



Centre de la science de la biodiversité du Québec
Quebec Centre for Biodiversity Science

Cours intensif 2019 en science de la biodiversité du CSBQ

2019 QCBS Biodiversity Science Intensive Course



**BIO860M: Séminaire
thématique en écologie**

November 18-27 novembre

Coordonnateurs du cours
Course coordinators

Steven Kembel, UQAM

Ce cours intensif de deux semaines offre un survol de haut niveau des concepts, méthodes et des questions en lien avec les différentes facettes de la science de la biodiversité.

This two week intensive course offers an advanced summary of concepts, methods and questions linking to the different aspects of biodiversity science.

Location :
Réserve naturelle Gault, Mont Saint-Hilaire

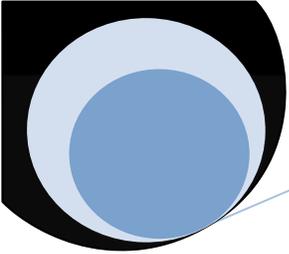


TABLE OF CONTENTS

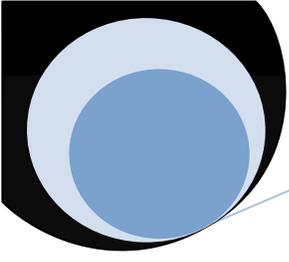
2019 Biodiversity Science Intensive Course

Course Overview

A word from the coordinator	2
General Schedule	4
Workload information	5

Presentation of Participants

The institutions	6
Course instructors	8
Students	16



COURSE OVERVIEW

A WORD FROM THE COORDINATOR

Welcome to the 2019 QCBS Biodiversity Science Intensive School.

The mission of the QCBS is

i) to foster and promote a world-class research and training program in biodiversity science, ii) to facilitate scientific exchange and learning between QCBS researchers and stakeholders in government and the public and private sectors of society, and iii) Contribute to the public's understanding of the causes and consequences of biodiversity change.

Now in its 9th year, the Biodiversity Science course is composed of a series of modules relating to the three axes of the QCBS:

- **Axis 1: Discovery of biodiversity:**

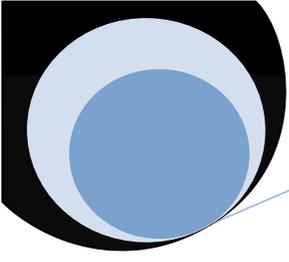
To describe the genomic, phenotypic, and functional diversity of poorly described components of Québec's biodiversity, and to link phylogenetic and phylogeographic information to functional species traits.

- **Axis 2: Changes in biodiversity and ecosystem services:**

To develop General Biodiversity Functioning Models (GBFMs) that establish the link between the drivers of biodiversity change and the consequences of that change for ecosystem functioning and services.

- **Axis 3: Management and adaptation to biodiversity changes:**

To identify tools to adaptively manage biodiversity and ecosystem services in human-dominated landscapes; to reveal socioeconomic drivers of biodiversity loss; to evaluate market and nonmarket values of biodiversity and associated ecosystem services; to better understand the role of local communities in biodiversity decision making and management; to generate scientifically sound, socially relevant and politically feasible strategies for biodiversity management and governance



Each module is taught by an expert in the field, and combines a mix of set lectures, practicals, and project work. This year the program will be held at the Gault Nature Reserve of McGill University, a private reserve which protects 1000 hectares of natural primeval forests of the St. Lawrence Valley. Situated at Mont-Saint-Hilaire approximately 40 km from Montreal, this panoramic natural landscape is ideal for discovering nature, teaching and academic research.

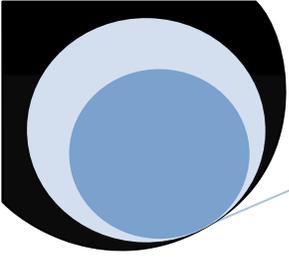
The term biodiversity was formally defined at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro as “the variability among living organisms from all sources, including, ‘inter alia’, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems”. Biodiversity provides us with multiple services, yet we still do not even have accurate estimates of how many different species share the planet with us. Today the terrestrial environment is now dominated by people – approximately 1/3 of land area has been transformed for human use and 1/4 of global productivity diverted to human consumption. It is estimated that current extinction rates are over an order of magnitude greater than background rates and are projected to increase further over the next several decades. We are only just starting to get to grips with how this impending extinction crisis might impact human welfare and the state of the Earth. The Biodiversity Science program aims to foster the emergence of an integrated science of biodiversity within Québec.

We have invited some of the top biodiversity scientists in Québec and elsewhere to contribute to the teaching and discussion. They will cover a wide range of topics, but of course the field of biodiversity science stretches beyond that which can be covered within a two-week course. At the end of the course, you will have become familiar with the different aspects of biodiversity science. You will have applied the concepts of biodiversity science to various examples and integrated them in your project work. You will have made links between the different research axes of the QCBS. Importantly, you will also have built a network of students working in biodiversity science. We hope you will enjoy the course and that you will gain much from it.

Special thanks to Helen Elina and Philippe Auzel from the QCBS, without whom this course would not have been possible.

We look forward to meeting you.

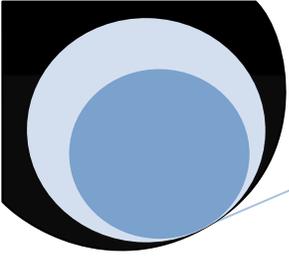
Steven Kembel
Course coordinators



COURSE OVERVIEW

GENERAL SCHEDULE

	Morning	Afternoon	Evening
Monday November 18	Welcome	Pedro Peres-Neto	Pedro Peres-Neto
Tuesday November 19	Marco Festa-Bianchet	Katja Neves	Intro to R
Wednesday November 20	Simon Joly	Simon Joly	
Thursday November 21	Jean-Philippe Lessard	Steve Kembel	
Friday November 22	Andy Gonzalez	Jaye Ellis	
Saturday November 23	Pierre Legendre	Pierre Legendre	
Sunday November 24			
Monday November 25	Student Project Planning	Andrew Hendry	
Tuesday November 26	Carly Ziter	Jochen Jaeger	
Wednesday November 27	Mark Vellend	Tanya Handa	
Thursday November 28	Presentations	Presentations	Party
Friday November 29	Return home		

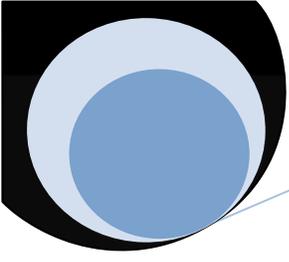


COURSE OVERVIEW

WORKLOAD INFORMATION

Course evaluation

- Class participation (30%)
- Oral presentation(s), set by Prof Kembel (15%)
- Final project, subject to be developed during the course (55%)
 - Project presentation (20%)
 - Write-up of project (35%)



PRESENTATION OF PARTICIPANTS

THE INSTITUTIONS

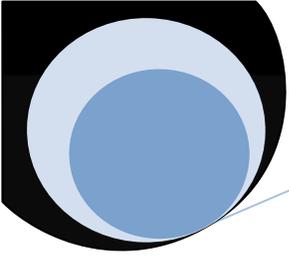
Gault Nature Reserve and Mont Saint-Hilaire Biosphere Reserve

The 2019 QCBS Biodiversity Science Intensive School will take place in the Gault Nature Reserve and Mont Saint-Hilaire Biosphere reserve. Gault Nature Reserve of McGill University is a private Reserve which protects 1000 hectares of natural primeval forests of the St. Lawrence Valley. Situated at Mont-Saint-Hilaire approximately 40 km from Montreal, this panoramic natural landscape is ideal for discovering nature, teaching and university research. The public sector with 25 km of trail network is open 365 days per year for visitors' enjoyment. Affiliated with the Faculty of Science of McGill University, the Gault team offers support to research and teaching of natural sciences while providing a wide range of services to the university community and the general public. In 1978, the mountain and its immediate surroundings were recognized as the first Biosphere Reserve in Canada under the UNESCO Man and the Biosphere Program.

Quebec Centre for Biodiversity Science (QCBS)

The Quebec Centre for Biodiversity Science (QCBS) was launched in February 2010. This FRQNT-funded institution brings together some of the province's best scientific minds to work on the problem of biodiversity loss. The objective of the QCBS is to foster the emergence of an integrated science of biodiversity within Québec. There is growing recognition that the diversity of life on Earth, including the variety of genes, species and ecosystems, is an irreplaceable natural heritage crucial to human wellbeing and sustainable development. The QCBS will seek to uncover the basic scientific principles required for the discovery, study, and sustainable use of Québec's biodiversity.

The QCBS comprises more than 120 researchers and 8 academic partner institutions— McGill University, Concordia University, Université de Montréal, Université du Québec à Montréal, Bishop's University, Université du Québec à Rimouski, Université de Sherbrooke, Université de Laval—2 additional universities – Université du Québec à Chicoutimi, Université du Québec en Outaouais – and 2 public institutions the Montreal Botanical Gardens and Agriculture and Agri-food Canada. It is hosted by McGill University, under the leadership of director Andrew Gonzalez. The province of Québec is home to an exceptional concentration of internationally recognized biodiversity scientists. The QCBS seeks to integrate biodiversity science by facilitating collaboration among these researchers, providing training opportunities for students, and helping to answer key questions that will contribute to more sustainable management of the province's biodiversity. The objective of the QCBS is to foster the emergence of an integrated science of biodiversity within Québec. In line with Québec's strategic plan for research and



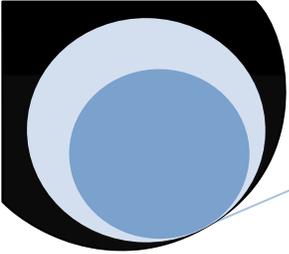
innovation in environmental science, the QCBS seeks to uncover the basic scientific principles required for the discovery, study, and sustainable use of Québec's biodiversity. Web site: <http://www.qcbs.ca>

Université du Québec à Montréal

The Université du Québec à Montréal (UQAM) is a comprehensive public university based in Montreal, Quebec, Canada. It is a French language university and is the largest constituent element of the Université du Québec (UQ), a public university system.

UQAM was founded on April 9, 1969 by the government of Quebec, through the merger of the École des Beaux-Arts de Montréal, a fine arts school; the Collège Sainte-Marie, a classical college; and a number of smaller schools. Although part of the UQ network, UQAM possesses a relative independence which allows it to print its own diplomas and choose its rector.

In 2013, UQAM had a student population of 43,140 in six faculties (Arts, Education, Communication, Political Science and Law, Science and Social science) and one school (Management). It offers Bachelors, Masters, and Doctoral degrees. It is one of Montreal's two French-language universities, along with the Université de Montréal, and only 1% of its student population is Anglophone.



PRESENTATION OF PARTICIPANTS

COURSE INSTRUCTORS

Andrew Gonzalez – Professor, McGill University

Department of Biology

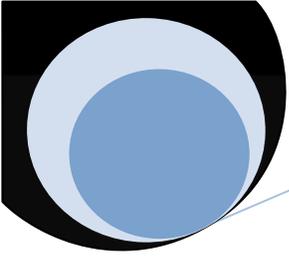


My research is broadly focused on the causes and consequences of biodiversity loss and the stability and functioning of ecosystems. As a corollary I hope to gain a better understanding of how the impacts of anthropogenic environmental change can be mitigated. We use experiments in the field and lab, theory, and databases to tackle the following research questions.

1. Biodiversity, ecosystem functions and landscape connectivity.
2. Ecological networks: The structure and function of ecological interaction networks in space (i.e. metacommunities).
3. Eco-evolutionary dynamics of environmental change.
4. The ecological impacts of economic inequality.

Web page: <http://gonzalezlab.weebly.com>

Email: andrew.gonzalez@mcgill.ca



Andrew Hendry – Associate Professor, McGill University

Redpath Museum



Darwin suggested that evolution proceeds very slowly, and this view was almost universally accepted until the later part of the 20th century. Over the past few decades, however, a dramatic shift has taken place toward the idea that ongoing evolution is occurring all around us; so-called “rapid” or “contemporary” evolution. Now that contemporary evolution is widely accepted as a commonplace occurrence, a number of researchers have become interested in its consequences for ecological dynamics; i.e., changes in populations, communities, and ecosystems.

This idea has been incorporated into the developing field of “eco-evolutionary dynamics,” broadly considers ongoing interactions between ecology and evolution. Most of our work to date has focused on one direction of causality in these dynamics – how ecological changes influence evolutionary dynamics (eco-to-evo). More recently, we have started to explore the reciprocal arrow of causality: how evolutionary changes influence ecological dynamics (evo-to-eco). We conduct work on both arrows of causality in multiple natural systems, most frequently in lake versus stream stickleback, high-predation versus low-predation guppies, and Darwin’s finches.

Web page: <http://redpath-staff.mcgill.ca/hendry/>

Email: andrew.hendry@mcgill.ca

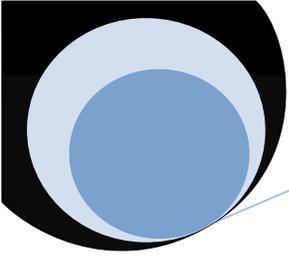
Carly Ziter – Assistant Professor, Concordia University

Department of Biology



Our research vision is to conduct solutions oriented science to enhance biodiversity conservation and ecosystem service provision in urban and urbanizing landscapes. We use the ecosystem services concept as a lens through which to ask ecological questions related to sustainability, policy and practice. Within this framework, we use field observation/experiments, advanced sensor data, and synthesis approaches to ask how landscape structure, land-use history, and biodiversity interact to impact multiple ecosystem services in urban and urbanizing landscapes. While research in the lab is strongly grounded in landscape and ecosystem ecology, we recognize that addressing complex ecological problems is inherently interdisciplinary. We strive to develop research partnerships both within and outside the university, and value community engagement as integral to our work. Past

research has relied on partnerships with landowners and managers, community groups, local governments, and planners. (We are always looking for new research partners!)



Web page: <http://www.carlyziter.com/>
Email: carly.ziter@concordia.ca

Jaye Ellis – Associate Professor, McGill University

Faculty of Law



Jaye Ellis studies legal responses to ecological risk, paying particular attention to inputs from the natural sciences and the processes of translation that are required when scientific knowledge is incorporated into law and policy. She studies both state and non-state regulatory initiatives at the international, transnational, and national levels, with particular attention to approaches such as goals and indicators, standards, and certification programmes. Current research projects include intersections among science, policy, law, and economics in the promulgation and implementation of certification projects such as those operated by the Marine and Forest Stewardship Councils.

Web page: <https://www.mcgill.ca/law/about/profs/ellis-jaye>
Email: jaye.ellis@mcgill.ca

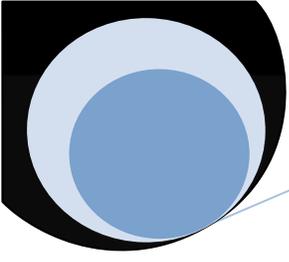
Jean-Philippe Lessard – Assistant Professor, Concordia University

Department of Biology



Our lab works toward elucidating the ecological and evolutionary drivers of biological diversity on planet Earth. We borrow concepts and tools from community ecology and biogeography to try and gain a better understanding of the mechanisms governing the emergence, distribution and maintenance of diversity. To accomplish this, we conduct observational and experimental field studies, and compile comprehensive databases on the distributions, ecological traits and evolutionary history of species.

Web Page: <http://jeanphilippelessard.com/>
Email: jp.lessard@concordia.ca



Jochen Jaeger – Associate Professor, Concordia University

Department of Geography, Planning and Environment



Dr. Jaeger is working in the fields of landscape ecology, road ecology, the quantification and assessment of landscape structure and landscape change, land consumption through urban sprawl, ecological modelling, environmental indicators, impact assessment, and novel concepts of problem-oriented transdisciplinary research.

Web page: <http://www.concordia.ca/artsci/geography-planning-environment/about/faculty.html>

Email: jochen.jaeger@concordia.ca

Katja Neves – Associate Professor, Concordia University

Department of Sociology and Anthropology

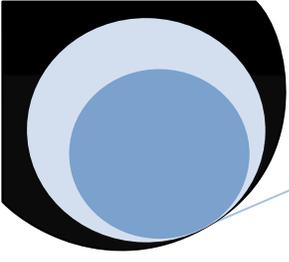


My work explores the ways in which markets, states and diverse aspects of civil society combine to shape and govern relations between people and nature. I am part of a growing group of scholars, principally anthropologists and geographers, who are exploring the ‘neoliberalisation of nature’. My particular interest is to examine the increasingly consequential intersection of conservation and capitalism: the social processes that distance humans from nature and promote damaging environmental practices (which Marx referred to as ‘metabolic rift’) and its distinction from contexts that foster social awareness of environmental issues and ecological stewardship. I have developed a comparative approach that analyses two major instances of ‘nature-society’ schisms in capitalism (industrial agriculture and industrial

whaling), and three instances in late-capitalism where attempts are being made to overcome such disconnects (Azorean whaling, the emergence of ecotourism and nature parks as conservation strategies, and the role of urban botanical gardens in raising the ecological literacy of city dwellers)

Web page: <https://www.concordia.ca/artsci/loyola-college-diversity-sustainability/faculty.html?fpid=katja-neves>

Email: katja.neves@concordia.ca



Marco Festa-Bianchet – Professor, Université de Sherbrooke

Département de Biologie



My research group is interested in understanding how environmental changes (natural and artificial) effects population dynamics and the evolution of mammals. These environmental changes include population density, parasites, predators and hunting. Our basic technique is a long-term follow-up on reproductive success, survival, weight and the behaviour of marked individuals. Local, national and international collaborators has allowed the presence of an array of my research programs on many study sites. My current research involves American

mouflons, chamois, caribous and grey kangaroos. As well as having fundamental importance, my research also allows the guidance of conservation and the management of studied species.

Web page: <http://marco.recherche.usherbrooke.ca/index.htm>

Email: m.festa@usherbrooke.ca

Mark Vellend - Associate Professor, Université de Sherbrooke

Département de Biologie

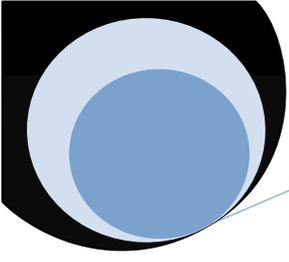


Research in my lab focuses on the ecological and evolutionary responses of plant populations and communities to environmental change. In one major line of research, we exploit historical records of many kinds – e.g., past vegetation surveys, paleoecological data, herbarium records – to quantify changes over time in ecological variables of interest, including the composition and diversity of communities as well as species' phenology (e.g., flowering time). We also conduct in-depth observational and experimental studies of current constraints on plant species distributions and abundance, and how these may influence responses to climate warming. Most empirical work is focused on the forests of southern Québec, including Mont St-Hilaire and Mont Mégantic.

I frequently participate in collaborative and synthetic working groups on broad issues in ecology and evolution, and I recently completed a monograph entitled “The theory of ecological communities”, to be published by Princeton University Press in 2016.

Web page: <http://mvellend.recherche.usherbrooke.ca/>

Email: mark.vellend@usherbrooke.ca



Pedro Peres-Neto – Professor, Concordia University

Department of biology



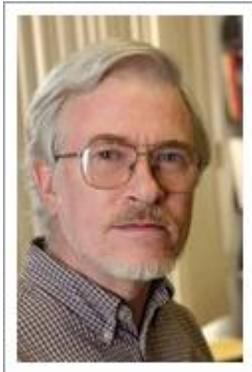
My research interests lie at the interface of community and quantitative ecology, incorporating principles from a diverse suite of areas including spatial ecology, landscape ecology, ecomorphology and evolution. I work to determine how different factors such as species level-traits (e.g., morphology, dispersal capacity, life history, phenotypic integration, evolutionary relationships), habitat choice, landscape structure and species interactions contribute to how regional pools of potential colonizer species are sorted into local communities. I combine observational studies, experimental approaches, data synthesis and quantitative frameworks to understand the relative roles of these factors in structuring communities across aquatic landscapes, involving a variety of organism types.

Web page: <https://www.concordia.ca/artsci/biology/faculty.html.html?fpid=pedro-peresneto>

Email: pedro.peres-neto@concordia.ca

Pierre Legendre – Professor, Université de Montréal

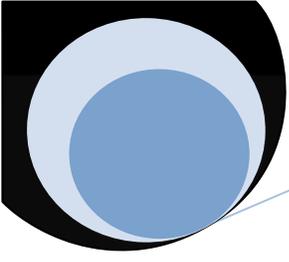
Département des Sciences Biologiques



Pierre Legendre has been teaching biostatistics and numerical ecology at Université de Montréal for more than 30 years. He is the author of the highly cited manual “Numerical ecology” [18115 citations according to Google Scholar]; the third English edition of that manual appeared in June 2012. He is also the author of 290 refereed research papers and book chapters. His *h*-index on Web of Knowledge is 63 (25026 citations for his papers, not counting citations of his books). He is also a “Highly Cited Researcher 2015” in Environment/Ecology. Besides his regular teaching at Université de Montréal, he has given 65 short courses in 38 universities and scientific institutes around the world. He is also the author of Fortran programs and R packages widely used by community ecologists and phylogeneticists, and coauthor (with D. Borcard and F. Gillet) of the book “Numerical ecology with R” (2011).

Web page: <http://adn.biol.umontreal.ca/~numericalectology/>

Email: Pierre.Legendre@umontreal.ca



Simon Joly – Adjunct Professor, Université de Montréal

Institut de recherche en biologie végétale



Simon Joly's laboratory aims at understanding biodiversity by studying plant evolution. Their research involves field work, molecular biology, and uses analytic and modelling approaches. They use tools from phylogenetics, population genetics, quantitative genetics and bioinformatics to understand the evolutionary processes that were involved in shaping the diversity of plants. The main subjects studied in the laboratory are the evolution of reproductive systems, speciation, hybridization, plant genetics, and polyploidy.

Web page: <http://www.plantevolution.org/en/index.html>

Email: simon.joly@umontreal.ca

Steven Kembel – Associate Professor, Université du Québec à Montréal

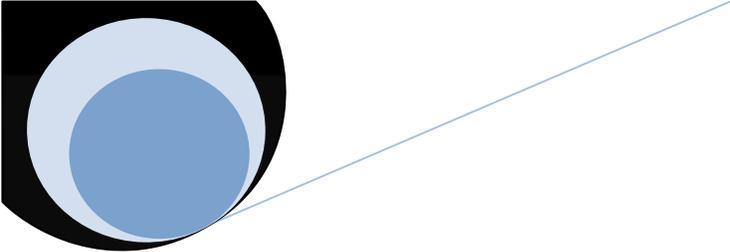
Department of Biology



Plant leaves and roots are home to thousands of different species of microbes, including bacteria, fungi and microscopic plants and animals. While some of these microbes are harmful, many have neutral or beneficial effects on their hosts. However, methods to measure microbial biodiversity in depth have only recently been developed, meaning that knowledge about how and why plants and microbes interact is only at an early stage of development. Dr. Steven Kembel is studying the biodiversity of microbes living on plants. He aims to better understand how plant hosts influence the microbial communities living on their leaves and roots, and how these microbes, in turn, influence the growth, health and functioning of their hosts. Kembel is examining microbial diversity by sequencing microbial DNA from environmental samples. His research includes

studying plant-microbe interactions in tropical, temperate and boreal forests, as well as experimental-manipulating microbes growing on plants in the lab and in natural ecosystems. Kembel's research is highlighting ecologically important plant-associated microbes in forests around the globe. As well, his research will provide better understanding of the evolution of plant-microbe interactions, and will offer important insights into the potential responses of forest ecosystems to global change. Kembel's research could also lead to improvements to sustainable forestry and agriculture through the management of plant-microbe interactions.

Web page: <http://kembellab.ca/>



Email: kembel.steven_w@uqam.ca

Tanya Handa – Assistant Professor, Université du Québec à Montréal

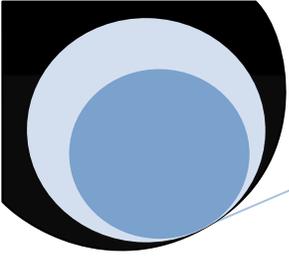
Département de sciences biologiques



Dr. Handa's research interests are linked by the desire to understand the consequences of global change on ecosystem processes. She is interested in how changes such as rising atmospheric CO₂ or urbanisation affect tree growth, as well as how changes in biodiversity influence litter decomposition and nutrient cycling in forest ecosystems.

Web page: <http://professeurs.uqam.ca/component/savrepertoireprofesseurs/ficheProfesseur?mId=CzmnFH%2BPUwA>

Email: handa.ira_tanya@uqam.ca



PRESENTATION OF PARTICIPANTS

THE STUDENTS

Abbie Gail Jones

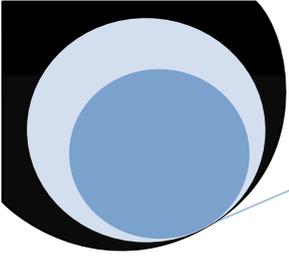
MSc year 1 with Dr. Brian Leung and Dr. Laura Pollock
McGill University

Being at the very early stages of my MSc. process, the resources and skills available through this intensive course would be vital in helping me build the expertise required to successfully approach my research project. I aim to build integrated species distribution models (SDMs) of all continental European plant species in order to create a reliable plant biodiversity layer of Europe for future uses in predicting losses due to anthropogenic factors. It is vital for my species and/or biodiversity modelling approach that I develop an understanding of current advances and new disciplines in biodiversity science, particularly concerning scientific concepts that will be directly applicable to my research, such as regional drivers of biological diversity, biological invasions, and the basics of ecosystem function and services.

Anna L. Crofts

PhD year 1 with Dr. Mark Vellend
Université de Sherbrooke

For my doctoral research, I am investigating two questions: (i) can remotely-sensed hyperspectral data quantify forest community properties (i.e., taxonomic and functional diversity), and in turn, (ii) how do these forest community properties vary across climate (i.e., elevation) and resource extraction gradients in Parc National du Mont Mégantic. I believe the Biodiversity Science intensive course will have a positive impact on my doctoral studies as the majority of my previous research experience has approached ecological questions from a species-level perspective compared to a community-level (i.e., biodiversity) perspective. I look forward to gaining theoretical knowledge and practical skills for topics covered that directly relate to my doctoral research, particularly: (i) patterns and drivers of biological diversity and (ii) trait and functional diversity; as well as, being introduced to biodiversity topics outside the realm of my doctoral studies.



Anne Leboeuf

MSc year 1 with Prof. Valerie Fournier and M. Maxim Larrivée
Université Laval

Je démarre un projet de science citoyenne pour mieux connaître et, surtout, faire connaître la diversité des abeilles sauvages et les moyens d'en favoriser la conservation. Ayant auparavant œuvré surtout en médecine vétérinaire et en épidémiologie, le cours BIO-860M m'apparaît très à propos parce qu'il me permettra d'enrichir mon angle d'approche et d'approfondir les aspects scientifiques de la biodiversité, notamment ses déterminants dans l'espace et le temps et le concept de services écologiques (essentiel à considérer quand on discute de pollinisateurs avec des représentants du monde agricole) dans une approche plus holistique.

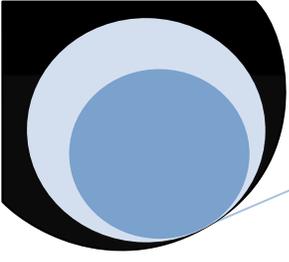
En ayant recours à la science citoyenne, le projet Abeilles citoyennes vise à :

1. Effectuer un inventaire des abeilles sauvages et des syrphes dans plusieurs régions rurales du Québec;
2. Étudier les éléments du paysage qui affectent cette diversité;
3. Sensibiliser un grand nombre de citoyens aux enjeux des pollinisateurs; ces citoyens pourront, à leur tour, contribuer à assurer la conservation des insectes pollinisateurs et, ainsi, optimiser les services écologiques qu'ils peuvent rendre.

Charlotte Steeves

MSc year 1 with Dr. Brian Leung
McGill University

The focus of my thesis is to examine exposure to plastic-associated organic pollutants in stationary pre-fledged seabird chicks in Panama through preen oil and feather samples. Collecting preen oil and feathers from the chicks is a minimally-invasive field approach to quantify exposure to hydrophobic organic pollutants that are biomagnified in the diet of most seabirds without causing harm to the animal. Additionally, I aim to model two pathways of exposure to pollutants via dietary sources and embryonic transfer using empirical data collected in the field and published data for seabird energetics and toxicokinetics.



Isaac Eckert

MSc year 2 with Dr. Jean-Philippe Lessard
Concordia University

My research focuses on understanding assembly processes in invaded ecosystems using observational data. Specifically, my focus is on assessing plant and microbial community response to invasion of Lodgepole pines (*Pinus contorta*) in an alpine meadow ecosystem in northern Argentine Patagonia. I am passionate about this research as it combines my interests in community ecology and invasive species with my technical background in bioinformatics and metabarcoding.

Gabrielle Rimok

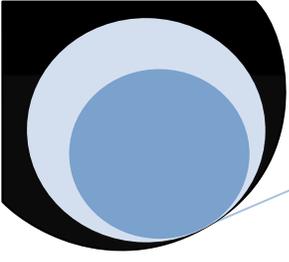
MSc year 1 with Dr. Pedro Peres-Neto
Concordia University

My research focuses on how climate change affects the community ecology, distribution, and diversity of all anuran (frog) species on the entire planet. The biodiversity intensive course would be exceptionally helpful for the analysis of my research, especially since it is highly related to the second research axis; changes in biodiversity and ecosystem services.

Kayleigh Hutt-Taylor

MSc year 1 with Dr. Carly Ziter
Concordia University

This fall I will be entering my first year of study for a M.Sc. in Biology at Concordia University. I will be examining urban forest biodiversity and ecosystem services, and how these differ on private and public land in the city of Montreal. There has been considerable research to identify and quantify ecosystem services provided by public trees in Montreal, but few studies have incorporated tree species located on private land (e.g., residential or commercial areas, vacant lots). My research will examine these differences in biodiversity and consider how private land can be properly integrated into biodiversity science in the city of Montreal.



Mariane Daneau-Lamoureux

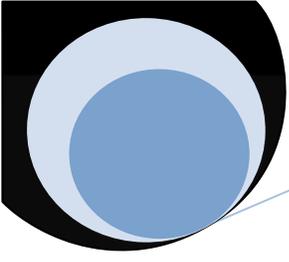
MSc year 1 with Prof. Alison Derry and Prof. Andrew Hendry
Université du Québec à Montréal

I am currently a M.Sc. student in aquatic biology in the laboratory of Alison Derry at UQAM, co-supervised by Andrew Hendry at McGill. I started in May 2019 and I am back from my fieldwork that took place on the Kenai Peninsula in Alaska. My current research topic is a part of the greater developing field of eco-evolutionary biology which considers ongoing interactions between ecology and evolution. For my M.Sc. project, I use fatty acids as qualitative tracers for trophic cascade in natural lake ecosystems. More precisely, I am looking at how evolutionary changes influence ecological dynamics and how these eco-evolutionary dynamics are shaping the structure of communities. We are trying to understand the implications in terms of trophic cascade of the implantation of two divergent populations – limnetic and benthic – of Threespine Sticklebacks (*Gasterosteus aculeatus*) whose phenotypic characteristics influence their feeding traits. Ultimately, we seek to understand how these evolutionary changes affect the diet of sticklebacks and subsequently modify the structure and nutritional quality of zooplankton prey communities through trophic cascades. To do this, we use repeated design manipulations of whole lake ecosystems before-after control-impact (BACI) involving the experimental enrichment of lakes with divergent evolutionary lineages of sticklebacks. So, the research axis closest to my research would probably be 2- Changes in biodiversity and ecosystem services.

Maëlle Tripon

MSc year 2 with Prof. Sophie Calmé and Prof. Dorothée Boccanfuso
Université de Sherbrooke

Mon sujet de mémoire porte sur la résilience économique et écologique de la production de cacao dans le sud-ouest du Mexique. En effet, je cherche à évaluer l'impact des techniques de gestion agricole sur l'écosystème (diversité du milieu et fertilité des sols) et sur le niveau de vie des producteurs, et voir la façon dont les deux sont liés. Je souhaiterais suivre le cours intensif en Science de la biodiversité car ce cours est particulièrement pertinent dans le cadre de mon mémoire qui s'intéresse à la durabilité des systèmes agroforestiers et notamment à leur rôle dans le maintien de la biodiversité et leur impact sur le niveau de vie des populations. Il s'intègre dans l'axe 3 du CSBQ qui concerne la gestion et les adaptations aux changements de la biodiversité. Le cours me permettrait de développer et renforcer mes connaissances en écologie et en statistiques, dans des domaines nouveaux (génétique et génomique en science de la biodiversité, invasions biologiques, etc.) ou qui me sont familiers (diversité biologique dans l'espace et le temps, réseaux écologiques, etc.). Il serait applicable directement puisque je suis actuellement en train de faire le traitement de mes données de terrain. Les dernières



interventions qui traitent de questions multidisciplinaires fonctionnement et services des écosystèmes, conservation et économie) m'intéressent particulièrement puisqu'elles sont au cœur de ma maîtrise, et que je souhaiterais ensuite les explorer davantage dans le cadre d'un doctorat. Plus généralement, mes intérêts portent sur les systèmes socio-écologiques et sur la conciliation des usages d'écosystèmes (conservation et agriculture par exemple), dans une perspective de durabilité. J'aimerais ainsi renforcer mes connaissances sur la biodiversité, pour pouvoir être capable par la suite de maîtriser concepts et perspectives, pour mieux faire dialoguer les disciplines entre elles.

Ming Ni

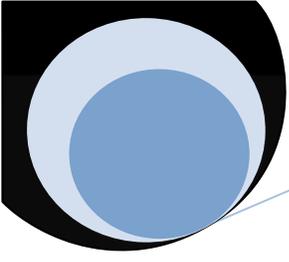
PhD year 1 with Dr. Mark Vellend
Université de Sherbrooke

There is a marked soil gradient in Eastern North America (ENA), so unsuitable soil conditions in high latitudes may impede ongoing plant migration caused by climate change. My Ph.D. project will investigate how soil properties influence plant distributions at large spatial scales and the evolutionary potential for plant species to adapt to high-latitude soil environment, with a focus on the flora of ENA. My research is related to two research axes of the course: discovery of biodiversity and changes in biodiversity and ecosystem services.

Olivier Slupik

MSc year 1 with prof. Valerie Fournier
Université Laval

Mon projet porte sur l'étude des populations d'insectes pollinisateurs en contexte d'agriculture en plaines inondables. Je dois comparer et expliquer la biodiversité de différents groupes taxonomiques de pollinisateurs selon un gradient d'intensification agricole. Les sites que j'étudie sont principalement des champs agricoles et des prairies inondés au printemps. La réponse des pollinisateurs à un gradient d'intensification agricole dans ce contexte offre beaucoup de possibilités d'interprétation et de modélisation. L'axe de recherche le plus proche de mon projet est 'les changements dans la biodiversité et les services de l'écosystème'.



Samuel Rosner

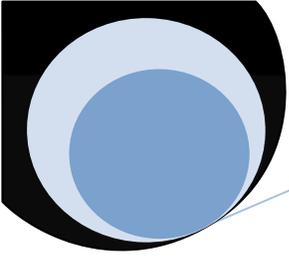
MSc year 1 with Dr. Carly Ziter and Dr. Jean-Philippe Lessard
Concordia University

Mon projet de doctorat porte sur l'importance du frêne pour la biodiversité dans les forêts ripariennes, sous couvert du castor et de l'agrile du frêne. Mes deux premiers chapitres sont tournés vers le castor (déterminer la place du frêne dans le régime alimentaire du castor, ainsi que la réponse fonctionnelle du castor face à cette essence pour mon premier chapitre ; et déterminer le rôle du frêne dans la distribution spatiale des colonies de castor pour mon second chapitre). Mon troisième chapitre en revanche vise à comprendre l'effet qu'aura la disparition du frêne sur les communautés d'invertébrés des forêts ripariennes. Ce chapitre vise spécifiquement à distinguer les effets qui seront dû à la modification structurelle de la forêt (mort des arbres) des changements qui seront propres à la disparition des frênes (modification de la composition de la litière). Ce chapitre correspond donc tout à fait à l'axe 2 (changements de biodiversité et des services écologiques), et la grande majorité des sujets abordés au cours de ce cours intensif semblent être directement applicable à mon projet de recherche ; notamment le volet touchant à l'application de la génétique en science de la biodiversité, puisque les différentes communautés d'invertébré que j'étudiais seront déterminées par une méthode de métabarcoding.

Serena Sonna

PhD year 2 with Prof. François Lorenzetti
Concordia University

My project will attempt to assess the biodiversity of native bees in urban ecosystems, and to determine which resources can best support urban bee conservation. The QCBS research axis closest to my future work is Axis 2: Linking Biodiversity to Ecosystems. As a new graduate student, the QCBS intensive course will help me gain understanding in a wide range of topics, especially some that may not be directly related to my research



Shannon Clarke

MSc year 1 with Dr. Dylan Fraser
Concordia University

I am currently conducting research as part of a large NSERC-funded project being conducted in the Rocky Mountains of Canada studying fisheries-induced evolution (FIE) on Brook Trout (*Salvelinus fontinalis*) populations in alpine lakes. Our team is using a multidisciplinary approach to assess how size-selective harvesting influences the productivity of the fishery and the functioning of the whole-lake ecosystem. My research specifically focuses on how genetic and demographic variables are influenced by harvest, by comparing changes in the effective population size and the census population size between harvest and control lakes. This research relates most closely to QCBS Axis 1 – Discovering biodiversity (theme 1.2 – genetic diversity), as I will be assessing the genetic diversity of these populations under natural (control) or harvest regimes.

Zihui Wang

PhD year 1 with Prof. Steven Kembel
Université du Québec à Montréal

My research is focused on the large-scale effects of host, environment and spatial autocorrelation on the diversities of leaf bacteria. By attending this class, I will learn how to collect and analyze community data and answer the biodiversity question that I am interested.