease of consumers, online platforms further provide ease for creators or sellers. This research aims to apply Ritzers concept of McDonaldization to the process of sex work on OnlyFans to determine how predictability, efficiency, control, and calculability have made it easier and safer for sex workers to conduct their work online while simultaneously increasing their profits.

Aimee Lynn Louis

Indigenous Governance

Miyo pimātisiwin opikināwasowin (Self-determination in Child-rearing)

The mīkiwahp (tipi) is used as the conceptual framework of what self-determination in child rearing would look like today. Using a creationist lens to apply the teaching that every person is created with unique gifts, purpose and plan, a Spiritual Framework and Circle of Life analysis are utilized to gain insight on moving forward in times of reconciliation on Turtle Island (North America).

The goal of this Indigenous Research Study is to create seeds of light that will inevitably change the discourse from pathologizing First Nation parents to empowering them with traditional knowledge by:

1. Creating purposeful literature connecting the First Nation right to self-determination with the right to determine own family structure and child rearing practices.
2. Use of an Indigenous Research Paradigm and Spiritual framework to create recommendations which will inform culturally relevant and inclusive practices in child rearing.
3. Interviewing a gender diverse sample to gain narratives on how the Tipi Teachings can be used to promote healing among Indigenous communities.

Nooshin Noshiri

Applied Computer Science and Society

Higher Agriculture Productivity and Sustainability in hands of Digital Green Revolution

Food insecurity becomes an importunate issue by the growth of the global population. Hence, in order to have sustainable food, we have to optimize the efficiency of agriculture and that is where the digitalization of agriculture plays a vital role. Here are some drawbacks of traditional agriculture which tremendously harm the environment: facing water shortages, the release of harmful greenhouse gases into the atmosphere, and the eutrophication of waterways.

Now, by the advancement of imaging technology, we are now able to go beyond RGB camera and have more powerful identification capability through hyperspectral camera to monitor the biochemical and biophysical attributes of agricultural crops through measuring the spectral content of light in every single pixel of the scenery image to determine the healthy growth procedure of them before they enter into their disease phase and also helps to better differentiate between similar crops and classify them with the utilization of machine learning techniques.

Shayla Jackson

Bioscience, Technology and Public Policy

Venison, squirrel or beef? Individual variation in coyote diet

Livestock carrion can subsidize predator populations, which may increase predation on species at risk. Previous research found that coyote scat in southwestern Saskatchewan contained cattle throughout the year. Scat containing prairie dog was close to colonies, while scat containing cattle was widely distributed. I hypothesize that individual coyotes specialize on either prairie dogs or cattle carrion. Further, I will see how individual diet variation affects the ranging and social interactions of coyotes. I will use genetic analysis of coyote scat to identify individual diet variation and ArcGIS to identify geographic factors influencing diet. Although I expect individuals to specialize on either prairie dogs or cattle, I expect most coyotes rely heavily on cattle obtained as carrion. If my results suggest that the coyote population is being sustained by livestock carrion, I will identify potential management strategies to reduce carrion availability, which may benefit species at risk and smaller competing predators.

Madelynn Perry

Environmental and Social Change

PHOSPHORUS: Why should you care?

Runoff caused by snowmelt is the main pathway of nutrient transport from agricultural lands to freshwater systems in the Canadian prairies. Spring snowmelt occurs rapidly and causes flooding in low lying areas, inducing anaerobic soil conditions. Anaerobic conditions often enhance P release from the soil into the floodwater. Additions of soil amendments, such as gypsum, alum, and magnesium-sulphate have been shown to effectively decrease P release from soils to floodwater. However, the residual benefits of these amendments have yet to be determined. This study will investigate the effects of gypsum, alum, and magnesium-sulphate in reducing P losses 18 months after amendment application during snowmelt flooding in both laboratory and field settings. The laboratory experiment consisted of 16 intact soil columns taken from the amended field plots and were flooded at +4 ℃ for 49 days to simulate spring snowmelt flooding. On a weekly basis, redox potential was measured, and samples of pore water and floodwater were extracted and analyzed for dissolved reactive P (DRP), and pH. In the laboratory experiment, all treatments saw an increase in both porewater and floodwater DRP concentrations over the flooding period. However, the alum-amendment significantly decreased porewater DRP concentrations when compared to all other treatments. In contrast the effect of the alum-amendment was not observed in floodwater DRP concentrations. These results will be further investigated with the field experiment occurring in the spring of 2022.

Kirstin Witwicki

Environmental and Social Change

Fighting Fire with Fire: Amplifying the Voices of Indigenous Fire Affected Communities across Western Canada

Indigenous communities face unique jurisdictional and infrastructure challenges in the fight against climate change related disasters, specifically forest fires and resulting evacuations, and further research to identify the cultural, social, and biophysical impacts is needed. Following an Indigenous framework, using mixed methods, my project will merge Indigenous and Western ways of knowing. Through participatory filmmaking, this project will document the human dimensions of fire risk and the opportunities for community capacity for resilience. A quantitative survey will further identify community-level risk perceptions and their geographical distributions and differences to better understand regional knowledge, capacities, and opportunities to adapt to climate-related fire risk. Existing research on the impacts of forest fires and resulting evacuations on Indigenous communities is sparse, and this project will fill a clear research gap while simultaneously creating real-world solutions for communities to prepare in a manner that is based on their Indigenous and local knowledge.

Sophia Brown

Bioscience, Technology and Public Policy

Identifying fall critical habitat of endangered little brown bats

Identifying and protecting critical habitat is fundamental to endangered species conservation. Little brown bats (Myotis lucifugus) are endangered by the disease, white-nose syndrome (WNS) and, while data exist on critical habitats during hibernation and summer reproduction, nothing is known about fall requirements when bats swarm at entrances of hibernation sites, mate, and fatten for hibernation. Understanding whether bats roost and feed close to swarm sites, and identifying fall roosting and feeding habitat, could enable management actions that help bats accumulate large hibernation fat reserves and survive the winter with WNS. I radio-tagged 40 little brown bats and tracked them to roosts and foraging locations throughout September 2021. Bats (n=6) were found roosting exclusively in natural structures, including snags, live trees, and caves. Home range size varied widely (62 m2-3.6 km2, n = 8 bats). My results suggest that large areas around hibernacula may require protection to help bat populations recover.

3MT® THREE MINUTE THESIS

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The 3-Minute Thesis (3MT®) is an annual, university-wide research communication competition, originally developed by The University of Queensland, which challenges postgraduate degree students to communicate scholarly research and its significance to a panel of non-specialist judges in *three minutes or less*.

Graduate students from various disciplines compete for a $1000 top prize and a $500 People's Choice Award voted on by the audience!

The top prize winner will compete at the Western 3MT Competition, hosted this year by the University of Winnipeg, with a chance to compete at the National 3MT!

ACKNOWLEDGMENTS

The University of Winnipeg acknowledges that we live and work in the territories of the Anishinaabeg, Cree, Dakota, Dene, Métis, and Oji-Cree Nations. The University of Winnipeg sits in Treaty 1 territory, the ancestral and traditional homeland of Anishinaabe peoples. Treaty 1, signed in 1871, took this territory from seven local Anishinaabe First Nations in order to make the land available for settler use and ownership. In expressing and enacting our land acknowledgment, we commit to honouring and supporting movements of self-determination and wellbeing led by Indigenous guardians, stewards, and protectors of this land that we share. This responsibility includes engaging with, questioning, and critiquing those practices and structures, within and outside our department and the university, that perpetuate the status quo as it concerns Indigenous lands, waters, and people in Manitoba.

THANKYOU to our student presenters, judges and the University of Winnipeg Events staff, especially Marina Britten, Evan Milejszo and Greg Chase for their help coordinating this competition.