JACK FARLEY

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Education

The University of British Columbia **2025 – 2027**
M.Sc. in Statistics *CGPA: 4.33/4.33*
Thesis: A GPU-accelerated parallel-in-time EM algorithm for hidden Markov models with application to cetacean diving behaviour

The University of British Columbia **2020 – 2025**
B.Sc. Honours in Mathematics *with Distinction* *CGPA: 4.2/4.33*

Research Experience

Statistics Department *Master's student* **2025-2027**
↪ Profs. Alexandre Bouchard-Côté and Marie Auger-Méthé *UBC*

- Developed a hidden Markov model framework for inferring continuous-time cetacean diving behaviour from aggregated, coarsely sampled data.
- Designed and implemented a parallel-in-time Expectation–Maximization algorithm for hidden Markov model parameter estimation in Julia, using custom CUDA kernels.
- Joined a Fisheries and Oceans Canada field camp in the high Arctic for a month, assisting with tagging and biopsying narwhals.

Irwin Lab *Undergraduate student researcher* **2023-2025**
↪ Prof. Darren Irwin *UBC*

- Built an individual-based model in Julia of hybrid zone formation following secondary contact between diverging populations, examining how magic traits and search costs affect species persistence.
- Conducted a literature review spanning hybrid zones, speciation models, and assortative mating to motivate and contextualize the modelling framework.
- First-author manuscript resulting from this work is currently under peer review (see Publications).

Ontario Ministry of Natural Resources *Student wildlife biologist* **Summer 2022**
↪ Rod Brook

- Carried out field protocols including nest searching, aerial polar bear surveys, goose banding, and climate monitoring from a remote research station in the sub-arctic.

Publications

In Review

Farley, J. R., & Irwin, D. (2026, July 24). *Magic traits, search costs, and the persistence of species in secondary contact*. https://doi.org/10.64898/2026.07.23.740407

Non-refereed

Term paper selected for placement in the UBC cIRcle database:

Howard, A., & Farley, J. (2021). *Differences in epiphyte community composition between ornamental and native hardwoods in urban Vancouver [R]*, The University of British Columbia. https://doi.org/10.14288/1.0398550

Presentations

International Statistical Ecology Conference. **2027**
A parallel-in-time method for parameter estimation in hidden Markov models (poster, upcoming).

Canadian Undergraduate Mathematics Conference. **2024**
The mathematics of hybrid zones.

Awards and Grants

Polar Knowledge Canada—Northern Scientific Training Program Grant ($3,108) **2026**
British Columbia Graduate Scholarship ($17,500) **2025**
UBC—BPOC Graduate Excellence Award ($3,000) **2025**
UBC—Faculty of Science Graduate Award ($2,000) **2025**
NSERC—Canada Graduate Scholarships – Master's ($27,000**, declined**) **2025**
UBC—Reginald Palliser-Wilson Scholarship ($3,175) **2024**
UBC—Trek Excellence Scholarship ($1,500) **2023**

Other Professional/Volunteer Experience

Thunder Cape Bird Observatory *Volunteer bird bander* **April–May, 2025**
- Banded birds from a remote migration monitoring station.

Long Point Bird Observatory *Volunteer bird bander* **April–May, 2024**
- Banded birds from a remote migration monitoring station.

Fundación Maquipucuna & The Sustainable Roots Foundation *Intern* **September 2021 – May 2022**
↪ Toni Walters *Various locations, Ecuador*
- Bird surveys, reserve maintenance, data analysis, and guiding tourists.

Delmore Lab *Volunteer field technician* **June 2021**
↪ Hannah Justen *Texas A&M University*
- Recaptured and banded Swainson's Thrushes in northern British Columbia

Web Development nachiketchildrenslibraries.org **January – March, 2021**
- Developed a website for a nonprofit dedicated to building libraries in rural India.

Killarney Provincial Park *Student park ranger* **July–August, 2020**
- Maintained park facilities.

James Bay Shorebird Project *Volunteer field technician* **August 2018, 2019**
↪ Doug McRae *Canadian Wildlife Service*
- Conducted shorebird surveys from a remote field station along the James Bay coast.

Royal Ontario Museum–Ornithological Collections *Volunteer and co-op student* **2017–2020**
↪ Mark Peck
- Organized ornithological collections and entered historical data.

Research Interests

I develop hidden Markov model methods for time-series inference, using parallel-in-time algorithms and GPU computation. My current work applies this to modelling whale movement in the Canadian Arctic. I'm interested in extending these methods to evolutionary and ecological questions — such as population genetic, phylogenetic, and phylodynamic inference — using Bayesian approaches.

Technical Skills

Programming Languages	Julia, R, Java, & LaTeX
Statistical Methods	MCMC, SMC, Hidden Markov Models, & CUDA / GPU computing
Tools & Technologies	Git, Adobe Creative Suite, & Web Development (HTML, CSS, PHP)

Selected Course Work

Mathematics	**Statistics**
Measure Theory	Statistical Computing
Continuous Time Stochastic Processes	Spatial Statistics
Discrete Random Processes	Statistical Theory I & II
Functional Analysis	Techniques of Statistical Consulting