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Education

Ph.D. Energy and Resources, University of California, Berkeley, 1994
M.S. Energy and Resources, University of California, Berkeley, 1990
B.S. Conservation and Resource Studies, Highest Honors, University of California, Berkeley, 1984

Professional Positions

Program Head, Climate Change and Carbon Management, Lawrence Berkeley Nat'l Lab, 2001-present
Associate Adjunct Professor, Energy and Resources, U.C. Berkeley, 2005-present
Staff Scientist, Earth Science Division, Lawrence Berkeley National Laboratory, 2005-present
Scientist, Earth Science Division, Lawrence Berkeley National Laboratory, 1998-2005
Post-Doctoral Fellow, U.C. Irvine and Stanford University 1994-1998
Graduate Research Assistant, Energy and Resources Group, U.C. Berkeley 1986-1994
Research Principal Investigator, Rocky Mountain Biological Laboratory, Colorado 1991-93
Science Intern, Lawrence Livermore National Laboratory 1985-1986

Fellowships and Honors

Presidential Early Career Award for Scientists and Engineers, 2003
DOE Early Career Award for Scientists and Engineers, 2003
Earth System Science Post-Doctoral Fellowship, 1994-1997
NASA Global Change Doctoral Fellowship, 1991-94
Switzer Environmental Fellowship, 1990-92
Graduate Opportunity Fellowship, U.C. Berkeley, 1986-87

Peer-reviewed Publications (**student or post doc*)

- *Bird, J.A. and M.S. Torn. 2006. Fine Roots versus Needles: A Comparison of ^{13}C and ^{15}N Dynamics in a Ponderosa Pine Forest Soil. *Biogeochemistry* 79(3):53-67, DOI 10.1007/s10533-005-5632
- Joslin, J.D., J.B. Gaudinski, M.S. Torn, W.J. Riley, and P.J. Hanson. 2006. Unearthing Live Fine Root Turnover Times in a Hardwood Forest: The Roles of Root Diameter, Soil Depth, and Root Branching Order. *New Phytologist* 172: 523-535
- Torn, M.S. and J. Harte. 2006. Missing feedbacks, asymmetric uncertainties, and the underestimation of future warming. *Geophys. Res. Lett.*, 33, L10703, doi:10.1029/2005GL025540.
- Treseder, K.K. , M.S. Torn, C.A. Masiello. 2006. An ecosystem-scale radiocarbon tracer to test use of litter carbon by ectomycorrhizal fungi. *Soil Biology and Biochemistry* 38(5): 1077-1082
- *Mikutta, R. M. Kleber, M.S. Torn, and R. Jahn. 2006. Stabilization of Soil Organic Matter: Association with Minerals or Chemical Recalcitrance? *Biogeochemistry* 77:25-56
- * Rasmussen, C, M.S. Torn, and R.J. Southard. 2005. Soil mineral assemblage and aggregates control soil carbon dynamics in a California conifer forest. Published online 29 September 2005; doi:10.2136/sssaj2005.0040 *Soil Sci Soc Am J* 2005 69:1711-1721.
- Kleber, M, R. *Mikutta, M.S. Torn, and R. Jahn. 2005. Poorly-crystalline mineral phases protect organic matter in acid subsoil horizons. *European Journal of Soil Science* 56:717-725.
- Torn, M.S., P.M. Vitousek, and S.E. Trumbore. 2005. The influence of nutrient availability on soil organic matter turnover estimated by incubations and radiocarbon modeling. *Ecosystems* 8: 352-

- * Swanston, C.W., M.S. Torn, P.J. Hanson, J.R. Southon, C.T. Garten, E.M. Hanlon, L. Gano. 2005. Characterizing processes of soil carbon stabilization using forest stand-level radiocarbon enrichment. *Geoderma* 128:52–62.
- * Cooley, H.S., W.J. Riley, M.S. Torn, and Y. He. 2005. Impact of Agricultural Practice on Regional Climate in a Coupled Land Surface Mesoscale Model. *JGR-Atmospheres* v110, D03113.
- * Masiello, C.A., O.A. Chadwick, J. Southon, M.S. Torn, and J.W. Harden. 2004. Mechanisms of Carbon Storage in Grassland Soils. *Global Biogeochemical Cycles* 18(4): GB4023
10.1029/2004GB002219
- Fried, J.S., M.S. Torn, and E. Mills. 2004. The impact of climate change on wildfire severity: a regional forecast for Northern California. *Climatic Change*, 64 (1-2): 169-191
- Billesbach, D.P., M.L. Fischer, M.S. Torn, and J.A. Berry. 2004. A portable eddy covariance system for the measurement of ecosystem-atmosphere exchange of CO₂, water vapor, and energy, *The Journal of Atmospheric and Oceanic Technology*, 21: 684-695
- Lapenis, A.G., G.B. Lawrence, A.A. Andreev, A.A. Bobrov M.S. Torn, J.W. Harden. 2004. Acidification of Forest Soil in Russia: 1893-Present. *Global Biogeochemical Cycles*, 18 (1): GB1037
- Torn, M.S., S. Davis, J.A. Bird, M.R. Shaw, M.E Conrad. 2003. Automated analysis of ¹³C/¹²C ratios in CO₂ and dissolved inorganic carbon for ecological and environmental applications. *Rapid Communications in Mass Spectrometry* 17(23):2675-2682
- * Kahle, M., M. Kleber, M.S. Torn and R. Jahn. 2003. Carbon storage in coarse and fine clay fractions of illitic soils. *Soil Science Society of America Journal*, 67:1732-1739.
- Riley, W.J., C.J. Still, M.S. Torn, and J.A. Berry. 2002. A mechanistic model of H₂¹⁸O and C¹⁸OO fluxes between ecosystems and the atmosphere: Model description and sensitivity analyses. *Global Biogeochemical Cycles*, 16, 1095-1109.
- Torn, M.S., Lapenis, A.G., Timofeev, A. Fischer, M., Babikov, I., Harden, J. 2002. Organic carbon and carbon isotopes in modern and 100-year-old soil archives of the Russian steppe. *Global Change Biology*, 8:941-953.
- Torn, M.S. and J. Southon. 2001. A New ¹³C Correction for Radiocarbon Samples from Elevated-CO₂ Experiments. *Radiocarbon*, 43: 691-694.
- Rillig, M.C., S.F. Wright, K.A. Nichols, W.F. Schmidt, and M.S. Torn. 2001. Large contribution of arbuscular mycorrhizal fungi to soil carbon pools in tropical forest soils. *Plant and Soil*, 233(2): 167-177.
- Lapenis, A.G., M.S.Torn, J.W. Harden, K.Hollocker, B.V. Babikov, A.I. Timofeev, M.I. Hornberger, R. Nattis. 2000. Scientists Unearth Clues to Soil Contamination by Comparing Old and New Soil Samples *EOS* 81(7): 55-57.
- Saleska, S.R., J. Harte, and M.S. Torn. 1999. The effect of experimental ecosystem warming on CO₂ fluxes in a montane meadow. *Global Change Biology* 5:125-141.
- Torn, M.S., S.E. Trumbore, O.A. Chadwick, P.M. Vitousek, and D.M. Hendricks. 1997. Mineral control over soil carbon storage and turnover. *Nature* 389:170-173.
- Chapin III, F.S., M.S. Torn and M. Taten. 1996. Principles of ecosystem sustainability. *American Naturalist* 148(6): 1016-1037.
- Torn, M.S. and J. Harte. 1996. Methane consumption by montane soils: implications for positive and negative feedback with climatic change. *Biogeochemistry* 32: 53-67.

- Harte, J., M.S. Torn, F. Chang, B. Feifarek, A. Kinzig, M.R. Shaw, and K. Shen. 1995. Results from a global warming experiment: Soil temperature and moisture responses in a subalpine meadow ecosystem. *Ecological Applications* 5(1): 132-150.
- Torn, M.S. and F.S. Chapin III. 1993. Environmental and biotic controls over methane flux from arctic tundra. *Chemosphere* 26 (1-4): 357-368.
- Torn, M.S. and J.S. Fried. 1992. Predicting the impact of global warming on wildfire. *Climatic Change* 21: 257-274.
- Fried, J.S. and M.S. Torn. 1990. Analyzing localized climate impacts with the Changed Climate Fire Modeling System. *Natural Resource Modeling* 4(2): 229-253.

Books and Book Chapters

- Trumbore, S.E. and M.S. Torn. Soils and the global carbon cycle. 2005. In: *Soils and Global Change*, EA Holland, ed. NATO Advanced Study Institute, http://esd.lbl.gov/ESD_staff/torn/nato_soilcarbon.pdf
- Jensen, D.B., M.S. Torn, and J. Harte. 1993. In *Our Own Hands: A Strategy for Conserving California's Biological Diversity*, University of California Press, Los Angeles. 290 pp.
- Harte, J., M.S. Torn, and D.B. Jensen. 1992. The nature and consequences of indirect linkages between climate change and biological diversity. In: *Global Warming and Biological Diversity*, R.L. Peters and T.E. Lovejoy, eds. Yale University Press, New Haven. pp. 325-343.

Selected Non-Refereed Publications

- Fried, J.S., J.K. Gilles, W.J. Riley, T.J. Moody, C. Simon de Blas, K. Hayhoe, M. Moritz, S. Stephens, M.S. Torn. 2006. Predicting the effect of climate change on wildfire severity and outcomes in California: Preliminary analysis. For: *California Climate Change: Science Report to Governor on Impacts and Adaptation Options*.
- Trumbore, S.E. and M.S. Torn. Soils and the Global Carbon Cycle. 2005. In: *Soils and Global Change*, EA Holland, ed. NATO Advanced Study Institute, LBNL-44910, 2005. http://esd.lbl.gov/ESD_staff/torn/nato_soilcarbon.pdf
- Denning, S., R. B. Cook, L. Dilling, L. Heath, D. McGuire, B. McKee C. Sabine, R. Oren, K. Paustian, J. Randerson, J. Reilly, S. Running, R. Stallard, M.S. Torn, S. Wofsy. Interagency Science Implementation Strategy for the North American Carbon Program. Report of the U.S. Interagency Carbon Cycle Science Program. Washington, DC: US Global Change Research Program.
- Farrell, A.E., A.C. Kerr, A.R. Brandt, M.S. Torn, and G. Franco. 2004. Research Roadmap for Greenhouse Gas Inventory Methods. Draft, Prepared for the California Energy Commission PIER (Public Interest Energy Research) program.
- Hanneman, M. and M.S. Torn. 2003. Review Chapter. In: *Global Climate Change and California: Potential Implications for Ecosystems, Health, and Economy*. California Energy Commission.
- Torn, M.S., C. Masiello, I. Basile-Doelsch, N. Bijoor, and R. Sutton. 2002. Mineral control of carbon storage in Andisols: Case studies and applications to other soils. In: Kleber, M., P. Bartoli, and O. Arnalds. *Mineralogy related features and processes common to European Andosols*. COST ACTION 622: "Soil Resources of European Volcanic Systems" Manderscheid, Germany, April 24-28, 2002. (conference proceedings). LBNL-53797 Ext. Abs.
- Hedin, L. O. Chadwick, J. Schimel, M. Torn, and workshop participants. 2002. Linking Ecological Biology and Geoscience. Report to the National Science Foundation April 4, 2002. Workshop held at the Annual meeting of the Ecological Society of America, August 4-5 2001, Madison, Wisconsin

- Barnes, F.J., S.M. Benson, and M.S. Torn, co-chairs. 2002. DOE Water Cycle Research Strategy. December 2001. U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research. DOE-SC-0043.
- Berner, R. and workshop participants. 2001. The Changing Carbon Cycle: A Terrestrial Focus. Report of the Workshop on the Terrestrial Carbon Cycle. Sponsored by The National Science Foundation, Division of Earth Sciences, June 3, 2000. Workshop Participants: Michael Bender, Robert Berner, Katherine H. Freeman, Chris Field, James Galloway, John Hedges, Lars O. Hedin, Fred Mackenzie, Claudia Mora, Joshua Schimel, William Schlesinger, Robert Stallard, Eric Sundquist, Margaret Torn, Steven C. Wofsy.
- Billesbach, D.P., M.L. Fischer, J.A. Berry and M.S. Torn (2001) A highly portable, rapidly deployable system for eddy covariance measurements of CO₂ fluxes. LBNL Report. LBNL-48953.
- Torn, M.S., E. Mills, and J.S. Fried. 1999. Will climate change spark more wildfire damage? Contingencies: American Academy of Actuaries. July/August p. 34-43. LBNL Report No. 42592.
- Torn, M.S. 1994. Environmental Controls over Methane Flux from Ecosystems and the Potential for Feedbacks with Climatic Change. Ph.D. Dissertation, University of California, Berkeley.
- Torn, M.S. 1993. Global Warming and Upwelling Ecosystems. In: California Sea Grant: Biennial Report of Completed Projects, 1988-1990. California Sea Grant College, U.C. San Diego.

Selected Synergistic and Professional Activities, 1999-2006

- Science Steering Group*, North American Carbon Program (NACP), 2005-present
- Co-Chair, Continental Synthesis Task Force*, Science Steering Group, (NACP), 2005
- Contributing writer and reviewer*, California Climate Change: Science Report to Governor on Impacts and Adaptation Options. Convened by California Energy Commission, EPA, and ARB.
- Peer Reviewer*, Carbon Dioxide Information Analysis Center (CDIAC), 2005
- Co-convenor and Co-chair*, AGU sessions (oral and poster), Carbon, Water, and Energy Exchange in Grassland and Cropland Ecosystems, Fall Meeting 2004
- National Technical Advisory Committee*, DOE National Institute for Global Environmental Change, 2003-Present
- Science advisor*, Union of Concerned Scientists assessment of climate change and wildfire impacts in California, 2005
- Invited participant and rapporteur*, NSF NEON Biogeochemistry Workshop, Boulder, July 2004
- Invited participant*, Interagency workshop on Ecosystem Chapter of the US Climate Change Science Plan, Spring, 2004.
- Session leader*, NSF-sponsored workshop on soil respiration: Carbon Respiration from Terrestrial Ecosystems (CaRTE). 2004
- Writing Team, Rapporteur*, North American Carbon Program workshop & implementation plan, 2003
- Co-Author*, Review Chapter of California Energy Commission Climate Change Assessment, 2003
- Lead Author*, Road map for non-CO₂ greenhouse gas inventories in California, California Energy Commission. 2003-2004
- Co-chair and author*, DOE Water Cycle Dynamics and Prediction Program plan, 2001
- Co-organizer NSF workshop* for research in joint geosciences and biosciences. Madison, WI, 2001.
- Co-author*, white paper on Biogeosciences in NSF. White Paper title "Linking Ecological Biology and Geoscience. Report to the National Science Foundation, April 4, 2002."
- Co-author* NSF workshop on the Terrestrial Carbon Cycle, June 2000. White Paper title: "The changing carbon cycle: A terrestrial focus,"

Co-author DOE Terrestrial Ecosystems Research Facilities white paper, 2000.

Invited Panelist California Energy Commission Workshop on Climate Change Science, June 1999.

Co-author Agricultural and grassland ecosystems, appendix to “Working paper on carbon sequestration science and technology,” Office of Science and Office of Fossil Energy, DOE 1999

Instructor of graduate class The Root-Ecosystem Interface. Co-taught with Todd Dawson. Department of Integrative Biology, UC Berkeley. Spring 2002. Course number: IB 250.

Guest Instructor workshop on “Monitoring, Evaluation, Reporting, Verification and Certification of CO₂ Emissions,” LBNL Energy and Environmental Technologies Division, 2000.

Reviewer *Atmospheric Environment, Biogeochemistry, Chemosphere, Climatic Change, Ecological Applications, Geoderma, Global Biogeochemical Cycles, Global Change Biology, Journal of Geophysical Research, Limnology and Oceanography, Nature, Oecologia, Soil Science Society of America Journal*

Proposal Reviewer DOE, NSF, WESTGEC, EPA

Proposal Panel Member DOE-TCP, DOE-NICCR

Mentor, ERULF, SULI, GREF, Pre-teacher training, and Mickey Leland programs.

Courses Taught

Quantitative Aspects of Global Environmental Problems (Energy and Resources 102) University of California, Berkeley, Spring 2006.

The Root-Ecosystem Interface. Co-taught with Todd Dawson. Department of Integrative Biology, University of California, Berkeley. Spring 2002. Course number: IB 250.

Biogeochemistry: Carbon and Nitrogen Cycles (Environmental Science 320), Colorado College, Spring 1996. (*Visiting Professor*)

Other Teaching Experience

Lecturer Environmental and Cultural Aspects of Energy, Workshop for Native American College *Instructor*, Native American Renewable Energy Education Project, Summer 1996.

Teaching Assistant Quantitative Aspects of Global Environmental Problems (Energy and Resources 102) University of California, Berkeley, Spring 1987.

Guest Lecturer UC Berkeley, UC Irvine, LBNL, 1991-1994, 1995, 1999-2000

Guest Lecturer Stanford University, 1999

Guest Instructor, workshop on “Monitoring, Evaluation, Reporting, Verification and Certification of CO₂ Emissions” organized by Ed Vine, LBNL Energy and Environmental Technologies Division, 2000.

Invited Presentations, 1999-2006 (more than 60 presentations given or co-authored during period):

Asymmetries in Climate Change Feedbacks: Why the Future may be Hotter Than you Think. AGU Fall Meeting, San Francisco, CA, December 12, 2006.

Climate Change: Facing the Impacts Now. Santa Rosa Jr College, Arts and Lectures Series. Santa Rosa, CA, October 11, 2006.

Climate Change Feedbacks and the Future Role of Soils. USGS Western Colloquium. Menlo Park, CA, August 14, 2006

Local Impacts of Global Warming, Presented to representatives from Alameda county and all its cities for the ICLEI Alameda Kickoff, Berkeley, CA, June 15, 2006

Next Generation Soil Carbon Models: Lessons from Isotopic Studies. Keynote address for the German Soil Priority Program 1090, Mechanisms of Soil Organic Matter Stabilization. Thurnau, Germany, March 21, 2006.

Are roots the source of all soil organic matter? Results from isotopic experiments in two temperate forests, AGU Fall meeting, San Francisco, 2005

From Mechanisms to Models. Final talk for the Second International Conference on Mechanisms of Soil Organic Matter Stabilization. Asilomar, CA, October 13, 2006.

TCP Soil Carbon Research, for the DOE/BER Carbon Cycle Research Review, Washington DC, Oct 4-6 2006, with contributions from J. Jastrow, R. Matamala, E. Paul, S. Morris, C. Garten, and P. Hanson.

Regional Analysis: ARM, for the DOE/BER Carbon Cycle Research Review, Washington DC, Oct 4-6 2006.

Women in Science. Panel discussion for Girls, Inc Alameda, Women of the 21st Century Club. Alameda, CA, July 19, 2005.

An Annual Grassland Exploration of Scaling from Genomes to Ecosystem Function. Program for Ecosystem Research Workshop, Flagstaff, AZ, April 12, 2005

Climate-Ecosystem Feedbacks: Observational Needs and Opportunities: A scoping project for the US Climate Change Science Program. Program for Ecosystem Research Workshop, Flagstaff, AZ, April 12, 2005

EBIS Microbial Carbon Cycling rates and substrates. Enriched Background Isotope Study Workshop, Livermore, CA, January 20, 2005.

Modeling wildfire and changing climates. Fire Ecology Seminar. University of California, Berkeley. September 2004.

Soil Carbon Dynamics in Two Novel Cases: The Historic Russian Archives and the Tennessee Burp. Informal Seminar. University of Zurich, Switzerland. May 2004.

Climate Change: Bringing it Back Home. Berkeley Lab Friends of Science Lecture Series. Berkeley City Main Library, April 26, 2004.

Biotic and biogeochemical feedbacks to climate change. AGU fall meeting, San Francisco, CA, December 2002. Presented by John Harte.

Mineral control of carbon storage in Andisols: Case studies and applications to other soils. European Union workshop. COST ACTION 622: "Soil Resources of European Volcanic Systems" Manderscheid, Germany, April 24-28, 2002. *Keynote address.

Applications of Radiocarbon to Terrestrial Carbon Research. Martin Luther University, April 30, 2002, Halle, Germany.

Quantifying the Importance of Belowground Plant Allocation for Sequestration of Carbon in Soil. DOE Science Team Meeting, Argonne National Laboratory, IL. October 29-31, 2001

Historic Russian Soil Collection Soil Carbon in the Russian Steppe. Workshop on Mechanisms of Soil Carbon Storage, UC Santa Barbara, December 3-4, 2001.

Using ¹³C and ¹⁴C in Elevated CO₂ Experiments to Understand Soil Carbon Cycling in Grasslands. Workshop on Mechanisms of Soil Carbon Storage, UC Santa Barbara, December 3-4, 2001.

Using ¹³C and ¹⁴C in Elevated CO₂ Experiments to Understand Soil Carbon Cycling and Microbial Activity in Grassland. Isotopes in Ecology and the Earth Sciences at UC Berkeley; Berkeley Center for Stable Isotope Biogeochemistry, Berkeley, CA, August 2000.

Ecological Complexity and Climate Change; California Energy Commission Workshop on Climate Change Science, Sacramento, CA, June 1999.

Mineral Control of Soil Organic Matter Storage and Turnover. Center For Accelerator Mass Spectrometry Seminar Series, Lawrence Berkeley National Laboratory, 1999.

Current Grants, Principal Investigator:

DOE BER *Carbon Cycle Measurements and Analysis for the DOE Atmospheric Radiation Measurement Program*. FY 2003-2007. Co-PI is Joe Berry, Carnegie Institution.

DOE BER *Quantifying the importance of belowground plant allocation for sequestration of carbon in soils*. FY 2000-2005 Co-PI is Todd Dawson, UCB.

DOE BER. *Characterizing Organic Carbon Flux from Litter Sources to Mineral-Soil Sinks*, FY2007.

DOE BER *DOE Early Career Award for Scientists and Engineers*, FY2005-2009

USFS *Soil Carbon Decomposition Along Paired Pine and Hardwood Climosequences*, FY07

Current Grants, Co-Investigator

DOE BER *An Annual Grassland Mesocosm Exploration of Scaling From Genomes to Ecosystem Function*, FY2005-2008. PI is Mary Firestone, LBL/UCB.

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Past Grants

LLNL. *Carbon Flux in a California Grassland Soil Sequence* FY2004-2006

USDA. *Dynamics of buried soil organic carbon along a depositional Toposequence*, FY 2003-2006. PI is John Harte

DOE BER *Enriched Background Isotope Study (EBIS)*, FY 2001-2006

DOE BER *Climate-Ecosystem Feedbacks: Observational Needs and Opportunities*, FY 2004-2006
NSF *Ecosystems*, FY 2001-2005 (co-PI)

California Energy Commission, non-CO₂ greenhouse gases. FY2003-2004

University of Martin Luther, Germany, fluoride reactivity of minerals, FY 2003-2005

Laboratory Director Long-Term Development, LBNL 2001-2003

Laboratory Director Long-Term Development, LBNL 1999-2001

DOE Water Cycle Pilot

DOE Terrestrial Carbon Program, 1999-2000, PI

National Science Foundation, 1996-1998

University-wide Energy Research Group Grant, 1990

California Policy Seminar Grant, 1987-1989

California Sea Grant Trainee (Scripps Oceanographic Institute), 1989

Climatic Change Effects Research Program Grant, US EPA, 1988

Council on Educational Development, Course Improvement Grant, 1987

Postdoctoral Research Advisors:

Susan Trumbore, Peter Vitousek, Chris Field

Thesis Advisors:

John Harte, F. Stuart Chapin, III, Pamela Matson, John Holdren

Postdoctoral Research Associates:

Jeff Bird, Julia Gaudinski, Simon Davis, Caroline Massiello, Chris Swanston

Thesis Research Advisees or Reader of Thesis, University of California, Berkeley unless noted:

Asmeret Behre, Laurie Koteen, Lara Kueppers, Erika Marin-Spiotta (DOE GREF Mentor),

Rebecca Sutton, Craig Rasmussen (UC Davis), Erika Zavaleta (Stanford), John Zobitz (DOE GREF Mentor)

Undergraduate and High School Interns as part of Mentorship Programs:

Diane Kenski (ERULF), Pallavi Shukla (Mickey Leland), Erin Hanlon (SULI), Braulia Sapien (Pre-Service Teacher Training), Laura Wells (Pre-Service Teacher Training), Francesca Mia Hopkins (Environmental Science Senior Thesis, UCB; now post baccalaureate fellow), Laura Huppert (Piedmont High School—and Regional Science Fair in March 2005 winner with our project).

Professional Affiliations

American Geophysical Union
Ecological Society of America