Updated November 2024

CURRICULUM VITAE

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EDUCATION:

B.Sc Environmental Science, The Ohio State University, Columbus, OH 2008 USA
M.Sc Environmental Science, The Ohio State University, Columbus, OH 2010 USA
Ph.D. Earth and Environmental Sciences, University of Michigan, Ann Arbor, MI 2015 USA

PROFESSIONAL EXPERIENCE:

2022 - Present, Associate Scientist without Tenure, Woods Hole Oceanographic Institution, Woods Hole, MA Department of Marine Chemistry and Geochemistry
2018 - 2022, Assistant Scientist, Woods Hole Oceanographic Institution, Woods Hole, MA Department of Marine Chemistry and Geochemistry
2018 - Present, Faculty, Woods Hole Oceanographic Institution and Massachusetts Institute of Technology Joint Program in Chemical Oceanography (WHOI/MIT JPCO)
2016 - 2018, Postdoctoral Investigator, Woods Hole Oceanographic Institution, Woods Hole, MA, Department of Marine Chemistry and Geochemistry
2015 - 2016, Camille and Henry Dreyfus Postdoctoral Fellow University of Michigan, Ann Arbor, MI, Department of Earth and Environmental Sciences

AWARDS:

- Eastman Innovation Partner Award (2024)
- *ACS Environmental Au* Rising Star in Environmental Research (2024)
- American Chemical Society James J. Morgan Early Career Award (2024)
- *Environmental Science & Technology* Excellence in Review Award (2022, 2023)

PROFESSIONAL AFFILIATIONS:

- American Chemical Society (2008 - present)
- American Geophysical Union (2008 - present)
- Association for Sciences of Limnology and Oceanography (2013 - present)

RESEARCH INTERESTS:

Biogeochemistry, Aquatic Photochemistry, Marine Pollution, Science Communication

PROFESSIONAL ACTIVITIES:

At WHOI:

- WHOI Capitol Campaign committee (2022 - present)
- Contributions to WHOI Development - engaged with over two dozen potential donor groups since joining the scientific staff (2018 - present)
- Participated in WHOI OTT and Tufts Gordon Institute summer practicum program. (2024)

- Chair of WHOI MC&G Laboratory Code of Conduct Development Committee (2022)
- NOSAMS Director search committee (2021)
- Participant in Unlearning Racism in the Geosciences (URGE; Spring 2021)
- A Sea Change: Oceanographers Learn from Psychologists About Systemic Racism in America (November 2020). *Curator and Host*
- The Science of Microplastics in the World Ocean. Woods Hole Oceanographic Institution, Woods Hole, MA (October 2019). *Co-chair and Speaker*
- Morss Colloquium - Microplastics in the Ocean: Emergency or Exaggeration? Woods Hole Oceanographic Institution, Woods Hole, MA (October 2019). *Panelist*
- Scientific advisor for Lincoln Laboratory Beaver Works Institute. Hosted ~20 high school students for CubeSat demonstration at WHOI focused on remote sensing of oil and plastics at sea. (2019 - 2022)
- Presented to elementary school students from Sidwell Friends School. (April 2019)
- Exploring the potential of ramp pyrolysis oxidation to study the global carbon cycle. National Ocean Sciences Accelerator Mass Spectrometry Facility (NOSAMS), Woods Hole, MA (September 2016). *Participant*

Outside WHOI:

Academic Journals and Funding Bodies

- Reviewer for: *Aquatic Sciences, Environmental Science & Technology, Environmental Science & Technology Letters, Environmental Sciences: Processes & Impacts, Frontiers of Marine Science, Geochimica et Cosmochimica Acta, Geophysical Research Letters, Hydrobiologia, Journal of Geophysical Research: Biogeosciences, Nature Communications, Nature Scientific Reports, Organic Geochemistry, Science,* and *Water Research.*
- Reviewer for: USA NSF (OCE-CO, OCE-OTIC, EAR-PDF, EAR-MRI, OPP-ANS), Swiss NSF (Spark, Ambizione), and US Army Research Office (Environmental Chemistry),
- *Environmental Science & Technology* Early Career Advisory Board (2020 - present)
- *Environmental Science & Technology* and *ACS Sensors* Global Webinar and Virtual Issue: Taking Earth's Pulse with Low-Cost Sensors: A Discussion of Opportunities and Obstacles (May 2022). *Curator, Host, and Guest Editor*
- NSF-Chemical Oceanography (November 2021) *Panelist*
- JGR-Oceans Editor-in-Chief search committee (May - November 2020)
- Arctic Domain Awareness Center of Excellence Funding Panel (August 2018)

Conferences, Workshops, and Panels

- National Academies of Sciences and Engineering Medicine Gulf Research Program's Gulf-Alaska Knowledge Exchange: A Workshop Series (March 2024 - present). *Committee Member and Participant*
- Marine Biological Laboratory's Falmouth Forum: Why We Should Care About the Arctic Part II: An Arctic Science Panel (January 2024). *Panelist*
- Organizer of ACS Fall Meeting session: Processes and Risks of Micro- & Nano-Plastics in the Environment (August 2023). *Co-Chair*
- Fortaleza Austral Spring School (November 2022). *Panelist and Speaker*
- Organizer of ACS Fall Meeting session: Environmental Chemistry & Polymer Science: Convergence at the Interface (August 2022). *Co-Chair*
- Three invited presentations at National High Field Magnet Laboratory NSF site visits

(October 2020, March 2021, and August 2021). *Speaker*
- Breaking it down: Oil in the environment. NOAA Gulf of Mexico Sea Grant Program (July 2020). *Panelist and Speaker*
- Plastics and the Environment: Science Meets Public Policy. Massachusetts Institute of Technology, Cambridge, MA (June 2020). *Panelist and Speaker*
- Responding to Plastic Pollution Through Science: From Research to Action. Le Mans University, Le Mans, France (December 2019). *Panelist and Speaker*
- Modelling Plastics in the Oceans. Massachusetts Institute of Technology, Cambridge, MA (November 2019). *Speaker*
- Towards Understanding the Physical, Photochemical, and Biological Processes that Determined the Fate and Effect of Oil and Oil-Dispersant Mixtures During the Deepwater Horizon Oil Spill. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. (May 2019) *Co-Chair and Speaker*
- GoMRI Synthesis Sub-Topic 2.5: Photochemical reactions at sea and on the shoreline, Washington, DC (December 2018) *Co-Chair and Speaker*
- SERC Earth Educators Rendezvous: Preparing for an Academic Career in the Geosciences. The University of Wisconsin, Madison, WI (July 2016). *Participant*
- Preparing Future Faculty Program: Rackham Graduate School. The University of Michigan, Ann Arbor, MI (May - June 2015). *Participant*

Engagement with Government Officials
- Briefed staff of US Senators Dan Sullivan (AK) and Sheldon Whitehouse (RI) on plastic pollution science (February 2024).
- Briefed Keri Holland and Jonathon Gillibrand, U.S. Department of State, on plastic pollution science. (January 2024).
- Briefed Keri Holland, Acting Division Chief of Multilateral Affairs at the U.S. Department of State, on plastic pollution science. (December 2023)
- Briefed Plymouth, MA Town Manager on application of pesticides to greenspaces (May 2021)
- Briefed Plymouth, MA Board of Public Health on risks of plastic pollution. (March 2021)
- Briefed Philippe Bolo (French National Assembly) and Angele Preville (French Senat) on plastic pollution. (December 2019)
- Briefed staff from US Congresswomen Katherine Clark (MA) and Eddie Bernice Johnson (TX; Chair of the House Science Committee) on plastic pollution. (June 2019)

Engagement with Media (See PAPERS IN REFEREED JOURNALS *for additional engagement)*
- New catalytic process completely breaks down nylon-6 in minutes. Chemistry World. (December 2023)
- Woods Hole Scientists Seek Solutions to Oceans' Plastic Problems. Vineyard Gazette. (December 2023)
- Bacterium may help answer mystery of 'missing' plastic in the seas. Chemistry World. (February 2023)
- The sun can help break down ocean plastic, but there's a catch. Popular Science. (November 2019)
- Interviews with Frontier Scientists to create videos focused on the impact of photochemistry in the arctic C cycle. Segments were screened on PBS-Alaska. (June 2013)

Educational Service (non-MIT/WHOI Joint Program)

- Scientific advisor for Lincoln Laboratory Beaver Works Institute Build a CubeSat Challenge. Aided the development of the scientific mission and provided a recorded presentation for the students (December 2021 – May 2022)
- Advisor to Dawna Garvin's Pleasanton, Texas 7th grade science laboratory on plastic degradation. (March 2022)
- Advisor to Abigail Okon's Falmouth High School Science Fair project: "Dispersant efficacy on vegetable oils and fossil-fuel lubricants." (March 2022)
- Guest Lecturer - Oil Spill Research and Response Virtual School hosted by Feiyue Wang at University of Manitoba (Spring 2021).
- Coordinated and led a group of 25 Florida State University high school students on a sampling trip to Fort Morgan, AL. (May 2017)
- Presentation to the Army Youth Leadership Forum (August 2017)
- Guest Lecturer - University of Michigan - Environmental Geology (Spring 2016)
- Teaching Assistant - University of Michigan - Global Change: The Science of Sustainability (Fall 2014)
- Teaching Assistant - University of Michigan - Environmental Geology (Spring 2014)
- Teaching Assistant - University of Michigan - Introduction to Environmental Sciences (Fall 2013)
- Teaching Assistant - University of North Carolina - Environmental Health (Fall 2010, Spring 2011)

PARTICIPATION IN EDUCATION PROGRAM:

Student Service

- WHOI/MIT JP Committee Member - Noah Germolus (May 2024)
- WHOI/MIT JP Thesis Defense Chair - Jordan Pitt (December 2023)
- WHOI/MIT JP Committee Member - Henry Holm (November 2023)
- WHOI/MIT JP Thesis Committee Member - Solomon Chen (December 2022)
- WHOI Summer Student Fellow Department Representative (2018 - 2021)
- WHOI/MIT JP Thesis Proposal Defense Chair - Brenna Boehman (November 2021)
- WHOI/MIT JP Thesis Defense Chair - Kevin Sutherland (December 2019)
- WHOI/MIT JP Thesis Proposal Defense Chair - Sheron Luk (December 2018)

Teaching

- Guest Lecturer - WHOI/MIT JP - Marine Organic Geochemistry (Spring 2020, 2022, and 2024)
- Presentation in WHOI Blue Economy Program: "Developing next-generation, marine biodegradable single-use plastics." (January 2023 and 2024)
- Presentation in WHOI Summer Student Fellow Seminar Series: "Five years of Ward Lab science through the lens of WHOI Graphics." (July 2023)
- Co-Instructor - WHOI/MIT JP - Chemical Oceanography Seminar in Hot Topics (Spring 2021)
- Presentation in WHOI Summer Student Fellow Seminar Series: "Yellow Sun is Shining in the Afternoon: Alteration of Organic Carbon in Sunlit Surface Waters." (July 2020)
- Guest Lecturer - WHOI/MIT JP - Environmental Toxicology (Spring 2020)
- Co-Instructor - WHOI/MIT JP - Seminar in Instrumental Analysis (Spring 2019)

- Presentation in WHOI Summer Student Fellow Seminar Series: "Why Sunlight Matters for Oil Spills in the Ocean." (July 2018)

SUPERVISITON AT WHOI:

- Joseph Frye Jones - Postdoctoral Investigator (September 2024 - present)
- Bryan James - Postdoctoral Investigator (March 2023 - present)
- Yanchen Sun - Postdoctoral Investigator (September 2022 - present)
- Sarah Messenger - WHOI/MIT JP graduate student (September 2022 - present)
    - NSF Graduate Research Fellow
- Eric Ryberg - Postdoctoral Investigator (September 2021 – September 2024)
- Phoebe Overberg – Undergraduate student from North Shore Community College (June – August 2024)
- Dominic Italiane - Undergraduate student from University of Massachusetts Boston (June - present)
- Kali Pate - Undergraduate student from Cape Cod Community College (January 2022 – July 2024)
- Danielle Freeman - WHOI/MIT JP graduate student (June 2019 – July 2024)
    - NSF Graduate Research Fellow
- Shinhyeong Choe - Graduate student from the Korea Advanced Institute of Science and Technology (February - March 2024)
- Polianna da Silva Ferreira - Graduate student from University of Campinas (October 2023 - April 2024)
- Brenden Irving - Undergraduate student from Massasoit Community College (June - August 2023)
- Cody Quiroz - Undergraduate student from University of Michigan (June - August 2023)
- Anna Walsh - WHOI/MIT JP graduate student (August 2018 - June 2023)
    - NSF Graduate Research Fellow
- Charlotte Underwood - Graduate guest student from University of Southampton (September - December 2022)
- Dhalia Sharpless - Undergraduate student from Duke University (June 2022)
- Emma Rieb - Graduate guest student from University of Michigan (October 2021 - December 2022)
- Taylor Nelson - Postdoctoral Investigator (July 2020 - March 2022)
- Michael Mazzotta - Postdoctoral Investigator (March 2020 - March 2022)
- Cole Zaleski - Undergraduate student from Northeastern (August 2021)
- Briana Prado - University of California at Santa Cruz undergraduate student (June - August 2019)
    - Doris Duke Conservation Scholar
- Jennifer Bowen - University of Michigan graduate student (October 2018 - March 2019)
    - NOSAMS Graduate Student Scholar
- Samuel McNichol - Oberlin undergraduate student (June - August 2018)
    - WHOI Summer Student Fellow
- Ulrich Hanke - Swiss NSF Postdoctoral Fellow (February 2018 - August 2019)
- Julia Jackson - Dartmouth undergraduate student (January - March 2018)
- Abigail Eckland - Tulane undergraduate student (February 2018)
- Cassia Armstrong - Trinity College undergraduate student (June - July 2017)

- Alexandra Morrison - Haverford College undergraduate student (June - July 2017)

PAPERS IN REFEREED JOURNALS:

*Student Mentee, #Equal contributions

Submitted

1. *Walsh, A.N., Dunlea, A.G., Reddy, C.M., & **Ward, C.P.** Characterization of inorganic additives in and photochemically liberated from consumer plastics: Implications for global and local biogeochemical cycles. In review at *ACS Environmental AU*.
2. #**Ward, C.P.**, Reddy, C.M., & *#James, B.D. Initial estimates of the lifetime of unsmoked cellulose diacetate and paper cigarette filters in the coastal ocean. In review at *Environmental Sciences: Advances.*

In Press

Published

1. *#James, B.D., *Sun, Y., *Pate, K., Shankur, R., Izallalen, M., Mazumder, S., Perri, S.T., Houston, K., Edwards, B., De Wit, J., B., Reddy, C.M., & #**Ward, C.P.** Foaming enables material-efficient bioplastic products with minimal persistence. 2024. *ACS Sustainable Chemistry and Engineering*. 12, 16030-16040.
    - Press releases by WHOI and Eastman
    - Highlighted by Scientific American, Falmouth Enterprise, Anthropocene, and Packaging Insights
2. *Freeman, D.H, Nelson, R.K., *Pate, K., Reddy, C.M., & **Ward, C.P.** Forecasting photo-dissolution for future oil spills at sea: Effects of oil properties and composition. 2024. *Environmental Science & Technology*. 58, 34, 15236-15245.
3. *Rieb, E.C., Polik, C.A., **Ward, C.P.**, Kling, G.W., & Cory, R.M. Controls on the Respiration of Ancient Permafrost Carbon in Sunlit Arctic Surface Waters. 2024. *JGR-Biogeosciences*. 129, e2023JG007853.
4. *#James, B.D., *Sun, Y., Izallalen, M., Mazumder, S., Perri, S.T., Edwards, B., De Wit, J., B., Reddy, C.M., & #**Ward, C.P**. Strategies to reduce the environmental lifetimes of drinking straws in the coastal ocean. 2024. *ACS Sustainable Chemistry & Engineering*. 12, 6, 2404–2411.
    - Press release by WHOI
    - Highlighted by ACS, ABC, CBS, NBC, NPR, Deutchlandfunk Radio
5. *James, B.D., **Ward, C.P.**, Hahn, M.H, Thorpe, S., Reddy, C.M. Minimizing the environmental impacts of plastic pollution through eco-design of products with low environmental persistence. 2024. *ACS Sustainable Chemistry & Engineering*. 12, 3, 1185-1194.
    - Press release by WHOI
    - Highlighted by AZO CleanTech
6. *#Sun, Y., *Mazzotta, M.G., Miller, C.A., Apprill, A., Izallalen, M., Mazumder, S., Perri, S.T., Edwards, B., Reddy, C.M., #**Ward, C.P.** Distinct Microbial Communities Degrade Cellulose Diacetate Bioplastics in the Coastal Ocean. 2023. *Applied & Environmental Microbiology*. 89, 12, e01651-23.
7. *Freeman, D.H, Niles, S.F., Rodgers, R.P., French-McCay, D.P., Longnecker, K., Reddy, C.M., **& Ward, C.P.** Hot and Cold: Photochemical Weathering Mediates Oil Properties and

Fate Differently Depending on Seawater Temperature. 2023. *Environmental Science & Technology*. 57, 32, 11988-11998.
    - Highlighted by American Physical Society and C&EN
8. *Chen, S., **Ward, C.P.**, & Long, M.H. Quantifying Pelagic Primary Production and Respiration via an Automated In-Situ Incubation System. 2023. Limnology and Oceanography: Methods. 21, 495-507.
9. *James, B., Karchner, S., *Walsh, A., Aluru, N., Franks, D., Sullivan, K., Reddy, C., **Ward, C.P.**, Hahn, M. Formulation controls the potential toxicity of leachates from photoweathered polyethylene bags in developing zebrafish. 2023. *Environmental Science & Technology*. 57, 21, 7966–7977.
10. *#Nelson, T.F., and #**Ward, C.P.** Diffusion ordered spectroscopy (DOSY) for rapid and facile determination of consumer plastic molecular weight. 2023. *Analytical Chemistry*. 95, 22, 8560–8568.
11. Alloy, M., Finch, B., **Ward, C.P.**, Redman, A., Bejarano, A., Barron, M. Recommendations for Improving Testing Protocols of Studies Examining the Photo-induced Toxicity of Petroleum and Polycyclic Aromatic Compounds. 2023. *Aquatic Toxicology*. 106390.
12. Chin, Y.P., McKnight, D.M., D'Andrilli, J., Brooks, N., Cawley, K., Guerard, J.E., Perdue, M., Stedmon, C.A., Tratnyek, P., Westerhoff, P., Wozniak, A., Bloom, P., Foreman, C., Gabor, R., Hamdi, J., Hanson, B., Hozalski, R., Kellerman, A., McKay, G., Reckhow, D., Remucal, C., Silverman, V., Spencer, R., **Ward, C.P.**, and Xin, D. 2023. Identification of Next Generation International Humic Substances Society Reference Materials for Advancing the Understanding of the Role of Natural Organic Matter in the Anthropocene. *Aquatic Sciences*. 85, 1, 32.
13. #Sutherland, K.M., Johnston, D.T., Hemingway, J.D., Wankel, S.D., and #**Ward, C.P.** 2022**.** Revised Microbial and Photochemical Triple-Oxygen Isotope Effects Improve Marine Gross Oxygen Production Estimates. *PNAS Nexus*. 1, 5, pgac233.
14. *Walsh, A.N., *Mazzotta, M., *Nelson, T.F., Reddy, C.M., and **Ward C.P.** 2022. Synergy between Sunlight, Titanium Dioxide, and Microbes Enhances Cellulose Diacetate Degradation in the Ocean. *Environmental Science & Technology*. 56, 19, 13810-13819.
15. James, B.D., de Vos, A., Aluwihare, L., Youngs, S., **Ward, C.P.**, Nelson, R.K., Michel, A.P.M., Hahm, M.E., and Reddy C.M. 2022. Divergent Forms of Pyroplastic: Lessons Learned from the M/V X-Press Pearl Ship Fire. *ACS Environmental AU*. 2, 5, 467-479.
16. Koehler, B., Powers, L.C., Cory, R.M., Einarsdóttir, K., Gu, Y. Tranvik, L.J., Vähätalo, A.V., **Ward, C.P.**, Miller, W.L. 2022. Inter-laboratory differences in the apparent quantum yield for the photochemical production of dissolved inorganic carbon in inland waters, and implications for photochemical rate modeling. *Limnology & Oceanography: Methods.* 20, 6, 320-337.
17. Berger, C.A., **Ward, C.P.**, Karchner, S. I., Nelson, R.K., Reddy, C.M., Hahn, M.E., Tarrant, A.M. 2022. *Nematostella vectensis* exhibits an enhanced molecular stress response upon co-exposure to weathered oil and UV radiation. *Marine Environmental Research*. 175, 105569.
18. *Freeman, D.H. & **Ward, C.P.** 2022. Sunlight-driven dissolution is a major fate of oil at sea. *Science Advances*. 8, eabl7605.
    - Press release by WHOI
    - Highlighted by The Hill, SYFY Wire, and Deutschlandfunk Radio
19. *#Mazzotta, M.G., Reddy, C.M., & #**Ward, C.P.** 2022. Rapid Degradation of Cellulose Diacetate by Marine Microbes. *Environmental Science & Technology Letters*. 9, 1, 37-41.

- Press release by WHOI
- Highlighted by AZO Materials

20. de Vos, A., Aluwihare, L., Youngs, S., DiBenedetto, M., **Ward, C.P.**, Michel, A., Colson, B., *Mazzotta, M., *Walsh, A., Nelson, R., Reddy, C., & James, B. 2021. The M/V X-Press Pearl nurdle spill: Contamination of burnt and unburnt nurdles along Sri Lanka's beaches. *ACS Environmental AU*. 2, 2, 128–135.
    - Press release by WHOI
    - Highlighted by C&EN
    - Awarded best paper in journal.
21. *Walsh, A.N., Reddy, C.M., Niles, S.F., McKenna, A.M., Hansel, C.M., & **Ward C.P.** 2021. Plastic Formulation is an Emerging Control of its Photochemical Fate in the Ocean. *Environmental Science and Technology*. 55, 18, 12383-12392.
    - Press release by WHOI
    - Highlighted by Chemistry World, ACS, and NSF
22. *[#]Nelson, T.F., Reddy, C. M., and [#]**Ward, C.P.** Product Formulation Controls the Impact of Biofouling on Consumer Plastic Photochemical Fate in the Ocean. 2021. *Environmental Science and Technology*. 55, 13, 8898-8907.
23. **Ward, C.P.**, *Bowen, J.C., *Freeman, D.H., and Sharpless, C.M. Rapid and Reproducible Characterization of the Wavelength Dependence of Aquatic Photochemical Reactions Using Light Emitting Diodes. 2021. *Environmental Science & Technology Letters*. 8, 437-442.
24. Xu, L., Roberts, M., Elder, K., Kurz, M., McNichol, A., Reddy, C., **Ward, C.P.**, *Hanke, U. Radiocarbon in dissolved organic carbon by UV oxidation: procedures and blank characterization at NOSAMS. 2021. *Radiocarbon*. 63, 357-374.
25. *Nalven, S.G., **Ward, C.P.**, Payet, J.P., Cory, R.M., Kling, G.W., Sharpton, T.J., Sullivan, C.M., & Crump, B.C. Experimental metatranscriptomics reveals the costs and benefits of dissolved organic matter photo-alteration for freshwater microbes. 2020. *Environmental Microbiology*. 22, 3505-3521
26. *Bowen, J.C., [#]**Ward, C.P.**, Kling, G.W., & [#]Cory, R.M. Arctic amplification of global warming strengthened by sunlight oxidation of permafrost carbon to CO_2. 2020. *Geophysical Research Letters*. 47, e2020GL087085.
    - Selected as journal cover
    - Press release by UM
    - Highlighted by Grist and EOS
27. **Ward, C.P.** & Reddy, C.M. Opinion: We need better data about the environmental persistence of plastic goods. 2020. *Proceedings of the National Academies of Sciences*. 26, 14618-14621.
    - Press release by WHOI
28. [#]**Ward, C.P.** & [#]Overton, E.B. How the 2010 *Deepwater Horizon* spill reshaped our understanding of crude oil photochemical weathering at sea: a past, present, and future perspective. 2020. *Environmental Sciences: Processes & Impacts*. 22, 1125-1138.
    - Selected as journal cover
    - Highlighted by GoMRI
29. [#]**Ward, C.P.** & [#]Cory, R. M. Assessing the prevalence, products, and pathways of dissolved organic matter partial photochemical oxidation in arctic surface waters. 2020. *Environmental Sciences: Processes & Impacts*. 22, 1214-1223.
30. **Ward, C.P.**, Armstrong, C.J., *Walsh, A.N., *Jackson, J.J. & Reddy, C.M. Sunlight converts

polystyrene into carbon dioxide and dissolved organic carbon. 2019. *Environmental Science & Technology Letters*, 6, 669-674.
    - Press release by WHOI
    - Highlighted by ACS, NSF, NY Times, and Forbes
31. **Ward, C.P.**, Sharpless, C.M., Valentine, D.L., Aeppli, C., *Sutherland, K.M., Wankel, S.D. & Reddy, C.M. Oxygen isotopes ($\delta^{18}O$) trace photochemical hydrocarbon oxidation at the sea surface. 2019. *Geophysical Research Letters*, 12, 6745-6754.
32. Gibson, C., Hatton, P.J., Bird, J., Nadelhoffer, K., **Ward, C.P.**, Stark, R. & Filley, T., 2018. Interacting Controls of Pyrolysis Temperature and Plant Taxa on the Degradability of PyOM in Fire-Prone Northern Temperate Forest Soil. *Soil Systems*, 2(3).
33. Aeppli, C., Swarthout, R., O'Neil, G., Katz, S., **Ward, C.P.**, Nelson, R., Sharpless, C., & Reddy, C.M. How persistent and bioavailable are oxygenated Deepwater Horizon oil transformation products? 2018. *Environmental Science & Technology*, 52, 7250-7258
34. Collins, J.R., Fredricks, H.F., Diaz, J.M., Bowman, J.S., **Ward, C.P.**, Moreno, C.M., Longnecker, K., Marchetti, A., Hansel, C.M., Ducklow, H.W., & Van Mooy, B.A.S. The diverse products and biogeochemical significance of lipid photooxidation in coastal surface waters of West Antarctica. 2018. *Geochimica et Cosmochimica Acta*, 232, 244-264.
35. **Ward, C.P.**, *Armstrong, C.J., Conmy, R.N., French-McCay, D.P., & Reddy, C.M. Photochemical Oxidation of Oil Reduced the Effectiveness of Aerial Dispersants Applied in Response to the Deepwater Horizon Spill. 2018. *Environmental Science & Technology Letters*, 5, 226-231.
    - Selected as Editors' Choice and journal cover
    - Press release by WHOI
    - Highlighted by ACS, NSF, GoMRI, and Natural History Magazine
36. **Ward, C.P.**, Sharpless, C.M., Aeppli, C., French-McCay, D.P., Valentine, D.L., Rodgers, R. P., Gosselin, K.M., Nelson, R.K., & Reddy, C.M. Partial photochemical oxidation was a dominant fate of *Deepwater Horizon* surface oil. 2018. *Environmental Science & Technology*, 52, *1797-1805.*
37. **Ward, C.P.,** Nalven, S.G., Crump, B.C., Kling, G.W., & Cory, R.M. Photochemical alteration of dissolved organic carbon draining permafrost soils shifts microbial metabolic pathways and stimulates respiration. 2017. *Nature Communications*, 8, 1-8.
    - Press release by UM
    - Highlighted by DOE-EMSL
38. **Ward, C.P.** & Cory, R.M. Complete and partial photo-oxidation of dissolved organic matter draining permafrost soils. 2016. *Environmental Science & Technology*, 50, 3545-3553.
39. **Ward, C.P.** & Cory, R.M. Chemical composition of dissolved organic matter draining permafrost soils. 2015. *Geochemica et Cosmochimica Acta*, 167, 63-79.
    - Highlighted by DOE-EMSL
40. Cory, R.M., **Ward, C.P.**, Crump, B.C., & Kling, G.W. Sunlight controls water column processing of carbon in arctic fresh waters. 2014. *Science*, 345, 925-928.
    - Highlighted in Science Perspective
41. **Ward, C.P.**, Sleighter, R.L., Hatcher, P.G., & Cory, R.M. Insights into the complete and partial photooxidation of black carbon in surface waters. 2014. *Environmental Science: Processes & Impacts*, 16, 721-731.
    - Selected as journal cover of aquatic photochemistry themed issue

42. Hakala, J.A., Fimmen, R.L., Chin, Y.P., Agrawal, S.G., & **Ward, C.P.** Assessment of the geochemical reactivity of Fe-DOM complexes in wetland sediment pore waters using a nitroaromatic probe compound. 2009. *Geochimica et Cosmochimica Acta*, 73, 1382-1393.

OTHER PUBLICATIONS:

1. **Ward., C.P.**, Reddy, C.M., Edwards, B., Perri, S.T. To curb plastic pollution, industry and academia must unite. 2024. *Nature*. 65, 658-662.
2. **Ward, C.P.** The Spire Center looks great. Now it's time to truly realize the venue's potential. 2024. *Plymouth Independent*.
3. Bakker, E., **Ward, C.P.**, Tarpeh, W. and Wang, Z. Taking Earth's Pulse with Low-Cost Sensors. 2022. *ACS Sensors*. *7* (6), 1613-1613.
4. **Ward, C.P.** A Bright, LED-Lit Future for the Ocean Sciences. 2022. *EOS*, 103.
5. **Ward, C.P.**, Reddy, C.M., Overton, E.B. Why sunlight matters for marine oil spills. 2020. *EOS*, 101.
    - Highlighted by *EOS* in video tutorial for writing for a broad audience
    - Una traducción de este artículo.
6. *Hanke, U.M., **Ward, C.P.**, & Reddy, C.M. Leveraging lessons learned from black carbon research to study plastics in the environment. 2019. *Environmental Science & Technology*, 53 (*12*), 6599-6600
7. **Ward, C.P.** The Sun's Overlooked Impact on Oil Spills. 2018. *Oceanus*, 52, 12-15.

PATENTS/DISCLOSURES:

Patents

1. James, B.D. & **Ward, C.P.** "Method for Determining Environmental Lifetime/Persistence of Items." U.S. provisional patent 63/544,829 filed October 19, 2023.
2. **Ward, C.P.** & French-McKay D. **"**Oil Degradation Predictor." U.S. provisional patent 62/795,954 filed January 23, 2019.

Disclosures

1. James, B.D. & **Ward, C.P.** "An irradiation chamber for photochemical studies with in-situ, real-time monitoring." Disclosure filed on September 12, 2024.
2. **Ward. C.P.** "Bioreactor for Accelerated Degradation of Cigarette Filters." Disclosure filed November 17, 2022
3. **Ward. C.P.** "Nanofiltration Technology for Efficient Recovery of Dissolved Organic Carbon." Disclosure filed November 17, 2022.
4. **Ward. C.P.** "LED Photochemical Reaction Chamber." Disclosure filed December 12, 2017.
5. **Ward. C.P.** "Respiratory Quotient Chamber." Disclosure filed December 12, 2017.

INVITED LECTURES, PRESENTATIONS, and ABSTRACTS:

1. **Ward, C.P.** (2024) Invest, Don't Divest: Embracing Industry-Academia Partnerships Will Solve the Plastic Pollution Crisis Faster. Organic Geochemistry Gordon Research Conference. Holderness, NH.

2. **Ward, C.P.** (2024) How industry and academia can unite to curb plastic pollution. Corporate Sustainability Lecture Series. Eastman Chemical Company, Kingsport, TN. *Keynote speaker and panelist.*
3. **Ward, C.P.** (2024) Towards a more predictive understanding of sunlight-driven weathering of oil spilled at sea. McGill University Department of Earth and Planetary Sciences. Montreal, CAN.
4. **Ward, C.P.** (2024) Why Sunlight Matters for Oil Spills in the Ocean. ACS Spring National Meeting Division of Environmental Chemistry Morgan Award Lecture Series. New Orleans, LA.
5. **Ward, C.P.** (2024) Probing Alterations to the Physical and Chemical Properties of Oil Spilled at Sea: Implications for Fate Models and Response Operations. American Society for Mass Spectrometry Winter Meeting. St. Petersburg, FL.
6. **Ward, C.P.**, *Sun, Y., *James, B.D., & Reddy, C.M. (2023) Translating fundamental knowledge about the degradation of cellulose diacetate in the environment into high-utility, low-persistence consumer products. Eastman Chemical Company, Kingsport, TN.
7. **Ward, C.P.** (2023) Linking the formulation of plastics to their fate in the ocean. UMass Dartmouth School of Marine Sciences and Technology. Dartmouth, MA.
8. **Ward, C.P.** (2023) Linking the formulation of plastics to their fate in the ocean. Gordon Research Conference in Chemical Oceanography. Manchester, NH.
9. **Ward, C.P.** (2022) Sunlight-driven oxidation of crude oil spilled at sea: implications for oil spill models and response operations. George Washington University Department of Environmental Engineering Lecture Series. Virtual Presentation.
10. **Ward, C.P.** (2022) Insights into the perceived persistence of plastics in the environment. Fortaleza Austral Spring School. Virtual Presentation.
11. **Ward, C.P.** (2022) Sunlight-driven oxidation of crude oil spilled at sea: implications for oil spill models and response operations. University of Michigan Department of Earth and Environmental Sciences Smith Lecture Series. Ann Arbor, MI.
12. **Ward, C.P.** (2022) Developing a Predictive Understanding of the Environmental Persistence of Cellulose Diacetate Based Materials. Eastman Chemical Company. Kingsport, TN.
13. **Ward, C.P.** (2022) A Bright, LED-lit Future for Aquatic Photochemistry. International Ultraviolet Association Research Symposium. Boulder, CO.
14. **Ward, C.P.** *Walsh, A.N., *Nelson, T.F., & Reddy, C.M. (2021) Insights into the perceived persistence and photochemical fate of plastics in the ocean. ACS Spring National Meeting Presidential Symposium: Plastics and the Oceans: Chemistry for the Journey Ahead. Virtual Presentation.
15. **Ward, C.P.** (2021) Insights into the perceived persistence of plastics in the environment. Chevron Phillips Chemistry Frontiers of Technology Speaker Series. Virtual Presentation.
16. **Ward, C.P.** and Overton, E.B. (2021) Synthesis of Oil Photochemical Transformations at Sea. International Oil Spill Conference. Virtual Presentation.
17. **Ward, C.P.** (2021) Photochemical oxidation of oil at sea: rates, controls, alterations, and impacts. The National Academies of Sciences, Engineering, and Medicine. Oil in the Sea IV – Committee Meeting #5. Virtual Presentation.
18. **Ward, C.P.** (2020) Is plastic forever? A call for a more complete understanding of the environmental persistence of plastics. Carnegie Institution for Science. Virtual Presentation.
19. **Ward, C.P.** (2020) How does oil at sea break down and evolve with exposure to sunlight? Gulf of Mexico Sea Grant Program. Virtual Presentation.

20. **Ward, C.P.** (2020) (Mis)Informing the Public and Legislators About the Environmental Persistence of Plastic Goods. Massachusetts Institute of Technology. Massachusetts Institute of Technology. Virtual Presentation.
21. **Ward, C.P.** (2019) How long does plastic last in the environment? Le Mans University. Le Mans, France.
22. **Ward, C.P.** (2019) How long does plastic last in the environment? University of Mary Washington. Fredericksburg, MD.
23. **Ward, C.P.** (2019) How long does plastic last in the environment? Massachusetts Institute of Technology. Cambridge, MA.
24. **Ward, C.P.** (2019) Characterizing the fate of dissolved organic carbon flushed from Alaskan Arctic permafrost soils to sunlit surface waters. University of Massachusetts at Amherst, Amherst, MA.
25. **Ward, C.P.** & Reddy C.M. (2019) Impacts of weathering on carbon and polymer degradation, Eastman Chemical lecture series, Eastman Chemical Company, Kingsport, TN.
26. **Ward, C.P.** (2019) Stable oxygen isotopes are a novel, sensitive, and quantitative tracer of hydrocarbon oxidation on the sunlit sea surface. University of New Orleans, New Orleans, LA.
27. **Ward, C.P.** (2017) Rethinking the impact sunlight has on the fate of oil spilled into aquatic ecosystems and the tools we use to clean it up. Haverford College, Haverford, PA.
28. **Ward, C.P.** (2017) Reevaluating the role of photochemical oxidation in oil spill fate models and response approaches. Massachusetts Institute of Technology, Boston, MA.
29. **Ward, C.P.** (2017) Linking organic matter chemistry to its degradation by sunlight in aquatic ecosystems. Old Dominion University, Norfolk, VA.
30. **Ward, C.P.** (2017) Mechanistic controls of the abiotic and biotic degradation of dissolved organic matter draining permafrost soils. Marine Biological Laboratories, Woods Hole, MA.

CONTRIBUTED PRESENTATIONS and ABSTRACTS (since 2018):

1. Radovic, J., Malloy, T., Sun, T., **Ward, C.P.**, Nelson, R.K., Reddy, C.M., Gao, Y., Casey, J. (2024) Cross-Temporal Insights into Oil Sands Bitumen Geochemistry: A Case Study from the Mackay River Valley. Goldschmidt Conference. Chicago, IL. Oral Presentation.
2. *Freeman, D.H. and **Ward, C.P.** (2024) Beyond *Deepwater Horizon:* Effects of photo-dissolution on diverse oils. North American Chapter SETAC. Woods Hole, MA. Oral Presentation.
3. **Ward, C.P.** (2024) Embracing industry academia partnerships will solve the plastic pollution crisis faster. ACS Spring National Meeting. New Orleans, LA. Oral Presentation
4. *Messenger, S., *Quiroz, C., Longnecker, K., Sylva, S., *Pate, K. M., & **Ward, C. P.** (2024) High-Pressure Ceramic Nanofiltration: A Novel and Effective Method for the Recovery of DOC From Natural Waters. ACS Spring National Meeting. New Orleans, LA. Poster Presentation.
5. *Sun, Y., *Mazzotta, M. G., Miller, C. A., Apprill, A., Izallalen, M., Mazumde, S., Perri, S. T., Edwards, B., Reddy, C. M., **Ward, C. P.** (2024) Unique microbes degrade cellulose diacetate bioplastics in the ocean. ACS Spring National Meeting. New Orleans, LA. Oral Presentation.
6. *James, B. D., *Sun, Y., Izallalen, M., Mazumder, S., Perri, S. T., Edwards, B., de Wit, J., Reddy, C. M., **Ward, C. P.** (2024) Biodegradation of bioplastic drinking straws in the coastal ocean. ACS Spring National Meeting. New Orleans, LA. Oral Presentation.

7. *Quiroz, C., *Messenger, S., Longnecker, K., Sylva, S., *Pate, K. M., & **Ward, C. P.** (2024) Using Optical Spectroscopy to Evaluate the Recovery of Dissolved Organic Carbon via Nanofiltration. AGU Ocean Sciences Meeting. Poster Presentation.
8. *Messenger, S., *Quiroz, C., Longnecker, K., Sylva, S., *Pate, K. M., & **Ward, C. P.** (2024) High-Pressure Ceramic Nanofiltration: A Novel and Effective Method for the Recovery of DOC From Natural Waters. AGU Ocean Sciences Meeting. Poster Presentation.
9. Edwards, B., Izallalen, M., Mazumder, S., Perri, S.T., *Walsh, A.N., *Mazzotta, M., *Nelson, T.F., Reddy, C.M., and **Ward C.P.** (2023) Rapid Degradation of Cellulose Diacetate Materials in the Coastal Ocean. Advancing a circular economy for plastics. Science History Institute. Philadelphia, PA. Poster Presentation.
10. *James, B. D., **Ward, C. P.**, Hahn, H. E., Thorpe, S. J., Reddy, C. M. Addressing plastic environmental impact through eco-design. 2023. ACS, San Francisco, CA. Oral Presentation.
11. *James, B. D., Karchner, S. I., *Walsh, A. N., Aluru, N., Franks, D. G., Sullivan, K. R., Reddy, C. M., **Ward, C. P.**, Hahn, M. E. Determining the toxicity of polyethylene photoproduct complex mixtures in developing zebrafish. 2023. ACS, San Francisco, CA. Poster Presentation.
12. *Nelson, T.F., Reddy, C. M., and **Ward, C.P.** (2023) Linking the Molecular Weight of Plastics to their Environmental Fate. ACS, San Francisco. Oral Presentation.
13. *Sun, Y., *Mazzotta, M. G., Miller, C. A., Apprill, A., Reddy, C. M., **Ward, C. P.** Distinct microbial communities degrade cellulose diacetate plastics in the coastal ocean. 2023. AEESP Conference. Boston, MA. Oral Presentation.
14. *Ryberg, E.C., Hansel, C., **Ward., C.P.**, Wankel, S. Photochemical Oxidation of Manganese by Nitrate Photolysis and Mineral Photocatalysis under Oxic and Anoxic Conditions. 2023. AEESP Conference. Boston, MA. Poster Presentation.
15. *James, B. D., Karchner, S. I., *Walsh, A. N., Aluru, N., Franks, D. G., Sullivan, K. R., Reddy, C. M., **Ward, C. P.**, Hahn, M. E. Determining the toxicity of polyethylene photoproduct complex mixtures in developing zebrafish. University of Rhode Island Global Plastics Forum, Kingston, RI. May 15-16, 2023. Poster Presentation.
16. *Freeman, D.H.**,** and **Ward, C.P.** Sunlight and temperature mediate the fate of oil in diverse spill environments. 2023. ACS, Indianapolis. Oral Presentation.
17. *Nelson, T.F. and **Ward, C.P.** (2022) Linking the Molecular Weight of Plastics to their Environmental Fate. ACS, Chicago. Oral Presentation.
18. *Walsh, A.N., *Mazzotta, M., *Nelson, T.F., Reddy, C.M., and **Ward C.P.** (2022) Synergy between Sunlight, Titanium Dioxide, and Microbes Enhances Cellulose Diacetate Degradation in the Ocean. ACS, Chicago. Oral Presentation.
19. *Sutherland, K.M., **Ward, C.P.**, Hemingway, J.D., & Johnston, D.T. (2022) Investigating the Complexity in the Marine Oxygen Cycle with Oxygen Isotopologues. Goldschmidt Conference. Honolulu, HI. Oral Presentation.
20. *Nelson, T.F., Reddy, C. M., and **Ward, C.P.** (2022) Characterizing consumer plastic molecular weight during environmental degradation. Gordon Research Conference – Environmental Sciences: Water. Holderness, NH. Poster Presentation.
21. *Walsh, A.N., *Mazzotta, M., *Nelson, T.F., Reddy, C.M., and **Ward C.P.** (2022) Synergy between Sunlight, Titanium Dioxide, and Microbes Enhances Cellulose Diacetate Degradation in the Ocean. Gordon Research Seminar – Environmental Sciences: Water. Holderness, NH. Oral Presentation.

22. A Bright, LED-lit Future for Aquatic Photochemistry. (2022) **Ward, C.P.**, *Bowen, J.C., *Freeman, D.H., Kling, G.W., Cory, R.M., & Sharpless, C.M. ACS, San Diego. Poster Presentation.
23. Sunlight-driven alterations to triple oxygen isotope signatures of dissolved O_2 in surface waters. (2022) Sutherland, K.M., Johnston, D.T., Hemingway, J.D., Wankel, S.D., and **Ward, C.P.** ACS, San Diego. ACS, San Diego. Oral Presentation.
24. *Walsh, A.N., Reddy, C.M., Niles, S.F., McKenna, A.M., Hansel, C.M., **Ward C.P.** (2022) Plastic formulation is an emerging control of its photochemical fate in the ocean. ACS, San Diego. Oral presentation.
25. *Freeman, D.H., and **Ward, C.P.** (2022) Sunlight-driven chemistry impacts oil fate in diverse spill scenarios. ACS, San Diego. Oral Presentation.
26. *Mazzotta, M.G.; Reddy, C.M.; Amarpuri, G.; Edwards, B.; Izallalen, M.; Mazumder, S.; **Ward, C.P.** (2021) Orthogonal techniques for observing the degradation of plastics in a natural seawater mesocosm: cellulose diacetate degrades within 3 months. ACS, Virtual. Poster Presentation.
27. *Walsh, A.N., Reddy, C.M., Niles, S.F., McKenna, A.M., Hansel, C.M., **Ward C.P.** (2021) Plastic formulation is an emerging control of its photochemical fate in the ocean. ACS, Virtual. Poster Presentation.
28. *Freeman, D.H., and **Ward, C.P.** (2021) Photochemical dissolution of oil at sea: Assessment of rates and controls. ACS, Virtual. Oral Presentation.
29. *Danielle, H.F., & **Ward, C.P.** (2020) Dissolving oil in a sunlit sea. Department of Fisheries and Oceans Canada Multi-Partner Research Initiative Virtual Symposium. Oral Presentation. Presentation.
30. *Bowen, J.C., **Ward, C.P.**, Kling, G.W., Cory, R.M. (2019) Sunlight and iron control the oxidation of DOC leached from permafrost soils. AGU, San Francisco, CA. Poster Presentation.
31. **Ward, C.P.** (2019) How long does plastic last in the environment? Woods Hole Oceanographic Institution, Woods Hole, MA.
32. **Ward, C.P.** (2019) Synthesis of photochemical transformation of crude oil. Gulf of Mexico Research Initiative Synthesis Workshop. Washington D.C. Oral Presentation.
33. *Walsh A.N., **Ward C.P.**, Armstrong C.J., Jackson J.J., and Reddy C.M. (2019) Rapid and Complete Photochemical Oxidation of Polystyrene in the Ocean. Ocean Outlook, Bergen, Norway. Poster Presentation.
34. *Chen, S, **Ward, C.P.**, Wang, A.Z., Long, M.H. (2020) PhRePhOx – an in-situ approach to quantifying carbon cycling processes. Ocean Sciences Meeting, San Diego, CA. Poster
35. **Ward, C.P.**, & Reddy, C.M. (2019) Stable Oxygen Isotopes as a Novel, Sensitive Tracer of Petroleum Hydrocarbon Oxidation at the Sunlit Sea Surface. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Poster Presentation.
36. **Ward, C.P.**, & Overton, E.B. (2019) Synthesis of Photochemical Transformations of Oil in Marine Waters. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.
37. **Ward, C.P.** (2019) Growing old and making new (analytical) friends: a proof-of-concept that stable oxygen isotopes ($\delta^{18}O$) sensitively trace photochemical hydrocarbon oxidation at the sea surface. MC&G Seminar Series at WHOI.
38. **Ward, C.P.** (2018) Why Sunlight Matters for Oil Spills in the Ocean. ACS Symposium at WHOI. Oral Presentation.

39. Nelson, R.K., Gosselin, K., **Ward, C.P.**, & Reddy, C.M. (2018) Environmental Forensic Analysis of Crude and Refined Petroleum Products Utilizing GC×GC-FID, GC×GC-TOF-MS, and GC×GC-HRT-MS, National Environmental Monitoring Conference, New Orleans, LA. Oral Presentation.
40. *Armstrong, C.J., **Ward, C.P.**, Conmy, R.N., French-McCay, D.P., & Reddy, C.M. (2018) Characterizing how sunlight impacts the efficacy of current oil spill response tools. ACS, New Orleans, LA. Poster Presentation.
41. Sharpless, C.M, **Ward, C.P.**, & Reddy, C.M (2018) Apparent Quantum Yields of Singlet Oxygen and Photochemical Oxygen Consumption for Crude Oils. ACS, New Orleans, LA. Poster Presentation.
42. **Ward, C.P.**, Reddy C.M., & Cory, R.M. (2018) Evaluating the magnitude of partial photo-oxidation of organic carbon in sunlit surface waters. ACS, New Orleans, LA. Oral Presentation.
43. Reddy, C.M. & **Ward, C.P**. (2018) The production of spillphatenes following the 2010 Deepwater Horizon disaster. ACS, New Orleans, LA. Oral Presentation.
44. **Ward, C.P.** & Cory, R.M. (2018) Molecular level evidence that the magnitude of partial photochemical oxidation of dissolved organic carbon in arctic surface waters is likely underestimated. Arctic LTER Annual Meeting, Woods Hole, MA. Poster Presentation.
45. **Ward, C.P.**, *Armstrong, C.J., Conmy, R.N., French-McCay, D.P., & Reddy, C.M. (2018) Photochemical oxidation reduces the efficacy of aerial dispersants applied in response to oil spills. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.
46. **Ward, C.P.**, Sharpless, C.M., Aeppli, C., French-McCay, D.P., Valentine, D.L., Rodgers, R. P., Gosselin, K.M., Nelson, R.K., & Reddy, C.M. (2018) Partial photochemical oxidation was a dominant fate of *Deepwater Horizon* surface oil. Gulf of Mexico Oil Spill & Ecosystem Science Conference, New Orleans, LA. Oral Presentation.