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## LANGUAGES

**English and French** — Native Tongues

**Spanish** — Intermediate spoken and written knowledge

## HIGHLIGHTED SOFTWARE EXPERIENCE

**R**

I work primarily in R. I use it for statistical, graphical, GIS and simulation purposes.

**Stata**

I have worked with high frequency time series and very large panel samples, and have written scripts to automate data processing for complex data sets.

**ArcMap, ArcGIS & QGIS**

I have used GIS software to visualise endemic pests such as mountain pine beetles and spruce budworm, and I have integrated QGIS into R routines to handle large amounts of geospatial data.

**Excel**

As a graduate student, I use Excel to visualize, clean, process and present data.
In previous work experience, I have used Excel to gather and distill information, produce charts and analysis, process organizational tasks and workflow, and build dynamic data tools.

**Matlab**

I simulated the decisions taken by a social planner, showing how these changed as parameters varied.

**Mathematica**

I primarily use Mathematica as a solver and to simplify and differentiate highly complex equations that represent the first order conditions resulting from constrained optimization.

## HIGHLIGHTED WORK EXPERIENCE

**University of Maryland** — *May 2018 - August 2022*

Research Assistant — *College Park, MD*

· Created a decision support system which will guide inspection and control choices for a novel invasive species. Using R, we created a flexible Monte Carlo simulation framework, which then simulated invasions for different invasion and host parameters. (with Dr. Rebecca Epanchin-Niell).

· Produced a report on the economic impacts and policy implications of invasive blue catfish in the Chesapeake. This involved an extensive literature review, followed by a presentation at the College of Agriculture and Natural Resources' Cornerstone Conference (with Dr. Jorge Holzer).

· Completed a survey on the financial health of Maryland Agri-business during the Covid pandemic. Producers, importers and wholesalers were surveyed directly, and findings were presented in a qualitative report (with Dr. Erik Lichtenberg).

**University of Maryland** — *August 2017 - May 2021*

Teaching Assistant — *College Park, MD*

· Adapted, mid-semester (Spring 2020), to the changing realities of Covid-19, and advised subsequent supervisors in the design of online and hybrid coursework.

· Provided in-person and online instruction for five different courses

· Met with students one-on-one to provide feedback on assignments and personalized help.

**Agriculture and Agri-food Canada** *May 2016 - July 2017*
Market Analyst *Ottawa, ON/Montréal, QC*
· I wrote and published reports on key agri-food markets, including sector trend analyses, country profiles, and health and wellness market research.
· I created an Excel-based statistical tool to determine the optimal roadmap for future market reports.
· I served as team's resident statistics expert, providing advice on the feasibility of potential projects during team meetings.

**State Street** *September 2015 - March 2016*
Associate, Wealth Management Services *Montréal, QC*
· I worked with a global team to give customers and employees the access they needed to do their jobs or manage their assets.
· I resolved technical issues related to customer accounts.
· I closed tickets promptly with a high degree of customer satisfaction.

## EDUCATION

**University of Maryland** *August 2017 - Present*
Ph.D. in Agricultural and Resource Economics
Thesis topic: optimal management of spruce budworm infestations in Eastern Canada
Primary research interests: invasive and endemic irruptive species management, optimal surveillance and control decisions, comparisons of early intervention and foliage protection programs

**Université de Montréal** *September 2013 - August 2014*
M.Sc. in Economics
Primary areas of study: applied microeconomics, econometrics

**Concordia University** *September 2010 - April 2013*
B.A. in Economics
Graduated with Distinction
Recipient of the Economics Prize, conferred to strongest graduating student in economics

**Dawson College** *August 2008 - April 2010*
Diploma of College Studies in Pure and Applied Science

## VOLUNTEERING EXPERIENCE

**Sexual Assault Resource Centre, Concordia University** *May – August 2014*
Resource Centre Volunteer *Montréal, QC*
· Trained in active listening, crisis intervention and consent advocacy.
· Maintained a welcoming, safe, and non-judgmental environment at the drop-in centre.
· Provided support, active listening, and resources to drop-in students.

## WORKS IN PROGRESS

**"The Economics of Spruce Budworm Monitoring and Management" (Dissertation)**
Committee: Drs Lars Olson (Chair), Rebecca Epanchin-Niell, Erik Lichtenberg, Jorge Holzer and Maureen Cropper

· **"Optimal Management of Spruce Budworm Outbreaks: An Economic Perspective"** (Job Market Paper)
Spruce budworms are the most destructive forest pest affecting eastern Canadian conifers. While they are always present at endemic levels in the landscape, periodic outbreaks cause massive, widespread tree death. Using a mixed-integer programming approach, I calculate the expected economic benefits of two policies that are currently used to manage spruce budworm outbreaks. The two policies are the Early Intervention Strategy (EIS), which proactively suppresses populations, and the Foliage Protection (FP) strategy, which reactively protects tree foliage. I compare both policies with one another and with a do-nothing policy. Chosen policies define the monitoring and treatment choices available to planners and the critical budworm densities and defoliation levels that trigger action on the part of planners. Optimal monitoring and treatment will maximize total social welfare (both from timber and non-timber uses of the forest), given endogenous harvest decisions by profit-maximizing firms. I use a theoretical model to characterize the optimal monitoring and treatment choices, subject to observed budworm density and defoliation levels, for either EIS or FP. I then use this model to build the simulation, with parameter values being drawn from literature and available data. Total expected benefits and costs are calculated for each strategy from the present through to the final management period, under different simulated outbreak scenarios. The purpose of this paper is to determine the conditions under which an EIS, FP or do-nothing strategy would dominate the other two choices, as well as conditions for which a manager would be indifferent towards the two strategies.

· **"Spatial Management of an Endemic Irruptive Forest Pest Subject to Dispersal"** (with Dr Olson)
We design a general, deterministic model that describes how an endemic irruptive pest spreads across a forest landscape. Since the pest is endemic, it cannot be eradicated and does not cause significant damages when it is present at low levels. Outbreaks, on the other hand, can cause massive tree loss. We consider two different cases for the landscape. First, we have a single site landscape, which is a contiguous forest. This landscape allows us to consider damages at a local scale, with an exogenous threat of invasion. We then generalize to a two-site landscape, which can inform a multi-site model. In the multi-site model, the pest disperses across the landscape according to a dispersal matrix, whose elements are functions of the Euclidean distance between the centroids of the invasion. Two actions can be used to mitigate damages: treatment and harvest. These actions are taken with the objective of maximizing net social benefits. Harvest reduces the available prey for pests, and treatments reduce the pressure that pests place on trees within their cells and the ability of pests to disperse. We apply this general model to spruce budworm in a spruce-fir forest. Specific functional forms for the transition equations of spruce budworm and Balsam fir (their primary prey) are drawn from literature. Static conditions are derived for optimal harvest and treatment. An empirical application of the model is then demonstrated using historical timber pricing, harvest, and budworm-caused defoliation data. The data are used to build a simulated model that determines optimal management outcomes over a fixed horizon. Simulated outcomes can then be compared to realized outcomes to determine optimality gaps from past policy, thereby guiding future budworm policy concerning treatment schedules and harvest incentives. While the model is built with spruce budworm in mind and is calibrated using spruce budworm data, it can readily be applied to other endemic forest pests. One such pest is the mountain pine beetle (MPB). This will require modifications to assumptions about the cost and effectiveness of harvest and treatment. For example, for MPB, treatment is often very costly and not very effective, such that efforts would be focused on preventive harvests.

· **"Managing Spruce Budworm Outbreak Risks Through Optimized Surveillance Strategies"** (with Dr Epanchin-Niell)
We determine the optimal locations to which a risk-averse planner seeking to prevent a large-scale spruce budworm outbreak should deploy ground-based monitoring resources when the locations of potential hotspots are unknown.

The objective is to reduce total treatment program costs and budworm damages. Detecting a hotspot early yields significant benefits, since it can prevent an irreversible outbreak. Missing a hotspot, therefore, causes significant harm. The landscape is one or more contiguous forest areas, and survey resources must be deployed across these landscapes. Potential damages from an outbreak differ based on location and spread possibilities. Survey costs can also differ: their main determinant is road access, and labour costs are also affected by landscape features. Survey operations are budget-constrained, and the budget is exhausted, such that program costs are minimized net of survey costs. Patterns of survey placement for different budget levels are determined. The objective function is a combination of total expected value across all scenarios and Conditional Value at Risk, defined for the "worst" 5% of scenarios. A sub-model is solved for a limited landscape and constrained set of scenarios to derive basic comparative statics, and the full model is then solved numerically through a simulation, with parameters being calibrated from data.