

# Fiona M Soper

Assistant Professor  
 Vice Graduate Program Director  
 Biology + Bieler School of Environment  
 McGill University  
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## PROFESSIONAL EXPERIENCE

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2020- Assistant Professor, McGill University  
*William Dawson Scholar (2026-2031)*  
*Maternity leave Mar-Dec 2022*

2018-19 Postdoctoral Research Associate, Cornell University

2016-18 Postdoctoral Research Associate, University of Montana

2009 Research Projects Officer, Commonwealth Scientific and Industrial Research Organisation

## EDUCATION

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Ph.D. Cornell University (Ecology and Evolutionary Biology), May 2016

B.Sc. Hons University of Queensland, Australia (Botany), Dec 2008

## PUBLICATIONS

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*H-index: 24 Total citations: 1670* ([Google Scholar](#))

Supervised McGill \*graduate student/post doc or ^undergraduate co-author

### *In review or revision*

Ana Avila\*, **FM Soper**, B Leung. Hidden lags and spatial context reveal increased Amazon climate mitigation potential. In revision at ***Global Change Biology***

**FM Soper**, M Gautreau\*, K Andersen, X Guilbeault-Meyers\*, C Dallstream\*. Where does symbiotic nitrogen fixation fit in the root economics spectrum? In revision at ***New Phytologist***

X Guilbeault-Meyers\*, C Dallstream\*, M Gautreau\*, **FM Soper**. Reconciling the root economics space across scales: Connecting global patterns and local adaptations. Submitted to ***Plant and Soil***

DNL Menge, CRG Reis, SS Perakis, S Kou-Giesbrecht, CC Cleveland, SC Reed, BN Taylor, SA Batterman, TE Crews, KA Dynarski, J Funk, MG Gei, KL Griffin, MJ Gundale, DF Herridge, SE Jovan, MB Peoples, J Piipponen, E Rodríguez-Caballero, VG Salmon, **FM Soper**, AP Staccone, B Weber, A Wolf, N Wurzbürger. Global carbon investment in terrestrial biological nitrogen fixation. In revision at ***Global Biogeochemical Cycles***

### *Published or accepted*

1. S Kou-Giesbrecht, CRG Reis, SS Perakis, CC Cleveland, DNL Menge, SC Reed, BN Taylor, SA Batterman, CM Clark, TE Crews, KA Dynarski, J Funk, MG Gei, KL Griffin, MJ Gundale, DF Herridge, SE Jovan, MB Peoples, J Piipponen, E Rodríguez-Caballero, VG Salmon, **FM Soper**, AP Staccone, B Weber, C Williams, N Wurzbürger (2025) Overestimated natural biological nitrogen fixation translates into an exaggerated CO<sub>2</sub> fertilization effect in Earth System Models. ***Proceedings of the National Academy of Sciences*** 122: e2514628122 (JIF = 9.1)

\*\*\* **Featured on** [Earth.com](#), [SciTechDaily](#), [Phys.org](#)

2. CRG Reis, SS Perakis, CC Cleveland, DNL Menge, SC Reed, BN Taylor, SA Batterman, CM Clark, TE Crews, KA Dynarski, MG Gei, MJ Gundale, DF Herridge, SE Jovan, S Kou-Giesbrecht, MB Peoples, J Piipponen, E Rodríguez-Caballero, VG Salmon, **FM Soper**, AP Staccone, B Weber, CA Williams, N Wurzbürger (2025) Global terrestrial biological nitrogen fixation and its modification by agriculture. *Nature* 643:705-711 (JIF = 48.5)  
**\*\*\* Featured on [BBC World Service \(Science in Action\)](#), [AGU Eos magazine](#), [The Microbiologist](#), [Earth.com](#) and others. Top 5% of research outputs scored by [Altmetric](#)**
3. C Dallstream\*, L Milder^, J Powers, **FM Soper** (2025) Strong scale-dependent relationships between fine-root function and soil conditions uncovered with spatially-coupled sampling. *New Phytologist* 246:2506-2521 (JIF = 8.1)
4. M Marcellus\*, EM Goud, N Swartz^, E Brown^, **FM Soper** (2024). Evolutionary history and root trait coordination predict nutrient strategy in tropical legume trees. *New Phytologist* 243:1711-1723 (JIF = 8.1)
5. C Dallstream\*, **FM Soper** (2024) Integrating edaphic gradients and community assembly concepts into the root trait space (Invited commentary). *New Phytologist* 243:509-512 (JIF = 8.1)
6. D Yaffar, LF Lugli, MY Wong, RJ Norby, SD Addo-Danso, M Arnaud, AL Cordeiro, LH Dietterich, MH Diaz-Toribio, MY Lee, O Prakash Ghimire, CM Smith-Martin, L Toro, K Andersen, LA McCulloch, IC Meier, JS Powers, M Sanchez-Julia, **FM Soper**, DF Cusack (2024). Tropical root responses to global changes: a synthesis. *Global Change Biology* 30:e17420 (JIF = 12.1)
7. C Dallstream\*, M Weemstra, **FM Soper** (2023) A framework for fine-root trait syndromes: syndrome coexistence may support phosphorus partitioning in tropical forests. *Oikos* 2023:e08908 (JIF = 3.0)
8. **FM Soper**, KS Sparks, RJ Cole, CP Giardina, CM Litton, JP Sparks (2023) Inconsistent recovery of nitrogen cycling after feral ungulate removal across three tropical island ecosystems. *Biogeochemistry* 167:651-663 (JIF = 3.7)
9. CC Cleveland, CRG Reis, SS Perakis, KA Dynarski, SA Batterman, TE Crews, M Gei, MJ Gundale, DNL Menge, MB Peoples, SC Reed, VG Salmon, **FM Soper**, BN Taylor, MG Turner, N Wurzbürger (2022). Exploring the role of cryptic nitrogen fixers in terrestrial ecosystems: a frontier in nitrogen cycling research *Ecosystems* 25:1653-1669 (JIF = 3.3)
10. L Toro, D Pereira Arias, D Peres-Aviles, G Vargas, **FM Soper**, J Gutknecht, J Powers (2022) Phosphorus limitation of early growth differs between nitrogen fixing and non-fixing dry tropical forest trees. *New Phytologist* 237:766-779 (JIF = 8.1)
11. KA Dynarski, **FM Soper**, SC Reed, WR Wieder, CC Cleveland (2022) Patterns and controls of foliar nutrient stoichiometry and flexibility across United States forests. *Ecology* 104:e3909 (JIF = 4.3)
12. **FM Soper**, C Simon^, SV Jaus (2021) Measuring terrestrial nitrogen fixation by the Acetylene Reduction Assay: Is three really the magic ratio? *Biogeochemistry* 152:345-351 (JIF = 3.7)
13. **FM Soper**, BN Taylor, JB Winbourne, MY Wong, KA Dynarski, CRG Reis, MB Peoples, CC Cleveland, S Reed, DNL Menge, SS Perakis (2021) A roadmap for sampling and scaling biological nitrogen fixation in terrestrial ecosystems. *Methods in Ecology and Evolution* 12:1122-1137 (JIF = 6.2)
14. K Covey, **FM Soper**, S Pangala, A Bernardino, Z Pagliaro, L Basso, H Cassol, P Fearnside, D Navarrete, S Novoa, H Sawakuchi, T Lovejoy, J Marengo, CA Peres, J Baillie, P Bernasconi, J Camargo, C Freitas, B Hoffman, GB Nardoto, I Nobre, J Mayorga, R Mesquita, S Pavan, F Pinto, F Rocha, R de Assis Mello, A Thuault, AA Bahl, A Elmore (2021) Carbon and Beyond: The biogeochemistry

of climate in a rapidly changing Amazon. *Frontiers in Forests and Global Change* 4:1-11 (JIF = 3.2)

\*\*\* **Featured in [The Smithsonian Magazine](#), [National Geographic online](#), [CNN](#), [NPR](#), [New Republic](#), [Mongabay](#), and others. Top 5% of research outputs scored by [Altmetric](#). 75,000 views, 6,400 downloads.**

15. D Cusack, ... [C Dallstream\\*](#), ... **FM Soper** et al. [38 authors, alphabetical order] (2021) Tradeoffs and synergies in tropical forest root traits for nutrient and water acquisition: field and modeling advances. *Frontiers in Forests and Global Change* 4:704469 (JIF = 3.2)
16. BB Osborne, **FM Soper**, MK Nasto, D Bru, S Hwang, MB Machmuller, ML Morales, L Philippot, BW Sullivan, GP Asner, CC Cleveland, AR Townsend, S Porder (2021) Litter inputs drive patterns of soil nitrogen heterogeneity in a diverse tropical forest. *Soil Biology and Biochemistry* 158:108247 (JIF = 9.8)
17. RJ Cole, **FM Soper**, CM Litton, AE Knauf, K Sparks, KG Gerow, GP Giardina, JP Sparks (2021) Restoration benefits of soil nutrient manipulation and weeding in invaded dry and wet tropical ecosystems in Hawai'i. *Restoration Ecology* 29:e13390 (JIF = 2.7)
18. G McNicol, Z Yu, ZC Berry, N Emery, **FM Soper**, W Yang (2021) Tracing plant-environment interactions from plant to planetary scales using stable isotopes: a mini-review. *Emerging Topics in Life Science* 5:301-316 (JIF = 3.3)
19. BB Osborne, MK Nasto, **FM Soper**, GP Asner, CS Balzotti, CC Cleveland, PG Taylor, AR Townsend, S Porder (2020) Leaf litter inputs reinforce islands of nitrogen fertility in a lowland tropical forest. *Biogeochemistry* 147:293-206 (JIF = 3.7)
20. AE Eller, **FM Soper**, JP Sparks (2020) The influence of elevated CO<sub>2</sub> on phenology of *Arabidopsis thaliana* (Brassicaceae) is altered by common air pollutants (NO<sub>2</sub> and O<sub>3</sub>) and soil nitrogen. *Journal of the Torrey Botanical Society* 147:156-166 (JIF = 0.8)
21. **FM Soper**, RA MacKenzie, S Sharma, TG Cole, CM Litton, JP Sparks (2019) Non-native mangroves support carbon storage, sediment carbon burial and accretion of coastal ecosystems. *Global Change Biology* 25:4315-4326 (JIF = 12.1)

\*\*\* **Gene E. Likens Outstanding Publication Award, Ecological Society of America**

22. **FM Soper** (2019) Three's a crowd: Triple-isotope analysis traces alternate plant nitrogen nutrition pathways (Invited commentary). *New Phytologist* 223:1687-1689 (JIF = 8.1)
23. AH Halbritter, H de Boeck... **FM Soper** et al. [90 authors] (2019) The handbook for standardized field and laboratory measurements in terrestrial climate change experiments and observational studies. *Methods in Ecology and Evolution* 11:22-37 (JIF = 6.2)
24. B Sullivan, RL Nifong, MK Nasto, S Alvarez Clare, C Dencker, **FM Soper**, KT Shoemaker, FY Ishida, J Zaragoza-Castells, EA Davidson, CC Cleveland (2019) Biogeochemical recuperation of lowland tropical forest during succession. *Ecology* 100:e02641 (JIF = 4.3)
25. PG Taylor, C Cleveland, **FM Soper**, W Wieder, SZ Dobrowski, CE Doughty, AR Townsend (2019) Greater stem growth, woody allocation and above ground biomass in Paleotropical versus Neotropical forests. *Ecology* 100:e02589 (JIF = 4.3)
26. **FM Soper**, B Sullivan, B Osborne, A Shaw, C Cleveland (2019) Leaf cutter ants engineer large N<sub>2</sub>O hot spots in tropical forests. *Proceedings of the Royal Society B* 286:1-7 (JIF = 3.5)

\*\*\* **Featured in [New Scientist](#), [Science magazine](#), [Europa Press](#), and others. Top 5% of research outputs scored by [Altmetric](#).**

27. **FM Soper**, M Nasto, BB Osborne, CC Cleveland (2018) Nitrogen fixation and foliar nitrogen do not predict phosphorus acquisition in tropical trees. *Journal of Ecology* 107:118-126 (JIF = 5.6)
28. **FM Soper**, B Sullivan, M Nasto, BB Osborne, D Bru, C Balzotti, P Taylor, G Asner, A Townsend, L Philippot, S Porder, CC Cleveland (2018) Remotely sensed canopy nitrogen influences N<sub>2</sub>O emissions in a lowland tropical rainforest. *Ecology* 99:2080-2089 (JIF = 4.3)
29. **FM Soper**, S Chamberlain, S Gregor, J Crumsey, L Derry, JP Sparks (2018) Biological cycling of mineral nutrients in a temperate forested shale catchment. *JGR Biogeosciences* 123:3204-3215 (JIF = 3.5)
30. SM Freund, **FM Soper**, SR Poulson, PC Selmants, BW Sullivan (2018) Actinorhizal species influence plant and soil nitrogen in semiarid shrub-dominated ecosystems in the western Great Basin. *Journal of Arid Environments* 157:48-56 (JIF = 2.5)
31. **FM Soper**, PG Taylor, W Wieder, S Weintraub, C Cleveland, S Porder, A Townsend (2017) Low rates of gaseous nitrogen loss point to conservative nitrogen cycling in a lowland tropical forest watershed. *Ecosystems* 21:901-912 (JIF = 3.3)
32. **FM Soper**, JP Sparks (2017) Estimating ecosystem nitrogen addition by a leguminous tree: a mass balance approach using a woody encroachment chronosequence. *Ecosystems* 20:1164-1178 (JIF = 3.3)
33. **FM Soper**, CK McCalley, K Sparks, JP Sparks (2016) Soil carbon dioxide emissions from the Mojave Desert: isotopic evidence for a carbonate source. *Geophysical Research Letters* 44:245-251 (JIF = 4.6)
34. **FM Soper**, PM Groffman, JP Sparks (2016) Denitrification in a subtropical, semi-arid savanna: field measurements and intact soil core incubations. *Biogeochemistry* 128:257-266 (JIF = 3.7)
35. **FM Soper**, TW Boutton, PM Groffman, JP Sparks (2016) Nitrogen trace gas fluxes from a semi-arid subtropical savanna under woody legume encroachment. *Global Biogeochemical Cycles* 30:614-628 (JIF = 5.5)
36. **FM Soper**, AE Richards, I Siddique, MPM Aidar, GD Cook, LB Hutley, N Robinson, S Schmidt (2015) Natural abundance ( $\delta^{15}\text{N}$ ) indicates shifts in nitrogen relations of woody taxa along a savanna-woodland continental rainfall gradient. *Oecologia* 178:297-308 (JIF = 2.3)
37. **FM Soper** TW Boutton, JP Sparks (2015) Investigating patterns of symbiotic nitrogen fixation during vegetation change from grassland to woodland using fine scale  $\delta^{15}\text{N}$  measurements. *Plant, Cell & Environment* 38:89-100 (JIF = 6.3)
38. **FM Soper**, C Paungfoo-Lonhienne, R Brackin, D Rentsch, S Schmidt, N Robinson (2011) *Arabidopsis* and *Lobelia anceps* access small peptides as a nitrogen source for growth. *Functional Plant Biology* 38:788-796 (JIF = 2.7)
39. N Robinson, R Brackin, K Vinall, **FM Soper**, J Holst, H Gamage, C Paungfoo-Lonhienne, H Rennenberg, H Lakshmanan, S Schmist (2011) Nitrate paradigm does not hold up for sugarcane. *PloS ONE* 6(4):e19045

#### Databases

1. CRG Reis, SS Perakis, CC Cleveland, DNL Menge, SC Reed, BN Taylor, SA Batterman, CM Clark, TE Crews, KA Dynarski, MG Gei, MJ Gundale, DF Herridge, SE Jovan, S Kou-Giesbrecht, MB Peoples, J Piipponen, E Rodríguez-Caballero, VG Salmon, **FM Soper** et al. (2025) A global dataset of terrestrial biological nitrogen fixation. *Scientific Data* 12:1362

2. AL Cordeiro, DF Cusack, N Guerrero-Ramírez, RJ Norby, L Toro, MY Wong, SJ Wright, KCabugao, KM Andersen, L Fuchslueger, CM Iversen, **FM Soper** et al. (2025) TropiRoot 1.0- Tropical root database of characteristics across environmental variation. *Ecology* 106:5, e70074
3. D Falster, ...**FM Soper** et al. [105 authors, alphabetical order] (2021) AusTraits: a curated plant trait database for the Australian flora. *Scientific Data* 8:254
4. CM Iversen, ML McCormack, JK Baer, AS Powell, W Chen, C Collins, Y Fan, N Fanin, GT Freschet, D Guo, JA Hogan, L Kou, DC Laughlin, E Lavelly, R Liese, D Lin, IC Meier, A Montagnoli, C Roumet, CR See, **FM Soper**, M Terzaghi, OJ Valverde-Barrantes, C Wang, SJ Wright, N Wurzbürger, M Zadworny (2021) Fine Root Ecology Database (FRED) Version 3.0.

#### Non-peer reviewed

1. N Bogayevsky<sup>^</sup>, M Cuevas Morales<sup>^</sup>, S Escallon<sup>^</sup>, S Montpetit<sup>^</sup>, C Mora<sup>^</sup>, E Ricard<sup>^</sup>, A Theriault<sup>^</sup>, A Zavelsky<sup>^</sup>, **FM Soper** 'Creek 53 Land Stewardship Priorities 2025-2028' (2025). Conservation plan for land trust in Hudson, QC. <https://creek53.org/pages/land-stewardship-priorities-2025-2028>
2. C Flynn<sup>^</sup>, R Fakhri, K Gehring, **FM Soper** (2024) Small heat shock Proteins (HSPs) identified in nodules of tropical woody legumes. *BioRxiv*. Pre-print.
3. D Cusack, S Reed, KM Andersen, D Cinoğlu, ME Craig, LH Dietterich, JA Hogan, JA Holm, AT Nottingham, R Ostertag, **FM Soper**, TE Wood, M Wong (2024) Tropical Forests and Global Change: Biogeochemical Responses and Opportunities for Cross-Site Comparisons, an organized INSPIRE session at the 108<sup>th</sup> Annual Meeting, Ecological Society of America, Portland, Oregon, USA, August 2023. *New Phytologist* 241:1922-1926.
4. **FM Soper**, JP Sparks, HW Greene, C McLinn (2014) Handbook: 'Empowering tomorrow's field instructors: A coupled graduate-undergraduate course for teaching research mentorship in a field context' Cornell University Centre for the Integration of Research, Teaching, and Learning

#### RESEARCH GRANTS

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As Principal Investigator unless indicated. <sup>^</sup>Pre-2020 values in \$USD

2026-2031	McGill William Dawson Scholar Research Stipend	\$75,000
2025-2026	McGill Bieler School of Environment IGNITE Research Award ' <i>Integrating social-ecological understanding to promote climate resiliency of traditional indigenous agriculture in Central America</i> ' (PI with Co-PIs Yann le Poulain de Waroux, Catherine Potvin)	\$50,000
2025-2028	NOVA FRQNT-NSERC Program for Junior Researchers (PI with Co-PIs Sian Kou-Giesbrecht, Dalhousie University, Sara Knox, McGill) ' <i>Global change impacts on tropical greenhouse gas fluxes: field data-model integration</i> '	\$225,000
2024	NSERC Research Tools and Infrastructure (Co-PI with Sian Kou-Giesbrecht, Dalhousie University) ' <i>Soil N<sub>2</sub>O emissions from the Canadian boreal to Neotropical forests</i> '	\$150,00
	Bieler School of Environment Spark Grant (Co-PI w Christie Lovat) ' <i>Rescuing the American chestnut: A user guide for identifying nutrient deficiency in cultivation</i> '	\$7,000
2022-2024	FRQNT Research Support for New Academics ' <i>Tropical root responses to eCO<sub>2</sub>: a paired lab and field approach</i> '	\$50,800

2022-2023	Bieler School of Environment Ignite Grant (Co-PI w Brian Leung, Graham McDonald, Kevin Manaugh) <i>'Estimating the urban nutrient footprint in Panama City and its ecological impact'</i>	\$50,000
2022	Bieler School of Environment Spark Grant (Co-PI w Cynthia Kallenbach) <i>'Nitrogen dynamics in a novel, perennial, diverse cropping system'</i>	\$7,000
2020-2025	NSERC Discovery Grant and Launch Supplement <i>'Plant nutrients and global change: Can supply meet demand?'</i>	\$152,500
2020	Canadian Foundation for Innovation John Evans Leadership Fund Award <i>'Plant nutrients and global change: Can supply meet demand?'</i>	\$355,000
2018-2024	National Science Foundation Research Co-Ordination Network Grant (Co-PI with Cory Cleveland, Will Wieder, Sasha Reed) <i>'INCYTE: Investigating Nutrient Cycling in Terrestrial Ecosystems: Integrating Observations, Experiments and Models'</i>	\$499,991^
2010-2014	Graduate student research grants (15 total) from Sigma Xi, Cornell University Andrew W. Mellon, Foundation, Southwestern Association of Naturalists	\$32,320^
2013	National Science Foundation Doctoral Dissertation Improvement Grant	\$20,000^

#### TRAINING GRANTS

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2025	McGill Bieler School of Environment Seed and Branch Grants <i>'Research to Action: A seminar/discussion series on translating university research to policy and practice'</i> (PI with Co-PI Amy Janzwood)
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#### FELLOWSHIPS AND AWARDS

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2026	McGill University William Dawson Scholar (2026-2031)
2024	Clark Science Executive Leadership Fund award (to attend McGill Desautels School of Management two-week intensive Executive Development Course)
2020	Gene E. Likens Outstanding Publication Award (Best Early Career Paper, Biogeosciences section), Ecological Society of America
2018	Plant, Cell & Environment Postdoctoral Award (Best Oral Presentation, Physiological Ecology section), Ecological Society of America Annual Meeting
2016	Erskine Stewart Young Alumna of the Year, Stuartholme School, Australia
2015	Whittaker Award (Best Oral Presentation), Cornell University Department of Ecology and Evolutionary Biology
2013	Billings Award (Best Oral Presentation, Physiological Ecology section), Ecological Society of America Annual Meeting
2011	American Australian Association Education Fellowship
2008	D.A. Herbert Prize in Botany, University of Queensland

#### WORKING GROUPS

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US Geological Survey John Wesley Powell Center for Analysis and Synthesis <i>'Novel multi-scale synthesis of nitrogen fixation rates and drivers across the terrestrial biosphere'</i> Member, 2019-present
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National Science Foundation Research Coordination Network '*Investigating Nutrient Cycling in Terrestrial Ecosystems: Integrating Observations, Experiments and Models*' Co-PI and Steering Committee, 2019-2025

Tropical Root Trait Initiative, Member, 2020-present

National Geographic Society '*Beyond Carbon: Towards a more holistic understanding of the biogeochemistry of forest-climate interactions in the Amazon Basin*' Member, 2019-2021

## PRESENTATIONS

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### Invited

- 2025 Smithsonian Tropical Research Institute, Panama  
Dept of Biology, Western University  
Ecology and Evolution seminar series, Université de Québec à Montreal
- 2023 Biogeochemistry Seminar Series, Cornell University  
Dept of Integrative Biology, University of Guelph
- 2021 Dept of Ecology, Evolution and Environmental Biology, Columbia University  
Dept of Geography, McGill University
- 2020 Geotop Research Center, Montreal
- 2019 Dept of Physical and Environmental Sciences, University of Toronto  
Dept of Biology, Boston University  
Early Career Scientists Symposium, University of Michigan Ann Arbor
- 2018 Dept of Forest and Wildlife Ecology, University of Wisconsin Madison
- 2017 Dept of Ecosystem and Conservation Sciences University of Montana  
Cary Institute of Ecosystem Studies

### Selected contributed <sup>S</sup>Supervised <sup>\*g</sup>graduate or <sup>^u</sup>undergraduate student author.

- 2025 Ana Avila\*... FM Soper. Local scale processes improve predictability of forest regrowth in the Brazilian Amazon. *Canadian Society for Ecology and Evolution Meeting, Sherbrooke, QC.*  
**\*First Prize: Oral Presentation Award**
- Ana Avila\*... FM Soper. Introducing anthropogenic effects to forest regrowth modeling. *Yale Chapter: International Society of Tropical Foresters Conference, New Haven, CT.*
- Sofia Sanabria^... FM Soper. Magnitude and drivers of leaf stoichiometric flexibility. *Quebec Center for Biodiversity Science Annual Meeting, Montreal, QC (poster).*
- Abby Levine^... FM Soper. Promoting sustainable pharmacy practice: A collaborative initiative to reduce environmental impact at the Jewish General Hospital. *Canadian Society of Healthcare Systems Pharmacy Meeting, Ottawa, ON (poster).*
- 2024 Kate Nelson\*... FM Soper. Blind spots in our understanding of the tropical nitrogen cycle. *American Geophysical Union Fall Meeting, Washington, DC.*
- Ana Avila\*... FM Soper. Modelling neotropical forest regrowth: The role of land use history. *American Geophysical Union Fall Meeting, Washington, DC (poster).*
- C Dallstream\*... FM Soper. Fine root functioning responds to soil heterogeneity in a tropical tree. *New Phytologist Next Generation Scientists Annual Meeting, Durham, NC.*

- 2023 Kate Nelson\*... FM Soper. Blind spots hinder understanding of the tropical nitrogen cycle. *European Geophysical Union Meeting, Vienna, Austria.*
- C Dallstream\*... FM Soper. Spatial scales and drivers of root functioning in a tropical tree. *Ecological Society of America Annual Meeting, Portland, OR.*
- 2022 M Marcellus\*... FM Soper. Evolutionary history predicts nutrient strategy in tropical trees. *Ecological Society of America Annual Meeting, Montreal, QC.*
- 2021 C Dallstream\*... FM Soper. Multiple nutrient uptake strategies may coexist on similar tropical soils. *Association for Tropical Biology and Conservation meeting (online).*
- 2020 FM Soper. Interactive global change impacts on Amazon biogeochemical cycles *American Geophysical Union Annual Meeting (online)*
- FM Soper. Interactive global change impacts on Amazon biogeochemical cycles *Ecological Society of America Annual Meeting (online)*
- 2019 FM Soper. Do foliar nutrient traits predict belowground investment on nutrient acquisition? *INCyTE Research Collaboration Network annual meeting*
- 2018 FM Soper. Tree-driven cycling of mineral nutrients in a temperate forested shale catchment *American Geophysical Union Fall Meeting, Washington, DC.*
- FM Soper. Nitrogen status does not predict phosphorus acquisition strategies in tropical trees *Ecological Society of America Annual Meeting, New Orleans, LA. \*Plant, Cell & Environment Postdoctoral Award*
- 2017 FM Soper. Canopy foliar nitrogen heterogeneity influences denitrification rates in a tropical lowland forest *Ecological Society of America Annual Meeting, Portland, OR.*
- 2016 FM Soper. Woody encroachment impacts on ecosystem nitrogen cycling: fixation, storage and gas loss *American Geophysical Union Fall Meeting, San Francisco, CA.*
- 2015 FM Soper. Abiotic drivers, not woody legume encroachment, predict nitrogen trace gas flux from a semi-arid subtropical savanna *Ecological Society of America Annual Meeting, Baltimore, MD.*
- 2014 FM Soper. Soil nitrogen gas fluxes during woody legume encroachment: Does encroachment increase gaseous losses? *American Geophysical Union Fall Meeting, San Francisco, CA.*
- FM Soper. Coupling graduate mentorship with undergraduate research in a field context *Ecological Society of America Annual Meeting, Sacramento, CA.*
- 2013 FM Soper. Seasonal and individual variation in leguminous tree nitrogen fixation in a natural ecosystem *Ecological Society of America Annual Meeting, Minneapolis, MN. \*Billings Award*
- 2012 FM Soper. Temporal variation in nitrogen fixation during woody encroachment of *Prosopis glandulosa* into grasslands of the Rio Grande Plains *Ecological Society of America Annual Meeting, Portland, OR.*
- 2011 FM Soper. The support of plant growth by small peptides in two functionally different plant species *Ecological Society of America Annual Meeting, Austin, TX.*
- Smithsonian Tropical Research Institute, Panama

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## SUPERVISION

### Post-doctoral

Xavier Guilbault-Meyers (2024-25) Biology

**PhD** Caroline Dallstream (2020- ) Biology  
 \*FRQNT Doctoral Training Scholarship  
 \*Lucy Braun Prize (Best Poster) Ecological Society of America meeting 2022  
 \*Sulzman Award: Honorable Mention (Best Paper, Biogeosciences) Ecological Society of America 2023

Ana Avila Vitorino (Co-supervised with Brian Leung, 2021- ) Quantitative Life Sciences  
 \*FRQNT Doctoral Training Scholarship  
 \*Best Student Presentation, Canadian Society for Ecology and Evolution meeting 2025

Kate Nelson (2023- ) Biology  
 \*FRQNT Doctoral Training Scholarship  
 \*Smithsonian Tropical Research Institute Graduate Fellowship

**MSc** Mia Marcellus (2020-22 Completed) Biology. Now Longevity Modeler, Club Vita  
 \*NSERC Canada Graduate Scholarship

Molly Gautreau (2024- ) Biology

**Undergraduates** (^ indicates authorship on published or forthcoming lab peer-reviewed publications)

*Honors thesis:*

^Natalie Swartz (Environment, 2022-23), now MSc student, UT Austin  
 ^Samti Luk (Environment, 2023-24), now MSc student, McGill Plant Science  
 ^Cara Flynn (Biochemistry, 2023-24), now PhD student, Northwestern  
 ^Sofia Quijada Sanabria (Quantitative Biology, 2024-25) \*QCBS Excellence Award  
 ^Antoine Laroche (Biology, 2025- )

*Summer research awards (including NSERC USRA):*

^Emily Brown (2021), now Research Assistant, UBC  
 ^Natalie Swartz (2021), now MSc student, UT Austin  
 ^Lola Milder (2022)  
 ^Jacob van Oorschot (2023), now MSc student, McGill Biology  
 ^Cara Flynn (2023), now PhD student, Northwestern  
 ^Sofia Quijada Sanabria (2024), current McGill student  
 ^Rachel Buchannon-Hutchinson (2025), current McGill student

*Research assistants:*

^Camille Simon (2020)  
 ^Salvador Babinet (2024), current McGill student  
 ^Sofia Quijada Sanabria (2025), current McGill student

*Independent study research courses:*

Rukshana Gupta, Lucy Everett, Sunny Han, Nicole Downar, Salvador Babinet, Lili Lin, Abby Levine, Anabel Evans, Terri Clark, Kristy Sanchez Varga, Sofia Quijada Sanabria, Rachel Buchanan-Hutchinson, Constance Fortin, Julia Jamieson

**TEACHING**

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**Instructor, McGill University**

BIOL205 Functional Biology of Plants and Animals (2021- , 104-120 students)

ENVR202 Evolving Earth (2021- , 157-221 students)

ENVR401 Environmental Research (2020-2021, Coordinator 2023- , 54-97 students)

BIOL601 Introduction to Graduate Studies in Biology (2021, 2023- , 16-35 students)

\*\*\*co-created class

BIOL111 Principles: Organismal Biology (2023, 481 students)

#### **Guest Lecturer**

Forest Ecosystem Analysis, Skidmore College (2019)

Principles of Biogeochemistry, Cornell University (2014)

**Invited small group instructor**, McGill Teaching Learning Services '*Beyond Grading: Engaged Teaching*' Symposium (2024)

#### **SELECTED PROFESSIONAL SERVICE**

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##### **Academic journals**

*Co-Editor*, New Phytologist (2026-)

*Advisory Board*, New Phytologist (2024-2026)

*Associate Editor*, Biogeochemistry (2021-2024)

*Reviewer*, 86 manuscripts for 35 journals including Ecology Letters, Global Change Biology, Nature Ecology and Evolution, New Phytologist, Science Advances

##### **Grant/Prize/Fellowship Review**

NSERC Alliance Grants (external reviewer), 2025

Bill & Melinda Gates Foundation (reviewer), 2024

FRQNT New Research Support for New Academics (invited panel member), 2024

Canadian Foundation for Innovation John R Evans Leaders Fund (reviewer), 2024

NASA Earth Science (invited panel member), 2021

National Science Foundation Division of Environmental Biology (ad hoc reviewer), 2020

Early Career Ecologist Outstanding Paper Award Selection Committee, 2018-2019

Science Ambassador Scholarship Advisory Board, 2017-2018

Ecological Society of America Billings and New Phytologist Awards, 2017, 2018

American Australian Association Education Fellowship, 2016

##### **Institutional Service**

McGill Sustainability Park Academic Community of Practice (2024- )

McGill Sustainability Park Fellowship Development committee (2025- )

McGill Climate Change Cluster (2021-2022)

Biology Vice-Graduate Program Director (2021- )

Biology Graduate Training Committee (2021- )

Biology Graduate Experience Task Force (2020- )

Biology Phytotron Advisory Committee (2024- )

Bieler School of Environment Experiential Learning and Student Awards Committee (2021 - , Chair 2025- )

Bieler School of Environment Undergraduate Retreat Co-Coordinator (2023-24)

Bieler School of Environment Faculty Lecturer Search Committee (x2, 2021-22)

Faculty of Agriculture and Environmental Science Impact+ Chair Search Committee

### Community Leadership

*Steering Committee*, INCyTE Research Coordination Network (2019-2025)

*Student President*, Sigma Xi: The Scientific Research Society (Cornell chapter, 2014-2015)

*President*, Cornell Biogeochemistry, Environmental Science and Sustainability GSA (2012-2013)

### Mentorship

*Mentor*, McGill College of Graduate Mentorship (2 postdoc mentees, 2024- )

*Faculty Mentor*, McGill Fungi Society (2024- )

*Mentorship Program Coordinator*, Ecological Society of America Early Career Ecologist Section 2016-2018

### Conferences and seminar organization

*Session Co-organiser*, American Geophysical Union Annual Meeting (2019, 2021)

*Co-organizer*, INCyTE Virtual Seminar and Workshop Series (2020)

### Outreach

*Invited Speaker*, McGill Bieler School of Environment Global Change Symposium (2025)

*Guest lecture*, West End Horticultural Society (2025)

*Guest lecture*, Science Week, Vanier College (2023)

*Co-presenter*, 'Science Communication for Advocacy' Ecological Society of America Meeting, 2018

*Presenter*, 'What can you do with a career in Science?' Stuartholme School, 2016

### Selected Media

- 2021 'Capturing carbon in Costa Rica' **Living Planet Radio** (*interview*)  
 'Amazon rainforest now emits more greenhouse gases than it absorbs' **Smithsonian Magazine**  
 'Amazon rainforest now appears to be contributing to climate change' **National Geographic website**  
 'The Amazon rainforest spews greenhouse gases' **Daily Mail**  
 'Amazon rainforest emits more greenhouse gases than it captures' **NPR The World**  
 'Amazon rainforest in worse shape than we thought' **New Republic**  
 'We have turned the Amazon into a net greenhouse gas emitter: study' **Mongabay**  
 'A new climate study shows Amazon deforestation has even more of a climate impact' **CNN**  
 'Degradacao na Amazonia agrava o aquecimento global' **Folha de Sao Paolo** (*authored Op Ed*)
- 2020 'Can we rely on tropical forests to stop runaway climate change?' **New Scientist** magazine (*interview, feature article*)  
 'Clues to the impact of climate change may seep from volcanoes in Costa Rica' **Washington Post** (*interview, feature article*)
- 2019 'Leafcutter ants have their own landfill sites that emit greenhouse gases' **New Scientist magazine** (*interview*)  
 'Leafcutter ant compost piles produce potent greenhouse gases' **Science News** (*interview*)  
 'Ant farming' **Vision Magazine** (*interview*)  
 'Leaf cutter ants emit as much N<sub>2</sub>O as wastewater treatment tanks' **Phys.org**

**PROFESSIONAL AFFILIATIONS**

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Ecological Society of America

American Geophysical Union

Canadian Society for Ecology and Evolution