

Jarrett D. Phillips, Ph.D.
School of Computer Science
Department of Integrative Biology
University of Guelph

✉ jphill01@uoguelph.ca

✉ phillipsjarrett1@gmail.com

 [jphill01](#)

 [Jarrett D. Phillips](#)

 [Jarrett D. Phillips](#)

 [Jarrett Phillips](#)

 [Jarrett Phillips](#)

 [Dr. Jarrett D. Phillips](#)

EDUCATION

PhD. in Computational Sciences, University of Guelph 2016-2022

Co-Advisors: Dr. Daniel Gillis and Dr. Robert Hanner

Advisory Committee Members: Dr. Deborah Stacey and Dr. Graham Taylor

Thesis: A Novel Statistical Framework for Assessment of Intraspecific Haplotype Sampling Completeness: Implications for DNA Barcode Gap Estimation

Master of Bioinformatics (MBinf.), University of Guelph 2013-2014

Co-Advisors: Dr. Robert Hanner and Dr. Daniel Ashlock

Thesis: Assessing DNA Barcode Haplotype Sampling Diversity in the Ray-finned Fishes (Chordata: Actinopterygii)

BSc. (Hons.) in Biological Science, University of Guelph 2009-2013

RESEARCH EXPERIENCE

Postdoctoral Fellow 2023

University of Guelph

Gillis Lab, School of Computer Science

Hanner Lab, Department of Integrative Biology

- Developed a Bayesian hierarchical binary logistic time-series regression model of seafood fraud in the Canadian supply chain
- Mentored and supervised an undergraduate STAT*4600 student and a University Research Assistant (URA) working to develop models in R, Stan, and Shiny

Postdoctoral Fellow 2022

University of Guelph

Hanner Lab, Department of Integrative Biology

Supervisor: Dr. Robert Hanner

- Mentored and supervised a Master of Bioinformatics (MBINF.) BINF*6999 student on research project

- Participated in conceptualization and drafting of various manuscripts and invited book chapters

Summer Research Assistant

2016

Algoma University
Plant and Soil Ecology Lab, Department of Biology
Invasive Species Research Institute (ISRI)
Supervisor: Dr. Pedro Antunes

- Offered bioinformatics and statistical analysis support in R
- Assisted Principal Investigator and undergraduate thesis student with initial drafting of a manuscript on invasive plant root lesion quantification

Lab Assistant Volunteer

2014-2016

Algoma University
Plant and Soil Ecology Lab, Department of Biology
Invasive Species Research Institute (ISRI)
Supervisor: Dr. Pedro Antunes

- Offered bioinformatics and statistical analysis support in R
- Assisted with collaborative and outreach initiatives for the Terrestrial Invasive Plant Species (TIPS) Network Project through drafting communication letters to public and private conservation agencies across Canada and the USA seeking volunteers to collect invasive plant species for root lesion quantification

Undergraduate Research Assistant

2013

University of Guelph
Vaccine Discovery Research Group
Supervisor: Dr. Mario Monteiro

- Performed various experimental techniques (gas chromatography-mass spectrometry (GC-MS) and Nuclear Magnetic Resonance (NMR)) on bacterial polysaccharide samples for vaccine synthesis and development under the supervision of qualified graduate students

TEACHING EXPERIENCE

In addition to co-teaching three undergraduate courses, I was directly involved in grading assignments, creating course and lab content, as well as materials for midterms and final exams.

Graduate Teaching Assistant (GTA)

2016-2020

University of Guelph

CIS*3130 – System Modelling and Simulation

2020

~ 30 students · Python

CIS*1910 – Discrete Structures in Computing I

2017

~ 300 students (~ 40 students per section)

CIS*2460 – Modelling of Computer Systems

2016-2019

~ 60 students · R, Excel, Java

STUDENT SUPERVISION AND MENTORSHIP

I have either directly or indirectly supervised and mentored 14 undergraduate students in the School of Computer Science and the Department of Integrative Biology, all of whom are, or will be, coauthors on my publications. My primary role has been to guide students through the entire scientific process (*i.e.*, formulating research questions, designing, and setting up experiments to test hypotheses, collecting data and analyzing results and writing the manuscript drafts), among other responsibilities, such as providing feedback on students' draft reports. Students completed research both as part of a course and as lab volunteers.

Zaid Al-Gayyali (with Dan Gillis) University of Guelph Summer Undergraduate Research Assistant (URA) · Bayesian modelling of seafood fraud in the Canadian supply chain	2023
Fynn De Vuono-Fraser (with Dan Gillis) University of Guelph STAT*4600 · Bayesian modelling of seafood fraud in the Canadian supply chain	2023
Amina Asif (with Bob Hanner) University of Guelph BINF*6999 · DNA barcode gap analysis of Canadian disease vectors and agricultural pests	2022
Navdeep Singh (with Dan Gillis) University of Guelph CIS*4900 · HACSim RShiny web application	2021
Maya Persram (with Bob Hanner) University of Guelph Hanner Lab volunteer · R reporting ecological meta-analysis	2020-present
Ashley Chen (with Bob Hanner) University of Guelph Hanner Lab volunteer · R reporting ecological meta-analysis	2020-present
Olivia Friesen Kroeker (with Bob Hanner) University of Guelph Hanner Lab volunteer · R reporting ecological meta-analysis	2020-present
Scarlett Bootsma (with Dan Gillis) University of Guelph CIS*4900/4910 · HACSim simulation study	2020-2021
Christina Fragel (with Bob Hanner) University of Guelph BINF*6999 · DNA barcode sequence classification with machine learning	2018-2019
Jiaojia (Paula) Yu (with Bob Hanner) University of Guelph BINF*6999 · MDMAPR R Shiny app	2018-2019
Danielle St. Jean (with Dan Gillis) University of Guelph MSc. thesis · DNA barcode sequence classification with machine learning	2018-2019
Steven French (with Dan Gillis) University of Guelph CIS*4900/4910 · HACSim R package	2018

Julia Harvie (with Bob Hanner)	2018-2019
University of Guelph	
MCB*4500/4510 · Data mining GenBank and BOLD	
Ankita Bhanderi (with Bob Hanner)	2018
University of Guelph	
BINF*6999 · Data mining GenBank and BOLD	

ASSISTANTSHIPS, AWARDS, SCHOLARSHIPS AND GRANTS

Graduate Teaching Assistantships	2017-2020
University of Guelph	\$34,506.00-35,148.00 CAD
Graduate Research Assistantships	2017-2019
University of Guelph	\$11,000.00 CAD
CPES Graduate Dean's Scholarship	2017
University of Guelph	\$3500.00 CAD
<ul style="list-style-type: none"> Awarded in recognition of achieving over 85% in Master's coursework 	
CPES Graduate Excellence Entrance (GEE) Scholarship	2016
University of Guelph	\$30000.00 CAD
<ul style="list-style-type: none"> Awarded in recognition of achieving over 85% in Master's coursework 	
Arthur D. Latornell Graduate Travel Grant	2019
University of Guelph	\$500.00 CAD
<ul style="list-style-type: none"> Awarded for first-class academic standing in Ph.D. coursework Supported travel to the 8th International Barcode of Life Conference in Trondheim, Norway to present work related to resource management and conservation 	
SoCS Travel Grant	2019
University of Guelph	\$1000.00 CAD
<ul style="list-style-type: none"> Supported travel to the 8th International Barcode of Life Conference in Trondheim, Norway to present doctoral research 	
Guelph Institute for Environmental Research Small Grants Program (GIER SGP)	2020
University of Guelph	\$15000 CAD (not funded)
<ul style="list-style-type: none"> 1-year postdoctoral funding to develop a Bayesian hierarchical binary logistic time-series regression model of seafood fraud in the Canadian supply chain 	
NSERC Postdoctoral Fellowship	2021
University of Waterloo	\$90000 CAD (not funded)
<ul style="list-style-type: none"> 2-year postdoctoral funding to develop an ensemble machine learning model for taxonomic classification of regulated species in Canada 	
Food from Thought Advancing Research Impact (ARIF) Fund	2022
University of Guelph	\$30000.00 CAD
<ul style="list-style-type: none"> 1-year postdoctoral funding to develop a Bayesian hierarchical binary logistic time-series regression model of seafood fraud in the Canadian supply chain 	

ACADEMIC SERVICE

School of Computer Science (SoCS) Search Committee	2018
University of Guelph	
• Associate Professor position in cybersecurity	
School of Computer Science (SoCS) Search Committee	2017-2018
University of Guelph	
• Two-year contractually-limited Assistant Professor position in cybersecurity	

ACADEMIC PEER REVIEW SERVICE

I have served as a reviewer for 17 manuscripts in 8 different journals, both alone or under the guidance of my PhD. supervisors.

<i>Ecology and Evolution</i> (2)	2021-2022
<i>F1000 Research</i> (1)	2022
<i>Frontiers in Ecology and Evolution</i> (2)	2022
<i>Lifestyle Genomics</i> (2)	2022
<i>Mitochondrial DNA Part A</i> (2)	2023
<i>Molecular Ecology Resources</i> (6)	2019-2022, 2023
<i>Molecular Biology Reports</i> (1)	2020
<i>Methods in Ecology and Evolution</i> (1)	2020

PROCEEDINGS

I have presented or attended graduate research at four national or international conferences, including both oral presentations and posters. Sessions listed here also include presentations by supervised undergraduate students.

Pathway to Increase Standards and Competency of eDNA Surveys (PICSeS)	2023
International Conference (poster presentation)	
University of Guelph	
8th International Barcode of Life Conference (oral presentation)	2019
NTNU University Museum and Norwegian Biodiversity Information Centre	
Guelph BioMathematics and Statistics (BioM&S) Symposium	
Artificial Intelligence and Machine Learning in Biology (attended)	2019
University of Guelph	
CEPS Undergraduate Poster Session (student poster presentation)	2018
University of Guelph	
7th International Barcode of Life Conference (oral presentation)	2017
University of Johannesburg	
6th International Barcode of Life Conference (poster presentation)	2015
University of Guelph	

SOFTWARE DEVELOPMENT

I have been directly or indirectly involved with the development and deployment of various software tools for molecular biodiversity analysis.

HACSim (**H**aplotype **A**ccumulation **C**urve **S**imulator) · R package · R Shiny web app

- A novel nonparametric stochastic (Monte Carlo) local search optimization method of iteratively generating species' haplotype accumulation curves through extrapolation to assess within-species sampling completeness
- R package and Shiny app respectively available for download through the Comprehensive R Archive Network ([CRAN](#)) package repository or at [shinyapps.io](#)
- Publication in *PeerJ Computer Science* was one of the top five most viewed papers in the category *Optimization Theory and Computation*
- Has been downloaded over 22000 times (c. 643 times per month) since being published in May 2019

VLF (**V**ery **L**ow **F**requency) · R package

- A tool to assess PCR errors, sequencing errors, etc. in the form of very low frequency variants, within DNA sequences using a sliding window approach
- R package available for download through [CRAN](#)
- Has been downloaded over 33000 times (c. 313 times per month) since publication
- Manuscript published in the *Biodiversity Data Journal*

REFEREED WORK

I have been directly or indirectly involved with the conceptualization, research, supervision and eventual publication of several academic and non-academic projects.

Journal Articles

Citations: 127 · H-index: 4 (According to Google Scholar, as of June 6, 2023)

* Indicates students under my direct mentorship or supervision

** Indicates students under my indirect mentorship or supervision

Published or Accepted

6. **Phillips, J.D.**, Athey, T.B.T., Hanner, R.H. and McNicholas, P.D. VLF: An R package for the analysis of very low frequency variants in DNA sequences. *Biodiversity Data Journal*, e96480. DOI: [10.3897/BDJ.11.e98480](#).

5. **Phillips, J.D.**, Gillis, D.J. and Hanner, R.H. (2022). Lack of statistical rigor in DNA barcoding likely invalidates the presence of a true species' barcode gap. *Frontiers in Ecology and Evolution*, 10: 859099. DOI: [10.3389/fevo.2022.859099](#).

4. D'Ercole, J., Dincă, V., Opler, P.A., Kondla, N.G., Schmidt, C.B., **Phillips, J.D.**, Robbins, R., Burns, J.M., Miller, S.E., Grishin, N., Zakharov, E.V., deWaard, J.R., Ratnasingham, S. and Hebert, P.D.N. (2020). A DNA barcode library for the butterflies of North America. *PeerJ*, 9: e11157. DOI: [10.7717/peerj.11157](#).

3. **Phillips, J.D.**, *French, S.H., Hanner, R.H. and Gillis, D.J. (2020). HACSim: An R package to estimate intraspecific sample sizes for genetic diversity assessment using haplotype accumulation curves. *PeerJ Computer Science*, 6(192): 1-37. DOI: [10.7717/peerj-cs.243](https://doi.org/10.7717/peerj-cs.243).
2. **Phillips, J.D.**, Gillis, D.J. and Hanner, R.H. (2019). Incomplete estimates of genetic diversity within species: Implications for DNA barcoding. *Ecology and Evolution*, 9(5): 2996-3010. DOI: [10.1002/ece3.4757](https://doi.org/10.1002/ece3.4757).
1. **Phillips, J.D.**, Gwiazdowski, R.A., Ashlock, D. and Hanner, R. (2015). An exploration of sufficient sampling effort to describe intraspecific DNA barcode haplotype diversity: examples from the ray-finned fishes (Chordata: Actinopterygii). *DNA Barcodes*, 3: 66-73. DOI: [10.1515/dna-2015-0008](https://doi.org/10.1515/dna-2015-0008).

Submitted or Under Revision

1. Young, R.G., **Persram, M., **Friesen, O., **Chen, A., **Yu, J., **Phillips, J.D.** and Hanner, R.H. (Under review). Incomplete and irregular reporting of the R statistical and computing environment highlights the need for citation guidelines to support scientific reproducibility. *PeerJ Computer Science*.

In Preparation or To Be Submitted

4. Morey, K.C., **Phillips, J.D.**, Loeza-Quintana, T. and Hanner, R.H. Haplotype diversity reveals challenges and opportunities for developing targeted detection assays for COI in Canadian freshwater fish. Targeted for *Environmental DNA*.
3. **Phillips, J.D.**, *Singh, N., Hanner, R.H. and Gillis, D.J. The HACSim R Shiny app: A web interface to estimate specimen sampling sufficiency for species genetic diversity assessment with DNA sequence data.
2. D'Ercole, J., Dapporto, L., **Phillips, J.D.**, Dincă, V.E., Vila, R., Talavera, G. and Hebert, P.D.N. Macrogenetics of North American butterflies—The impact of Quaternary climatic fluctuations. Targeted for *PNAS*.
1. **Phillips, J.D.**, *Bootsma, S.E., Hanner, R.H. and Gillis, D.J. Solving the genetic specimen sample size problem with a local search optimization algorithm. Targeted for *Methods in Ecology and Evolution*.

Book Chapters

Submitted or Under Revision

2. **Phillips, J.D.**, Griswold, C.K., Young, R.G., Hubert, N. and Hanner, R.H. A measure of the DNA barcode gap for applied and basic research. *Methods in Molecular Biology*. Springer.
1. Hubert, N., **Phillips, J.D.** and Hanner, R.H. Delimiting species with single-locus DNA sequences. *Methods in Molecular Biology*. Springer.

In Preparation or To Be Submitted

N/A

Conference Proceedings

4. Morey, K., Loeza-Quintana, T., **Phillips, J.** and Hanner R. (2023). Haplotype diversity reveals challenges and opportunities for developing targeted detection assays for COI in Canadian freshwater fish. Pathways to Increase Standards and Competency in eDNA Surveys (PISCeS) Conference. Poster.

3. **Phillips, J.D.**, Gillis, D. and Hanner, R. (2019). HACSim: Iterative extrapolation of haplotype accumulation curves for assessment of intraspecific COI DNA barcode sampling completeness Scientific abstracts from the 8th International Barcode of Life Conference, Trondheim, Norway (ed. Torbjørn Ekrem), *Genome*, 62(6): 349-453. Oral presentation.
2. **Phillips, J.D.**, Gillis, D. and Hanner, R. (2017). Intraspecific sample size estimation for DNA barcoding: Are current sampling levels enough? Scientific abstracts from the 7th International Barcode of Life Conference, Johannesburg, South Africa (ed. M. van der Bank), *Genome*, 60(11): 881-1019. Oral presentation.
1. **Phillips, J.D.**, Gwiazdowski, R.A., Ashlock, D. and Hanner, R. (2015). An exploration of sufficient sampling effort to describe intraspecific haplotype diversity in the ray-finned fishes (Chordata: Actinopterygii). Scientific abstracts from the 6th International Barcode of Life Conference, Guelph, ON., Canada (ed. S.J. Adamowicz), *Genome*, 58(5): 163-303. Poster

NON-REFEREED WORK

I have communicated aspects of my research to non-technical audiences through various online media.

Blog posts

6. **Phillips, J.D.** (2022) Mind the Gap — The DNA Barcode Gap, That Is. Contributed CEPS Research Highlights article (<https://www.uoguelph.ca/ceps/news/2022/08/mind-gap—dna-barcode-gap>).
5. **Phillips, J.D.** (2020). Barcode Cracking. Contributed CEPS Research Highlights article (<https://www.uoguelph.ca/ceps/news/2020/02/barcode-cracking>).
4. **Phillips, J.D.** (2020). Protecting Biodiversity Through the Lens of Genetic Diversity. Contributed guest post to the blog of Dr. Daniel Gillis (<https://danielgillis.wordpress.com/2020/01/30/protecting-biodiversity-through-the-lens-of-genetic-diversity/>).
3. **Phillips, J.D.** (2019). IBOL8 and the Midnight Sun. Contributed guest post to the blog of Dr. Daniel Gillis (<https://danielgillis.wordpress.com/2019/07/02/reflections-ibol8-and-the-midnight-sun/>).
2. **Phillips, J.D.** (2017). The Big Five and IBOL7. Contributed guest post to the blog of Dr. Daniel Gillis (<https://danielgillis.wordpress.com/2017/12/06/reflections-the-big-five-and-ibol7/>).
1. **Phillips, J.D.** (2016). Sample size estimation for DNA barcoding: Are current sampling levels enough? Contributed guest post to the DNA Barcoding Blog of Dr. Dirk Steinke (<http://dna-barcoding.blogspot.com/2016/01/guest-post-sample-size-estimation-for.html>).

Newsletters

1. **Phillips, J.D.** (2016). Sample size estimation for DNA barcoding of ray-finned fishes: Are current sampling levels enough? Contributed newsletter article to the Barcode Bulletin, 7(1).

VOLUNTEER EXPERIENCE

2. Pathways to Increase Standards and Competency in eDNA Surveys (PISCeS) Conference University of Guelph

2023

- Participated in international eDNA conference hosted by the Hanner Lab
- Duties included registration, upload, and audiovisual support

1. Wireframing session

2021

University of Guelph

- Participated in student-led use case mobile app prototype demonstrations for CIS*3750 – System Analysis and Design in Applications
- Graded students based on several factors via Qualtrics surveys

REFERENCES

Dr. Daniel Gillis
Associate Professor
School of Computer Science
University of Guelph
50 Stone Road East
Guelph, ON.
N1G 2W1
dgillis@uoguelph.ca

Dr. Deborah Stacey
Associate Professor
School of Computer Science
University of Guelph
50 Stone Road East
Guelph, ON.
N1G 2W1
dastacey@uoguelph.ca

Dr. Dirk Steinke
Associate Director – Analytics
Adjunct Professor
Centre for Biodiversity Genomics
Department of Integrative Biology
University of Guelph
50 Stone Road East
N1G 2W1
Guelph, ON.
(519) 824-4120 ext. 53759
dsteinke@uoguelph.ca

Dr. Robert Hanner
Full Professor
Department of Integrative Biology
Biodiversity Institute of Ontario
University of Guelph
Guelph, ON.
50 Stone Road East
N1G 2W1
(519) 824-4120 ext. 53479
rhanner@uoguelph.ca

Dr. Graham Taylor
Full Professor
School of Engineering
University of Guelph
50 Stone Road East
Guelph, ON.
N1G 2W1
(519) 824-4120 ext. 53644
gwtaylor@uoguelph.ca

Dr. Sarah Adamowicz
Associate Professor
Department of Integrative Biology
University of Guelph
50 Stone Road East
N1G 2W1
Guelph, ON.
(519) 824-4120 ext. 53055
sadamowi@uoguelph.ca