Jocelyn Pender
BIODIVERSITY DATA SCIENTIST

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Sackville, New Brunswick

Professional Experience

Conservation Data Analyst at the Atlantic Canada Conservation Data Centre, Sackville, New Brunswick
JULY 2021 — PRESENT

- I deployed Hidden Markov model classifiers via Kaleidoscope software to detect bat, bird and amphibian species from **autonomous recording unit data** collected at six sites on Prince Edward Island
- I build and tune **species distribution models** by assembling and processing environmental predictor datasets and species occurrence data, selecting model algorithms, deploying machine learning models, testing parameters, assessing multicollinearity and handling bias to develop actionable and reproducible model products
- By leveraging a high-performance computing cluster, I processed 50 TB of LiDAR data ("**big data**") to produce a metric of shrub density across New Brunswick. I developed and computationally optimized R and Bash scripts and utilized the job scheduler SLURM
- I developed a set of **modular** and **well-documented convenience scripts** in Python to automate the generation of biologically meaningful from LiDAR tiles (*work sample upon request*)
- I use **GIS software** (ArcGIS, arcpy) daily to develop map products and perform analyses to support field biologists
- I optimize the teams' data load workflow by writing R and Python scripts to **automate tasks** and by **revamping the Excel template** used to massage datasets. To increase adoption, I developed an online GitHub repository with a publicly available data dictionary
- As the lead of data integration, I developed a **PowerBI dashboard** to monitor our key performance metrics and implemented check-ins to identify blockers towards achieving our data integration target timelines
- I maintain the organization's website and develop data applications using R Shiny to enhance access and engagement
- I respond to external requests for biodiversity data by querying our **FileMaker database** and **meticulously prepare datasets** for load into the biodiversity database
- I facilitate a **Species Distribution Modelling Community of Practice** by crafting engaging monthly virtual 2-hour sessions, developing the group's website, and recruiting speakers and workshops. I **chair two working groups** that are developing resources to improve the quality and effectiveness of habitat models for Species At Risk.

Biodiversity Data Manager at Agriculture and Agri-Food Canada, Ottawa, Ontario
SEPTEMBER 2017 — JULY 2021

- I founded, developed materials for and led a lunch and learn series called **'Data Chats'** where scientists learned, practiced and discussed data management, data analysis and data science techniques relevant to biodiversity science (e.g., cleaning species distribution data in R)
- I launched the Flora of North America knowledge platform with my team. In February 2023, the site had **22.4K users** globally. I implemented project management tools, delivered workshops (e.g., at Botany 2020 and Botany 2021), developed requirements, designed the site's appearance and discovered and fixed website bugs
- I developed publicly available API wrappers in **R and Python** to enhance the programmatic accessibility of structured botanical data (e.g., taxonomy, distribution, morphology)
- I developed a proof-of-concept **multinominal NaiveBayes machine learning model** to prepare flora documents for more fine-grained parsing and data integration by annotating data types
- I was a champion for Git and other **open science technologies** and delivered a one-day Git training to researchers
- I **directly supervised** computer science and biology students, mentored a junior member of my team and regularly supported contractors. I established regular weekly meetings and provided training and check-ins to members of my team

Data Analyst at Fullscript, Ottawa, Ontario

APRIL 2016 — AUGUST 2017

- I served as the data point person at the **fastest-growing start-up** in Ottawa during my tenure as selected by the Ottawa Business Journal (2016, 2017)
- I designed Tableau **dashboards** to display key performance indicators and metrics and **distilled the results** of data analysis for decision-makers
- I issued SQL queries daily to extract relevant data from a **MySQL database** by understanding its schema documented via Entity Relationship Diagrams, as well as extracting data from other platforms like Salesforce
- I implemented **procedures for efficient prioritization** of incoming data requests from internal (C suite, marketing, customer support) and external customers
- I developed a statistical model to **project revenue growth** in partnership with a board member
- When the company grew beyond my capacity to deliver requisite data reports, I recruited and trained a data team lead
- I promoted a **data-driven, curious** and **scientifically rigorous** company culture

Math & Science Tutor and Organizational Coach, Prep Academy Tutors, Ottawa, Ontario

JANUARY 2018 – APRIL 2021

- I empowered students in grades 8-12 to approach math and science courses with confidence and build skills like **time management** and **task initiation**
- I emphasized multiple ways of understanding and I **communicated** to my students verbally, through diagrams and by using keywords
- My teaching philosophy emphasized **self-compassion, patience, organization** and a **'Darwinian approach'** to studying where students constantly incorporate new study techniques and select those that work best for them
- I was one of two exceptional non-certified teachers on the team who **delivered the same high-quality level of service** expected of certified teacher staff

Research Affiliate in Bioinformatics, at Agriculture and Agri-Food Canada, Ottawa, Ontario

DECEMBER 2015 – MARCH 2016

- I investigated the potential of **Wikidata** and **Semantic MediaWiki** for the management and dissemination of floral data
- I deployed **Natural Language Processing algorithms**, managed, curated and analyzed botanical text data
- I developed scripts in the **Ruby programming language** to parse bibliographic data and produce fine-grained XML files

Teaching Assistant, University of Ottawa, Ottawa, Ontario

SEPTEMBER 2013 – AUGUST 2015

Computational Tools for Biological Sciences	I introduced upper-year biology students to **data analysis** and **visualization in MATLAB**. I aided in script design, debugged code and creatively fixed problems
Field Course in Environmental Science	In **French** and **English**, I provided pedagogical support and field assistance to hydrogeology students in Deep River, Ontario
Introduction to Plant Science: Biodiversity to Biotechnology	I coordinated lab sessions with 20 students and **delivered pre-lab talks every other week**. **I communicated** experimental protocols, introduced the principles of microscopy and helped students to develop an understanding of plant structures and function

Plant Science Technician, Fachhochschule Bingen, Bingen, Germany

JUNE 2013 – SEPTEMBER 2013

This internship was granted under the 2013 German Academic Exchange Service (DAAD) Research Internships in Science and Engineering (RISE) scholarship program

- I supported **agricultural research** in the **Plant Protection group** on a project evaluating the efficiency of reduced herbicide doses on weed control in wheat and barley fields
- I planned **greenhouse experiments**, sowed seeds, assisted in plant care, collected and analyzed experiment data
- I conducted **field experiments** using plot treatments, collected data using techniques such as quadrat sampling and percent cover estimation, assisted with crop harvesting and grain cleaning, compiled data and assisted with analysis

Research Assistant in Computational Biology, University of Ottawa, Ontario

SEPTEMBER 2012 – APRIL 2013

- I cared for *Arabidopsis thaliana* plants for various scientific projects investigating and quantifying growth patterns in leaves (sowing of seeds, imaging of leaves, dissection and mounting of leaves for microscopy)
- I imaged live plants and wet mounts of *A. thaliana* leaves with the Leica Z16 APO A MacroFluo fluorescence macroscope
- I processed data using MATLAB programs and **developed MATLAB scripts** to extract growth variables

Herbarium Curatorial Assistant, Université Lyon 1, Lyon, France
JULY 2012 – AUGUST 2012
- I meticulously restored and mounted 19th-20th century herbarium specimens and rearranged specimens not properly stowed in the herbarium, often resolving taxonomic issues
- I created digital inventories for and indexed three separate mycological collections and updated the online database of Herbarium specimens (imaging and databasing of specimens)
- I responded to requests for specimen loans

Research Assistant in Plant Systematics at the Canadian Museum of Nature, Aylmer, Quebec
JANUARY 2011 – AUGUST 2011
- I routinely performed DNA extraction, PCR and DNA sequencing (Sanger sequencing)
- I utilized the online database GenBank and submitted DNA sequences collected by lab members
- I developed a database (BRAHMS software) housing >460 specimens and associated herbaria label information
- I used a Scanning Electron Microscope for high-quality images of achenes (small fruit structures found in sedges)
- I collected plant locality data and subsequently created species distribution maps using **GIS software** (ArcGIS 9.3, 10) and georeferencing techniques
- I employed MaxEnt (a species distribution modelling **machine learning** software) as an investigatory analysis tool to find patterns in habitat colonization of five related species
- To ensure my research and learning persisted in the lab group, I authored tutorials for use by future lab members: (1) georeferencing, (2) mapping and (3) MaxEnt

Junior Analyst in the Pollution Data Division, Environment Canada, Gatineau, Quebec
JANUARY 2011 – AUGUST 2011
- I collaborated with GIS analysts to produce criteria air contaminant emission density maps of Canada for publication and public use (ArcGIS 9)
- I assisted with latitude longitude verification for a GIS project (Google Earth)
- I was responsible for uploading and editing content for the National Pollutant Release Inventory during my tenure
- I researched, compiled background information, edited and improved reports published by the Division

Education

M.Sc. Biology Specialization Bioinformatics
SEPTEMBER 2013 — MARCH 2016
University of Ottawa and the Canadian Museum of Nature, Aylmer, Quebec
Thesis: Climatic niche estimation, trait evolution and species richness in North American *Carex* (Cyperaceae)
Thesis Advisors: Julian Starr (University of Ottawa) and Andrew Hipp (The Morton Arboretum, Lisle IL, USA)
My work resulted in two first author scientific publications
- I investigated the evolutionary past of a group of plants using **heterogeneous datasets** and the **R programming language**
- I developed scripts to extract trait data from text, pulled locality data from online biodiversity databases (GBIF), developed climatic and habitat niche inferences using geospatial data and sequenced DNA from botanical specimens to develop a phylogeny of nearly all 480 North American *Carex* species
- To ensure my climatic niche inference methodology was valid, I evaluated data against more vetted and complete yet coarser distribution data, to test the sensitivity of climatic niche inferences to distribution data sampling. This work has been **cited 17 times since 2019**
- I supervised a summer student by providing appropriate learning opportunities and challenging work

B.Sc. Environmental Science with Honours, Specialization Biodiversity & Conservation
SEPTEMBER 2008 — AUGUST 2013
University of Ottawa, Ontario, Canada
Summa Cum Laude
Thesis: Environmental and Genetic Control of Leaf Growth
Thesis Advisor: Anne-Gaëlle Rolland-Lagan
SEPTEMBER 2011 — AUGUST 2012
International Exchange Program: BSc. Biology, **Université Lyon 1, France**

Publications

JE Pender, AL Hipp, M Hahn, JR Starr. 2021. Trait evolution rates shape continental patterns of species richness in North America's most diverse angiosperm genus (*Carex*, Cyperaceae). Journal of Systematics and Evolution 59 (4), 763-775. https://doi.org/10.1111/jse.12739.

J Sachs, R Page, SJ Baskauf, **J Pender**, B Lujan-Toro, J Macklin, Z Compson. 2019. Training and hackathon on building biodiversity knowledge graphs. Research Ideas and Outcomes 5, e36152. https://doi.org/10.3897/rio.5.e36152

JE Pender, AL Hipp, M Hahn, J Kartesz, M Nishino, JR Starr. 2019. How sensitive are climatic niche inferences to distribution data sampling? A comparison of Biota of North America Program (BONAP) and Global Biodiversity Information Facility … Ecological Informatics 54, 100991. https://doi.org/10.1016/j.ecoinf.2019.100991

D Spalink, **J Pender,** M Escudero, AL Hipp, EH Roalson, JR Starr, MJ Waterway, L Bohs, KJ Sytsma. 2018. The spatial structure of phylogenetic and functional diversity in the United States and Canada: An example using the sedge family (Cyperaceae). Journal of Systematics and Evolution 56 (5), 449-465. https://doi.org/10.1111/jse.12423

P Jiménez-Mejías, M Hahn, K Lueders, JR Starr, BH Brown, BN Chouinard, KS Chung, M Escudero, BA Ford, KA Ford, S Gebauer, B Gehrke, MH Hoffmann, XF Jin, J Jung, S Kim, M Luceño, E Maguilla, S Martín-Bravo, M Míguez, A Molina, RFC Naczi, **JE Pender**, AA Reznicek, T Villaverde, MJ Waterway, KL Wilson, JC Yang, S Zhang, A Hipp, EH Roalson. 2016. Megaphylogenetic specimen-level approaches to the *Carex* (Cyperaceae) phylogeny using ITS, ETS, and matK sequences: implications for classification. Systematic Botany 41 (3), 500-518. https://doi.org/10.1600/036364416X692497

Awards & Honours

2021	Ontario Volunteer Service Award (5 Years of Service)
2014 — 2015	NSERC Canada Graduate Scholarships-Master's (CGS M) award for research excellence
2014	University of Ottawa Department of Biology Scholarship awarded for volunteer work
2014	Robert J. Desnoyers Memorial Fund Scholarship awarded for volunteer work
2013	German Academic Exchange Service (DAAD) Research Internships in Science and Engineering (RISE) scholar
2012 — 2013	TD Green Scholarship for studies in Environmental Development awarded for academic excellence
2012 — 2013	Science Students' Association Scholarships Award for Research Excellence in an Undergraduate Honour's thesis
2012 — 2013	Students Federation of the University of Ottawa Educational Foundation Scholarship Fund for Ontario Students community involvement and improvement
2012 — 2013	Comsatec Scholarship awarded involvement in university activities
2010 — 2011	Student Federation of the University of Ottawa Volunteer of the Year, the top award for on-campus volunteering excellence
2010 – 2011	Ontario International Education Opportunity Scholarship
2008 — 2013	Dean's Honour list at the University of Ottawa
2008 — 2013	University of Ottawa Admission Scholarship, awarded for academic excellence

Recent Professional Development

JAUNARY 2022 — DECEMBER 2022	Women in Communication and Technology Mentorship Program
NOVEMBER 2021	NatureServe Core Methodology Training
MAY 2021 — MAY 2022	Dr. Roberta Bondar STEM Career Development Program Participant
JULY 2021	Software Design for Scientists
FEBRUARY 2021	Deep Learning for Natural Language Processing, Learning Tree International

Recent Presentations & Posters

2021   **J Pender**. Invited speaker at the Careers in Botany Luncheon. Botany 2021 Conference.   PANELLIST

2020   **J Pender**, J Sachs, B Lujan-Toro, J Macklin. Even Simple Habitat Ontologies are Hard to Use. Biodiversity Information Science and Standards 4, e59190. https://doi.org/10.3897/biss.4.59190. TDWG 2020 Conference.   PRESENTATION

2020   D Shorthouse, **J Pender**, R Rabeler, J Macklin. Digitization of US Herbaria-How close did we get to the 2020 goal? Biodiversity Information Science and Standards 4, e59166. https://doi.org/10.3897/biss.4.59166. TDWG 2020 Conference.   PRESENTATION

2020   **J Pender,** J Macklin, J Sachs, B Lujan-Toro, G Levin. A Digital Flora of North America for a Digital Age: An Interactive Session with the Flora of North America. Botany 2020 Conference.   WORKSHOP
- The workshop content is available here.
- See this online Botany One article written about the workshop.

2019   J Sachs, **J Pender**, B Lujan-Toro, J Macklin, P Haase, R Malik. 2019. Using Wikidata and Metaphactory to Underpin an Integrated Flora of Canada. Biodiversity Information Science and Standards 3, e38627. https://doi.org/10.3897/biss.3.38627. TDWG 2019 Conference.   PRESENTATION

2019   **J Pender.** Flora Prepper: Preparing floras for morphological parsing and integration. Biodiversity Information Science and Standards 3, e37743. TDWG 2019 Conference.   POSTER

2018   **J Pender**. Leveraging Industry Visualization Tools for Biodiversity Science. Biodiversity Information Science and Standards. TDWG 2018 Conference.   PRESENTATION

2018   **J Pender**, JL Sachs, J Macklin, H Cui, A Vallance, B Lujan-Toro, T Rodenhausen, M Belisle-Leclerc, G Levin. Bringing a Semantic MediaWiki Flora to Life. Biodiversity Information Science and Standards 2, e25885. https://doi.org/10.3897/biss.2.25885. TDWG 2018 Conference.   POSTER

2018   **J Pender**. Challenges in building a botanical knowledge portal based on knowledge extracted from taxonomic treatments. Exploring Taxon Concepts Workshop.   PRESENTATION

2018   **J Pender**. Biodiversity to Business. Data Science Bootcamp. See my blog post about the event here.   PRESENTATION

2017   **J Pender**. Fullscript Growth Model. Fullscript Lunch & Learn.   PRESENTATION

2015   **J Pender**, J Starr, RFC Naczi, M Hahn, A Hipp. Ecological diversification and niche evolution in the temperate zone's largest genus: *Carex*. Botany 2015 Conference Symposium.   PRESENTATION

Recent Volunteer Experience

Girl Guides of Canada
2016— PRESENT

**1st Sackville Pathfinders
Contact Guider
Sackville, New Brunswick**
2022— PRESENT

**16th Ottawa Guides
Contact Guider
Ottawa, Ontario**
2016 — 2022

**Juliette Low Seminar
Cuernavaca, Mexico**
NOVEMBER 2019 – APRIL 2021

- My role in the Girl Guiding movement allows me to impart my **passion for nature, science, female empowerment** and **curiosity** to girls
- As the facilitator of this group of 12 to 14 year old girls, I provide leadership opportunities for the girls to develop their own program through **strategic** and **thoughtful planning**
- To deliver an enriching program, I conducted extensive activity planning, preparation, activity execution, maintained consistent communication with parents and coordinated a **shared leadership** model within the team of 16th Ottawa Guides volunteers
- We maintained a **waitlist** each year for our group of 30 girls aged 8 to 12
- In 2019 I took the trip of a lifetime to learn about **leadership practice** at the World Association of Girl Guides and Girl Scouts' world centre Our Cabaña in Mexico
- As part of my training, I independently planned and executed a project to deliver **virtual weekend camps to teach over 120 girls** aged 12-15 about leadership

Science Demonstrator, Let's Talk Science, Ottawa, Ontario
2014— 2017
- I delivered **hands-on science activities** in elementary and high schools across Ottawa
- I executed lesson plans and tailored content to children's developmental stages

Instructional Support at the Data Carpentry Workshop, Biodiversity Information Standards (TDWG) conference, Ottawa, Ontario
2017
- I provided **OpenRefine** and R support to ensure learners gained **fundamental data skills** to accelerate their research

Technical Skills

Data Analysis
Data Science
Data Management
Programming
Database Interrogation

Non–Technical Skills

Leadership and Teamwork
Compassion
Empathy
Speaking
Effective Teaching
Scientific Writing
Adaptation
Problem Solving
 Curiosity

Software & Tools

ArcGIS Pro, ArcMap, ArcCatalog
Google Earth
Python (arcpy, numpy, pandas)
R
Git (GitHub, BitBucket)
Bash
PowerShell
Docker
MATLAB
Ruby
Tableau
Power BI
MySQL
FileMaker
Microsoft SQL Server
HTML, CSS
Jekyll
XML
Wiki, Semantic MediaWiki
Excel
Visual Studio Code
DNA Sequencing Software
Zoom, Teams

Languages

- I am competent in **oral** and **written French**
- I obtained a **Second-Language Certification in French as a second language** through the University of Ottawa Official Languages and Bilingualism Institute in 2012

Hobbies

Swimming in lakes, cycling in the Gatineau hills, snapping photos of plants with iNaturalist, weight training, non-fiction reading and podcasts.

Contact Me!

All my socials can be found at jocelynpender.github.io

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