University of New England
College of Arts and Sciences
Westbrook College of Health Professions

Summer Undergraduate RESEARCH EXPERIENCE Symposium

SATURDAY
October 25, 2025

UNE
UNIVERSITY OF NEW ENGLAND
INNOVATION FOR A HEALTHIER PLANET

SCHEDULE

Saturday, October 25, 2025 | 9–11 a.m.

Decary Annex/Leonard Hall

9–11 a.m. | Poster Presentations

10:30 a.m. | Remarks

Wesley Renfro, Ph.D.
Dean, College of Arts and Sciences

Amy Keirstead, Ph.D.
Associate Dean, College of Arts and Sciences

RESEARCH AT UNE

Welcome to the 2025 Summer Undergraduate Research Experience (SURE) Symposium! This annual event features the work of our students in the College of Arts and Sciences (CAS) and the Westbrook College of Health Professions (WCHP) who have performed research over the summer, working closely with dedicated faculty and professional staff. In doing so, our students have built on the knowledge they have acquired through their coursework, gained valuable hands-on skills in their fields, and enjoyed an intensive research experience that fosters the habits of mind and professional competencies that will benefit them in their future careers.

From the Portland Campus for the Health Sciences to UNE's 363 Acre Forest and from Saco Bay to the Pacific Marine Environmental Laboratory, our students have been busy investigating a diverse array of research questions. These projects might continue through their undergraduate years, evolve into a master's thesis, and form the basis for additional presentations, manuscripts, articles, and more.

Please join us in celebrating the hard work, dedication, and creativity of our students while learning more about their fascinating projects. We hope you enjoy your day!

Amy Keirstead, Ph.D.
Associate Dean and Associate Professor of Chemistry
College of Arts and Sciences

John Rosene, D.P.E., LAT, ATC, CSCS, ACSM EP-C
Clinical Professor of Exercise and Sport Performance
Westbrook College of Health Professions

PRESENTATIONS

LEGEND

63. Goat Island Alternative Energy Project

Student Author(s) Cameron Indeck '22 | *Pam Morgan, Ph.D.* ***Faculty Advisor(s)***

Abstract

Goat Island, offshore Kennebunkport, Maine, has had an operating lighthouse since 1833. The lighthouse and buildings are powered by an underwater cable from the mainland, which is leaking electricity into the ocean.

Funded by

Kennebunkport Conservation Trust and the Gulf of Maine Institute.

1. Population Estimates of *Sotalia guianensis*, Guiana Dolphins, in Costa Rica Using Photo Identification

Jillian Bender ’27 | *Michelle Caputo, Ph.D.*

This study employed mark-recapture methods to estimate the population size of Guiana dolphins *(Sotalia guianensis)* in Costa Rica. In light of the absence of prior abundance estimates in this region and escalating anthropogenic pressures, it was crucial to obtain a population estimate of this species. Photos of the animals were taken across three seasons: winter 2023, winter 2024, and fall 2024. Using Rmark programming, there are an estimated 47.942743 individuals across all three seasons.

2025 Doug and Lauren Sanford Marine and Environmental Science Fellowship Fund

2. Are Changes in Activation of the Hypothalamus or Amygdala Responsible for Pain Hypersensitivity in Rats That Experienced Repeated Acute Pain in the First 7 Days of Life?

Brayden Wesler ’26, Joshua Paraskos ’26 | *Michael Burman, Ph.D.*

The neonatal intensive care unit (NICU) involves early life pain and stress that is associated with anxiety and pain sensitivity. Using immunohistochemistry for immediate early genes EGR-1 and C-fos, we are examining activation in the hypothalamus and amygdala of rats that experience repeated acute early life pain compared to rats that did not in a manner that correlates with the degree of pain sensitivity following a stressful event later in life.

Khan Family Fellowship

3. Delayed Onset Muscle Soreness and the Potential Impact of Selective Serotonin Reuptake Inhibitors

Jack Deitch '26 | *Paul Visich, Ph.D.*

This study examined whether SSRI use affects delayed onset muscle soreness (DOMS) after eccentric quadriceps exercise. Thirty-six healthy young adults performed 300 eccentric repetitions on a Biodex. Muscle soreness, thigh circumference, flexibility, and isometric strength were measured at baseline to 96 hours. DOMS was induced, with significant changes in all variables when groups were collapsed, but no differences were found between groups. SSRIs did not impair short-term recovery.

4. Further Development of Microplastic Extraction and Visualization from Farmed Oysters

Mikayla Straube '26 (MS) | *Carrie Byron, Ph.D.*

Microplastics (<5 mm) are prevalent throughout the global hydrosphere, disruptive to the functionality of organisms, like oysters, important to ecosystem services and the "blue" economy. Though most marine microplastic loading originates from land-based sources, there is question as to whether marine fishing and farming gear contribute directly to microplastic loading in ocean foods. Continuation of extraction and visualization methodology development toward objective of quantifying ambient loading of microplastics in oysters accurately and precisely.

5. Do Microplastics Threaten the Microbial Safety of Oysters?

Yein Kang ’28, Abigail Vigue ’26 (MS), Tyler Janik ’27, Caitlin O’Brien ’27 | *Kristin Burkholder, Ph.D.*

Microplastics pollute waterways and are ingested by shellfish. Since pathogenic microbes bind to microplastics, we tested the role of microplastics in bacterial colonization of oysters. We compared *E. coli* entry in oysters exposed to *E. coli*-coated microplastics versus oysters exposed to *E. coli* alone. Microplastics did enhance *E. coli* entry into oysters, but their impact on bacterial retention was less clear. Ongoing work examines the effect of microplastics on oyster colonization by additional seafood-relevant microbes.

Maine Sea Grant

6. Advancing Software Tools for Delayed-Mode Quality Control of Biogeochemical Argo Profiling Data

Josephine Pikowski ’26 | *Hartmut Frenzel, M.S., Andrea Fassbender, Ph.D.*

Biogeochemical Argo floats require delayed-mode quality control (DMQC) to correct sensor drift before scientific use. Existing DMQC tools rely on MATLAB, limiting accessibility. We translated SAGE’s (SOCCOM Assessment and Graphical Evaluation) correction methods — using regression and neural networks — from MATLAB to Python, integrating with Argo Canada’s oxygen DMQC package. Python’s open-source environment streamlines workflows in Jupyter Notebooks. Our expanded tool now supports nitrate and other variables, improving access to high-quality ocean data for diverse research communities.

National Oceanic and Atmospheric Administration (NOAA)

7. Long-Term Effects of 10 ppb Early-Life Arsenic Exposure in a Zebrafish Model with a Focus on the HPI Axis

Tyler McGoldrick ’26, Gabe Stoehr ’26 | *Michael Burman, Ph.D.*

Arsenic is a naturally occurring toxic metalloid found in well water. The long-term effects of low-level exposure (10 ppb), the limit for safe drinking water, on stress, anxiety, and social and defensive behaviors were investigated in adult zebrafish after arsenic exposure during the 5 days after fertilization. In this study, particular interest was placed on the possible effects it may have on the stress response system, so WT and zebrafish with a dysfunctional glucocorticoid receptor were compared.

Khan Family Foundation

8. Photo ID of Phocidae, Focusing on Disease and Predation

Isabella Parks ’26 | *Michelle Caputo, Ph.D.*

The poster will present my project on the Phocidae seals of the Gulf of Maine, specifically Grey and Harbor seals. An introduction will explain the importance of monitoring disease and predation with other examples; the methods will explain the photo ID process as well as the drone footage. I expect to include photos and show off bite marks and disease nodules.

9. Exploring the Influence of Eutrophication on Cultured Phytoplankton Species

Emma Hutchings ’27 | *Tricia Thibodeau Ph.D.*

The aim of this project was to simulate effects of eutrophication on phytoplankton cultures via the addition of nitrogen and phosphorus to culture conditions. Preliminary results indicated that each species exhibited the most growth under different nutrient conditions. Under the nitrogen-phosphorous conditions, which most simulated eutrophication, all species exhibited less growth than control conditions. These results are significant as they imply that phytoplankton growth will be influenced by changing ocean conditions and is species dependent.

10. Can Antimicrobial Compounds in the Red Algae *Chondrus crispus* Be Induced by a Bacterial Elicitor?

Ethan Case ’28 | *Ursula Roese, Ph.D.*

The goal of our project was to see if the bacterial elicitor flagellin-22 could induce antimicrobial compounds in *Chondrus crispus* and *Fucus vesiculosus*. We tested production of antimicrobial compounds against *Staphylococcus aureus*. Algae were incubated with the elicitor for three hours and harvested 1, 3, and 6 days after exposure. We found no increase in antimicrobial activity in *F. vesiculosus* for either timepoint. In contrast to previous experiments, we did not detect any antimicrobial activity from *C. crispus*.

Maine Space Grant Consortium

11. Comparative Analysis of Gut Microbiomes Between Lab-Reared and Live-Caught Monogononta Rotifers

Beth Gera ’26 | *Tricia Thibodeau Ph.D.*

Marine rotifers play an important role in aquatic ecosystems by consuming algae, being consumed by higher trophic organisms, and being used as food in aquaculture. Limited research exists surrounding the gut microbiome — the naturally occurring microbial gut community — in rotifers. The purpose of this research was to conduct a comparative analysis of microbiomes between lab-reared and wild-caught rotifers within Saco Bay. Protocols were developed and executed to determine microbiome data, and future results will be useful to understand how climate change how climate changes has impacted — and continues to impact — these organisms and their adaptive potential.

12. Modeling Bottom Water Temperatures of Saco River Estuary

Lillian Westerberg ’27 | *Emily Kelting, Ph.D.*

The purpose of this project was to analyze and model changes in bottom water temperatures with differential equations. This project included preliminary research on prior methods that have been used to make models, developing mathematical equations for the model, and starting to program those models. The model is based on Euler’s method to solve equations as well as the Energy Conservation Law. Results from this study could aid ecosystems and coastal communities in managing the effects of future ocean warming.

Maine Space Grant Consortium

13. The Impacts of Semaglutide and Temperature, a Glucagon-Like Peptide 1 Analog, on the Energy Metabolism and Locomotion of *Palaemon elegans*

Elizabeth Tracy ’25 | *Gwangseok R. Yoon, Ph.D.*

Semaglutide is a pharmaceutical used to treat type 2 diabetes. Pharmaceuticals have the potential to contaminate environmental wastewater, leaving aquatic organisms susceptible. Therefore, the invertebrate intertidal species *Palaemon elegans* will be exposed to varying degrees of temperature and semaglutide concentration. Respirometry, feeding behavior, glucose, and enzymatic assays will be analyzed in Rockpool Shrimp to determine the degree of changes to their glucose metabolism caused by semaglutide and any intensification caused by heat-wave temperatures.

Maine Space Grant Consortium and NASA

14. Informal Conservation of Seaweed in Maine Despite Policies, Gentrification, and Privatization in Coastal Areas

Johanna Birchem ’26 | *Sarah Ebel, Ph.D.*

The objective of my SURE research was to examine how independent seaweed harvesters practice conservation while they harvest seaweed, navigating issues of policy, gentrification, and privatization. Through my research, I ask: How are seaweed harvester livelihoods and conservation practices impacted by changes in resource access due to gentrification and privatization in the intertidal zone? We have found that harvester livelihoods are challenged by policies that limit their efforts and stop traditional ways of living.

St. Francis College Class of 1969 Alumni Fund

15. Sex and Postural Effects on Lactate Recovery and Power Performance Metrics During the Wingate

Kayden Haylock ’26, Alison Dresser ’23, Kiara Morse ’24, Samantha Yurcak ’25, Sydney Mason ’24, Alexis Coombs ’25 | *John Rosene, D.P.E.*

Participants completed three separate WAnTs in the seated, standing, and combined posture. Each session started with a warmup. Once the warmup was completed, a five-second countdown was given to start the 30-second. During every session, blood lactate was collected at the beginning of the session, before the start of the WAnT, after the WAnT, and then 5, 10, 15, 20, 25, and 30 minutes posttest.

16. Neck Reaction Time Fails to Improve Following Vision Training

Jamie DuPont ’26, Caitlin Gallo ’21, Alison Dresser ’23, Jess Tolzman ’22 | *John Rosene, D.P.E.*

Subjects were tested by projecting a weight dropping onto a stanchion, connected to the subject, onto a monitor, while two other monitors projected distracting videos. Three trials each were performed with the weight drop in the foveal view and right and left periphery. Reaction time, peak EMG, and time-to-peak EMG of the right and left sternocleidomastoid were assessed in each subject. Subjects in the 3D-MOT group trained using software twice per week for eight weeks.

17. eDNA and Jellyfish on the Coast of Maine

Jhana LoRe ’26 (MS) | *Markus Frederich, Ph.D.*

This project aimed to start a larger experiment involving the detection of lion's mane and moon jellyfish along the Gulf of Maine (GOM). The goals for summer were to collect tissue samples from both species, order and optimize species-specific eDNA primers, and sample eDNA. New protocols were developed for gel electrophoresis and qPCR, and an eDNA time series was begun. This information is important in understanding and detecting jellyfish blooms along the GOM.

18. Connecting Phosphate Metabolism to Neurogenetic Leukoencephalopathy

Allison Kee ’27 | *Jennifer Garcia, Ph.D.*

RNaseT2-deficiency leukoencephalopathy is a neurogenetic disorder that leads to psychomotor delays. Yeast was used to understand the disease and to test the impact of RNase T2 on cellular function. Previously, we showed that phosphate metabolism may be altered by T2 function. We validated that T2 plays a critical role in phosphate metabolism. Since phosphate metabolism is important for the function of the mitochondria, we looked at mitochondrial protein expression to test the impact of T2.

Khan Family Foundation

19. Occurrence of Small Cetaceans in the Gulf of Maine

Kara Mickiewicz ’27 | *Michelle Caputo, Ph.D.*

This project identified occurrence hotspots and modeled habitat suitability for small cetaceans in the Gulf of Maine. Ensemble models projected northward distribution shifts under future climate scenarios, with chlorophyll-a, temperature, and depth as key predictors. Under unsustainable pathways, highly suitable habitats largely disappeared. These findings highlight the vulnerability of cetaceans to climate change and show the importance of identifying current habitats to guide adaptive conservation.

20. Sex Differences of Neck Reaction Time Following an 8-Week Neck Strengthening Program

Cheyenne Cahill ’26, Caitlin Gallo ’21, Allison Dresser ’23, Jess Tolzman ’22 | *John Rosene, D.P.E.*

To assess sex differences in neck reaction time, a twice-a-week 8-week neck strengthening versus no strengthening program was completed. Reaction time (RT) was tested via a weight drop, displayed on a monitor, from 13 cm high onto a stanchion connected to headgear by cable. RT measurements, males right SCM had significantly increased RT (m=0.185±0.055 s; f=0.176±0.012 s) (p=0.014) in foveal view. Males showed greater neck strength, muscle activity, and force production versus females.

21. Analyzing Zooplankton Community Composition in the Gulf of Maine

Julia Hobbs ’27 | *Tricia Thibodeau Ph.D.*

Zooplankton make up the base of the food chain and can be used as an indicator for ecological health. Further, zooplankton community composition and diversity are key indicators for understanding how changing environmental conditions affect food webs and carbon flux. This project aims to quantify community composition throughout the Gulf of Maine during three summers and identify changes both spatially and temporally. Further, to use satellite data to compare zooplankton biomass to environmental factors.

Maine Space Grant Consortium

22. Activation of the Deep and Superficial Lumbar Multifidus During Pallof Press Variations

Abigail McHallam ’27 (MS), Olivia Durfee ’27 (MS), Benjamin Coderre ’26 | *Michael Lawrence, Ph.D.*

We studied the effect of the Pallof Press on activation of spine-stabilizing muscles, focusing on the deep and superficial multifidus muscle using indwelling electrodes, as well erector spinae and external oblique, using surface electrodes. We hope to gain an understanding if one type of Pallof Press exercise can best train muscles that are weakened by lower back pain.

23. Changes in the Wintering Habits of Bobolinks *(Dolichonyx oryzivorus)* Due to Climate Change

Emma Lake ’26 | *Noah Perlut, Ph.D.*

My project investigates whether Bobolinks, a long-distance migratory songbird, are altering their wintering locations and timing due to climate change. I analyzed potential shifts using light-level geolocator data collected from a population in Vermont from 2009 to 2025. I hypothesized that Bobolinks would begin wintering further north and spend more time at these locations. After analyzing the migration patterns of 49 Bobolinks, it appears that the population is shifting its wintering grounds.

2025 Doug and Lauren Sanford Marine and Environmental Science Fellowship Fund, Deeni Galipeau, U.S. Fish and Wildlife Service, Hudson Valley Farm Hub, Toyota TogetherGreen

24. Settlement Success of Sea Lettuce Spores on Different Substrates and Implications for Sea Farming

Daniel Gallagher ’26 | *Carrie Byron, Ph.D.*

This project aimed to establish a sea farm for *Ulva fenestrata* (sea lettuce) and to evaluate spore settlement on different colored substrates during the nursery phase. Although there was promising nursery growth, the sea farm ultimately produced no net yield. While the results were inconclusive, the project provided valuable insight into farm design and experimental methods for future research regarding *Ulva fenestrata*.

25. Soil Respiration Rate and Its Relationship with Red Oak Tree Genetic Diversity

Finn Sclafani ’27 | *Steven Travis, Ph.D., Gregory Zogg, Ph.D.*

This project measured soil respiration rate and investigated its relationship with genetic variation in red oak *(Quercus rubra)*. Results show that soil respiration rates varied among three plots, but were not influenced by plant genetic variation. These findings provide important insight into how genetic biodiversity shapes soil respiration, deepening our understanding of its potential role in global climate change.

26. The Role of Alox12 in HIV-Associated Peripheral Neuropathy

Samantha Willey ’26 | *Ling Cao, M.D., Ph.D.*

HIV-associated peripheral neuropathy (HIV-PN) is a common complication of HIV marked by sensory discomfort from nerve damage. The HIV transactivator of transcription (Tat) protein drives neuroinflammation and has been implicated in HIV-PN. Alox12, a 12-lipoxygenase enzyme linked to inflammation, has been associated with neuropathy. Previously, the Cao Lab found increased Alox12 RNA in the lumbar spinal cord of iTat mice. Here, immunohisto-chemistry was used to examine Alox12 protein expression. Further time course studies are underway.

Kahn Family Foundation

27. Differences in Epg5 Expression in Dorsal Root Ganglion of CD137L Knockout vs. Wildtype Mice After Peripheral Nerve Injury

Olivia Dunleavy ’27 | *Ling Cao, M.D., Ph.D.*

Ectopic P-Granules 5 Autophagy Tethering Factor is a gene in the autophagy pathway that was previously identified as increased in an injury model of neuropathic pain. Here, the expression of Epg5 was examined at the protein level in CD137L KO vs. WT dorsal root ganglions (DRG) after a sciatic nerve crush injury using an immunohistochemistry approach. The results showed a need for further optimization of the procedure and neuronal markers will give successful future co-stains.

Kahn Family Foundation

28. Genetic Variation of Tannin Levels in Red Oak Bark

Madeline Frank ’26 | *Gregory Zogg, Ph.D., Steven Travis, Ph.D.*

The objective of this study was to examine the relationship between tannin levels and tree genetic variation by quantifying tannin concentrations in red oak *(Quercus rubra)* bark. Results indicate bark tannin concentrations were influenced by tree genetic variation, and a significant negative relationship was found between bark tannin concentration and lichen coverage in two of three sites. These findings advance the understanding of the role that genetic factors play in ecosystem processes.

29. Impact of Groins and Jetties on Coastal Erosion Using Diffusion-Based Modeling

Ruby Kimball ’26 | *Emily Kelting, Ph.D.*

This project models coastal erosion and sediment transport using a diffusion-based partial differential equation. Finite differences were applied to compute shoreline changes with boundary conditions representing groins and jetties. The model reproduces accretion on the updrift side and erosion downdrift, consistent with field observations at Camp Ellis, Maine. This approach demonstrates how coastal engineering alters sediment transport and provides a foundation for future multidimensional modeling that includes wave diffraction and spur jetties.

30. Tracing Movement Patterns and Natal Origins of Striped Bass in Maine: Connecting Acoustic Telemetry with Scale Chemistry

Benjamin Gowell ’25 | *Michelle Caputo, Ph.D.; Will Kochtitzky, Ph.D.*

Striped bass, an anadromous species, migrate extensively along the Atlantic coast, complicating management due to complex stock structure and seasonal movements. This study integrates acoustic telemetry and scale chemistry to evaluate the efficacy of stock assignment, characterize stock composition, and examine fine-scale and coastal differences in migratory behavior among spawning populations of Saco River striped bass tagged from 2022–2024. Results identify key spawning sources contributing to Maine’s recreational fishery and their annual variability.

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THANK YOU

THANK YOU!

The projects that you've enjoyed today are tangible products of the efforts of many people and units across the University of New England, who each do our part — individually and collectively — so that our students can contribute toward a greater understanding of their field of study. Here, we recognize individuals and organizations who have made our students' SURE projects and the SURE symposium a success, recognizing that it takes a village to achieve these impressive outcomes.

First, a hearty **THANK YOU** to the faculty mentors and professional staff who have supported the students in carrying out the research presented here today. Your generosity of time and effort has allowed the students to complete truly remarkable work. Likewise, the College of Arts and Sciences Undergraduate Research, Scholarship, and Creative Activity Committee was instrumental in the success of our 2025 CAS SURE program.

Several agencies have sponsored the students' summer research through fellowships and grants including the Kahn Family Foundation, the Maine Space Grant Consortium, the Doug and Lauren Sanford Marine and Environmental Science Fellowship Fund, Maine Sea Grant, the National Oceanic and Atmospheric Administration, NASA, Deeni Galipeau, U.S. Fish and Wildlife Service, Hudson Valley Farm Hub, Toyota TogetherGreen, the St. Francis College Class of 1969, the UNE Office of Research and Innovation, the UNE Girard

Marine Science Center, and the UNE College of Arts and Sciences and the Westbrook College of Health Professions Dean's Offices. Thank you for your investment in our students. Appreciation is also extended to UNE Institutional Advancement, the Office of Communications, the Office of Admissions and Marketing, and UNE Conference Services for their help in executing our event.

Thank you to all of the family and friends who have traveled to UNE to support their students during this event, and for your support during their busy summer research period. Whether you consoled your student when their experiment was "a bust" or shared their excitement when they experienced their "aha" moment, we appreciate you being part of our community.

Finally, we'd like to extend a special thank you to Erinn Stetson and Rachel Volstad, who have provided invaluable logistical and tactical support during all stages of the SURE 2025 program, including this symposium, and to Clio Thayer for their assistance with poster printing.

—Dr. Amy Keirstead

—Dr. John Rosene

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