ELSIE M. SUNDERLAND

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EDUCATION

1997	B.Sc., Environmental Science, McGill University, Canada
2003	Ph.D., Environmental Toxicology, Simon Fraser University, Canada
2003-2004	Postdoctoral Fellow, Office of Science Policy, US EPA, Washington DC, USA

ACADEMIC APPOINTMENTS & PROFESSIONAL EXPERIENCE

Harvard University, Cambridge MA, USA

2018-present	Gordon McKay Professor of Environmental Chemistry, Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS)
2018-present	Professor of Environmental Science and Engineering, Department of Environmental Health, Harvard T.H. Chan School of Public Health (HSPH)
2018-present	Faculty Affiliate, Department of Earth and Planetary Sciences, Harvard University
2015-2018	Thomas D. Cabot Associate Professor of Environmental Science and Engineering, SEAS
2014-2018	Associate Professor of Environmental Science and Engineering, Department of Environmental Health, HSPH
2014-2015	Associate Professor of Environmental Science and Engineering, SEAS
2010-2014	Mark and Catherine Winkler Assistant Professor of Aquatic Science, HSPH
2008-2010	Research Associate, SEAS & Harvard Center for Risk Analysis, HSPH

U.S. Environmental Protection Agency, Washington DC, USA

2004-2008 Worked in the Office of Science Policy; Office of the Science Advisor; National Center for Environmental Research; National Center for Environmental Economics; National Exposure Research Laboratory. *Positions and responsibilities included*:

- Led cross-Agency workgroup drafting guidance on the development, evaluation and application of environmental models used to inform regulatory decisions.
- Developed policy recommendations for nearshore water quality in the Great Lakes as the representative for the International Air Quality Planning Board (IAQAB) of the International Joint Commission (IJC).
- Developed federal regulations for atmospheric emissions of hazardous air pollutants from coal-fired utilities.

Lunenburg Municipal Government, Bridgewater NS, Canada

1994-1995 Assisted in the development of the first fully-integrated four waste stream management system in North America (large-scale recycling and composting).

PERSONAL

Citizenship: dual, Canada and United States.

ACADEMIC & PROFESSIONAL HONORS

2019, 2020 Web of Science Highly Cited Researcher (multiple highly cited papers in top 1% of field)

2017	Harvard Star Family Award for Promising Scientific Research
2013	Excellence in Reviewing Award from journal *Biogeochemistry*
2012	Smith Family Foundation Award for Excellence in Biomedical Research
2010	U.S. EPA Level II Scientific & Technological Achievement (STAA) Award
2010	Outstanding Reviewer citation by Editorial Board of *Estuaries and Coasts*
2008	U.S. EPA Level I (highest level) Scientific & Technological Achievement (STAA) Award
2005	U.S. EPA National Honor Award, Gold Medal for Exceptional Service
2003	Dean's Convocation Medal (best graduate thesis), Simon Fraser University
2002	Society of Environmental Toxicology & Chemistry best student paper presentation
1998-2002	Natural Sciences and Engineering Research Council of Canada Graduate Fellowships
1993	Greville Smith Scholarship (top-entrance scholarship), McGill University
1993	Canada Scholarship, Industry and Technology Canada

TEACHING

Undergraduate:

ESE-6	Introduction to Environmental Science and Engineering, Harvard School of Engineering and Applied Sciences, Spring 2016-2018; 2020-2021.
ESE-161	Applied Environmental Toxicology, Harvard School of Engineering and Applied Sciences, Spring 2015; Fall 2016; Fall 2019; Spring 2022.
ESE-169	Seminar on Global Pollution Issues, Harvard School of Engineering and Applied Sciences, Spring 2013; Fall 2017; Spring 2021.

Graduate:

ES-298r	Mitigating Toxicity Through Materials Design, Harvard School of Engineering and Applied Sciences, Fall 2015.
RDS-500	Risk Assessment, Department of Environmental Health, Harvard School of Public Health, Spring 2011-2014.
ENVR E-215	Environmental Science, Harvard Extension School, Fall 2011.

Other teaching activities:

2009-2021	Faculty, Analyzing Risk: Science, Assessment, and Management; Center for Continuing Professional Education, Harvard School of Public Health. (~60 students each year).
2008	Developed curriculum and instructed training course on the use of models in environmental regulatory decision-making for U.S. EPA Region 1. (~50 staff members).
2004-2008	Led nation-wide seminar series (webinar) for ten U.S. EPA Regional Offices on the use of environmental models to inform environmental management decisions.

RESEARCH MENTORING

Doctoral Theses Supervised:

2021	Rebecca Stern, Environmental Science and Engineering *The Microbiome of Atmospheric Particles*
2021	Charlotte Wagner, Environmental Science and Engineering *Global Modeling of Persistent Pollutants in an Era of Changing Emissions and Climate*
2019	Andrea K. (Weber) Tokranov, Environmental Science and Engineering

Fate, Transport and Detection of Poly- and Perfluoroalkyl Substances in Natural and Engineered Environments

2018 Xindi C. Hu, Environmental Health
From Source to Dose: Modeling Human Exposure to Poly- and Perfluoroalkyl Substances

2018 Clifton Dassuncao, Environmental Health
Modeling Exposures to Poly- and Perfluoroalkyl Substances (PFASs) in Aquatic Biota and Humans

2017 Ryan S.D Calder, Environmental Health
Hydroelectric Power and Indigenous Health in the Canadian North

2017 Hannah M. Horowitz, Earth and Planetary Sciences
The Global Biogeochemical Cycle of Mercury: Insights from Modeling Atmospheric Chemistry and All-time Emissions from Human Activity

2016 Miling Li, Environmental Health
Environmental Origins of Methylmercury in Aquatic Biota and Humans

2014 Helen M. Amos, Earth and Planetary Sciences
Toward an Improved Understanding of the Global Biogeochemical Cycle of Mercury

Postdoctoral Fellows/Research Associates

[13] Scott Zolkos (2020-present)
[12] Lara Schultes (2019-present)
[11] Maxime Enrico (2019-2021), now postdoctoral fellow, Université de Pau, France.
[10] Kyle Delwiche (2018-19), now postdoc Stanford.
[9] Marie Perkins (2017-19), now Assistant Professor, University of Wisconsin-Stevens Point.
[8] Linjun Yao (2017-19), now Scientist, MA DEP.
[7] Colin Thackray (2016-present).
[6] Xianming Zhang (2013-16), now Scientist, Ontario Ministry of the Environment.
[5] Yanxu Zhang (2013-15), now Professor, Nanjing U.
[4] Amina Schartup (2012-17), now Assistant Professor, Scripps Institute of Oceanography.
[3] Anne Soerensen (2011-14), now Curator, Swedish Museum of Natural History.
[2] Asif Qureshi (2011-2013), now Associate Professor, IIT Hyderabad, India.
[1] Jenny Fisher (2011-12), now Senior Lecturer, U. of Wollongong, Australia.

Doctoral Students:

SEAS = School of Engineering & Applied Sciences; HSPH = School of Public Health; EPS = Earth and Planetary Sciences.

[15] Jahred Liddie (HSPH: 2021-present, G1)
[14] Mona Dai (SEAS: 2019-present, G3)
[13] Heidi Pickard (SEAS: 2019-present, G3)
[12] Jennifer Sun (SEAS: 2018-present, G4)
[11] Ben Geyman (SEAS: 2018-present, G4)
[10] Bridger Ruyle (SEAS: 2017-present, G5)
[9] Charlotte Wagner (SEAS: 2015-2021), Now: Scientist, Stockholm Environment Institute
[8] Rebecca Stern (SEAS: 2016-2021), Now: Postdoctoral Fellow, HSPH
[7] Andrea Tokranov (SEAS: 2013-19); Now: Hydrologist, USGS
[6] Xindi Hu (HSPH: 2014-18); Now: Data Scientist, Mathematica Policy Research
[5] Clifton Dassuncao (HSPH: 2013-2018); Now Environmental Health Scientist, Eastern Research Group, Inc.

[4] Ryan Calder (HSPH: 2012-17); Now: Assistant Professor, Virginia Tech
[3] Hannah Horowitz (EPS: 2011-17); Now: Assistant Professor, U. Illinois
[2] Miling Li (HSPH: 2011-16); Now: Assistant Professor, U. Delaware
[1] Helen Amos (EPS: 2010-14); Now: Senior Research Scientist, SSAI / NASA Goddard Space Flight Center

Masters Students:

[8] Jahred Liddie (2020-21, now doctoral student HSPH)
[7] Adela Chovancova (2017-18, now Regulatory and Compliance Specialist at Catania Oils)
[6] Paheliya Aixilafu (2016-17, now Doctoral candidate, U. Michigan)
[5] Amelia Valberg (2014-15, now Scientist, US EPA)
[4] Cindy Hu (2012-2014, now Data Scientist, Mathematica Policy Research)
[3] Clifton Dassuncao (2011-13, now Environmental Health Scientist, Eastern Research Group, Inc.)
[2] Matthew Tumpney (2011-12, now Consultant Gradient Inc.)
[1] Elizabeth Corbitt (2010-15, now science teacher Louisiana)

Doctoral and Oral Examination Committees – Harvard

[15] Tianning Zhao, SEAS (2019)
[14] Tina Liu, EPS (2019)
[13] Colleen Goija, SEAS (2018-)
[12] Eleni Dovrou, SEAS (2018-2020)
[11] Tia Scarpelli, EPS (2018-2021)
[10] Sabri Bromage, Department of Nutrition, HSPH (2016)
[9] Carlo Alberto Amadei, SEAS (2016-2019)
[8] Andrea Weber, SEAS (2015)
[7] Yingjun Lui, SEAS (2014)
[6] Yanina Barrera, SEAS (2014)
[5] Eun-Joo Park, Environmental Health, HSPH (2013-2015)
[4] Kathryn McKain, SEAS (2015)
[3] Yong-Mei Shen, Environmental Health, HSPH (2011-2015)
[2] Iny Jhun, Environmental Health, HSPH (2012-2013)
[1] Matthieu Trudeau, Environmental Health, HSPH (2011-2013)

Doctoral and Oral Examination Committees - Other Universities

[8] Connor Olsen, Syracuse University (Committee Member, 2021-)
[7] Aryeh Feinberg, ETH, Switzerland (Examining Committee, 2020)
[6] Lara Schultes, Stockholm University, Sweden (Opponent, 2019)
[5] Amanda Giang, MIT, Institute for Data, Systems and Society (Committee Member, 2013-2017)
[4] Michelle Mastromonaco, Chalmers University of Technology, Sweden (Opponent, 2016)
[3] Matthew Binnington, University of Toronto, Canada (External Examiner, 2016)
[2] Ravinder Pannu, University of Saskatchewan, Canada (External Examiner, 2012)
[1] Adrienne Ethier, University of Ottawa, Canada (External Examiner, 2009)

Undergraduate Research Assistants, Thesis and/or Independent Study Students

[23] Jordan Daigle (2021-22), [22] Murphy Agnew (2021), [21] Elida Kocharian (2020), [20] Maya Levine (2020), [19] Jonas LaPier (2019-21), [18] Jenn Greiner (2020-21), [17] Cecil Myers (2019-20), [16] Daniel Chang (2019-20), [15] Beverly Ge (2017-19), [14] Chandler Brown (2018-19), [13] Nicole Nishizawa (2017-19), [12] Helen Kim (2018), [11] Amira Hannon (2018), [10] Bruno Moguel Gallegos (2017-18), [9] Alina McIntyre (2017), [8] Nakoa Farrant (2017-18), [7] Alicia Juang (2016-18), [6] Jessica Ewald (2015-17), [5] Harry Stone (2015-16), [4] Jahred Liddie (2014-16), [3] Sam Krabbenhoft (2015), [2] Angela Jiang (2014), [1] Kurt Bullard (2014)

Undergraduate Student Awards:

Jonas LaPier ('21), Dean's Award for Outstanding Engineering Project

Daniel Chang ('20), Honorable mention, Dean's Award for Outstanding Engineering Project

Alicia Juang ('18), Dean's Award for Outstanding Engineering Project, Harvard College Hoopes Prize

Jessica Ewald ('17), Dean's Award for Outstanding Engineering Project

Publications with Undergraduate Authors:

- X.C. Hu, **B. Ge ('20)**, B. Ruyle, J. Sun, E.M. Sunderland. 2021. A statistical approach for identifying private wells susceptible to PFAS contamination. *Environmental Science & Technology Letters*. https://doi.org/10.1021/acs.estlett.1c00264.
- M. Li, **A. Juang ('18), J. Ewald ('17)**, R. Yin, B. Mikkelsen, D.P. Krabbenhoft, P. Balcom, C. Dassuncao, E.M. Sunderland. 2020. Selenium and stable mercury isotopic analysis provide new insights into mercury toxicokinetics in pilot whales. *Science of the Total Environment*. 710 : 136325.
- **J.D. Ewald ('17)**, J.L. Kirk, M. Li, E.M. Sunderland. 2019. Organ-specific differences in mercury speciation and accumulation in juvenile and adult ringed seals (*Phoca hispida*). *Science of the Total Environment*. 650(2): 2013-2020.
- A.K. Tokranov, **N. Nishizawa ('19)**, C.A. Amadei, J.E. Zenobio, H.M. Pickard, J.G. Allen, C.D. Vecitis, E.M. Sunderland. 2019. How do we measure the poly- and perfluoroalkyl substances (PFASs) at the surface of consumer products? *Environmental Science & Technology Letters.* 6(1): 38-43.
- X.C. Hu, A.K. Tokranov, **J. Liddie ('16)**, X. Zhang, P. Grandjean, J.E. Hart, F. Laden, Q. Sun, L.W.Y. Yeung, E.M. Sunderland. 2019. Tap water contributions to plasma concentrations of poly- and perfluoroalkyl substances (PFASs) in a nationwide prospective cohort of U.S. women. *Environmental Health Perspectives.* 127(6):067006.
- E.M. Sunderland, M. Li, **K.T. Bullard ('17).** 2018. Decadal changes in edible supply of seafood and methylmercury exposure in the United States. *Environmental Health Perspectives.* 126(1): 017006.

PROFESSIONAL ACTIVITIES

Professional Service: International

2021	Back to Blue Expert Panel on Ocean Pollution sponsored by the Economist Group and Nippon Foundation
2020-2021	Theme co-chair, GeoHealth, Goldschmidt 2021, virtual meeting, 4-9 July, 2021.
2019	Scientific Observer/Expert for the *ad hoc* committee on Effectiveness Evaluation for the Minamata Convention on Mercury, UNEP.
2018-2019	Planning Committee and Exposure Workgroup Co-Chair, SETAC Special Topic Meeting on PFAS Risk Assessment, Durham, NC, August 12-15, 2019.
2017-2019	Scientific Steering Committee, 14th International Conference on Mercury as a Global Pollutant, Krakow, Poland, 2019.
2017-2018	International Planning Committee, 19th International Conference on Heavy Metals in the Environment, Georgia, USA, 2018.
2017-2018	Contributor, 2018 UNEP Global Mercury Assessment (atmospheric and biotic workgroups).
2015-2017	Scientific Steering Committee, 13th International Conference on Mercury as a Global Pollutant, Providence, RI, 2017.
2015-2016	International Planning Committee, 18th International Conference on Heavy Metals in the Environment, Ghent, Belgium, 12-14 September 2016.

2013-2015 GEOS-Chem Model International Steering Committee (Co-chair: Hg & POPs working group).

2014-2015 Environmental Geochemistry theme co-convener for Goldschmidt 2015, Prague, CZ.

2013-2015 Scientific Steering Committee, 12th International Conference on Mercury as a Global Pollutant, Jeju, Korea, June 14-19, 2015.

2013-2014 International Planning Committee (IPC), 17th International Conference on Heavy Metals in the Environment, Guiyang, China, September 22-26, 2014.

2011-2013 Planning Team, UNECE/LRTAP Hemispheric Transport of Air Pollutants (HTAP), Impacts on Health and Ecosystems

2011-2013 Scientific Steering Committee, 11th International Conference on Mercury as a Global Pollutant, Edinburgh, Scotland, 28 July – 2 August 2013

2009-2012 Steering Committee, Consortium on Mercury in the Marine Environment (C-MERC)

2011-2012 International Planning Committee, 16th International Conference on Heavy Metals in the Environment, Rome, Italy, 22-27 September 2012

2006-2011 Conference Co-Host and Technical Co-Chair for the 10th International Conference on Mercury as a Global Pollutant, Halifax, Nova Scotia, 24-29 July 2011

2009-2010 Chapter Lead Author for Task Force on Hemispheric Transport of Air Pollution 2010 Assessment Report

2008-2010 International Joint Commission Fish Consumption Priority Workgroup

2004-2006 Regional Planning Committee for the 8th International Conference on Mercury as a Global Pollutant, Madison, Wisconsin, 6-11 August 2006

2007-2008 Invited Panelist for International Joint Commission Nearshore Priority Expert Consultations

Professional Service: National

2020 U.S. National Academies planning committee and session chair for Federal Government Human Health PFAS Research Workshop, October 26-27, 2020.

2019 U.S. National Academies of Science, Engineering and Medicine: Workshop Planning Committee on Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment - A Systems Approach to Exploring Exposure and Identifying Opportunities for Leadership, September 26-27, 2019.

2009-2019 Science Council, Biodiversity Research Institute, Gorham, ME

2008-2009 Steering Committee: Mercury Science and Policy Conference for the Northeast and Great Lakes Region, Chicago, Illinois, 2009

2007-2008 Organizing Committee for the 6th National Water Quality Monitoring Conference, Atlantic City, New Jersey, May 18-22, 2008

2006-2007 Co-organizer of the Lake Ontario Contaminants Modeling and Monitoring Meeting, Grand Island, NY. March 27-28, 2007

2005-2006 Co-organizer of the International Joint Commission Collaborative Meeting on Mercury Modeling in Freshwater Environments, Niagara Falls, NY, 19-20 January 2006

2003-2008 Nation-wide modeling seminar series coordinator for U.S. EPA's Regional Offices

2007-2008 Great Lakes Observing System Modeling Subsystem Team Member

2003-2008 Co-organizer of Northwest Water Quality Modelers

2006-2008 U.S. EPA Region 1 Regional Science Council

2006-2008 Workgroup on U.S. EPA Guidance Document for Calculating National Bioaccumulation Factors

2006-2008 Workgroup on U.S. EPA Methylmercury Fish Tissue Residue Implementation Guidance

2003-2008 Lead Author and workgroup coordinator for U.S. EPA Guidance on Regulatory Environmental Modeling

2005 U.S. EPA Reconsideration of the Clean Air Mercury Rule Workgroup and Author

2004-2005 U.S. EPA Clean Air Mercury Rule Regulatory Impact Assessment Workgroup and Author

2003-2004 U.S. EPA Office of Water Mercury in Marine Life Workgroup

University Service

2020-present Harvard FAS financial study working group

2020-present Director of Undergraduate Studies, Environmental Science and Engineering, SEAS

2019-present Harvard Standing Committee on Oceanography

2016-present Standing Committee on the Concentration in Environmental Science and Public Policy

2019-2020 Presidential Committee on Sustainability, Member

2019-2021 Harvard Faculty Council, Division Representative for Natural and Applied Sciences

2017-2020 Director for Graduate Studies, Environmental Science and Engineering, SEAS

2019-2020 Docket Committee, Harvard Faculty of Arts and Science

2018-2020 Member, Faculty search committee in Risk Assessment, HSPH

2018-2020 Harvard Standing Committee on Women

2018-2019 Member, Faculty search committee in Marine Biology, Organismic and Evolutionary Biology (OEB)

2018-2019 Member, Faculty search committee in Earth History, Earth and Planetary Sciences (EPS)

2018 Harvard Campus Sustainability Innovation Fund (CSIF) Review Committee

2017-2018 Harvard University child-care vendor selection committee

2017-2018 Harvard Food Sustainability Standards Committee

2017-2018 Member, Faculty search committee in Climate Science (EPS/SEAS)

2016-2017 Harvard University Climate Change Task Force

2016-2017 Harvard Office of Sustainability Healthy Buildings Initiative

2016-2018 Harvard Alumni Association Speakers Bureau

2016-2017 Mentor, Harvard Graduate Student Women in Science and Engineering (HGWISE)

2016-2018 Board of Freshman Advisors

2016-2017 Committee on Higher Degrees, School of Engineering and Applied Sciences

2015-2016 Oceans and Health Seminar Series Coordinator, School of Engineering and Applied Sciences

2014-2016 Graduate Admissions and Scholarship, School of Engineering and Applied Sciences (Area Chair in 2015-2016)

2014-2015 Committee on Higher Degrees, School of Engineering and Applied Sciences

2010-2014 Curriculum Committee, Department of Environmental Health, HSPH

Special Session Organizer

2020 Goldschmidt 2020, Honolulu, USA, 21-26 June.

2019 Goldschmidt 2019, Barcelona, Spain, 18-23 August.

2018 Goldschmidt 2018, Boston, MA, August 12-17.

2015 2015 Joint Assembly of the American Geophysical Union and Canadian Geophysical Union, Montreal, PQ, 3-7 May.

2013 11th International Conference on Mercury as Global Pollutant, Edinburgh, Scotland, 28 July – 2 August.

2012 American Meteorological Society, First Conference on Atmospheric Biogeosciences, 29 May – 1 June.

2010 Society of Environmental Toxicology & Chemistry, Annual Meeting, Portland OR, November 7-11.

2009 American Geophysical Union, Fall Meeting, San Francisco CA, December 14-18.

2009 9th International Conference on Hg as a Global Pollutant, Guiyang, China, June 7-12.

2008 6th National Water Quality Monitoring Conference, Atlantic City, New Jersey, May 18-22.

2006 8th International Conference on Hg as a Global Pollutant, Madison, WI, August 6-11.

University Affiliations and Professional Societies

Member, American Geophysical Union (AGU)

Member, American Chemical Society (ACS)

Member, European Association of Geochemistry (EAG)

Member, Society of Environmental Toxicology and Chemistry (SETAC)

Faculty Associate, Harvard University Center for the Environment (HUCE)

Faculty Associate, Harvard Center for Risk Analysis (HCRA)

Co-leader, Harvard Atmospheric Chemistry Modeling Group (2011-2014)

Reviews/Panels/Editorial

2018-present	Editorial Advisory Board Member, *Environmental Science & Technology*
2017-present	Editorial Advisory Board Member, *Environmental Science Processes and Impacts*
2018-2020	Editorial Board Member, *International Journal of Environmental Research and Public Health (IJERPH)*
2018	Guest Editor, *ACS Earth and Space Science*, 2018, Special Issue on Global Mercury Cycling
2012-2019	U.S. National Science Foundation (peer-reviewer)
2009-2016	Canadian Northern Contaminants Program (panel reviewer)
2013, 2016	U.S. National Science Foundation (panel reviewer)
2014	Netherlands Organization for Scientific Research (peer-reviewer)
2014	Gulf of Mexico Research Initiative (panel reviewer)
2013	Reviewer, Penobscot Bay scientific panel report on impacts of a chlor-alkali plant on estuarine water quality and mercury bioaccumulation.
2012	Guest Editor, *Environmental Research*, Volume 119, Pages 1-142 (November 2012): Mercury in Marine Ecosystems: Sources to Seafood Consumers
2012	Natural Sciences and Engineering Research Council of Canada (NSERC)
2012	Canadian Assessment of Mercury in the Marine Environment, Environment Canada
2010, 2015	Swiss National Science Foundation (peer-reviewer)
2011	Nunatsiavut Government, Expert review of potential impacts of hydroelectric power development on the Lower Churchill River in Labrador, Canada on methylmercury dynamics and risks to Inuit health.
2011	Panelist for blueprint review of research and monitoring priorities for the Northern Contaminants Program, Indian and Northern Affairs Canada.
2010	Arctic Monitoring and Assessment Report, Arctic Monitoring and Assessment Program
2009	New Hampshire Sea Grant, Virginia Sea Grant (peer-reviewer)
2009	UNEP Mercury Fate and Transport Partnership Assessment Report
2008	Minnesota Sea Grant (peer-reviewer)
2007	Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Grants Program (peer-reviewer)

PUBLICATIONS

Students and postdocs mentored are underlined. Senior author indicated by the last position.

PEER-REVIEWED JOURNALS

2021

102. X.C. Hu, B. Ge, B. Ruyle, J. Sun, **E.M. Sunderland**. 2021. A statistical approach for identifying private wells susceptible to PFAS contamination. *Environmental Science & Technology Letters*. https://doi.org/10.1021/acs.estlett.1c00264.

101. M. Alcala-Orozco, P. Balcom, **E.M. Sunderland**, J. Olivero-Verbel, K. Caballero-Gallardo. 2021. Occurrence of Essential and Toxic Elements in Canned Fish (sardines and tuna) Commercialized in the Latin American market: Public Health at Stake. *Food Additives and Contaminants: Part B*. Accepted.

100. M. Enrico, P. Balcom, D.T. Johnston, J. Foriel, **E.M. Sunderland**. 2021. Simultaneous combustion preparation for mercury isotope analysis and detection of total mercury using a direct mercury analyzer. *Analytica Chimica Acta*. 1154, 338327.

99. B. Ruyle, H. Pickard, D. LeBlanc, A. Tokranov, C. Thackray, X.C. Hu, C.D. Vecitis, **E.M. Sunderland**. 2021. Isolating the AFFF signature in coastal watersheds using oxidizable PFAS precursors and unexplained organofluorine. *Environmental Science & Technology*. 55(6): 3686-3695.

98. R.A. Stern, P. Koutrakis, M. Martins, B. Lemos, S.E. Dowd, **E. Sunderland**, E. Garshick. 2021. Characterization of Hospital Airborne SARS-CoV-2. *Respiratory Research*. 22:73.

97. Y. Zhang, S. Dutkiewicz, **E.M. Sunderland**. 2021. Impacts of climate change on methylmercury formation and bioaccumulation in the 21st century ocean. *One Earth*. 4(2): 279–288.

96. A. Young, E. Sparer, H. Pickard, **E.M. Sunderland**, G. Peaslee, J.G. Allen. 2021. Per- and polyfluoroalkyl substances (PFAS) and total fluorine in fire station dust. *Journal of Exposure Science and Environmental Epidemiology*. Accepted. https://doi.org/10.1038/s41370-021-00288-7.

95. R. Stern, N. Mahmoudi, C. Buckee, A. Schartup, P. Koutrakis, S. Ferguson, J. Wolfson, S. Wofsy, B. Daube, **E.M. Sunderland**. 2021. The microbiome of size fractionated airborne particles from the Sahara source region. *Environmental Science & Technology*. 55(3): 1487-1496.

94. A.O. De Silva, J.M. Armitage, T.A. Bruton, C. Dassuncao, W. Heiger-Bernays, X.C. Hu, A. Karrman, C. Ng, A. Robuck, M. Sun, T.F. Webster, **E.M. Sunderland**. 2021. PFAS exposure pathways for humans and wildlife: A synthesis of current knowledge and key gaps in understanding. *Environmental Toxicology and Chemistry*. 40(3): 631-657.

93. R. Lohmann, E. Markham, J. Klanova, P. Kukucka, P. Pribylova, X. Gong, T. Yanisheswki, C. Wagner, **E. Sunderland**. 2021. Trends of diverse POPs in air and water across the Western Atlantic Ocean: Strong gradients in the ocean, but not in the air. *Environmental Science & Technology*. https://doi.org/10.1021/acs.est.0c04611.

92. B.J. Ruyle, C.P. Thackray, J.P. McCord, M.J. Strynar, K.A. Mauge-Lewis, S.E. Fenton, **E.M. Sunderland**. 2021. Reconstructing the composition of poly- and perfluroalkyl substances (PFAS) in contemporary aqueous film forming foams. *Environmental Science & Technology Letters*. 8(1): 59-65.

2020

91. K. Schaefer, Y. Elshorbany, E. Jafarov, P.F. Schuster, R.G. Striegl, K.P. Wickland, **E.M. Sunderland**. 2020. Potential impacts of mercury released from thawing permafrost. *Nature Communications.* 11(1): 1-6.

90. H. Joerss, Z. Xie, C.C. Wagner, W-J von Appen, **E.M. Sunderland**, R. Ebinghaus. 2020. Transport of legacy perfluoroalkyl substances and the replacement compound HFPO-DA through the Atlantic gateway to the Arctic Ocean – Is the Arctic a sink or a source? *Environmental Science & Technology.* 54(16): 9958-9967.

89. X. Zhang, X. Sun, R. Jiang, E. Zeng, **E.M. Sunderland**, D.C.G. Muir. 2020. Screening new persistent and bioaccumulative organics in China's inventory of industrial chemicals. *Environmental Science & Technology*. 54(12): 7398-7408.

88. D. Bitounis, D. Parviz, X. Cao, C.A. Amadei, C.D. Vecitis, **E.M. Sunderland**, B.D. Thrall, M. Fang, M.S. Strano, P. Demokritou. 2020. Synthesis and physicochemical transformations of size-sorted graphene oxide during

simulated digestion and its toxicological assessment against an in *in vitro* model of the human intestinal epithelium. *Small*. 16(21): 1907640.

87. Y. Zhang, A.L. Soerensen, A.T. Schartup, **E.M. Sunderland**. 2020. A global model for methylmercury formation and uptake at the base of marine food webs. *Global Biogeochemical Cycles.* 34 (2), e2019GB006348.

86. M. Li, A. Juang, J. Ewald, R. Yin, B. Mikkelsen, D.P. Krabbenhoft, P. Balcom, C. Dassuncao, **E.M. Sunderland**. 2020. Selenium and stable mercury isotopic analysis provide new insights into mercury toxicokinetics in pilot whales. *Science of the Total Environment*. 710: 136325.

85. M. Perkins, O.P. Lane, D.C. Evers, A. Sauer, N.J. O'Driscoll, S.T. Edmunds, J.C. Haelin, J. Trimble, **E.M. Sunderland**. 2020. Historical patterns of mercury exposure for North American songbirds. *Ecotoxicology.* 29(8):1161-1173.

2019

84. D.H. Fourie, I.M. Hedgecock, F. DeSimone, **E.M. Sunderland**, N. Pirrone. 2019. Are mercury emisssions from satellite electric propulsion an environmental concern? *Environmental Research Letters*. 14: 124021. https://doi.org/10.1088/1748-9326/ab4b75.

83. S. Cinnirella, D. Evelina Bruno, N. Pirrone, M. Horvat, I. Živković, D. Evers, S. Johnson, and **E.M. Sunderland**. 2019. Mercury concentrations in biota in the Mediterranean Sea, a compilation of 40 years of surveys. *Scientific Data*. 6: 205. https://doi.org/10.1038/s41597-019-0219-y.

82. X. Zhang, R. Lohmann, **E.M. Sunderland**. 2019. Poly- and perfluoroalkyl substances (PFASs) in seawater and plankton from the Northwestern Atlantic Margin. *Environmental Science & Technology.* 53 (21), 12348-12356.

81. W. Xue, S.Y. Kwon, S. Grasby, **E. Sunderland**, X. Pan, Z. Puiyang, T. Zhou, H. Yan, R. Yin. 2019. Anthropogenic influences on mercury in Chinese soil and sediment revealed by relationships with total organic carbon. *Environmental Pollution.* 255(1): 113186.

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INVITED PRESENTATIONS

2021

104. Invited panel, Environmental Working Group Symposium on PFAS, July 14.

103. Invited talk, National Academies of Science, Engineering, and Medicine Consensus Study on "Guidance on PFAS Testing and Health Outcomes," July 13.

102. Invited talk. Massachusetts Interagency PFAS Task Force, Virtual, June 15.

101. Invited talk. Physical Geography Seminar Series, University College London, Virtual seminar, May 20.

100. Invited talk. Environmental Metrology and Policy Program, Georgetown University. Virtual seminar, April 29.

99. Invited talk. Hemispheric Transport of Air Pollution (HTAP) Fate and Transport Partnership meeting, April 13.

98. Invited panelist for "Dark Waters" film discussion on the business and societal impacts of drinking water contamination. Harvard Business School Food, Agriculture and Water Club. March 24.

97. Invited panelist for 2021 PFAS Workshop. Institute for Journalism and Natural Resources. Virtual panel, Jan 27.

2020

96. Invited panelist. Minamata Online: Multimedia modelling. United Nations Environment Programme. Nov. 17.

95. Invited talk. University of Michigan Lifestage Environmental Exposures and Disease Center. Oct. 7.

94. Invited seminar. NOAA Chemical Sciences Laboratory Seminar Series. September 9.

93. Keynote talk. Emerging Contaminants Summit. Denver, Colorado, March 11.

92. Invited seminar, Doctoral Seminar Series, College of Pharmacy and Health Sciences, St John's University, Queens, New York, February 24.

2019

92. Invited plenary talk, North American Deposition Program (NADP) Meeting, Boulder, Colorado, November 6.

91. Invited seminar, University of Pittsburgh, Civil and Environmental Engineering Seminar, Pittsburgh, PA, Oct. 11.

90. Invited seminar, Gijs van Seventer Lectureship in Environmental Health, Boston University, Boston, MA, Oct. 4.

89. Invited talk, Symposium on Faroese Research on Health and Environment, Tórshavn, Faroe Islands, August 30.

88. Invited seminar, Institute of Coastal Research, Helmholtz-Zentrum Geesthacht, Hamburg, Germany, August 26.

87. Invited seminar, New Insights in Atmospheric Science Seminar Series, US EPA, Research Triangle Park, NC, August 15.

86. Invited talk, ESTCP and SERDP PFAS Project Meeting, San Diego, CA, July 31.

85. Invited seminar, Department of Estuarine and Ocean Sciences, University of Massachusetts, Dartmouth, MA, March 20.

84. Invited seminar, University of Toronto, Center for Global Change Science Distinguished Lecturer Series. Toronto, Canada, January 8.

2018

83. Invited talk, Harvard Club of Portland, Portland, OR, June 20.

82. Invited seminar, University of Rhode Island Superfund Center Trainees, Kingston, RI, May 21.

81. Invited seminar, Agency for Toxic Substances and Disease Research (ATSDR), Atlanta, GA, May 10.

80. Invited seminar, Department of Earth, Ocean and Atmospheric Sciences Seminar Series, University of British Columbia, Vancouver, Canada, May 3.

79. Invited presentation at the "Six Classes" Toxics Retreat IV, Sequoia Retreat Center, Ben Lomond, CA, May 1.

78. Invited talk, Harvard Club of Cape Cod, Falmouth, MA, April 27.

77. Invited presentation, Northeast Regional Superfund Program Meeting, Woods Hole Oceanographic Institute, Woods Hole, MA, March 26.

76. Invited presentation, Nereus Symposium on Health of the Oceans, Nippon Foundation, Tokyo, Japan, Dec. 22.

2017

75. Invited talk, Hertz Foundation Fellows East Coast Retreat, Woods Hole, MA, September 24.

74. Invited keynote talk, Goldschmidt 2017, Paris, France, August 13-18.

73. Invited talk and plenary panel, 13th International Conference on Mercury as a Global Pollutant, Providence, RI, July 16-21.

72. Invited talk, Highly Fluorinated Compounds – Social and Scientific Discovery, Northeastern University, Boston MA, June 14.

71. Invited seminar, Washington Harvard Alumni Special Interest Group, Washington DC, May 22.

70. Invited seminar, Science, Technology and Environmental Policy Seminar, Princeton University, Princeton NJ, April 10.

69. Invited seminar, Climate Change and Global Health Seminar, Harvard Global Health Institute, Cambridge MA, February 28.

68. Invited talk, Harvard Standing Committee on Women Mini-Symposium, Cambridge MA, February 27.

67. Invited talk, Global Food+ 2017 Symposium, Cambridge MA, February 24.

2016

66. Invited seminar, Saturday of Symposia, Harvard Club of Boston, Boston MA, December 5.

65. Invited seminar, U.S. Environmental Protection Agency, Washington DC, November 28.

64. Invited seminar, Nereus Program, University of British Columbia: Adapting to Global Changes in Oceans and Fisheries, Vancouver BC, Canada, November 17.

63. Invited talk, UNEP Global Mercury Partnership consultation meeting, Portland, ME, October 13.

62. Plenary talk, 18th International Conference on Heavy Metals in the Environment, Ghent, Belgium, September 12.

61. Invited presentation, Methylmercury mitigation and Muskrat Falls workshop, Happy Valley - Goose Bay, Labrador, Canada, August 4.

60. Invited talk, Gordon Research Conference: Organic Geochemistry, Holderness School NH, July 28.

59. Invited seminar, NOAA Geophysical Fluid Dynamics Laboratory (GFDL) Seminar Series, Princeton NJ, April 28.

58. Technical lead, Nunatsiavut Government press conference on risks to Inuit health of Muskrat Falls development, St. John's NL, Canada, April 18.

57. Invited panelist, Center for Public Leadership, Belfer Center, Harvard Kennedy School, Cambridge MA, Panel on Women and Climate Change, Cambridge MA, March 29.

2015

56. Invited talk, Transatlantic Science Week 2015 speaker, Boston MA, November 5.

55. Invited speaker, Faculty Forum, Harvard Alumni Association, Cambridge MA, October 23.

54. Invited plenary speaker, Arctic Circle Assembly 2015 plenary talk, Reykjavík, Iceland, October 17.

53. Invited speaker, ScienceWriters2015.org, Cambridge, MA, October 12.
52. Invited seminar, Metals research core seminar, Harvard NIEHS Center, Harvard School of Public Health, Boston MA, October 1.
51. Invited speaker, Faculty Forum, Harvard Alumni Association, Cambridge MA, May 29.
50. Invited seminar, Environmental Geology & Geochemistry Seminar, Princeton University, Princeton NJ, May 14.
49. Invited talk, Goldschmidt2015, Prague, CZ, August 17.

2014

48. Invited keynote talk, Goldschmidt2014, Sacramento, CA, June 8.
47. Invited seminar, Environmental Science and Engineering Seminar Series, Harvard School of Engineering and Applied Sciences, Cambridge MA, March 14.
46. Discussion lead, Harvard University Center for the Environment, Cambridge MA, January 28.
45. Invited seminar, Department of Chemistry Seminar Series, University of British Columbia, Vancouver BC, Canada, January 21.

2013

44. Plenary speaker, 11th International Conference on Mercury as a Global Pollutant, Edinburgh, Scotland (presented for medical reasons by D.P. Krabbenhoft), August 1.
43. Invited seminar, Graduate School of Oceanography Seminar Series, University of Rhode Island, Narrangansett RI, April 26.

2012

42. Invited seminar, Dartmouth College Superfund Program Seminar Series, Hanover NH, October 16.
41. Plenary speaker, 16th International Conference on Heavy Metals in the Environment (ICHMET), Rome, Italy, September 24.
40. Invited talk, Mercury Science in the Great Lakes Workshop, Chicago IL. May 30-31.
39. Invited seminar, School of Marine and Atmospheric Sciences Seminar Series, Stony Brook University, Stony Brook NY, February 3.

2011

38. Invited talk, Gulf of Mexico Alliance Mercury Meeting, Gulf Breeze FL, October 18.
37. Invited seminar, Interdisciplinary Seminar Series, Lafayette College, Easton PA, September 26.
36. Invited seminar, Superfund Research Program Seminar Series, Harvard School of Public Health, Boston MA, March 7.

2010

35. Invited talk, Gordon Research Conference – Environmental Sciences: Water, Holderness NH, June 20-25.
34. Invited meeting lead, U.S. EPA Meeting on Global Mercury Emissions and U.S. Exposures, Washington, DC. Jan. 14.

Prior to 2010

33. Invited talk, Northeast and Great Lakes Region Mercury Science & Policy Conference, Chicago IL, November 18.
32. Invited talk, 10th National Forum on Contaminants in Fish, Portland OR, November 2-5.
31. Invited presentation, Session hosted by the National Institute for Minamata Disease (NIMD), 9th International Conference on Mercury as a Global Pollutant, Guiyang, China. June 7-12.
30. Invited presentation, UNECE/CLRTAP Task Force on Hemispheric Transport of Air Pollution, St. Petersburg, Russia, April 1-3.

29. Invited presentation, International Air Quality Advisory Board, Washington DC. April 15.
28. Invited talk, Gulf of Mexico Mercury Workshop, Gulfport MS, December 2-4.
27. Invited talk, 5th Annual Northwest Water Quality Modelers Meeting, Hood River OR, May 2-3.
26. Invited roundtable panelist, International Joint Commission Nearshore Priority Expert Consultation Part II, Dearborn MI, March 12-13.
25. Invited talk, Joint ASLO and AGU Ocean Sciences Meeting, Orlando FL. March 2-7.
24. Invited seminar, New England Tribal Council, Boston MA, December 11.
23. Invited seminar, US EPA Region 1 Science Council Seminar Series, Boston MA, August 29.
22. Invited seminar, New England Interstate Water Pollution Control Commission Fish Consumption Workgroup, Lowell MA, April 3.
21. Invited talks, Lake Ontario Contaminant Monitoring, Modeling and Research Workshop, Grand Island NY, March 27-28.
20. Invited seminar, Harvard Center for Risk Analysis Seminar Series, Harvard School of Public Health, Boston MA, March 5.
19. Invited talk, US EPA's Mercury Coordination Workgroup, Washington DC, February 28.
18. Invited seminar, Dartmouth Toxic Metals Research Program and Sea Grant Sponsored Workshop, Durham NH, November 15-16.
17. Invited seminar, Marine Science Program Seminar Series, University of Connecticut, Groton CT, October 13.
16. Invited seminar, NOAA Great Lakes Environmental Research Laboratory Seminar Series, Ann Arbor MI, September 14.
15. Invited talk, USGS/US EPA Roundtable on Mercury in the Environment, Washington DC, April 13.
14. Invited seminar, US EPA Region 1 Regional Science Council Seminar Series, Boston MA, March 1.
13. Invited seminar, University of British Columbia, School of Occupational and Environmental Hygiene Seminar Series, Vancouver BC, Canada, February 3.
12. Invited talk, US Army Corps of Engineers Committee on Water Quality, San Francisco CA, August 30.
11. Invited plenary talk, Shared Air Summit sponsored by the Premier of Ontario, Toronto ON, Canada, June 20.
10. Invited talks, Biennial Meeting of the International Joint Commission, Kingston ON, Canada. Two Invited talks. June 9-11.
9. Invited talk, NOAA- US EPA Scientist-to-Scientist Meeting on Multi-Media Aspects of Environmental Pollution in Coastal and Marine Environments. Laurel MD, June 2.
8. Invited seminars, Ontario Ministry of the Environment, Toronto/Dorset ON, Canada, April 20&22.
7. Invited talk, US EPA's Scientific Advisory Board, Panel on Regulatory Environmental Modeling, Washington DC, February 7-9.
6. Invited seminar, International Air Quality Advisory Board of the International Joint Commission, Vancouver BC, Canada, January 26.
5. Invited seminars, Department of Fisheries and Oceans Canada, Bedford Institute of Oceanography, Halifax NS, Canada, January 13&15.
4. Invited talk, USGS/US EPA Mercury Roundtable on Tools for Modeling Fish Bioaccumulation and Potential Health Effects, Washington DC, June 4.
3. Invited talk, Woodrow Wilson International Center for Scholars, Washington DC, June 20.
2. Invited seminar, US EPA Mercury in Marine Life Workgroup, Office of Water. Washington DC, July 10, 2003.

1. Invited talk, 4th International Conference on Air Quality: Mercury, Trace Elements and Particulate Matter, Arlington VA, September 22-24.

Great Lakes Indian Fish & Wildlife Commission (GLIFWC)

Mission Statement

GLIFWC is an agency of **eleven Ojibwe tribes** in Michigan, Wisconsin and Minnesota, all signatories to **treaties** retaining off-reservation **treaty rights**.

- GLIFWC is committed to the implementation of its members' off-reservation treaty rights to fish, hunt and gather in the ceded territories.
- GLIFWC is committed to the preservation and enhancement of the natural resources so harvest opportunities will be available for generations to come.
- GLIFWC strives to infuse Ojibwe culture and values into all aspects of its work.

GLIFWC

Formed in 1984, GLIFWC is an agency of eleven Ojibwe nations in Minnesota, Wisconsin, and Michigan, who retain off-reservation treaty rights to hunt, fish, and gather in treaty-ceded lands. It exercises powers delegated by its member tribes.

GLIFWC assists its member bands in implementing off-reservation treaty seasons and in the protection of treaty rights and natural resources. GLIFWC provides natural resource management expertise, conservation enforcement, legal and policy analysis, and public information services.

All member tribes retained hunting, fishing and gathering rights in treaties with the U.S. government, including the 1836, 1837, 1842, and 1854 Treaties.

GLIFWC's **Board of Commissioners**, comprised of a representative from each member tribe, provides the direction and policy for the organization. GLIFWC has two standing committees the **Voigt Intertribal Task Force (VITF)** and the **Great Lakes Indian Fisheries Committee**. The VITF was formed following the 1983 Voigt decision and makes recommendations regarding the management of the fishery in inland lakes and wild game and wild plants in the 1837 and 1842 treaty-ceded territories. The Lakes Committee addresses matters pertaining to the management of the Lake Superior fishery and related issues.

GLIFWC's main office is located on the Bad River reservation, just east of Ashland, Wisconsin. A satellite office is also maintained in Madison, and enforcement personnel are stationed throughout the ceded territory. GLIFWC's work is divided among the divisions of **Administration, Biological Management, Enforcement, Intergovernmental Affiars, Development and Planning, and Public Informaion**.

GLIFWC maintains about 60 full time staff, adding temporary personnel based on the season's demands, such as during the spring spearing and netting season.

GLIFWC's Constitution

Member Tribes

Misi-zaaga'iganiing (Mille Lacs)

Nagaajiwanaang (Fond du Lac)

Bikoganoogan St.Croix (Danbury)

Gaa-miskwaabikaang (Red Cliff)

Mashkiigong-ziibiing (Bad River)

Ginoozhekaaning (Bay Mills)

Waaswaaganing (Lac du Flambeaau)

Gete-gitigaaning (Lac Vieux Desert)

Zaka'aaganing (Mole Lake/Sokaogon)

Gakiiwe 'onaning (Keweenaw Bay)

Odaawaa-zaaga'iganiing (Lac Courte Oreilles)