CRAIG R. SEE

University of Minnesota
St. Paul, MN, 55413

Phone: 612-845-8154
Email: crsee@umn.edu

Education

Ph.D.	University of Minnesota	Ecology	2021
M.S.	State University of New York	Natural Resources	2014
B.A.	Hamline University	Biology	2009

Professional Experience

University of Minnesota	Researcher	2023-present
Northern Arizona University	Post-Doctoral Scientist	2021-2023
University of Minnesota	Graduate Research/Teaching Assistant	2016-2021
Lawrence Livermore National Lab	D.O.E. Graduate Fellow	2019-2020
University of Georgia	Data Analyst (Coweeta LTER)	2015-2016
SUNY-ESF	Researcher/Project Manager	2013-2015
	Graduate Research/Teaching Assistant	2011-2013
University of Massachusetts	Project Manager	2011
University of Minnesota	Intern (Cedar Creek LTER)	2010
Dartmouth College	Field Technician	2010
Duke University	Research Technician	2009

Peer Reviewed Articles

(*denotes mentees, ‡denotes shared lead authorship)

Virkkala, A.M., many authors including **C.R. See**. 2024. An increasing Arctic-Boreal CO_2 sink offset by wildfires and source regions. *Nature Climate Change* (*accepted*)

Bryant, R.L.*‡, S. Kothari‡, J. Cavender-Bares, S.J. Curran*, J.J. Grossman, S.E. Hobbie, C. Nash*, G.C. Neumiller*, **C.R. See‡.** 2024. Independent effects of tree diversity on aboveground and soil carbon pools after six years of experimental afforestation. *Ecological Applications (in press)*

See, C.R., A.M. Virkkala, S.M. Natiali, B.M. Rogers, M. Mauritz, C. Biasi, S. Bokhorst, J. Boike, M.S. Bret-Harte, G. Celis, N. Chae, T.R. Christensen, S.J. Murner, S. Dengel, H. Dolman, C.W. Edgar, B. Elberling, C.A. Emmerton, E.S. Euskirchen, M. Göckede, A. Grelle, L. Heffernan, M. Helbig, D. Holl, E. Humphreys, H. Iwata, J. Järveoja, H. Kobayashi, J. Kochendorfer, P. Kolari, A. Kotani, L. Kutzbach, M.J. Kwon, E.R. Lathrop*, E. López-Blanco, I. Mammarella, M.E. Marushchak, M. Mastepanov, Y. Matsuura, L. Merbold, G. Meyer, C. Minions, M.B. Nilsson, J. Nojeim, S.F. Oberbauer, D. Olefeldt, S. Park, F.W. Parmentier, M. Peichl, D. Peter, R. Petrov, R. Poyatos, A.S. Prokushkin, W. Quinton, H. Rodenhizer, T. Sachs, K. Savage, C. Schulze, S. Sjögersten, O. Sonnentag, V.L. St. Louis, M.S. Torn, E. Tuittila, M. Ueyama, A. Varlagin, C. Voigt, J.D. Watts, D. Zona, V.I. Zyryanov, and E.A.G. Schuur. 2024. Decadal increases in carbon uptake offset by respiratory losses across northern permafrost ecosystems. *Nature Climate Change* 14(8)

Pan, J., **C.R. See**, R. Wang, J. Laun, J. Wang, F. Liu, X. Quan, H. Chen, X. Wang, C. Wang. 2024. Decoupling of nitrogen and phosphorus release from fine and coarse roots during seven years of decomposition. *Journal of Ecology 112*(*22*)

Rodenhizer, H., G. Celis, S. Kadej, A.K. Kelly, E.R. Lathrop, M. Mauritz, S.M. Natali, E.F.

Pegoraro, V.G. Salmon, **C.R. See**, M.A. Taylor, E.E. Webb, E.A.G. Schuur. 2023. Divergent hydrologic responses to abrupt permafrost thaw drive spatially heterogeneous carbon dioxide fluxes. *Global Change Biology* 29(22)

Maillard, F., B. Beatty, M. Park, S. Adamczyk, B. Adamczyk, **C.R. See**, J. Cavendar-Bares, S.E. Hobbie, and P.G. Kennedy. 2023. Microbial community attributes supersede plant and soil parameters in predicting fungal necromass decomposition rates in a 12-tree species common garden experiment. *Soil Biology and Biochemistry* 184(109124)

Schuur, E.A., C. Hicks Pries, M. Mauritz, E. Pegraro, H. Rodenhizer, **C.R. See**, C. Ebert. 2023. Ecosystem and soil respiration radiocarbon detects old carbon release as a fingerprint of permafrost destabilization with climate change. *Proceedings of the Royal Society A* 381(2261)

Maillard, F., T. Michaud, **C.R. See**, L. DeLancey, S.J. Blazewicz, J. Kimbrel, J. Pett-Ridge, and P.G. Kennedy. 2023. Soils and microbial communities associated with decomposing microbial necromass rapidly incorporate both nitrogen and carbon. *Msystems e00390-23*

Gill, A.L., R.M. Grinder, **C.R. See**, F.S. Chapin, L.C. DeLancey, M.C. Fisk, P.M. Groffman, T.K. Harms, S.E. Hobbie, J.D. Knoepp, J.M.H. Knops, M.C. Mack, P.B. Reich, and A.D. Keiser. 2023. Soil carbon availability decouples net nitrogen mineralization and net nitrification across United States Long Term Ecological Research sites. *Biogeochemistry* 10.1007/s10533-022-01011-w

Halpern, B.S., and many authors including **C.R. See**. 2023. Priorities for synthesis in ecology and environmental science. *Ecosphere 14(1*)

See, C.R., A.B. Keller, S.E. Hobbie, P.G. Kennedy, P.K. Weber and J. Pett-Ridge. 2022. Hyphae move matter and microbes to mineral microsites: integrating the hyphosphere into conceptual models of soil organic matter stabilization. *Global Change Biology 28*(*8*)

See, C.R., A.M. Conley*, L.C. Delancey*, C.W. Fernandez, K.A. Heckman, P.G. Kennedy, and S.E. Hobbie. 2021. Distinct carbon fractions drive a generalisable two pool model of fungal necromass decomposition *Functional Ecology* 35(3)

Fernandez, C.W. **C.R. See**, and P.G. Kennedy. 2020. Decelerated carbon cycling by ectomycorrhizal fungi is controlled by community composition and substrate quality. *New Phytologist* 226(2)

See, C.R.[‡], M.B. Green[‡], R.D. Yanai, A. Bailey, J.L. Campbell, and J.A. Hayward. 2020. Quantifying uncertainty in annual runoff due to missing data *PeerJ* 8(e9531)

See, C.R., M.L. McCormack, H. Flores-Moreno, S.E. Hobbie, W.L. Silver, and P.G. Kennedy. 2019. Global patterns in fine-root decomposition: climate, chemistry, mycorrhizal association and woodiness. *Ecology Letters* 22(6)

Paseka, R.E., A.R. Bratt, K.L. MacNeill, Alfred Burian, and **C.R. See**. 2019. Elemental ratios link environmental change and human health. *Frontiers in Ecology and Evolution* 8(e9531)

See, C.R., R.D. Yanai, and T.J. Fahey. 2019. Shifting N and P concentrations and stoichiometry during autumn litterfall: Implications for ecosystem monitoring. *Ecological Indicators* 103(8)

Campbell, J.L., M.B. Green, R.D. Yanai, C.W. Woodall, S. Fraver, M.E. Harmon, M.A. Hatfield, C.J. Barnett, **C.R. See**, and G.M. Domke. 2019. Estimating uncertainty in the volume and carbon storage of coarse woody debris. *Ecological Applications* 29(2)

Knoepp, J.D., **C.R. See**, J.M. Vose, C.F. Miniat, and J.S. Clark. 2018. Total C and N pools and fluxes vary with soil temperature and soil moisture along an elevation, precipitation and vegetation gradient in southern Appalachian forests. *Ecosystems* 21(8)

Yanai, R.D., **C.R. See**, and J.L. Campbell. 2018. Current practices in reporting uncertainty in ecosystem ecology. *Ecosystems* 21(5)

Yang, Y., R.D. Yanai, **C.R. See**, and M.A. Arthur. 2017. Sampling effort and uncertainty in leaf litterfall mass and nutrient flux in Northern hardwood forests. *Ecosphere* 8(11)

Campbell, J.L., R.D. Yanai, M.B. Green, G.E. Likens, **C.R. See**, A.S. Bailey, D.C. Buso, and D. Yang. 2016. Uncertainty in the net hydrologic flux of calcium in a paired-watershed harvesting study. *Ecosphere* 7(6)

Kang, H., T.J. Fahey, K. Bae, M.C. Fisk, R.E. Sherman, R.D. Yanai, and **C.R. See**. 2016. Response of forest soil respiration to nutrient addition depends on site fertility. *Biogeochemistry* 127(1)

See, C.R., R.D. Yanai, M.C. Fisk, M. Vadeboncoeur, B.A. Quintero, and T.J. Fahey. 2015. Soil nitrogen affects phosphorus recycling: foliar resorption and plant-soil feedbacks in a northern hardwood forest. *Ecology* 96(9)

Articles in review or revision (drafts available upon request; *denotes mentee)

See, C.R., Yang, Y. and J.M. Jungers. Seeded diversity decreases yield variability in bioenergy perennials across marginal lands, but net yield is driven by presence of a dominant species. (*in review*)

See, C.R., K. McLean, J.D. Knoepp, and J. Mohan. Decadal changes in carbon and nitrogen cycling are constrained by slowly cycling soil phosphorus pools (*in review*)

Wang L., H. Wang, R. Cao, Q. Ma, A. Zhang, Z. Wang, Z. Wang, Q. Wang, B. Liu, W. Yang, **C.R. See**. Trophic multifunctionality mediates the release of elements from decomposing tropical typhoon litter. (*in review*)

Fernandez C.W. and **C.R. See**. Interactions between ectomycorrhizal fungi and saprotrophic fungi are determined by soil pH constraints and enzyme function in a global dataset. (*in review*)

Articles in Preparation (drafts available upon request, *denotes mentee)

See, C.R., H. Farah*, S.E. Hobbie, P.G. Kennedy, F. Maillard, and J. Pett-Ridge. Contrasting biogeochemical effects of arbuscular versus ectomycorrhizal hyphospheres in a co-occurring soil. (*in prep*)

Long, L., A. Gill, **C.R. See,** T.J. Fahey, H. Lambers, E.F. Solly, Y. Ding, T. Sun. Global patterns of coarse root decomposition of woody plants: effects of climate, litter quality, mycorrhizal association and phylogeny. (*in prep*)

Published Datasets

Fisk, M.C., R.D. Yanai, S.D. Hong, **C.R. See**, and S. Goswami. 2022. *Litter chemistry and masses for the MELNHE NxP fertilization experiment ver 1*. Hubbard Brook LTER. doi:10.6073/pasta/8b2975a3a02cbcfb1b0a12ac954576d4

See, C.R.; G. Celis, M. Mauritz, M. Taylor, J. Ledman, S. Natali, E.A. Schuur. 2022. *Eight Mile Lake Research Watershed, Carbon in Permafrost Experimental Heating and Drying Research (DryPEHR): Half-hourly soil moisture and temperature data, 2010-2021*, Bonanza Creek LTER.

doi:10.6073/pasta/6b0570b9f16b69f725a63a3fe24859dd

See, C.R., G. Celis, M. Mauritz, M. Taylor, J. Ledman, S. Natali, E.A. Schuur. 2022. *Eight Mile Lake Research Watershed, Carbon in Permafrost Experimental Heating Research (CiPEHR): Half-hourly soil moisture and temperature data, 2008-2021*, Bonanza Creek LTER. doi:10.6073/pasta/6b934d2d1797b01e76ee4f75be1c9512

See, C.R., G. Celis, J. Ledman, R. Bracho, E.A. Schuur, 2022. *Eight Mile Lake Research Watershed, Thaw Gradient: half-hourly soil temperature 2004-2021*, Bonanza Creek LTER. doi:10.6073/pasta/47eff2bd7dda816f077eb871ab6fadb7

Zukswert, J., k. Gonzales, S.D. Hong, C.R. See, B. Quintero, and R.D. Yanai. 2022. *MELNHE: Foliar Chemistry 2008-2016,* Hubbard Brook LTER. doi:10.6073/pasta/eadff535e428a7c32c8d26a55fce8796

Hong, S.D., K.E. Gonzales, **C.R. See**, R.D. Yanai. 2021. *MELNHE: Multiple Element Limitation in Northeast Hardwood Ecosystems (MELNHE): Fresh Litter Chemistry.* Environmental Data Initiative. doi:10.6073/pasta/b23deb8e1ccf1c1413382bf911c6be19

See, C.R. *Substrate chemical characteristics and decomposition parameters for 28 types of fungal necromass*. Environmental Data Initiative. doi:10.6073/pasta/7173255f16bf4848fac274b50e225e2e

See, C.R., M.L. McCormack, H. Flores-Moreno, S.E. Hobbie, W.L. Silver, and P.G. Kennedy. *Global decomposition constants for fine roots by species.* DRYAD. doi:10.5061/dryad.30h50r7

Selected Presentations (*invited talk)

American Geophysical Union Annual Meeting (2013, 2016, 2019, 2021, 2022*); Cedar Creek 75th Anniversary Symposium (2017); Coweeta Hydrologic Lab Seminar Series (2015); Ecological Society of America Annual Meeting (2012, 2013*, 2014, 2017, 2020); Hubbard Brook Annual Cooperators Meeting (2011-13), International Conference on Mycorrhizae (2019), ILTER Meeting (2019), LTER All Scientists Meeting (2012, 2015, 2018, 2022); New York Society of American Foresters Annual Meeting (2012); Mycological Society of America Meeting (2019), Minnesota Mycological Society Meeting (2018*); Northeastern Natural History Conference (2013); Rochester Academy of Science Annual Meeting (2011); Soil Science Society of America Meeting (2015, 2016*, 2021), Syracuse University Life Sciences Symposium (2013); Umass Symposium on Plant-microbe Interactions (2012).

Manuscript reviews

Applied Soil Ecology, Ecological Research, Ecosystems (3), Ecology Letters, Environmental Management, Environmental Science and Technology, Forest Ecology and Management (5), Functional Ecology (3), Geoderma, Global Change Biology (6), Global Ecology and Biogeography, Journal of Ecology (3), Journal of Geophysical Research: Biogeosciences, Journal of Soil Science and Plant Nutrition, mSystems, New Phytologist (5), Plant and Soil (7), Science of the Total Environment (2), Soil Biology & Biochemistry (3)

Service

- Flagstaff Family Food Center (2022)
- AGU OSPA student award coordinator and judge (2021)
- UMN Field Guides Mentor (2020)

- UMN EEB faculty search committee (2019)
- Organizer of 6 departmental writing retreats (2017-19)
- Co-president, University of Minnesota EEB graduate students (2017-18)
- Group leader, Cedar Creek Eco-extravaganza educational outreach (2017, 2018)
- Secretary, Quantifying Uncertainty in Ecosystem Studies (QUEST) research coordination network (2012-2016)
- Participation in more than 15 in-classroom science outreach activities in middle and high schools since 2012.
- Lead or Co-organizer of sessions or workshops at AGU (2012, 2021), ESA (2013), LTER ASM (2012, 2015, 2022), and SSSA (2016)

Awards and Fellowships

2024	Wilde Early Career Researcher Award (Soil Science Society of America)
2021	Phillip C. Hamm award (university-wide award for graduate research at UMN)
2020	Sitka Center for Art and Ecology (6 month residency)
2020	University of Minnesota Doctoral Dissertation Fellowship
2017, 2019	Cedar Creek Ecosystem Science Reserve Graduate Fellow
2016	Honorable Mention - National Science Foundation Graduate Fellowship
2013	SUNY-ESF LEAF Award (faculty selected for promise in research)
2007	Distinguished First Year Biology Student, Hamline University
2006-2009	Hamline University Presidential Fellowship

Research Funding (non-departmental)

2023	NCEAS SPARC working group (lead P.I. $20,000)
2022	Western Ag Innovations research grant ($1,200)
2020	Geri Nelson Grant ($2,500)
2019	D.O.E. SCGSR ($18,000)
2019	Carolyn M. Crosby Grant ($3,000)
2018	Minnesota Mycological Society Research Award ($500)
2012	Edna B. Sussman Fellowship ($7,000)

Teaching Experience ("*" denotes instructor of record, "w" denotes writing intensive course)
General Chemistry I, General Chemistry II, Forest Ecology, History of Ecosystem Ecology*, Ecology (w), Foundations of Biology II (w), Plant Algal and Fungal Evolution (w), Ecosystem Ecology (w), Ecological Uncertainty Analysis

Additional Training

2023	Introduction to the Eddy Covariance Method Workshop (1 day course)
2022	CIMER Mentorship Training (1 day course)
2022	IARPC Collaboration Mentorship Program (Monthly meetings)
2021	Radioisotopes in ecology (6 day course)
2021	Cultivating Leadership for Change and Justice in Geoscience (1 day)
2017	Mixed-effects Models Short Course (1 day)
2016	Teaching with Writing Training (1 day workshop)
2015	Campbell Scientific Datalogger Certification (3 day training)
2013	Chainsaw Safety Certification (1 day training)

2012 Likelihood and Bayesian Approaches for Ecologists (5 day workshop)