

## LIST OF ABSTRACTS (Alphabetical by first name).



# SCIENCE ATLANTIC ENVIRONMENT VIRTUAL CONFERENCE 2023

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## Conférences en environnement de Science Atlantique 2023

25 MARS  
CONFÉRENCE VIRTUELLE ORGANISÉE PAR  
CAMPUS GRENFELL, UNIVERSITÉ MEMORIAL

# Thermal habitat selection and movement behaviour of Yellow Lampmussel (*Lampsilis cariosa*) in the Wolastoq | Saint John River Watershed, New Brunswick

**Darren Greeley**<sup>1, 2</sup>, Michelle Gray<sup>1, 2, 3</sup>, Antóin O'Sullivan<sup>1, 2, 3</sup>, Bernhard Wegscheider<sup>1, 2, 4</sup>

<sup>1</sup>University of New Brunswick, <sup>2</sup>Canadian Rivers Institute, <sup>3</sup>Faculty of Forestry and Environmental Management, <sup>4</sup>Institute of Ecology and Evolution, University of Bern, Switzerland

Temperature is one of the most important factors affecting the ecology and biology of ectothermic organisms. For freshwater mussels, when river temperatures exceed certain thermal thresholds, temperature may drive refuge seeking behavior via vertical (burrowing) or horizontal migration. This research examined temperature as a driver of habitat selection and movement during the summer (July-September) of a New Brunswick mussel species-at-risk, the Yellow Lampmussel (*Lampsilis cariosa*). A grid of hyporheic wells, thermal sensors attached to individual mussels, and underwater cameras were used to collect thermal and movement data at two sites within the Wolastoq | Saint John River watershed. Furthering the understanding of this mussel's complex ecology is crucial for its continuing management and conservation, as a species of Special Concern under the Federal Species at Risk Act.

## Submission types

Oral GRAD

# Could using earthworms be the potential ecofriendly approach on minimizing the impacts of improper disposal of food waste in Canada?

**Dasinaa Subramaniam**<sup>1</sup>, Mano Krishnapillai<sup>1</sup>, Lakshman Galagedara<sup>1</sup>, Kalinga Jayagoda<sup>2</sup>

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Organic waste management is a worldwide concern in the 21<sup>st</sup> century as it impacts the environment and human wellbeing. As the world population increases, food consumption and generation of waste are also significantly increasing. Nearly 14% of global food production is lost between harvesting and marketing. Meanwhile, 58% of all the food produced includes perishables like fruits and vegetables that are either lost or wasted (35.5 million tons) in Canada. Moreover, 4.82 million tons (2022) of food (\$21 billion) was wasted during manufacturing and processing. Currently, incineration, composting and landfill are the most common disposal methods, resulting in 56.6 tons of greenhouse gas emissions from all levels of food chain in Canada. Therefore, it is vital to recycle nutrients found in food so as to replace fertilizer needs of local farmers and to minimize emission of greenhouse gases.

Vermicomposting is an alternative environmentally friendly approach with an abundant level of earthworms and used as a tool for bio-degrading solid waste in many temperate countries.

Adaptation of this green technology in Canada is limited and needs scrutiny in investigating the limitations and bottlenecks involved. This study reviews different types of food waste generated in each province and propose opportunities available for vermicomposting which can help with sustainable farming in a circular economy context. Potential for producing animal feed from earthworms for fish and poultry industry also will be evaluated. Further, this study provides some recommendations to produce nutrient rich economically sustainable vermicompost for growing farming industries.

## **Submission types**

Poster GRAD

# **The Occurrence and Preference of Anthropogenic Materials in European Starling (*Sturnus vulgaris*) Nests**

Gabrielle Armstrong<sup>1</sup>

<sup>1</sup>Saint Marys University

Avian nests provide critical shelter for offspring. Nests typically consist of natural and sometimes, anthropogenic materials. Natural materials include plant materials and feathers while anthropogenic materials consist of various types of plastics, string/ribbon, fabric and fishing gear. Even cigarette butts have been found in various avian nests and are thought to decrease ectoparasite abundance, potentially increasing nestling success. The increase in anthropogenic materials observed in nests demonstrate that worldwide use of plastics and improper garbage disposal is on the rise. Although there are many studies documenting anthropogenic materials in aquatic/marine avian species, there is surprisingly little research focusing on terrestrial species, although occurrence of anthropogenic materials is more prevalent in terrestrial environments. Some of the known consequences of these materials occurring in avian nests that could result in potential death among avian species includes entanglement from various anthropogenic materials, along with ingestion that could lead to impaction, suffocation or other internal damage. European Starlings (*Sturnus vulgaris*) are an urban-thriving species that incorporates anthropogenic materials within their nests from the nearby landscape. In knowing if anthropogenic materials affect the reproductive success of European starlings, along with determining possible reasons for their occurrences in nests, we can then apply that information in the future to potentially helping them along with other species of passerines in achieving a higher reproductive success as the population of birds in the world continues to decrease.

## **Submission types**

Oral GRAD

# **Telling the North American beaver tale: modelling *Castor canadensis* distribution in Mi'kma'ki (Nova Scotia, Canada)**

Geneva Bahen<sup>1</sup>

<sup>1</sup>Department of Earth and Environmental Sciences, Dalhousie University

The American beaver (*Castor canadensis*) is a keystone species of significant ecological and biocultural importance in Mi'kma'ki (Nova Scotia). However, occurrence data in the province has never been systematically collected resulting in geographic knowledge gaps. This thesis generated a species distribution model (SDM), identifying landscape-scale drivers of beaver distribution, areas of high value, and investigated the relationship between human footprint and predicted probability of occurrence. Several variables are known to influence habitat selection, including distance to watercourse, stream gradient, and distance to preferred hardwood tree stands, yet specific distances and species vary greatly throughout their continental range. Using four environmental datasets, 25 raster layers characterizing beaver niche habitat were extracted in ArcGIS and spatially correlated layers were removed. Occurrence data from iNaturalist and AC CDC was compiled, and a 10-replicate cross-validated model was generated with a jackknife test measuring variable importance in Maximum Entropy software. The model produced a high averaged area under the receiver operating curve value, with stronger predictive capacity than a null model. The most deterministic variables according to permutation importance were 'Distance to Watercourse', 'Elevation', 'Distance to Gray Birch', 'Distance to Yellow Birch', and 'Distance to Aspen'. These findings are consistent with previous studies suggesting watercourses and hardwood species compose suitable habitat for beavers, while highlighting the important ecological relationships between beavers and the Wabanaki-Acadian Forest. The findings will contribute to future efforts to map biocultural connectivity in Unama'ki (Cape Breton) and can be used in future conservation, protection, and management efforts.

## **Submission types**

Oral UNDERGRAD

# **Morphological and physiological adaptations of the parasitic lichen *Ochrolechia frigida* in coastal habitats of Newfoundland**

Hailey Martin<sup>1</sup>

<sup>1</sup>Dr. Dmitry Sveshnikov, Dr. Michele Piercey-Normore, and Dr. Andre Arsenault

*Ochrolechia frigida* (Sw.) Lynge is a crustose lichen adapted to the harsh conditions of arctic/alpine regions. It has been found growing in the bogs of the island of Newfoundland on both the west and east coasts. *O. frigida* shares a symbiotic relationship with its algal partner and displays parasitic or saprotrophic behaviour towards a range of hosts from mosses to higher plants. There is limited research regarding the preference of *O. frigida* for particular plants, plant communities or microclimate conditions, as well as about its nutritional strategies or physiological and morphological adaptations. *O. frigida* exhibits two distinct morphological forms: photosynthetic verruciform granules and non-photosynthetic elongated spinules. The relative amounts of these morphologies present on any particular thallus is suggested to reflect the differences in water availability: spinules may improve the water supply from the air through increased surface area. This project assesses potential relationships between thallus morphology and moisture absorption, using anatomy studies and physiological recovery experiments, towards a better understanding of how the morphological plasticity of *O. frigida* contributes to its ecological success.

## **Submission types**

Oral UNDERGRAD

# Woodlice feeding preferences between two species of lichens in western Newfoundland

Izek Walters<sup>1</sup>

<sup>1</sup>Undergraduate student

Woodlice are best known as detritivores within terrestrial ecosystems, however recent research indicates woodlice populations in Newfoundland also forage on lichen species. This study examines whether woodlice collected in western Newfoundland have a preference between two species of lichen: *Lobaria pulmonaria* (tree lungwort lichen) and *Platismatia glauca* (ragbag lichen). I am running laboratory trials in which woodlice are given a choice between the two lichens under optimal conditions (i.e., in a moist environment, in the shade, and with easy access to both lichen species). Preliminary results suggest higher consumption of ragbag lichen, which leads to a follow-up question: whether woodlice can forage on tree lungwort if the preferred species (ragbag lichen) is not available.

## Submission types

Poster UNDERGRAD

# Regional Marine Trends Following Cessation of CO<sub>2</sub> Emissions: What Will Be the Future of Coral Reefs?

**Josie Mallett**<sup>1</sup>, Andrew MacDougall<sup>1</sup>

<sup>1</sup>St. Francis Xavier University

In 2020, the Zero Emissions Commitment Model Intercomparison Project (ZECMIP) explored what will happen to the global climate after net-zero carbon emissions are reached. The globally averaged value of the Zero Emissions Commitment (ZEC) was found to be approximately zero, but with large regional variations. Furthermore, ZECMIP projects that atmospheric CO<sub>2</sub> levels are to decrease, but that leaves unanswered questions about levels of CO<sub>2</sub> being sequestered in the ocean. The ocean is commonly referred to as a carbon sink, and dissolving the projected high levels of CO<sub>2</sub> will result in ocean acidification. The ZECMIP datasets are used here to examine marine trends such as ocean surface temperature and aragonite saturation state in the locations of modern major coral reefs. The aragonite saturation state implicitly considers ocean pH and will act as an indicator of healthy coral conditions. Given the current global trajectory, major coral reefs are expected to undergo mass bleaching events resulting in widespread coral mortality. After the turning point of coral mortality is surpassed, the question left to be answered is whether the oceans will be able to support coral ecosystems in the future. Through examining these regions with ZECMIP, it was found that while the data is largely inconclusive to date due to a lack of model availability, the ocean is unlikely to return to the required state to support coral ecosystems in the timescale present in these models.

## Submission types

Poster UNDERGRAD



# Examination of Diurnal Activity Patterns, Social Behavior, Enclosure Use, and Impact of Visitor Density in Four Species of Penguins in Captivity

Julie Anne Francois<sup>1</sup>

<sup>1</sup>Department of Biology, Cape Breton University

Modern zoos design enclosures that mimic wild habitats with the goal of encouraging natural behaviours and enhancing animal welfare. Behavioural assessments of animals within these enclosures are needed to ensure this goal is achieved. Our research objective was to assess diurnal behaviour, social interactions, enclosure usage, and the impact of visitors on penguins housed at the Kansas City Zoo. We did scan and focal sampling of 74 penguins from four different species using live and archived webcam video. Behavioral activity differed significantly ( $p < 0.05$ ) among the four species and over time with Gentoo (*Pygoscelis papua*) being the least active, and behavioural inactivity peaking at night for all species. Patterns of habitat use within the enclosure also varied significantly among species, with King (*Aptenodytes patagonicus*) and Chinstrap penguins (*Pygoscelis antarcticus*) almost entirely restricted to concrete platforms and Kings spending less time in pools than other species. Gentoo and Macaroni penguins (*Eudyptes chrysolophus*) used the greatest range of habitats within the enclosure. High frequencies of social behaviours were also observed among Gentoos while Macaroni penguins engaged in significant amounts of agonistic behaviour towards other species. Visitor density impacted behaviour with penguins increasing their time in the pool closest to observation windows when visitor density was high. This suggests that visitors represent a source of enrichment. In the wild, penguins spend up to 75% of their time swimming. Future research should investigate the addition of enrichment and design features that could increase swimming activity in captive penguins at the Kansas City Zoo.

## Submission types

Poster UNDERGRAD

# The Great Dusty North?

**Kagan Akiyama Akiyama**<sup>1</sup>, Ian Ashpole<sup>1</sup>, Aldona Wiacek<sup>1</sup>

<sup>1</sup>Saint Mary's University

Mineral dust aerosols (MDA) have an important impact on weather and climate. This can be directly, say through scattering solar radiation, or indirectly by affecting the surface albedo of snow, or by influencing ice cloud formation. MDA studies in Canada are limited, specifically in the northern parts where the populations are less dense, but MDA are also known to have a negative impact on air quality and human health. This research focuses on identifying sources of dust emissions in northern Canada with the TROPOMI instrument on board the European Copernicus Sentinel-5 Precursor satellite. Since August of 2019, TROPOMI has been recording aerosol absorbing index (AAI) and aerosol layer height (ALH) at a spatial resolution of 3.5 km x 5.5 km. As the most advanced (newest) instrument measuring AAI, TROPOMI is used to examine AAI hotspots across Canada's north. This is done by creating frequency of occurrence maps for AAI greater than a given threshold, which reduces the impact of temporal averaging effects. TROPOMI results will then be compared to other satellite-derived long-term aerosol datasets, specifically Dust Optical Depth (DOD) derived from MODIS Deep Blue AOD retrievals (0.1° x 0.1°, ~10 km x 10 km). The results of this study will help answer two key questions: firstly, where are MDA the most frequent in the atmosphere of northern Canada; and secondly, where might there be sources of dust on the surface. TROPOMI's role focuses primarily on atmospheric dust hotspots, and thus primarily helps answer the first question.

## Submission types

Poster UNDERGRAD

# Variation in body condition within a differentially migrating bat species

**Kathryn Patterson**<sup>1</sup>, Fred J. Longstaffe<sup>2</sup>, Liam P. McGuire<sup>3</sup>, Erin E. Fraser<sup>1</sup>

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<sup>3</sup>University of Waterloo

Many North American mammals migrate seasonally in response to changes in temperature and resource availability. Migratory movements are energetically expensive and many organisms must balance competing life history demands as they build up energy stores in the form of fat pre-migration. Some North American bat species migrate annually to overwinter in hibernacula, including tricolored bats (*Perimyotis subflavus*), which have been recorded engaging in sex-biased differential migration. We hypothesized that (i) individuals embarking on long distance migratory movements would have a higher body mass and percentage of body fat while in hibernation than those who are sedentary or who migrate short distances, and (ii) this effect would be more pronounced in females than in males. We conducted stable hydrogen isotope ( $\delta^2\text{H}$ ) analyses on fur samples taken from individuals that had been previously collected during hibernation in the southern US and had subsequently undergone body condition assessment. We used the  $\delta^2\text{H}_{\text{fur}}$  data to conduct origin assignments for each bat, and to then designate each individual as migratory or not, as well as to assign a minimum distance travelled to all migratory bats. We then used linear models to test for relationships between migratory behaviour (status and distance travelled) and body condition (percent body fat and initial body mass) in hibernating *P. subflavus*. We detected no effect of migratory status or distance on body condition of bats of either sex, suggesting that the energetic cost of spring migration does not constitute a substantial part of this species' energy budget during hibernation.

## Submission types

Oral UNDERGRAD

# Localized herbivory of woodlice on a foliose lichen

Kiana Jacobs<sup>1</sup>

<sup>1</sup>Memorial University- Grenfell Campus

Woodlice are terrestrial crustaceans belonging to the order Isopoda. Woodlice are known to feed on lichens, however, the patterns of herbivory have not been well researched. Foliose lichens, in particular, provide diverse opportunities for localized variation in herbivory, as both the upper and the lower sides of the thallus are accessible from the edges as well as from the middle. I am testing for such localized herbivory preferences using observations of the common woodlouse *Oniscus asellus* on the foliose lichen *Platismatia glauca*. Preliminary results show that woodlice prefer the center of a thallus rather than the edge. It is uncertain whether there is a preference of the top layer versus the bottom layer of a thallus.

## Submission types

Poster UNDERGRAD

# Interacting effects of light and temperature on the activity of terrestrial isopods

Lauren Colpitts<sup>1</sup>

<sup>1</sup>Memorial University of Newfoundland

In terrestrial isopods (suborder Oniscidea), activity is highly dependent on the combined effects of temperature and light exposure. For example, in Brazil, *Armadillidium vulgare* isopods are primarily nocturnal but are active during the day at low temperatures. Interactions between light and temperature may be particularly important in northern, boreal habitats. I hypothesized that exposing Newfoundland isopods to temperature extremes would affect their behavioral response to light. I maintained groups of local isopods on a 12:12 hours light:dark cycle at either 5 °C or 24 °C, and used feces production to infer foraging activity. I found that isopods in the low temperature treatment were more active during the light periods, while isopods in the higher temperature treatment were more active during the dark periods. These results confirm that the interaction of light and temperature is important for Newfoundland isopod species.

## Submission types

Poster UNDERGRAD

# **An Analysis of Introductory Environmental Science Textbooks' Approaches to Commonly Held Climate Change Misconceptions**

Lauren Lowther<sup>1</sup>

<sup>1</sup>Dalhousie University

Climate literacy is taught across environmental science courses in Canadian universities with textbooks used as a key tool. This study aims to evaluate how these textbooks are approaching their delivery of commonly held climate change misconceptions. Prevalent misconceptions and textbook elements that enhance learning and combat misconceptions were determined through a literature review. Climate change chapters from eight textbooks used among top research universities in Canada were analyzed for the six most common misconceptions and for five key textbook elements. A checklist containing the misconceptions and textbook elements was used to code; each time a check mark was given, the key terms and associated content segments were also recorded. The results show that some textbook elements were heavily underrepresented across all textbooks while some misconceptions, in particular, were frequently presented without select textbook elements. The results also showed similarities in their explanation of concepts as 'short term' and 'long term' were used across all but one textbook when explaining the difference between weather and climate. Addressing misconceptions directly is one of the most effective strategies in tackling them, yet this was the most underrepresented textbook element. The inclusion of this element into future textbooks could lead to a reduction in misconceptions held by students. Misconceptions regarding water vapour as a greenhouse gas and the greenhouse effect being a natural phenomenon require better representation in textbooks as elements used were lacking. Ultimately, textbooks should be written with misconceptions in mind to diminish their prominence and better facilitate a climate literate society.

## **Submission types**

Poster UNDERGRAD

# The Impact of Chain Pickerel Invasion on Yellow Lampmussel and Their Fish Host in Cape Breton, Nova Scotia

Lenayah Ryan<sup>1</sup>

<sup>1</sup>Department of Biology, Cape Breton University

Chain Pickerel (*Esox niger*) is a predatory fish that was first introduced into mainland Nova Scotia in 1945 and has since spread to 95 locations in the province. They were illegally introduced into Blacketts Lake, Cape Breton in 2010. This is particularly concerning because Blacketts Lake is home to the Yellow Lampmussel (*Lampsilis cariosa*), a freshwater mussel designated as a Species at Risk. The mussel depends on White Perch (*Morone americana*) to host its larvae for the completion of its lifecycle. Our research assessed the potential impact of Chain Pickerel on Yellow Lampmussel and its fish host within Blacketts Lake. Boat electrofishing carried out in 2017 and 2021 indicates that Chain Pickerel is now well established in Blacketts Lake making up 90% of fish sampled; no White Perch were found. Several large White Perch were collected in Blacketts Lake with gill nets in 2021 indicating that the species has not been completely eliminated. However, recent quadrat sampling found no Yellow Lampmussels younger than five years of age in Blacketts Lake, which is consistent with Chain Pickerel predation reducing the availability of Yellow Lampmussel fish host and their ability to complete their lifecycle. Two nearby lakes with no Chain Pickerel had evidence of recent Yellow Lampmussel recruitment. Risk assessment of Chain Pickerel invasion for 50 lakes in Cape Breton County based on connectivity and public access revealed 13 lakes at very high risk. However, the other Cape Breton lakes with known Yellow Lampmussel populations were found to be at low risk.

## Submission types

Poster UNDERGRAD

# **Characterizing the Conifer Gradient from the Halifax Peninsula to the Hinterlands of the Halifax Regional Municipality**

Levyn Radomske<sup>1</sup>

<sup>1</sup>Dalhousie University

The urban forest tree species composition is influenced by the urban environment and thus, by daily anthropogenic activity; however, in the naturalized woodlands, species composition is primarily influenced by natural disturbances. In moving away from the urban setting to the naturalized forest there is a shift in the environment, leading to a transition of dominant species, ultimately creating a species composition gradient. This study is interested in characterizing the existing conifer gradient, through assessing the Halifax Peninsula, surrounding communities, and the hinterlands of the HRM. The assessment of the conifer density on the Halifax Peninsula followed a non-probabilistic sampling technique in which ocular estimates were conducted, producing a conifer inventory for this study area. To assess the conifer density in the other study areas, two independent datasets were analyzed. Further analyses on other cities conifer densities were conducted to develop benchmark values for the city of Halifax. Through these assessments, it became apparent that there is a steep conifer gradient that exists in the transition from the urban environment to the naturalized environment. This data can be used to question the lack of conifers in the urban forest despite their prominence in the naturalized setting and in other cities.

## **Submission types**

Poster UNDERGRAD



# Meta-analysis of the impacts of chloride-based road salts on biodiversity and ecosystems

**Madison Silver**<sup>1</sup>, Erin Cameron<sup>1</sup>, Andrew Medeiros<sup>2</sup>

<sup>1</sup>Saint Mary's University, <sup>2</sup>Dalhousie University

The use of chloride-based salts to clear roads of ice has been widespread across northern latitudes since the late 1930s. Although advantageous for road safety both in efficacy and cost, these salts can have extensive and long-term impacts on aquatic and terrestrial species and ecosystems. Although qualitative reviews on these impacts have previously been published, a quantitative meta-analysis is useful for a broader understanding of the intensity of impacts across different environments. I conducted a random-effects meta-analysis to explore the ecological impacts of chloride-based road salts and determine whether these impacts are moderated by habitat type (aquatic vs. terrestrial), salt type (NaCl, CaCl<sub>2</sub>, MgCl<sub>2</sub>, or a mixture), and study characteristics. Hedge's *d* was calculated for a total of 619 records from 76 articles. Preliminary results suggest that impacts are consistently negative across species, populations, and ecosystems, with significant reductions in animal and plant fitness, pH, carbon pools, and soil moisture. Impacts were greater in aquatic ecosystems than in terrestrial ecosystems. Overall, de-icing salts have negative impacts on biodiversity and ecosystems, and ideally, their use would be reduced to mitigate these impacts.

## Submission types

Oral GRAD

# **The effect of lichen water content on foraging preferences of woodlouse**

Meaghan O'Neill<sup>1</sup>

<sup>1</sup>Memorial University - Grenfell Campus

Woodlice (*Oniscus* sp.) are terrestrial isopods. Woodlice are known to forage on lichens, however their foraging preferences are relatively unknown. One key difference between lichens and other woodlouse food sources is that a lichen's internal water content can vary dramatically. Therefore, I am interested in whether the lichen moisture content affects woodlouse foraging. I am running experimental trials to test for consumption preferences between hydrated versus non-hydrated ragbag lichens (*Platismatia glauca*). My results will give insight into the browsing interaction between woodlice and lichen.

## **Submission types**

Poster UNDERGRAD

# **Cu-doped anatase TiO<sub>2</sub>: An efficient visible-light photocatalyst for water treatment**

**Naizhen Yu**<sup>1</sup>, Collins Nganou<sup>1</sup>, Andrew Carrier<sup>1</sup>, Mita Dasog<sup>2</sup>, Xu Zhang<sup>1</sup>

<sup>1</sup>Cape Breton University, <sup>2</sup>Dalhousie University

Organic pollutants and pathogenic microbes exist in water systems causing many communities, especially in developing countries, resulting in a high risk of infection with water-borne diseases. Developing simple, cost-effective, and efficient sunlight-driven water treatment technologies is crucial for people to access clean and safe water. The most widely studied photoactive and antibacterial material is titanium dioxide (TiO<sub>2</sub>). TiO<sub>2</sub> nanoparticles (NPs) can produce highly reactive free radicals to oxidize organic pollutants and deactivate biological pollutants. However, pristine TiO<sub>2</sub> NPs have a large band gap and only harvest solar radiation in the UV region, limiting its efficacy. This project focuses on developing a visible light photocatalyst by copper doping in regular white anatase TiO<sub>2</sub> (wTiCuxO<sub>2</sub>) and evaluating its photocatalytic and antibacterial activity.

We synthesized wTiCuxO<sub>2</sub> NPs using a solvothermal approach. The photocatalytic performance was evaluated using the degradation of Rhodamine B (RhB) dye and disinfection of Escherichia coli (E. coli) under visible light irradiation. We show that Cu doping and surface defects on pristine TiO<sub>2</sub> enhance its photodegradation ability. The mechanism is hypothesized to be due to band gap narrowing and accelerated charge separation. In the project, an efficient photocatalyst was developed for water treatment; the mechanistic investigation of the catalyst increases our understanding of the heterogeneous catalysts, which are useful for engineering more efficient water treatment devices.

## **Submission types**

Poster GRAD

# **Plant growth parameters as affected by organic and inorganic amendments, and the influence of peat moss in metal and hydrocarbon contaminated soils.**

Riley Henniffent<sup>1</sup>

<sup>1</sup>Memorial University Student

Metal elements originate and disperse in the environment through biogeochemical and physical processes. While many of them are required by different species some of them can induce cytotoxic responses at low amounts. Anthropogenic disturbances have excelled the release of metal elements, having inverse impacts on the biodiversity within contaminated ecosystems. Some plant species can survive in contaminated soils, with metabolic and physiological responses capable of mediating metal induced toxicity, which can be applied to remediate contaminated locations; collectively termed as phytoremediation. This environmentally friendly, economically feasible, and highly applicable technique is a promising solution for polluted regions across Newfoundland, for example, in Port-Aux-Basque where an abandoned auto repair shop was once located.

The objectives of this study were to determine (1) whether an organic or inorganic amendment will allow for greater biomass production when growing plants on metal and hydrocarbon contaminated soils for three selected species, and (2) how will the addition of peat moss affect the biomass production when using each amendment; for three selected species (*Brassica rapa*, *Brassica juncea* and *Rumex crispus*). Plants were grown in contaminated soils obtained from various sample-locations of a metal and hydrocarbon contaminated location in Port-Aux-Basque. The organic treatment had commercially available compost added; the inorganic had commercially available NPK fertilizer added and; the positive control consisted of commercially available potting soil. One trial of treatments had peat moss added, while the other did not. Plant growth measurements were taken at weeks 3 and 8 of growth. Data collection and analysis is on-going.

## **Submission types**

Oral UNDERGRAD

# Effects of Jumping Worms on European Worms and Soil Properties

**Samantha Bennett**<sup>1</sup>, Erin Cameron<sup>1</sup>, Helen Phillips<sup>1</sup>

<sup>1</sup>Saint Mary's University

Earthworms are ecosystem engineers, meaning that they alter soil structure and impact other organisms and ecosystem functioning. In 2014, pheretimoid “jumping worms” (*Megascolecidae* spp.) were discovered in Ontario, Canada, with later discoveries in New Brunswick (2021), and Nova Scotia (2022). Jumping worms have had substantial impacts on ecosystems in the northeastern United States, including effects on nutrient cycling and other soil organisms. In Canada, little research has been done to examine spread or effects of jumping worms since they have established only recently. Thus, we conducted sampling at a residential property in Oromocto, New Brunswick - the first location where jumping worms were found in the province. Our objectives were to examine: (1) how jumping worms impact soil properties (specifically nitrogen and carbon), (2) how their presence impacts the abundance of European earthworms, and (3) the effectiveness of different sampling methods. We found that jumping worms had significant impacts on soil nitrogen but did not have significant impacts on European earthworm species or soil carbon. The results also revealed that both sampling methods (i.e., mustard solution and wooden discs) are equally effective at detecting the presence of jumping worms at a site. Over the longer term, we hope to track the expansion of this population in order to determine rates of spread. Understanding the impacts and spatial spread of these species will be critical for future management of these invasions.

## Submission types

Oral UNDERGRAD

# **Predictive modelling of habitat suitability for Yellow Lampmussel (*Lampsilis cariosa*) in the lower Wolastoq | Saint John River Watershed, New Brunswick**

**Sarah Cusack**<sup>1,2,3</sup>, Michelle Gray<sup>1,2,3</sup>, Antoin O'Sullivan<sup>1,2,3</sup>, Bernhard Wegscheider<sup>4</sup>, Jae Ogilvie<sup>2,3</sup>

<sup>1</sup>Canadian Rivers Institute, <sup>2</sup>Faculty of Forestry and Environmental Management, <sup>3</sup>University of New Brunswick, <sup>4</sup>Institute of Ecology and Evolution, University of Bern, Switzerland

The population of Yellow Lampmussel (*Lampsilis cariosa*) (YLM) found within the Wolastoq | Saint John River watershed in New Brunswick, is one of two disjunct populations in Atlantic Canada. The objective of this research was to better our understanding of regional variables influencing the distribution of the species' preferred habitat in the Wolastoq, by producing a species distribution model for YLM in the lower portion of the watershed. We used existing mussel datasets and machine learning algorithms to determine if temporal landscape-scale variables that influence the availability of suitable habitats can accurately predict the presence and absence of YLM. The model had 96% training accuracy and 70% validation accuracy for the historic dataset. Snorkel surveys to ground truth model predictions identified two new occurrence locations for YLM. Understanding key habitat requirements of this species support important management decisions, including prioritization of conservation areas.

## **Submission types**

Oral GRAD

# Factors affecting the spread of invasive earthworms in the Yukon

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Most earthworms in Canada are non-native species introduced from Europe. Earthworms affect soil structure and alter rates of nutrient cycling with predominantly negative impacts on biodiversity and carbon storage in Canadian forests. Ranges of non-native earthworms are expanding northward in the boreal zone, however their largescale distributions and mechanisms of spread remain poorly understood. Our objective was to determine how climate, habitat, and land-use affect earthworm distributions in the Yukon using a broadscale quantitative survey. Sites (n=141) were selected using a stratified design to include four categories of land use, within five bioclimate zones, and common habitat types throughout the Yukon. Earthworms were sampled in forest plots adjacent to anthropogenic disturbances and in the forest interior. Non-native earthworms were found to be common at urban and residential sites in the most southern bioclimate zone (83% of sites, n=12) but rare elsewhere in the territory (2% of sites, n=129). Only one earthworm species, *Dendrobaena octaedra*, was found in forest plots. These results differ from findings in northern Alberta and Saskatchewan where non-native earthworms have become relatively widespread in remote forests. Additional work will be carried out in 2023 to determine microclimate effects on earthworm distributions. These results will improve understanding of factors affecting current and potential future distributions of non-native earthworms in the Yukon. These distributional data can be applied to quantify the largescale impacts of non-native earthworms, assess potential future impacts, and inform management plans to limit their spread.

## Submission types

Oral GRAD

# Changes in feeding behavior of woodlice on lichen thalli after removal of protective secondary metabolites.

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Woodlice are terrestrial crustaceans that predominantly feed on decaying plant material. Woodlice can also feed on lichen; however, this herbivory has been shown to be affected by the presence of carbon-based secondary metabolites. In this study, I aim to find whether such metabolites affect the feeding preference of woodlice for lichens *Lobaria pulmonaria* and *Platismatia glauca*. I used acetone washes to remove carbon-based secondary metabolites from lichen thalli, and contrast herbivory of washed and unwashed pieces of each species. My preliminary results suggest that woodlice prefer to feed on the lichens that have had their secondary metabolites removed. Further, I investigate whether the amount of such metabolites removed from lichen thalli corresponds to the observed increase in herbivory.

## Submission types

Poster UNDERGRAD



# **Comparison of Copper Complexation with Natural Organic Matter in Standards, Leaf Leachate, and Oilsands Pit Lake Waters**

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The Canadian Oil Sands industry uses substantial water to extract and upgrade bitumen. Recycling this water concentrates potentially hazardous compounds within oil sands process affected waters (OSPW), which circulate through tailings ponds. Potentially harmful constituents of OSPW include naphthenic acids (NAs) and metals, creating potentially hostile environments for some organisms in tailings ponds, and posing risk to surrounding ecosystems and groundwaters. NAs are a group of simple molecules, many of which include carboxylic functional groups and fluorescent aromatic rings. Complexation between metals, NAs and natural organic matter (NOM) which increases molecular size may reduce bioavailability. Complexation with metals also alters the fluorescent characteristics of aromatic molecules, making fluorescence spectroscopy a useful tool for studying this interaction. Lake Miwasin is a demonstration pit lake that contains treated fluid tailings utilizing the Permanent Aquatic Storage Structure (PASS) treatment process to reduce mobility and ameliorate the potentially harmful constituents of tailings. Fluorescent characteristics of a sample from Lake Miwasin were identified using excitation-emission matrices. A range of copper (II) concentrations were added to samples from Lake Miwasin, leaf leachate, and NOM standards to evaluate their interaction. The modified Stern-Volmer method was used to determine the conditional binding constant (K) and the number of binding sites (n) for all samples based on fluorescence quenching. The K values for the Lake Miwasin sample were notably high, indicating a stronger interaction compared to the other samples. This presentation will focus on experimental methods and comparisons of metal-binding parameters for Lake Miwasin, leaf leachate, and NOM.

## **Submission types**

Oral UNDERGRAD