



UNIVERSITÉ
LAVAL



UNIVERSITY OF
ALBERTA

PHD OPPORTUNITIES IN AVIAN ECOLOGY AND CONSERVATION IN CANADIAN BOREAL FORESTS

The Canadian boreal region supports globally-significant populations of >200 species of migratory songbirds and waterfowl, at some of the highest breeding densities in North America. About 50% of the forests in this region have already been allocated to industrial forestry, the most widespread and persistent land use affecting currently forested lands. The long-term effects of these activities on migratory bird populations remain poorly understood and we don't know what conservation measures might be necessary or possible.

We have four PhD opportunities to address these knowledge gaps, as part of a large, collaborative project on avian conservation in managed boreal forests. In partnership with industry and government, the goal of this 3-year research program is to model and forecast how bird species respond to the landscape changes that occur through forestry activities, at local, regional, and national extents. The successful candidate will use statistical analysis of observational data coupled with spatial simulation and scenario analyses. Students will work with scientists from the Boreal Avian Modelling Project (www.borealbirds.ca), Ducks Unlimited Canada, the Canadian Forest Service, and Environment and Climate Change Canada, who have assembled enormous collections of empirical data that can be used to model species' abundance and distribution in relation to environmental factors such as the "forestry footprint".

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The following four PhD opportunities are available:

The first three positions will be in the Department of Wood and Forest Sciences at Laval University in Québec City. Laval is a French-language university. Theses may be written in English, but the capacity to function in French or the interest to learn are recommended. Québec City is well known for its exceptional outdoor recreational opportunities, natural beauty, historical interest, and vibrant cultural life. The francophone cultural environment provides non-francophone students an excellent opportunity to develop or improve French language skills.

1. STAND, LANDSCAPE, AND REGIONAL FOREST MANAGEMENT PRACTICES TO CONSERVE AVIAN POPULATIONS
 This project will integrate custom predictive avian abundance models and high resolution simulation tools (SpaDES) to evaluate: a) how the distribution and abundance of avian species varies naturally in space and time; b) how the introduction of forest harvesting into unmanaged systems affects these two indicators; and c) how variation in spatial and temporal patterns of harvesting alters the long-term impacts of forest management. The outcomes will be insight into the efficacy of the available management and policy instruments in improving joint outcomes of harvest levels and species abundance, and how management choices should vary among regions with different climates or fire regimes.

The project will be co-led by Steven Cumming (stevec@sbf.ulaval.ca) and Eliot McIntire (Pacific Forestry Centre).

2. ABUNDANCE AND DISTRIBUTION OF WATERFOWL AND OTHER NON-SONGBIRDS IN MANAGED FORESTS
 This project will develop predictive models of waterfowl, raptors, and songbirds associated with riparian areas. A critical step will be identifying specialized habitat elements (e.g., wetland types, potential cavity-trees) and developing indicators for their presence in terms of forest inventory and other spatial data. Once species abundance models have been built, the student will use simulation models to evaluate best management practices for maintaining these species on riparian areas within managed forests.

The project will be co-led by Marcel Darveau (Ducks Unlimited Canada, Marcel.Darveau@sbf.ulaval.ca) and Steven Cumming.

3. SCALE AND EXTENT OF FOREST MANAGEMENT PLANNING: WHAT'S BEST FOR BOTH HARVEST AND BIRDS?

This project will develop effective methods to bridge scales and extents to incorporate non-timber values such as forest songbirds in both operational and strategic forest management planning. Québec forests will be used as a case study system wherein example integrated management areas which account for non-timber values are constructed. Some prior knowledge of forest management planning and/or operations research would be beneficial in this post.

The project will be co-led by Frédéric Raulier and Steven Cumming (stevec@sbf.ulaval.ca).

4. COSTS AND BENEFITS OF WITHIN-BLOCK FOREST PRACTICES FOR SONGBIRD COMMUNITIES

The goal of this project will be to evaluate how post-harvest within-block forest structure (e.g., basal area remaining) influences bird communities. The project will use Forest Resource Inventory, LiDAR, and avian data to quantify and identify thresholds and predict species' non-linear responses to retention areas, while evaluating the relative merits of different methods for estimating the amount of retained structure from e.g. satellite or LiDAR data.

The project will be co-led by Erin Bayne (bayne@ualberta.ca) and Steven Cumming and will be based in the Department of Biological Sciences at the University of Alberta, in Edmonton Alberta, Canada.

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The students will interact with a large team of researchers across Canada, including: Steven Cumming (Université Laval, forest landscape dynamics, avian habitat modelling, and spatial simulation), Marcel Darveau (Ducks Unlimited Canada and Université Laval, conservation of waterfowl and riparian habitat), Erin Bayne (University of Alberta, avian ecology and impacts of natural resource management), Eliot McIntire (Pacific Forestry Centre, spatial simulation and habitat models), Frédéric Raulier (Université Laval, risk management in forest planning), Péter Sólymos (University of Alberta, statistical ecology), and several postdoctoral fellows working with the Boreal Avian Modelling Project (www.borealbirds.ca).

Candidates for any of the four positions should meet the following criteria:

- Strong quantitative skills and keen interest in statistical and ecological modelling;
- High academic standing in avian ecology, forest ecology, conservation biology, or similar disciplines;
- An interest in spatial simulation independent of disciplinary background
- A high level of written communication skills in English is essential
- Programming experience (e.g. in R, Python) would be an asset, but modelling courses are available
- Familiarity with forest management planning in Canada would be an asset, as would some experience with Geographic Information Systems and remotely sensed data

These are all lab-based projects, although small field components may be possible in some cases.

Funding: We guarantee \$22,000/year for three years. Significant additional scholarships may be available as well.

Start date: As early as January 2017, not later than September 2017.

To Apply: Applicants should submit by email a short statement of interest, a sample of their scientific writing, a current CV, a copy of your most recent transcripts (unofficial transcripts are acceptable at this stage), and the names of three references. Your letter should indicate how you meet all of the criteria, summarize your research interests, and commit to your earliest starting date. We will accept applications until suitable candidates are found.

Candidates should send their application package to the email address associated with each position's description, above. *Please specify in the subject line for which position you are applying.*