Policy & Science Advisor UPDATE

ENVIRONMENTAL RESEARCH

<u>Featured Research</u>: Mysteriously rapid rise in Legionnaires' disease incidence correlates with declining atmospheric sulfur dioxide

Legionnaires' disease (LD) is a severe form of pneumonia with a fatality rate of 10-25% caused by inhaling or aspirating Legionella, bacteria that thrive in built environment water systems. The United States saw over a nine-fold increase in LD between 2000 and 2018, with New York State having one of the highest burdens and increases in disease rates. Despite the focus of decades of research since the infamous 1976 outbreak, large knowledge gaps remain. Over 90% of community-acquired cases have no known point source of exposure and the rapid increase in LD rates remains unexplained.

These gaps are examined in the March 2024 issue of the Proceedings of the National Academy of Sciences Nexus, where the NYSERDA-funded collaborative research team of Fangqun Yu, Arshad A. Nair, Ursula Lauper, Gan Luo, Jason Herb, Matthew Morse, Braden Savage, Martin Zartarian, Meng Wang, and Shao Lin across the University at Albany's Atmospheric Sciences Research Center (ASRC) and School of Public Health (SPH), the NYSDOH's Bureau of Water Supply Protection, and the University at Buffalo's School of Public Health and Health Professions published their findings titled "Mysteriously rapid rise in Legionnaires' disease incidence correlates with declining atmospheric sulfur dioxide."

The research team explored correlations between the increases in observed LD cases and environmental factors such as temperature, relative humidity, and solar (UV), although those

 Pyu, Nair, et al., PNAS Nexus, Volume 3, Issue 3, March 2024, pgae085

 Mysteriously rapid rise in Legionnaires' disease incidence correlates with declining atmospheric sulfur dioxide



Photo Credits: The Authors, https://doi.org/10.1093/pnasnexus/pgae085

LD greater closer to a cooling tower (CT)

Largest increases occur closer to CTs

Range of elevated risk around CT increased over time to at least 7.3 km



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(Article Highlight, continued...)

factors contribute to variability they did not explain the dramatic rise in LD cases. However, a hitherto unexplored factor -- declining atmospheric SO_2 was found to be linked to the long-term LD increases. Over the past few decades, there has been a significant reduction in atmospheric SO_2 due to science-informed federal, State, and local air-quality regulations aimed at improving public health. However, an inadvertent consequence of this environmental success may have emerged.

The authors hypothesize and test a physical mechanism whereby the declining SO_2 results in reduced acidity of aerosols emitted from cooling towers, making them more conducive to the survival and growth of Legionella in contaminated droplets, contributing to the increase in LD incidence. Importantly, controlling for confounding factors, a link between cooling tower proximity and LD incidence is established, finding a greater risk of LD hospitalization up to 4.5 miles from a cooling tower, and this range has been increasing from 2000 to 2019 as SO_2 levels have dropped.

The finding of this study, if can be confirmed in further analysis and research, has implications for forecasting LD risks and needed interventions as SO_2 concentration changes are expected to continue. While this work highlights the need to holistically consider the complexities of SO_2 concentration changes, it would be unwise to argue against its reductions, which have well-recognized health benefits. Public health officials and clinicians should be aware of the increased risk of LD in the context of reduced SO_2 levels, especially during peak cooling tower operation periods. Enhanced monitoring and maintenance of water systems, along with targeted public health interventions, could mitigate these risks.

This interdisciplinary collaboration between the academic community and State agencies highlights the importance of considering the complexity of environmental health interactions and the broader implications of environmental policies. It serves as a reminder that actions taken to improve one aspect of public health may inadvertently influence other health outcomes. By adopting a holistic approach to environmental and public health policy, we can better anticipate and address these complex interactions in building climate and health resilient communities.

The project that this work was conducted under, *Evaluating short-/long-term impacts and exposure sources of ultrafine particles on multiple health outcomes in NY State*, was selected competitively through NYSERDA Program Opportunity Notice 3921, Energy-Related Air Quality and Health Effects Research in 2018.

NYSERDA's Environmental Research Program, since its inception in the late 1990s, has supported research that provides objective, science-based information to help address immediate and long-term, energy-related environmental challenges across New York State.

For more information, please refer to the detailed publication in <u>PNAS Nexus</u> and the <u>press</u> release.



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Climate Change

- Climate Impact Assessment: The Climate Impacts Assessment (CIA) was completed and released in February (<u>https://nysclimateimpacts.org/</u>). Work continues on several additional communication products and the economic impact analysis, anticipated to be completed later this year. Staff have given a number of presentations on the assessment to various organizations in order to disseminate the results and raise awareness of the information.
- Extreme Heat Adaptation Plan: Program staff continued working with others at NYSERDA, NYS Department of Environmental Conservation, and other agencies on the Extreme Heat Adaptation Plan. The plan was released and announced by the Governor on July 28th and can be found on the DEC website. The final plan includes specific actions the State will take to build resilience and adapt to extreme heat, build local capacities, and support local communities in taking action.
- Statewide Adaptation Plan: Program staff have begun working with other State agencies on the statewide comprehensive adaptation and resiliency plan, a Governor's initiative announced in the 2024 State of the State agenda. The plan will help ensure that New Yorkers are prepared for and can adapt to the changing climate.

Ecosystem Response

Long-Term Monitoring Cooperators Meeting: NYSERDA attended the Long-Term Monitoring (LTM) Cooperators Meeting held by the United States Environmental Protection Agency (EPA) in May 2024. LTM Cooperators from Vermont, Northern New England, Adirondacks, Catskills, and Ridge/Blue Ridge provided overviews of their region's lake and stream sampling program and resultant research. Collectively, the LTM Cooperators discussed potential ways to maintain the LTM programs in the absence of EPA funding, as well as LTM program successes and outreach.



Offshore Wind

- Regional Fisheries Compensation Fund: The Multi-State effort to advance a regional fisheries compensation fund has continued to make significant progress. The States, offshore wind developers, and fishing industry members are in the process of selecting individuals to sit on the Design Oversight Committee (DOC), which will advise, guide and support the work of the selected administrator during the design and development phase. Additionally, the selected entity is expected to commence work during Q3 2024. Further details on the program can be found here: https://offshorewindpower.org/fisheries-mitigation-project
- State of the Science: The 2024 State of the Science Workshop on Offshore Wind, Wildlife, and Fisheries, hosted by NYSERDA on behalf of the New York State Environmental Technical Working Group was held on Long Island, New York from July 16-19. Approximately 400 people attended in person and nearly 200 joining virtually as well. More information can be found here: <u>https://www.nyetwg.com/2024-workshop</u>

(Offshore Wind, continued...)

 Rutgers University Surf Clam Study: Research projects from PON 5226 are well underway. The Rutgers sponsored surfclam study recently completed a successful 6-month survey to evaluate growth and survival of clams seeded offshore this past October. The Commercial Fisheries Research Foundation just started field activities testing mechanical jigging machines as a possible gear alternative to increase coexistence with offshore wind development. Several images below depict field activities from both projects.

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(Left) Deployed Clams for the Study with Dark Bank Indicating New Growth and (Right) Clam Types from the Study



Photo Credit: Rutgers University

- ECOncrete Kick Off: ECOncrete kicked off their field work (PON 5226) to monitor biodiversity development and benthic change on their large-scale demonstration project for their nature-inclusive scour protection. Over 12-months, they will work with Stony Brook University to collect environmental DNA (eDNA), conduct high-resolution multibeam mapping, and model fish habitat. This study will increase understanding of novel scour protection materials and their impacts on the marine environment.
- **Glider Deployment:** In May, Stony Brook University and Rutgers University (RFP 4831) deployed an autonomous glider to detect baleen whales and collect oceanographic data. The survey detected sei, fin, and humpback whales during the 35-day deployment. Under the same RFP, the Wildlife Conservation Society deployed seven passive acoustic recorders in the New York Bight in June to detect marine mammal activity in and around offshore wind energy areas. The recorders will collect data for two years. Together, these studies will increase understanding of marine mammal presence and movement, which will support decision making on monitoring and mitigation needs.









Photo Credit: NYSERDA



 Port of New London: On May 15th Morgan Brunbauer toured the Port of New London to view the staging and marshalling areas for the OSW tower components and blades for Orsted's Sunrise Wind and Revolution Wind Projects. See below for a few photos of the site as it gets prepped for heavy activity later this summer.

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Environmental Technical Working Group (E-TWG): The **Environmental Technical** Working Group (E-TWG) met in May to discuss ongoing work, including the development of sciencebased communications materials to understand potential impacts of offshore wind activities on whales and the finalization of avian displacement guidance. The E-TWG also hosted presentations from **Biodiversity Research** Institute, The Nature Conservancy, U.S. Fish and Wildlife Service, Bureau of Ocean Energy Management, Connecticut Department of Energy and Environmental Protection, and the Regional Wildlife Science Collaborative on compensatory mitigation and marine net gain. The meeting ended with a discussion of priorities for E-TWG work over the next few years. All meeting materials can be found here: https://www.nyetwg.com/etwg-meeting-archive



(Offshore Wind, continued...)

- E-TWG Whale Communications Committee: The E-TWG Whale Communications Committee <u>published an update</u> to their series of Frequently Asked Questions about whales and offshore wind activities. This answers questions such as, "What are strandings and Unusual Mortality Events?", "Does offshore wind energy development kill whales?", and "What mitigation measures are being required by regulators in the U.S. for offshore wind?".
- Rhode Island Sea Grant: On May 16th Morgan Brunbauer, attended a meeting at the University of Rhode Island (URI) hosted by Sea Grant to discuss advancing the development of current tools and techniques that contribute to our shared understanding of impacts and changing behavior of recreational fishers due to the accelerated growth of offshore wind energy. This effort is part of the National Oceanic and Atmospheric Administration (NOAA)/URI Cooperative Research and Development Agreement to advance collaborative research and ocean planning solutions on the interactions of offshore wind energy development and marine ecosystems, inclusive of humans and coastal communities.
- NYSERDA Recreational Fisheries Liaison: On June 7th Morgan Brunbauer and Captain Tony DiLernia, NYSERDA Recreational Fisheries Liaison, attended at meeting hosted by The University of Rhode Island, NOAA Fisheries Northeast Fisheries Science Center, Commercial Fisheries Research Foundation, and the Commercial Fisheries Center of Rhode Island, and Sea Grant's National Offshore Wind Energy Liaison Initiative to learn from European experts and researchers about the most up-to-date research related to the effects of offshore wind energy on fish and fisheries. Members of the International Council for the Exploration of the Seas (ICES) Working Group on Offshore Wind Development and Fisheries discussed scientific evidence and research needs around fisheries and offshore wind energy development that could be helpful in making decisions on coexistence and co-use experiences and strategies.
- Webinar Series: NYSERDA continues to host a monthly offshore wind webinar series, <u>Learning from the Experts</u>. Recent webinars have discussed New York's electric grid, transmission needs, and innovations and emerging technologies in offshore wind energy.
- **Open Houses:** On June 18th, the Offshore Wind Team participated in an Open House hosted by the Jones Beach Energy and Nature Center focused on New York's Offshore Wind Program, State regulatory processes, and general offshore wind education.





Land Based-Renewables

• The Agricultural Technical Working Group (A-TWG): This group continued its devoted work by convening 7 meetings in the 2nd quarter (2 A-TWG meetings; 3 Regional Agronomic Impact Specialist Committee (SC) meetings, 1 Agrivoltaic SC meeting, and 1 Solar Siting Scorecard SC meeting). Two noteworthy work products the A-TWG supported the development of were published this quarter.

"Grazing Ready" Publication



Considerations for "Grazing-Ready" Solar Facilities Planning for Integration of Sheep



- In April, NYSERDA posted <u>Considerations for "Grazing-Ready"</u> <u>Solar Facilities: Planning for Integration of Sheep</u> to its Agrivoltaics <u>webpage</u>. This resource was developed to support integration of "graze-ready" site elements at the facility planning and design stage to help promote grazing at any point in the lifespan of a solar facility. The guide is intended to help solar developers substantiate co-location of animal agriculture with solar and encourage discussions among the farming and solar development communities to expand farmer involvement in agrivoltaics.
- NYSERDA's <u>2024 Smart Solar Siting Scorecard</u> was recently published with the Large-Scale Renewables RFP: <u>RESRFP24-1</u>. The Scorecard will for the second time utilize the Climate & Applied Forest Research Institute's (CAFRI) New York Forest Carbon Assessment data and maps to evaluate a project's potential overlap with forested lands and the associated live carbon stocks. The Scorecard also introduced a new in-field verification method for proposers of solar projects to ground truth desktop GIS data.

Photo Credit: NYSERDA



Agrivoltaic Design Studio Award Recipients

 Agrivoltaic Design Studio: Cornell's Henry Williams and Mike Liao competed in the EnergyTech University Prize National Pitch Event this April. They were one of 28 finalists, out of 225 competing teams across the country. Their pitch focused on an "Agrivoltaic Design Studio", based on NYSERDA funded agrivoltaics work. The team was selected by Department of Energy's Solar Energy Technologies Office as a finalist and took home \$20K from the EnergyTech national competition. The photo to the left shows the Henry Williams and Mike Liao from the Cornell team.

Photo Credit: Cornell University

Program Reports and Papers

Program Reports & Papers posted recently include:

Air Quality and Related Health Research: Particulate Matter (PM), Ozone and Co-Pollutants

- Croft, D.P., Utell, M.J., Liu, H. et al. Change in rate of healthcare encounters for respiratory infection from air pollution exposure after improved vehicle emissions standards in New York State. Air Qual Atmos Health 17, 1267–1280 (2024). <u>https://doi.org/10.1007/s11869-024-01505-6</u>
- Morin B, Ahmadi M, Rector L, Allen G. Development of an integrated duty cycle test method to assess cordwood stove performance. J Air Waste Manag Assoc. (2022) https://pubmed.ncbi.nlm.nih.gov/35775660/
- Zhao, T., Hopke, P.K., Utell, M.J., Croft, D.P., Thurston, S.W., Lin, S., Ling, F.S., Chen, Y., Yount, C.S., & Rich, D.Q. (2024). A case-crossover study of ST-elevation myocardial infarction and organic carbon and source-specific PM2.5 concentrations in Monroe County, New York. Frontiers in Public Health. <u>doi.org/10.3389/fpubh.2024.1369698</u>

Offshore Wind

Williams et al. 2024. A framework for studying the effects of offshore wind energy development on birds and bats in the Eastern United States. Frontiers of Marine Science, Vol 11 - 2024 https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2024.1274052/full