

2017

# QCBS Intensive Course Booklet



Cours intensif 2017 en science de la biodiversité du CSBQ

2017 QCBS Biodiversity Science Intensive Course

## BIO860M: Séminaire thématique en écologie



**November 13-24 novembre**

Réserve naturelle Gault, Mont Saint-Hilaire  
Gault Nature Reserve, Mont-Saint-Hilaire

[qcbs.ca/course](http://qcbs.ca/course)  

By Helen Elina

QCBS Intensive course

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# COURSE OVERVIEW

## A Word from the coordinators

Welcome to the 2017 QCBS Biodiversity Science Intensive Course.

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 6th 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 and Jonathan Davis  
Course coordinators

## General Schedule

### Monday, November 13<sup>th</sup>

9:00-10:30	<b>Travel to Mont St-Hilaire</b> - Bus pick-up at McGill (Biology Department)
10:30-11:00	Coffee break
11:00-12:30	<b>Introduction</b>
12:30-2:00	Lunch
2:00-3:30	<b>Key Note</b> (Catherine Potvin)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Discussion</b>
6:00-7:00	Supper
7:00-8:00	<b>“Zoonotic diseases, biodiversity and climate change: the emergence of Lyme disease in Southern Quebec”</b> (Virginie Millien)

### Tuesday, November 14<sup>th</sup>

9:00-10:30	<b>Biodiversity science to meet the challenges of global environmental change</b> (Andrew Gonzalez)
10:30-11:00	Coffee break
11:00-12:30	<b>Biodiversity science to meet the challenges of global environmental change</b> (Andrew Gonzalez)
12:30-2:00	Lunch
2:00-3:30	<b>Biodiversity Conservation: Human Non-Human Intersection</b> (Katja Neves)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Biodiversity Conservation: Human Non-Human Intersection</b> (Katja Neves)
6:00-7:00	Supper
7:00-8:00	<b>Nature, Wilderness, and the Global Ark: should we really be meddling with biodiversity?</b> (Arne Mooers)

## Wednesday, November 15<sup>th</sup>

9:00-10:30	<b>What is this? Planning material identification in biodiversity research</b> (Jade Savage)
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>What is this? Planning material identification in biodiversity research</b> (Jade Savage)
12:30-2:00	Lunch
2:00-3:30	<b>What is this? Planning material identification in biodiversity research</b> ( Jade Savage)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>What is this? Planning material identification in biodiversity research</b> (Jade Savage)
6:00-7:00	Supper
7:00-8:00	<b>Presentation</b>

## Thursday, November 16<sup>th</sup>

9:00-10:30	<b>Studying biodiversity through the functional traits of organisms</b> (Tanya Handa)
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Studying biodiversity through the functional traits of organisms</b> (Tanya Handa)
12:30-2:00	Lunch
2:00-3:30	<b>Biodiversity Analysis with R</b> (Steven Kembel)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Biodiversity Analysis with R</b> (Steven Kembel)
6:00-7:00	Supper

## Friday, November 17<sup>th</sup>

9:00-10:30	<b>Phylogenies and statistics</b> (Simon Joly)
10:30-11:00	Coffee/Tea break

11:00-12:30	<b>Phylogenies and statistics</b> (Simon Joly)
12:30-2:00	Lunch
2:00-3:30	<b>Phylogenies and statistics</b> (Simon Joly)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Phylogenies and statistics</b> (Simon Joly and Steven Kembel)
6:00-7:00	Supper

### Saturday, November 18<sup>th</sup>

9:00-10:30	<b>Title TBA</b> (Pedro Peres-Neto)
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Title TBA</b> (Pedro Peres-Neto)
12:30-2:00	Lunch
2:00-3:30	<b>Analysing beta diversity</b> (Pierre Legendre)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Analysing beta diversity</b> (Pierre Legendre)
6:00-7:00	Supper

### Sunday, November 19<sup>th</sup>

### DAY OFF

8:00-9:00	<b>Breakfast</b>
12:30-2:00	<b>Lunch</b>
6:00-7:30	<b>Supper</b>

### Monday, November 20<sup>st</sup>

9:00-10:30	<b>Eco-Evolutionary Dynamics</b> (Andrew Hendry)
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10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Eco-Evolutionary Dynamics</b> (Andrew Hendry)
12:30-2:00	Lunch
2:00-3:30	<b>Title TBA</b> (Jerome Dupras)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Title TBA</b> (Jerome Dupras)
6:00-7:00	Supper
7:00-8:00	Projects

## Tuesday, November 21<sup>nd</sup>

9:00-10:30	<b>Conservation as hybrid knowledge</b> (Sophie Calmé)
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Conservation as hybrid knowledge</b> (Sophie Calmé)
12:30-2:00	Lunch
2:00-3:30	<b>Spatial analysis of population genetic data: landscape genetics and beyond</b> (Patrick James)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Spatial analysis of population genetic data: landscape genetics and beyond</b> (Patrick James)
6:00-7:00	Supper
7:00-8:00	Projects

## Wednesday, November 22<sup>rd</sup>

9:00-10:30	<b>Projects/Presentations</b>
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Projects/Presentations</b>

12:30-2:00	Lunch
2:00-3:30	<b>The trouble with biodiversity</b> (Mark Vellend)
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>The trouble with biodiversity</b> (Mark Vellend)
6:00-7:00	Supper
7:00-8:00	<b>Projects</b>

### Thursday, November 23<sup>th</sup>

9:00-10:30	<b>Projects/Presentations</b>
10:30-11:00	Coffee/Tea break
11:00-12:30	<b>Presentations</b>
12:30-2:00	Lunch
2:00-3:30	<b>Presentations</b>
3:30-4:00	Coffee/Tea break
4:00-6:00	<b>Presentations</b>
6:00-7:00	Supper
7:00-8:00	<b>Party</b>

### Friday, November 24<sup>th</sup>

9:00-10:30	<b>Pack up</b>
10:30-11:00	<b>Bus to McGill</b>

## Workload Information

### Course evaluation

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

# PRESENTATION OF PARTICIPANTS

## THE INSTITUTIONS

The 7<sup>th</sup> edition of QCBS Biodiversity Science Intensive School (2017) will be hosted by UQAM in collaboration with McGill and it will take place at the Gault Nature Reserve. Below is some information on the institutions, organizations and on the location that the course will be taking place.

### 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.

### McGill University

The oldest university in Montreal, McGill was founded in 1821 from a generous bequest by James McGill, a prominent Scottish merchant. Since that time, McGill has grown from a small college to a bustling university with two campuses, 11 faculties, some 300 programs of study, and more than 35,000 students.

### Gault Nature Reserve and Mont Saint-Hilaire Biosphere Reserve

The QCBS intensive course will be taking place at the Gault Nature Reserve. The 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.

# PRESENTATION OF PARTICIPANTS

## **Course Instructors**

Sophie Calmé

Professor, Département de biologie at Université de Sherbrooke

Tropical landscapes are extremely dynamic in time and space and under strong influence of rural populations that practice burn agriculture and the extraction of forest resources to assure their subsidy. The Yucatán peninsula, particularly the Calakmul region, is characterized by the absence of superficial hydrological networks where water becomes a limited critical factor during the long dry season. Wildlife species must compose with seasonal variations of the availability of many resources, as well as continuously changing coverage, whether because of natural processes like hurricanes or human caused processes such as agriculture conversion. Important mechanisms for maintaining populations like dispersal are henceforth threatened and so can the access to certain natural key resources such as water points and feeding or nesting sites. The understanding of these relationships of animal species with landscape characteristics that shelter them is necessary to predict their vulnerability to the changes within these landscapes. My research is situated between the ecological and social research (historical, cultural, political) that motivates the study of changing ecosystems, all while using landscape ecology as a theoretical framework

Jérôme Dupras

Professor in the Department of Natural Sciences of UQO and researcher at the Institute of Temperate Forest Science (ISFORT)

A man of multiple talents, Professor Jérôme Dupras's roadmap is impressive. Bassist and founding member of “Les Cowboys fringants”, passionate about forests, the environment and music, Professor Dupras is committed to safeguarding the natural heritage both in terms of raising awareness and financing various projects. His main research work is the economic evaluation of ecosystem services, the relationship between ecosystems and the production of ecosystem services, and governance and land use planning. His objective is to combine economic and ecological analyzes in a social dimension by working on environmental governance from a public policy perspective.

Andrew Gonzalez

Professor at McGill University, Canada Research Chair in Biodiversity Science and Director of the [Quebec Centre for Biodiversity Science](#)

His research is focused on the causes and consequences of biodiversity change. Important causes include habitat loss and fragmentation, climate change, and emergent diseases. He also studies how biodiversity change impacts ecosystems and the many benefits we get from them. He translates his

research into knowledge for conservation and policy, particularly focusing on the restoration of ecological connectivity in human-dominated landscapes. He is applying this to the design of ecosystem networks for cities, like Montreal. He is very committed in improving opportunities for collaboration and training in biodiversity science via the Quebec Centre for Biodiversity Science a large research network he founded in 2009.

#### Tanya Handa

Professor at the Department of Biological Sciences at UQAM

Her research interests include a desire to understand the consequences of global changes for ecosystem processes. She is interested in the effects of changes such as increasing atmospheric CO<sub>2</sub> or urbanization on tree growth. She also seeks to understand how changes in biodiversity can influence litter decomposition and nutrient recycling in forest ecosystems.

#### Andrew Hendry

Associate Professor, McGill University

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.

#### Patrick James

Associate Professor, Département de sciences biologiques, Université de Montréal

He is a spatial ecologist interested in how spatial and temporal heterogeneity affects ecological and evolutionary processes. Research in the lab specifically examines how forest landscape structure affects spatial population dynamics, landscape connectivity, gene flow, and interactions among disturbances such as forest fire, insect outbreaks, and forest management. Using empirical, simulation, and statistical approaches we aim to improve our understanding of the links between pattern and processes to better forecast the long-term ecosystem consequences of land-use and climate change and to improve forest management strategies.

#### Simon Joly

Professeur associé, département de sciences biologiques, Université de Montréal

He is a plant evolutionary biologist. He is researcher at the Montreal Botanical Garden and adjunct professor at the Université de Montréal. His research interests mostly consist in understanding how

plants adapt to their environments. His work combines field work, genomics, and computational biology. Simon Joly is particularly interested in using information on species relationships to resolve evolutionary or ecological questions. In his workshop, he will explain why it is important to account for phylogenetic relationships when performing statistical tests involving multiple species and introduce appropriate methods of analysis.

#### Steve Kembel

Associate Professor and Canada Research Chair in Plant Microbiomes, Département des Sciences Biologiques, Université du Québec à Montréal

My research program focuses on 1) understanding the processes responsible for the assembly and evolution of plant and microbial communities, 2) the functional ecology of plant leaves and roots, and 3) the ecology of host-microbe associations. Current research in my lab includes the use of high-throughput environmental DNA sequencing to understand the biodiversity and assembly of microbial communities, and the evolutionary ecology of plant-microbes associations in forests.

#### Pierre Legendre

Professor, Département des Sciences Biologiques of Université de Montréal

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” [11653 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).

#### Virginie Millien

Associate Professor and Curator, Redpath Museum (McGill University) and Director, Gault Nature Reserve

Her research focuses on the evolution of mammalian diversity in a changing environment; • Ecotypic variation and climate change; • The evolution of species on islands; • The effects of climate change and isolation on morphological evolution; Functional morphology in fossil rodents and other mammals; Competition and community size structure among coexisting species. More recently, she has been working on the emergence of Lyme disease in Quebec.

### Arne Mooers

Professor, Department of Biological Sciences in Simon Fraser University

Arne Mooers is an eastern Canadian by birth, and now a professor of biodiversity at Simon Fraser University British Columbia. He was trained as a comparative biologist by Graham Bell at McGill, Paul Harvey at Oxford, Dolph Schluter at UBC, Frederick Schram at the University of Amsterdam, and subsequently by his many students and colleagues. His main focus has been on measuring how much biodiversity different sets of species represent, a technical phylogenetic issue that has led to more general questions concerning the valuation of biodiversity. In this vein, Dr. Mooers is currently part of an NSERC CREATE training program (RenewZoo) that links zoos and aquaria with conservation biology, a partnership that puts the value of biodiversity into the very sharpest relief.

### Katja Neves

Associate professor of Sociology of the Environment and Social Sustainability at Concordia University

Her current projects have unveiled a major historical paradigmatic shift in the global governance, hegemonic understanding, and practice of biodiversity conservation. Whereas from the late 1980s onwards neoliberal biodiversity conservation tended to manage humans and non-humans as two dichotomous spheres in need of “reconciliation”, botanic gardens approach social and ecological sustainability as two inextricably connected dimensions of biodiversity conservation. Dr. Neves findings demonstrate that from this perspective, embracing social roles such as integration, food security, social justice and equity is as important as engaging with plant ecology and plant management. This contrasts with the “fortress conservation” approach of the hegemonic neoliberal conservation model that predominated in Africa throughout the 1990s resulting in the eviction of local people from local ecosystems. Dr. Neves’ findings also suggest that the aforementioned transformations reflect a much wider transformation in global and national socio-ecological governance. These challenge extant theorization.

### Pedro Peres-Neto

Professor, Department of biology at Concordia University

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.

### Catherine Potvin

Professor, Department of Biology, McGill University, Trottier Fellow from the Trottier Institute for Science and Public Policy and Director, PFSS: [Panama Field Study Semester](#)

She is a plant biologist who specialized in tropical forest ecology and conservation. Tropical forests play a crucial role in the global carbon cycle and for species conservation. Besides they are amazingly beautiful and express the full imagination of nature! She is very preoccupied by climate change and, with her research group, she is passionately searching for solutions. These entail the study of land uses and the protection of forests in full respect for the people that live in or from them. This is why the banner of her laboratory is “Science for empowerment”. For 20 years now she has been collaborating and learning from Panama’s indigenous people.

### Jade Savage

Professor at Department of Biological Sciences at Bishop’s University

Her research program aims at documenting the systematics and biodiversity of muscoid Diptera (house flies and relatives) in different target habitats, using a variety of analytical and conceptual approach. Field collections in south eastern Quebec and Ontario and in the arctic regions of North America and Eurasia will allow Dr. Savage to fill some gaps in the distribution record of many species, yield large numbers of species including some new to science, and document biological diversity in some of the most understudied ecosystems of the northern hemisphere. The main contribution of her research program will be to increase knowledge of muscoid Diptera systematics through phylogenetic analyses and the description of new species; produce identification keys allowing non-specialists to identify specimens; and compile data on the ecology and biodiversity of Diptera.

### Mark Vellend

Associate Professor, Département de Biologie at Université de Sherbrooke

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.

## The Students

Dat Nguyen

M.Sc., McGill University

I am a Year 1 M.Sc. Student studying Biology at McGill University under Dr. Brian Leung. My graduate research focuses on where environment-based species distribution models (SDMs) may fail when predicting to new locations under changing environmental conditions such as climate change. I will be building SDMs for hundreds of species between disjoint distributions, and evaluating the result using various metrics. My project best aligns with the second research axis (changes in biodiversity and ecosystem services) because of its concern with invasive species and ecological prediction. I am interested in taking the 2017 Biodiversity Science Intensive course. In addition to learning about issues and methods in current biodiversity research, this course will also provide networking opportunities with other attending graduate students and researchers. I believe the course offers an exceptional opportunity to learn new perspectives in biodiversity research and will help with my current research as well as future projects.

Martin Demers

M.Sc., UQAM

Je fais présentement ma deuxième année de maîtrise en biologie (limnologie) à l'UQAM, supervisé par Paul del Giorgio et co-supervisé par Beatrix Beisner. Mon projet de recherche s'intéresse aux larves de *Chaoborus* qui sont des agents de bioturbation importants dans les lacs de par leur migration journalière des sédiments vers la colonne d'eau. De plus, ces larves utilisent le méthane ( $\text{CH}_4$ ) dans les sédiments pour gonfler leurs sacs trachéaux et ainsi leur permettre de migrer par flottaison. Malgré leur rôle en tant que transporteur passif et actif du  $\text{CH}_4$ , très peu d'information existe sur la contribution de *Chaoborus* aux émissions de  $\text{CH}_4$  vers l'atmosphère dans les lacs. L'objectif de mon étude est donc d'évaluer et de quantifier les effets des larves de *Chaoborus* sur les émissions de  $\text{CH}_4$  dans les lacs. Cette étude, étant une des premières sur le sujet, permettra d'améliorer notre compréhension encore très précaire de cet aspect de la dynamique lacustre du  $\text{CH}_4$ .

Arun Dayanandan

M.Sc. Candidate, Concordia University

As a 3<sup>rd</sup> semester M.Sc. student at Concordia University under the supervision of Dr. Grant E. Brown, my research aims to investigate the use of environmental background risk levels as a mechanism of training hatchery-raised fish in order to improve the survival of aquatic species reintroduced into degraded and over-harvested waterways. My research falls primarily under Axis 2: Linking Biodiversity to Ecosystems, notably under Theme 2.2: Adaptation in Response to Environmental Changes. However, through my work with the Loyola Sustainability Research Centre, as well as with the United Nations initiative Future

Earth, I am expanding the output of my research to encompass other axes, notably Axis 3: Ecosystem Goods and Services and Human Well-being and Axis 4: Human Dimensions of Biodiversity.

Ana Morales

M.Sc., McGill University

I am a first year Masters student at the Natural Resources Sciences department at McGill University working under the supervision of Dr. Kyle Elliott. For my Masters project, I am researching the migratory movements and stopover strategies of moult-migrant Swainson's thrushes (*Catharus ustulatus*). I will determine the fall stopover duration, fine-scale habitat use and departure decisions of several radio-tagged Swainson's thrushes in the island of Montreal using the Motus Wildlife Tracking System, a network of automated telemetry stations located all across North America. Swainson's thrushes breed in the boreal forests of the United States and Canada. After the breeding season is over, these moult-migrant songbirds perform extended stopovers during migration in order to moult their feathers before reaching their wintering grounds. By studying the movement patterns of migratory birds and their habitat use during the duration of their stopover, we could assess the importance and the need for such areas in order to conserve and manage bird populations. We could also assess how the continued loss of such important ecosystems could affect this one and other bird species that may depend on them for moulting and replenishing energy reserves during migration. The QCBS axis closest to my area of research would be axis 2-Linking Biodiversity to Ecosystems.

Vincent Lessard

M.Sc., Université de Montréal

Je suis présentement un étudiant de première année au programme de Maîtrise en biologie quantitative et computationnelle de l'Université de Montréal, où j'ai également complété un Baccalauréat en sciences biologiques dans le profil « Biodiversité, écologie et évolution ». Je crois fermement que mes intérêts pour la biodiversité et mes expériences passées font de moi un candidat idéal pour ce cours. Dans le cadre de ma maîtrise, je vais débiter très prochainement un travail dirigé ou un stage de recherche dans le laboratoire de M. Colin Favret. Au courant de ce stage, je travaillerai beaucoup sur l'analyse de la diversité des insectes au Québec. Je travaillerai principalement sur deux projets en cours dans le Laboratoire Favret, soit un projet sur la distribution connue et modélisée des espèces d'odonates au Québec ainsi qu'un projet sur la comparaison de la diversité d'insectes capturés dans quatre habitats différents et à l'aide de deux types de pièges. L'efficacité des pièges ainsi que la compartimentalisation de l'habitat seront discutées dans le dernier projet. De plus, les résultats des deux projets seront observés à l'échelle temporelle et spatiale. Les projets sur lesquels je vais travailler sont donc axés sur la découverte de la biodiversité entomologique dans une forêt Laurentienne du Québec, mais peuvent aussi être liés aux changements de la biodiversité selon les types d'habitats et les services écologiques apportés par ces différents types d'habitat.

Christina Rinas

Ph.D., University of Sherbrooke

I am researching how epiphytic lichen and bryophyte communities change across vertical, elevational, and ecological gradients in Mont Mégantic National Park, Quebec. My project falls under the research axis of "discovery of biodiversity." My study system provides excellent opportunities for addressing

fundamental questions about the causes of species distribution limits and how those influence biodiversity in the eastern forests. A tree trunk can represent many gradients (i.e., vertical, circular), easily replicated in a single site. Additionally, the distinctive deciduous – coniferous gradient in Mont Mégantic National Park makes it an ideal place to study how the biodiversity of epiphytic species changes between forest types. Since I am a new PhD student, this course would benefit me because it will help direct my research and intellectual development early in my career.

Frédéric McCune

M.Sc. 2<sup>ième</sup> année, Université Laval

Je suis étudiant à l'Université Laval sous la direction de Valérie Fournier et la codirection de Marc J. Mazerolle. Dans le cadre de mon projet, je m'intéresse aux impacts de l'apiculture urbaine et du paysage urbain sur les abeilles sauvages. La réponse des abeilles en fonction de leurs traits fonctionnels aux différentes pressions du milieu urbain (ressources florales et de nidification, îlots de chaleur, compétition par l'abeille domestique) m'intéresse particulièrement. Les objectifs visent notamment à comprendre ces réponses et à déterminer des stratégies de conservation des abeilles sauvages face aux pressions du milieu urbain.

Peter Morrison

I retired from the federal public service last year and am currently working to update my expertise. I have graduate degrees in zoology and economics (see my CV), and this past year have been taking graduate courses at the University of Ottawa and Carleton University, focusing on biodiversity and ecosystem services. My objectives are (1) to determine how the lens of “ecosystem goods and services” and associated insights from ecological economics can help us frame and understand management decisions regarding biodiversity, and (2) then to design and apply tools to help make these decisions. This requires linking ecological and economics analyses and careful consideration of the implicit assumptions, strengths and weaknesses of these disciplines.

Matthieu Beaumont

Ph.D., UQO

Je suis nouvellement étudiant au doctorat à l'UQO dans le laboratoire d'économie écologique du professeur Jérôme Dupras. L'étude que je réaliserai durant mon doctorat s'inscrit dans les activités du projet multidisciplinaire ANCRAGE (Agriculture, nature et communautés – recherche-action en gouvernance environnementale) qui vise à identifier des pistes d'amélioration au modèle agricole québécois et suggérer des solutions politiques pertinentes pour favoriser sa soutenabilité écologique.

Shelby Clarke

M.Sc. at McGill University

Under the co-supervision of Dr. Chapman and Dr. Krahe my project examines how hypoxia influences phenotypic divergence in mormyrid weakly electric fishes. I am exploring trends in long-term data to identify changes in fish assemblage structure and distribution in the Lake Victoria Basin (LVB) to see what ecological shifts have occurred and the factors driving them. Additionally, I am using mormyrids in

ecophysiological and behavioural studies to compare phenotypic traits that highlight the effects of stressors on phenotypic divergence.

Elyse-Ann Faubert

Doctorat en Biologie, Université de Montréal (Institut de Recherche en Biologie Végétale)  
Professeure, Département de Biologie  
Cégep Édouard-Montpetit

Ma recherche se base sur l'étude des patrons de diversification des *Dialioideae*, sous-famille pantropicale des Légumineuses qui comprend 85 espèces. Pour cette étude, il est envisagé d'utiliser des données moléculaires (chloroplastiques et nucléaires), qui seront mises en corrélation avec des données écologiques (climat, sol, précipitations, etc.) utilisées afin de reconstituer les biomes et les changements climatiques passés. L'étude de la répartition du groupe en lien avec les biomes qui l'ont vu évoluer peut nous permettre de mieux comprendre les événements évolutifs (extinctions, radiations adaptatives, etc.) qui ont pu moduler la diversité des genres de *Dialioideae*. Dans le cadre de cette recherche je propose de comparer les hypothèses de conservatisme de niche et d'adaptation à de nouveaux biomes. Il est prévu que les clades présents originellement dans les forêts tropicales sèches vont démontrer un taux de diversification lent et constant, tandis que les clades présents dans les forêts tropicales humides et les savanes vont plutôt présenter des taux de diversification plus rapides et plus hétérogènes. En utilisant des phylogénies calibrées grâce aux fossiles disponibles, je vais plus spécifiquement étudier la distribution géographique et écologique actuelle du groupe, inférer les biomes ancestraux qui ont vu se diversifier les *Dialioideae*, et tenter de déterminer l'importance relative du conservatisme de niche versus l'importance de l'histoire géographique dans la distribution et l'évolution des *Dialioideae*.

Ashlee Prevost

MSc Candidate, Concordia University

I am currently working on an applied Atlantic salmon restoration project in the Lake Champlain watershed. We are trying to determine the phenotypic correlates of reproductive success using a genetic parentage analysis. These data will be used to provide fisheries managers with more information on the status of the reintroduction project as well as aide in adapting conservation initiatives. Additionally, I am also conducting a literature review and synthesis of freshwater fish reintroduction to determine the correlates of reintroduction success. Every year, fish of varying life stages are stocked to supplement populations, few of these projects are successful in developing a self-sustaining population. Therefore by doing this research we hope to provide an effective overview of the problems faced in different systems (species interactions, habitat issues, social issues...etc) and provide management solutions to promote reestablishment. Therefore, the research axis which is closest to my project is management and adaptation to biodiversity changes.

Caron Dominique

M.Sc., Université de Montréal

Je m'intéresse à la façon dont les outils informatiques et mathématiques peuvent nous aider à mieux comprendre le fonctionnement des écosystèmes. Étant un programme cours, je n'ai pas de projet de recherche défini, cependant, j'effectuerai un stage dans le laboratoire de Patrick James de l'Université

de Montréal à l'automne. Je m'intéresse beaucoup à la façon dont la fragmentation des habitats agit sur la biodiversité. Avec Patrick James, le sujet du projet n'est pas encore fixé, mais je prévois travailler sur un modèle simulant l'effet de la fragmentation du paysage sur les interactions inter et intraspécifiques. J'ai aussi travaillé avec Timothée Poisot (Université de Montréal) afin d'évaluer l'état des données ouvertes sur la biodiversité au Québec.