Rhode Island Network of Excellence in Science and Technology (RI-NEST)

2026 SURF Project List

Summer Undergraduate Research Fellowships (SURF)

May 26 – July 31, 2026

For more information, and to apply for a SURF position, please visit:
https://web.uri.edu/rinsfepscor/surf/

Testing how increasing temperature modulates the growth, competition and toxicity of a harmful algal bloom-forming diatom from Narragansett Bay, Rhode Island

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Drajad Seto (URI)
Dr. Bethany Jenkins (URI)

Project Description
Harmful algal blooms (HABs), caused by the toxigenic diatom *Pseudo-nitzschia*, pose substantial economic and public health risks along U.S. coastlines, including state of Rhode Island. Because multiple Pseudo-nitzschia species coexist in Narragansett Bay and may respond differently to environmental change, it is important to determine which species are present and how they react to increasing temperature. This project aims to identify the taxonomic classification of *Pseudo-nitzschia* isolated from Narragansett Bay and understand the impact of temperature on their growth. By studying the response of various *Pseudo-nitzschia* species to warming conditions, we can better predict their prevalence in warming ocean environments. In this project, the student will conduct controlled laboratory growth experiments, employ molecular technique, such as DNA barcoding and qPCR, to assess species-specific responses and competitive interactions of different diatom *Pseudo-nitzschia* species under ambient and warming conditions. The findings will enhance our ability to forecast the development of harmful blooms under future climate conditions and contribute to coastal management strategies in Narragansett Bay.

The mentoring strategy here will emphasize hands-on experience. The mentor will guide the student through preparing growth media, maintaining diatom cultures, observing their morphology using microscopy, and conducting cell counts to calculate growth rates. Additionally, the student will receive training in the molecular work pipeline, which includes biomass collection, DNA extraction using commercial kits, PCR amplification, and sample preparation for sequencing. The student will also be introduced to basic computational tools for processing raw sequencing data. The student will be mentored by a postdoctoral researcher with expertise in phytoplankton physiology and metabarcoding.

Tissue-Specific Distribution and Bioaccumulation of Microplastics in *Arbacia punctulata*

Project Location
Rhode Island College

This project is open to:
full-time SURF only

Mentor(s)
Dr. Carla Narvaez Diaz (RIC)

Project Description
Microplastic pollution represents a pressing environmental challenges facing marine ecosystems globally, with particular concern for coastal waters where anthropogenic inputs are highest. Rhode Island's coastal waters, including Narragansett Bay, receive microplastics from multiple sources including wastewater treatment plants, stormwater runoff, and degradation of marine debris. These synthetic particles are readily ingested by marine organisms and can accumulate in tissues with unknown consequences for organism health and human seafood safety. The increasing presence of microplastics in commercially and ecologically important species demands urgent investigation of contamination patterns and bioaccumulation pathways. The purple sea urchin *Arbacia punctulata* serves as an ideal sentinel species for monitoring microplastic contamination in southern New England waters. As an omnivorous benthic grazer, this species processes large volumes of particulate matter and occupies a critical position in coastal food webs. Understanding tissue-specific microplastic accumulation in this species is essential for assessing both ecological impacts and risks to human health through seafood consumption. This research project has two primary objectives: 1) establish baseline microplastic contamination levels in wild *A. punctulata* populations, and 2) determine tissue-specific distribution patterns of microplastics within sea urchins to identify bioaccumulation pathways and assess risks for organisms that consume sea urchins. The project will use microscopic and spectroscopic characterization of extracted particles.

This project will provide undergraduate students with a comprehensive research experience progressing from basic laboratory skills to independent scientific investigation. The 10-week program will unfold in phases designed to build competence and confidence in environmental research methods. Students will receive intensive training in field collection techniques, and laboratory safety protocols for contamination prevention methods critical for microplastic research. Students will also develop skills in scientific literature review, focusing on microplastic extraction methodologies and echinoderm biology.

This project is funded through [RI SIMCoast]

Tracking and Forecasting Compound Extreme Climate Impacts in Rhode Island with EMPIRIC-AI

Project Location
Brown University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Chris Horvat (Brown)

Project Description
Anthropogenic climate change is a global public health emergency. Changes to tropical cyclones, and associated waves, winds, storm surge, and extreme rainfall have direct impacts on the health of individuals and the healthcare facilities that serve them. When analyzing the relationship between extreme climate events and health outcomes, several key considerations deserve special attention: (1) Geographical variability: The spatial distribution of extreme events varies greatly, leading to different levels of impact across regions. (2) Compound extreme events: The combined impacts of compound extreme events on health are often greater than that of single events. For instance, concurrent heat and humidity extremes tend to exacerbate cardiovascular risk. (3) Event intensity: health consequences differ markedly with event intensity, but definitions of "extreme events" tend to be formed without local context. Taking into account these critical but frequently neglected considerations, the SURF student will center on systematically investigate multiple types of compound extreme climate events, their frequency and evolution in time, and their associations with major health outcomes in the greater Providence region.

The SURF student will join the EMPIRIC project, a multi-national attempt to address stakeholder needs, and use tools like the Optimal Path Threshold method to understand extreme events using machine learning and new statistical techniques. They will use subseasonal-to-seasonal (S2S) North American Multi-Model Ensemble (NMME) phase II meteorological data to establish short-term predictive and early warning systems for compound extreme climate events, enhancing preparedness and risk mitigation in the Providence Area

This project is funded through [RI SIMCoast]

Advancing Marine Ecosystem Research and Conservation through Baited Remote Underwater Video Systems (BRUVs)

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. David Taylor (RWU)
Jon Dodd (Atlantic Shark Institute)

Project Description
Baited Remote Underwater Video Systems (BRUVs) represent an innovative, non-invasive method for monitoring marine ecosystems, enabling continuous observation of species interactions without human disturbance. Since 2021, the Atlantic Shark Institute (ASI) has used BRUVs to assess fish biodiversity in Block Island Sound, RI, generating over 200 hours of video data from 57 independent deployments. The Taylor Laboratory, as part of a formal partnership between RWU and ASI, will perform a comprehensive analysis of the existing BRUVs dataset (2021-2025), while concurrently supporting the deployment of additional systems in the summer of 2026. The aim is to assess fish abundance, diversity, and habitat use, ultimately supporting conservation efforts, fisheries management, and ecosystem protection in the region.

The student will learn to formulate research questions from independent observations, and generate and test multiple hypotheses. They will receive training in data collection, statistical analysis, interpretation of results, and defending scientific conclusions. The student will conduct advanced quantitative analyses, including spatially explicit modeling and both parametric and non-parametric statistics. Through this work, they will gain proficiency in software such as R, PRIMER, and QGIS. The student will strengthen their scientific communication skills by presenting research findings at professional meetings. These activities also expose students to the broader scientific community and help them establish networks that support future academic and career opportunities.

Writing Wild: A Woodland Community Field Guide

Project Location
University of Rhode Island

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Stephanie West-Puckett (URI)
Dr. Madison Jones (URI)

Project Description
Writing Wild: A Woodland Community Field Guide is a civic-science storytelling collaboration between the Digital Writing Environments, Location, and Localization (DWELL) Lab at the University of Rhode Island and ecoRI News. The project brings together environmental journalists, natural resource scientists, community members, artists, and undergraduate students to co-create a multimedia "people's field guide" to URI's North Woods, a teaching forest largely unknown to the wider public despite its ecological and cultural significance.

Students will participate in field-based research and multi-media content creation, contributing to the development of field guide entries that integrate science communication and environmental storytelling. Activities include collecting field observations, conducting interviews with community partners and environmental scientists, developing multimedia content (short videos, sound recordings, sketches, photographs), and designing accessible digital field guide materials. Students will also manage community submissions and help to publish volume one of the North Woods Community Field Guide.

This project directly aligns with RI-NEST goals by strengthening student pathways into the Blue Economy workforce through applied environmental communication and field-based ecological observation. This project catalyzes partnerships between the University, ecoRI News, and Rhode Island community groups to advance science communication that is accessible, inclusive, and grounded in place. Students will complete the SURF program with strengthened research skills, digital media competencies, and experience working with a multidisciplinary team at the intersection of environment, community engagement, and public communication.

The SURF student will:
- Conduct ecological field observations in the North Woods (habitat features, species presence, seasonal changes, human uses).
- Collect and curate multimedia content (photography, sketches, audio recordings, short videos, and other visual artifacts).
- Contribute to writing, revising, and editing field guide entries that integrate science, traditional ecological knowledge, narrative, and art.
- Collaborate with ecoRI environmental journalists to learn about story development, interviewing, and public communication.
- Help organize and manage digital submissions and assets (text, audio, images, written work) for an accessible, public-facing online field guide.

Assessing Geomorphic Changes in Rhode Island Salt Marshes Over the Last Century

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Erin Peck (URI)

Project Description
Salt marshes provide valuable ecosystem services, including flood protection for vulnerable coastal communities, habitat for fish, shellfish, and birds, filtration of nutrients and pollutants improving water quality, and carbon burial buSering climate change. However, sea level rise and human landscape alterations threaten salt marshes. Rhode Island salt marshes have been particularly impacted, having lost 53% of their area in the last two centuries (Bromberg & Bertnes 2005). Bricker-Urso and colleagues (1989) found that salt marshes in Narragansett Bay are generally keeping pace with or accreting faster than relative sea level rates. However, in the decades since the work of Bricker-Urso, local researchers and coastal managers have observed rapid loss and deterioration of salt marshes in the state, combined with widespread conversion of high elevation marsh to low elevation marsh, a sign of drowning.

The Peck Lab has collected 1-m sediment cores from five salt marshes in Narragansett Bay, Rhode Island to assess whether salt marshes are continuing to keep pace with sea level rise in the ~four decades since the work of Bricker-Urso. Three replicate cores were collected by gauge auger at eight core locations across the five sites. Cores were split lengthwise, sectioned at 1-cm increments, dried, and disaggregated; from these data, water content and dry bulk density will be calculated. Loss on ignition will be conducted on all depths across all sediment cores to assess downcore organic matter contents. Organic carbon and total nitrogen will be measured on a subset to determine empirical relationships with organic matter. Accumulation rates from one replicate core from each site will be determined using gamma detection to measure excess Pb-210, Cs-137, and Am-241. Combined, sediment accretion and carbon burial rates over the last ~century will be determined, as well as the relative contributions of mineral and organic matter to salt marsh vertical growth.

During summer 2026, transects will be set up at each salt marsh to measure elevation by RTK-GPS and vegetation assemblage by quadrat analysis. Additionally, analysis of historical aerial photographs and maps will help assess how the salt marshes have changed in area over the last century. These data will help inform interpretation of the sediment core derived sediment and carbon accumulation rates.

Microbiome Implications of Climate Change-Induced Dormancy Loss in the Temperate Coral *Astrangia poculata*

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Koty Sharp (RWU)

Project Description
Over the past ten years, students in our laboratory have studied the microbiome diversity and dynamics in the temperate coral *Astrangia poculata* in Narragansett Bay. Our studies suggest that its microbiome exhibits stability and predictability that is much greater than what is documented in tropical coral microbiomes (Sharp et al. 2017). In winter, *A. poculata* undergoes quiescence, a dormancy induced by winter temperatures, typically in December-March, when temperatures go below 5°C (Grace 2017). The microbiome composition shifts across seasons: it repeatedly recovers from a winter dormancy period, retains a “core” group of microbes throughout all seasons, and exhibits a predictable pattern of microbiome reassembly following quiescence that can be replicated in the laboratory (Sharp et al. 2017; Brown et al. 2022; Brown et al. in prep). This microbiome reshuffling is an important source of stability and maintenance of the coral’s beneficial microbial associates (Brown et al. 2022). In winters of 2022-2023 and 2023-2024, our collaborators documented a lack of *A. poculata* dormancy, which is likely due in part to elevated sea surface temperature (SST). It is not yet known whether that lack of dormancy has implications on the microbiome assembly, and, ultimately, on the animal host. As part of an ongoing research collaboration, our lab has used highthroughput gene sequencing to characterize microbiomes in *A. poculata* throughout the nonquiescence winter period. As a continuation of the project, in the proposed work, a SURF fellow will work with those sequences, using microbiome analysis and statistical software tools such as QIIME and R, to perform comparative analyses of *A. poculata* microbiomes from winters with and without quiescence, to construct a model of how *A. poculata*’s microbiome, and more broadly, how animal microbiomes shift in response to climate change, leading to new methods for monitoring coastal ecosystem health and change in Narragansett Bay.

The student working on this project will gain a deep knowledge in marine biology and marine microbiology concepts. Additionally, and more importantly – the student will be trained in broadly transferable skills in molecular biology, microbiology, and bioinformatics, preparing them for a wide range of fields as they continue in their career after graduation. Graduates of my lab program have moved on to multiple fields in life sciences, ranging from human disease research to coral restoration practice, coastal conservation policy, and veterinary sciences. Together, these skill sets (labwork, fieldwork, project design, and presentation skills) are broadly applicable across a variety of careers, especially applied marine research and life sciences, two major components of Rhode Island’s rapidly emerging Blue Economy research and innovation ecosystem.

Using bioinformatics to design molecular probes that reveal the presence of distinctive LSU rRNA genes in whole genomes or transcriptomes of winter and summer *Pseudo-nitzschia* species (unicellular eukaryotes associated with harmful algal blooms, HABs)

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Avelina Espinosa (RWU)

Project Description
Harmful algal blooms (HABs) affect marine ecosystems, fisheries, and human health. HABs are often caused by protists like *Pseudo-nitzschia* species. Ocean researchers have reported seasonal variation (winter and summer) in *Pseudo-nitzschia* populations. During 2024 and 2025, our SURF participants designed prototypes of electrochemical genosensors to detect marine microbial protists, including *Pseudo-nitzschia delicatissima*. Their work involved bioinformatics and *in vitro* testing of the genosensor probes (as per variable domains in the large subunit ribosomal RNA, LSU rRNA, that were typical of *P. delicatissima*) using artificial complementary DNA sequences.

The SURF 2026 project proposed here will be entirely done in the laboratory (no live samples) and have three components: 1) Bioinformatics work to identify and design molecular probes that reveal the presence of distinctive LSU rRNA genes in whole genomes or transcriptomes of *Pseudo-nitzschia* species (computer database work). (2) Design genetic primers containing the identified sequences of LSU rRNA and match them, via PCR, to whole genomes or transcriptomes of *Pseudo-nitzschia delicatissima* (winter species) and *Pseudonitzschia* multiseries (summer species). Note that whole genomes or transcriptomes are available to researchers from R1 Rhode Island institutions and other repositories. (3) Generate a bioinformatics/molecular biology research and teaching module to be shared with diverse audiences in Rhode Island (science communication).

Our SURF 2026 candidate will develop hands-on bioinformatics and data-analysis skills combined with high-technology laboratory dexterity. This project merges basic and applied sciences to better understand and address a Blue Economy problem: the impact of HABs on marine ecosystems, fisheries, and human health.

Community-Informed Curriculum for the Woonasquatucket River Watershed and Surrounding Communities

Project Location
Rhode Island College

This project is open to:
full-time SURF only

Mentor(s)
Dr. Daniel Hewins (RIC)

Project Description
This SURF project will focus on developing a communication strategy and environmental education curriculum based on input and feedback from community members and organizations that participate in land stewardship and community engagement opportunities at parks and greenspaces along the Woonasquatucket River. The project will approach issues of plastic pollution from a perspective of understanding and support rather than risk and mitigation, promoting sustainable practices at the neighborhood scale that are visibly connected to community inputs (concerns, needs and challenges). The curriculum design will be informed by data gathered from the IT and its community partners in the Woonasquatucket River Watershed and will focus on Riverside and Merino Parks that are a part of the urban river greenway. The project will leverage collaboration with the Woonasquatucket River Watershed Council (WRWC) and community partners. The interdisciplinary team will be led by Dr. Daniel Hewins in collaboration with Dr. Melva Treviño Peña, and URI-based Ph.D. student Omisha Manglani. The team will provide support for the SURF student. The team and SURF-student may also collaborate with WRWC and IT specialists to integrate planned interviews and focus groups into accessible, culturally relevant educational materials.

The communication strategy and curriculum will reflect community needs and values, while emphasizing the value of environmental literacy, community-led stewardship for everyday Rhode Islanders. Special attention will be given to multilingual accessibility and equitable use of languages and formats, with content tailored for audiences such as youth, families, and community organizations. By working with WRWC and community partners, this project has the potential to become a modular addition to long-standing community engagement programs, addressing gaps that connect community and watershed. Additionally, the student may have opportunities for community engagement at events such as river paddles and greenway runs frequently held along the Woonasquatucket River Greenway strengthening the connection between community and coast.

The SURF student will gain experience in curriculum design, science communication, and collaborative work, while contributing to a broader effort to enhance environmental education and literacy in Rhode Island. Project deliverables may be: demos, field experiences, event tabling, guided and self-guided educational materials placed in parks etc. This project is ideal for students interested in environmental science, education, community engagement, and the intersection of science and society. It offers a unique opportunity to work directly with community partners and researchers to co-create meaningful educational resources that support the health and sustainability of the Woonasquatucket River Watershed.

This project is funded through [RI SIMCoast]

Influence of environmental factors on growth rates of anaerobic ciliates and their methanogenic symbionts

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Anna Schrecengost (URI)
Dr. Roxanne Beinart (URI)

Project Description
Microbial eukaryotes, or protists, are among the more abundant and diverse organisms in the ocean, where they drive key ecological processes such as nutrient and carbon cycling and microbial food-web dynamics. While most eukaryotes depend on oxygen for survival, many protist groups have evolved to live in oxygen-depleted habitats, including in sediments from coastal habitats such as salt marshes and mudflats. Ciliates are particularly active and abundant members of anaerobic microbial communities. They are able to thrive in these environments thanks to intimate partnerships, or symbioses, that they form with methanogenic archaea. Because these partnerships are widespread in coastal sediments, they may represent an important but overlooked contributor to methane production in marine environments. Yet, unlike anaerobic bacteria and archaea, anaerobic ciliates and other protists are largely understudied and underappreciated in their impact on biogeochemical cycles. Despite the ubiquity and potential ecological importance of these symbioses in anoxic habitats, fundamental questions about their biology are largely unknown. This project aims to understand how anaerobic ciliate growth rates respond to environmental factors such as temperature and oxygen levels. Using cultivation techniques and microscopy, the student researcher will quantify growth rates and examine physiological responses in culture, contributing to fundamental knowledge about this understudied microbial partnership. Data collected as part of this project will be useful for understanding the role of benthic microbes in coastal ecosystem biogeochemical cycles, in particular their role in the production of methane.

The student intern will be trained in fundamental life and marine science laboratory methods such as microbial cultivation, microbial preservation, light and epifluorescent microscopy, and methods for quantification and enumeration of cell growth. They will also be exposed to modern molecular genetic methods such as DNA extractions, PCR, and gene or genomic sequencing. The intern will also be included in internal lab group meetings and meetings with external collaborators where they will be exposed to the breadth of research in the Beinart lab and to the work of our collaborators. Additionally, the student will benefit from career guidance and mentoring through the lab's Individual Development Plan (IDP) approach, tailored to support their professional aspirations.

Synthesis and Analysis of Platinum based Heusler Alloy Nanoparticles

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. David Carnevale (RWU)

Project Description
A series a platinum based Heusler alloy nanoparticles will be generated with the formula X_2PtZ (where X=Co or Fe, Z = In or Sn). Current theoretical work on these materials suggest they have a range of magnetic anisotropic properties, which will be studied both as-is and through shelling. The undergraduate in charge of synthesizing and analyzing the materials will be working with equipment at RWU, Brown, and URI in order to fully study these materials. These compounds will be studied for their structural (XRD, XRF, TEM), magnetic (VSM), and potential fluorescent properties (UV-vis).
Research in the group is predominately done by the hands-on work of undergrads, with insights and guidance on the process provided by the faculty/principle investigator (PI). Students are taught a variety of techniques including: Nanoparticle/Microwave synthesis, hot-injection synthesis, air-free sample handling working in a glovebox, X-ray diffraction (XRD), X-ray fluorescence (XRF), infrared analysis (IR), UV-vis analysis, transmission electron microscopy (TEM) sample prep and analysis, and vibrating sample magnetometry (VSM) sample prep.

Mortality Salience Impacts on Delay Discounting and Environmental Risk Perceptions

Project Location
Rhode Island College

This project is open to:
SURF Flex only

Mentor(s)
Dr. Vincent Medina (RIC)
Dr. Katherine Lacasse (RIC)

Project Description
Mortality salience, or the heightened awareness of death, can be quite influential on human's decision-making processes. Environmental disasters, disease outbreaks, or political violence often heighten mortality salience, which can prompt more future and abstract thinking. Future thinking can affect a broad range of cognitive decision-making processes with implications for many real-world behaviors (e.g., financial and environmental actions).

During the 10 weeks, students will collaborate with the PIs in investigating how mortality salience may impact financial and environmental decision-making. Specifically, we will conduct an experiment examining how mortality salience impacts a cognitive process called delay discounting, investigating when people are more likely to prefer immediate, smaller rewards over later, larger rewards. We will also examine how mortality salience alters risk perceptions of environmental pollutants including microplastics, which have uncertain and distant impacts on our ecosystems and human health.

Students will gain comprehensive, hands-on experience in the research process. They will have the opportunity to (1) read, write, and learn about the core psychological concepts, (2) create and administer an online survey (3) evaluate pilot responses and incorporate survey edits, (4) conduct statistical data analysis to test hypotheses, (5) prepare and submit a science blog or news article, and (6) prepare and present a SURF conference research poster, which may be adapted for an additional conference.

Over the course of the 10 weeks, students will engage in many stages of the research process. They will receive specific training in: (1) CITI human subjects research ethics training, and we will discuss how to design human subjects projects so as to minimize risks to participants; (2) best-practices in designing online experiments; (3) data analysis training including how to conduct and interpret some basic descriptive and inferential statistics as well as create engaging graphs or other data visualizations; (4) science communication training in how to succinctly describe and present the findings from a psychological experiment to a wide audience, (5) specific software experience using Qualtrics, Prolific, and jamovi. Importantly, the students will produce original research findings that will be influential in the psychology and environmental risks fields.

Exploring microplastics in the natural systems of Narragansett Bay

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Coleen Suckling (URI)
Dr. Andy Davies (URI)

Project Description
We are seeking one full-time SURF fellow to contribute to ongoing research aimed at understanding the distributions and impacts of microplastics within coastal marine ecosystems. This fellow will gain hands-on skills relating to field sampling and laboratory analysis of water, sediments, and organisms for microplastics while contributing to stakeholder engagement as part of a multi-institution, collaborative research team. This student will have the opportunity to develop best practices for microplastics research, including sampling techniques, dissections, microscopy skills, and microplastic identification in an ultra-clean working environment. Work will primarily be based at the URI Kingston Campus, with some shoreline and small-boat based fieldwork expected within the Narragansett Bay watershed and some work completed at the URI Bay Campus. The fellow will be jointly mentored by postdoctoral and graduate-level scientists.

This project is funded through RI SIMCoast

Evaluating desiccation-induced changes in metabolism

Project Location
Rhode Island College

This project is open to:
full-time SURF only

Mentor(s)
Dr. Geoff Stillwell (RIC)

Project Description
Dehydration stress (desiccation) has the potential to impact most terrestrial organisms and is anticipated to become more severe in the coming decades. Beyond well-studied systems such as plants, the molecular and cellular effects of dehydration stress are not well characterized. This project will use the genetic model insect *Drosophila melanogaster* to investigate metabolic changes induced by dehydration. We have identified several drosophila mutant lines that are hypersensitive to dehydration stress and further identified other suppressor mutations that can restore dehydration resistance. The proteins that alter dehydration sensitivity regulate lipid metabolism, but in ways which are not well understood. This research will employ a combination of genetic, molecular, and biochemical techniques to gain a deeper understanding of how lipid content changes in response to dehydration stress and to begin identifying the differences between sensitive and resistant mutants. This work is relevant to understanding molecular adaptations relevant to a changing environment.

Incoming students will learn basic *Drosophila* genetics (crosses following Mendelian patterns of inheritance) and/or basic molecular biology skills (cloning, PCR, gel electrophoresis, site-directed mutagenesis). The lab holds weekly lab meetings and journal clubs. For the upcoming summer, a focus will be on publication-ready figures, including work in R for data analysis and Adobe Illustrator for final production. Thus, there will be a combination of laboratory skills (for this project, a combination of genetics and biochemistry), data analysis and data visualization.

Using electrochemical genosensing techniques to train the next generation of Rhode Island innovators: A high school to college and industry biotechnology program

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Avelina Espinosa (RWU)
Dr. Allison Marn (RWU)
Dr. Jennifer Pearce (RWU)

Project Description
This use-inspired project broadens the electrochemical genosensing SURF research previously funded by RI-NEST (2024/2025). This transdisciplinary RWU-centered initiative connects RI high school teachers/students, college mentors/students, biotechnology master's interns (RWU), and RI Life Science Hub industries to strengthen the state's societal and economic growth. The project will use the *'electrochemical genosensing to detect diseased shellfish and toxin-polluted waterways'* 2024-2025 techniques to develop a training and retaining strategy for STEAM RI proficient trainees. The 2026 SURF student would play a 'connecting' role in the high school-college-RI industry genosensing training module. The student will work with the RWU Faculty and the science communicator to develop VR simulations to use genosensing technologies, implement virtual genosensing training, and deliver the hands-on genosensing lab work. A summer 10-day virtual training plus a 2-day in-person camp at RWU that includes high school teachers with 2 students plus the presentation of the project will be the SURF capstone. The ideal SURF candidate will be interested in an interdisciplinary team that includes bio- and nano- technology, engineering, and science communication to deliver public-friendly visual genosensing training strategies.

Linking Rhode Island Local Food Supply and Consumer Demand: Integrating Spatial Food Flow Mapping with Consumers Demand Survey

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Simona Trandafir (URI)
Dr. Natalie Meyer (URI)

Project Description
Rhode Island's local food system plays a vital role in supporting farmers, strengthening communities, and shaping statewide food policy—yet little is known about how well local supply and consumer demand truly align. This research project brings together two complementary efforts: developing a detailed spatial food-flow map of Rhode Island farmers' production and distribution channels, and assessing how both consumers and producers value and use the RI Grown label. Together, these components create a comprehensive, policy-relevant picture of how agricultural products move across the state and how local markets function.

Students working on this project will help link geographic, economic, and behavioral data to better understand where food is produced, where it travels, how consumers make purchasing decisions, and how farmers perceive marketing tools such as the RI Grown label. This work directly supports Rhode Island's Department of Environmental Management (RI DEM), Agriculture Division, who will use the findings to evaluate programs and guide future decision-making. Students will also have opportunities to meet and collaborate with RI DEM partners—an excellent networking opportunity for those interested in public policy, agriculture, or environmental research.

Two student roles are available: a **Producer Research Assistant**, who will conduct interviews with Rhode Island farmers, perform qualitative and non-market valuation analyses, and synthesize producer perspectives; and a **Spatial Data Analyst**, who will help build and analyze the statewide food-flow map, link the map to producer and consumer data, and create visual products for policy audiences. Both roles offer hands-on experience in research design, data analysis, communication, and applied policy work. This is a unique chance to contribute to real-world environmental economics research that directly informs Rhode Island's food system planning.

Analysis and management of multi-modal oceanographic data obtained from benthic observatories

Project Location
University of Rhode Island

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Jane Carrick (URI)
Dr. Andrew Davies (URI)

Project Description
To better understand valuable seafl oor habitats, researchers at the University of Rhode Island's (URI) Graduate School of Oceanography (GSO) are collecting long-term environmental measurements using ocean observatories (autonomous benthic observation platforms) deployed for up to a year on the seafl oor. From these deployments, arrays of high-resolution physical, chemical, and environmental time series datasets are being acquired on an ongoing basis. Findings will be used to better characterize the marine ecosystem dynamics, environmental drivers, species niches, and restoration potential of impacted habitats. A participating RI-NEST intern will have the opportunity to contribute to this work by assisting with data management and processing, and to develop their technical skill sets in data analysis, biological oceanography, and fundamental research within a team of experienced marine scientists. Under the supervision of lab faculty, research staff , and graduate student mentors, the RI-NEST intern will interact with large oceanographic and environmental datasets in a variety of formats largely using R.

Day-to-day responsibilities will include: ingestion of data files into a central database; conversion of raw data into standard formats; data "cleaning" (QA/QC and trimming); alignment (merging) of data variables by time stamp; visualization/plotting; conducting basic analyses over various spatial and temporal scales. The intern will also gain hands-on experience working with ocean observing equipment in our workshop to maintain our platforms and sensors. In addition, mentors will help the student develop and investigate their own research questions related to environmental dynamics within the scope of the laboratory. Mentors will provide oversight of the intern's project with a combination of one-on-one training, collaborative sessions, and weekly (or more frequent) meetings to discuss goals, progress, problems, and student well-being within the research environment. Training will be provided to help the student develop their data fl uency, coding ability, analytical experience, understanding of research literature, science communication, and other relevant skill sets. The student will also be able to develop their professional and academic network with other students and interns, with colleagues at URI, and with inter-institutional partners.

Climate-Resilient Construction Practices: Moisture Management, Material Reuse, and Workforce Training for Coastal Rhode Island

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Shay Kurzinski (RWU)

Project Description
Rhode Island's coastal building sector faces growing challenges from climate change, including more intense rainfall, high humidity, and storm-related wetting that threaten building durability, indoor air quality, and project schedules. This project will support one full-time RI-NEST SURF fellow to investigate climate-resilient construction practices in three integrated areas: (1) moisture management on active construction sites, (2) material reuse and waste reduction strategies, and (3) workforce training for coastal resilience. Through structured site visits, interviews with contractors, and documentation of enclosure and material-handling practices, the student will identify vulnerabilities and opportunities for improvement in real-world projects. The fellow will then synthesize findings into a concise, illustrated "Coastal Construction Resilience Module" targeted to contractors and construction management students. The project strongly aligns with RI-NEST's goals by advancing use-inspired research, supporting workforce development for the Blue Economy, and generating practical tools that enhance climate resilience in Rhode Island's coastal communities.

The student will meet regularly with the PI to review project goals, learn fundamentals of coastal moisture risk and sustainable material management, and receive training in field documentation, ethical conduct on job sites, and basic qualitative data collection. A simple field protocol and observation checklist will be developed. The fellow will conduct structured site visits to 2–4 active coastal construction projects, documenting material storage, moisture protection strategies, enclosure sequencing, and waste-handling/reuse practices. Short informal conversations with contractors and superintendents will capture practitioner perspectives. The student will maintain a field notebook, photo log, and organized digital records. The student will identify recurring patterns, risks, and opportunities across all sites; summarize material-flow observations; and produce tables, diagrams, and a short practice-based summary of findings. The fellow will design the Coastal Construction Resilience Module, including a slide deck and jobsite checklist based on field findings. They will prepare and present a poster for the RI-NEST statewide symposium.

Timing is everything: Exploring the phenology of plants and pollinators in The Great Swamp, Rhode Island.

Project Location
Roger Williams University

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Charles Nicholson (RWU)
Ren Johnson (URI)

Project Description
The timing of seasonal events, or phenology, is critical in nature; species must be synchronized for ecosystems to function, such as pollinators being active when host plants flower. Climate change can disrupt this essential synchrony, threatening key ecosystem services like pollination and the stability of natural systems (Rafferty, CaraDonna & Bronstein 2014). However, testing for these "phenological shifts" requires rare, long-term datasets that provide a historic baseline against which contemporary conditions can be compared. This project will address the critical question of whether the timing of plant-pollinator interactions has changed in Rhode Island over the last five decades. We will conduct a historic resurvey (Verheyen et al. 2021) of a flowering shrub community in the Great Swamp, South Kingstown, RI, originally studied by pioneering ecologist Beverley Rathcke between 1977 and 1982 (Rathcke 1988a,b). The undergraduate researcher funded by this award will be responsible for the core fieldwork during the 2026 spring and summer. This involves tracking the flowering tempo of 13 native plant species and observing visitation by the local pollinator community. By gathering this contemporary data, the student will directly contribute to a landmark study that combines old and new analytical approaches to understand the effects of global change on species coexistence. This experience offers hands-on training in ecological field work and climate change research.

The undergraduate student will serve as a Research Fellow and is central to the success of this project and will work as part of a team. The student will receive rigorous training in ecological fieldwork, data management, and scientific communication. The student's primary responsibility will be executing the field monitoring protocol over the 10-week program. This will include:

- **Floral Phenology Sampling**: Systematically marking and monitoring 13 native plant species every 1–3 days to construct flowering curves (date vs. proportion of flower-days).
- **Pollinator Sampling**: Conducting timed, 10-minute surveys to record the number and type of floral visitors (categorized into morphospecies like bumble bees, small bees, flies, etc.).
- **Specimen Collection & Data Entry**: Collecting insect specimens for curatorial needs and digitizing field notes and historical data.

Virtual Reality-Enhanced Community Resilience Planning: Engaging Rhode Island Coastal Residents in Building Retrofit Decision-Making

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Hang Ren (RWU)
Dr. Anne Anderson (RWU)

Project Description
With the increasing frequency and intensity of disasters, coastal communities face increasing challenges that require more proactive approaches to resilience planning. While prior research emphasizes the importance of stakeholder engagement, there is a lack of human-centered approach that actively engages community residents and incorporate their diverse priorities into resilience planning. This project focuses on advancing community resilience by integrating Virtual Reality (VR) technology with human-centered resilience planning that engage Rhode Island coastal community residents in residential building retrofit decision-making. Undergraduate researchers will develop immersive VR disaster simulations (e.g., hurricanes, flooding) that allow residents to experience potential disaster impacts on alternative building designs firsthand. By analyzing what community residents truly value and how their priorities change before and after VR exposure, this research will generate critical insights into how immersive technology (i.e., VR) helps and influences resilience decision-making. Through this project, undergraduate researchers will have the opportunity to explore interdisciplinary approaches including building science, data science, social science, and decision-making to facilitate coastal community resilience, while providing undergraduates with hands-on experience in emerging technologies and community-engaged research. The project contributes to human-centered and effective resilience planning while enhancing public awareness of disaster risk through immersive and interactive learning experiences.

This 10-week summer program will provide students with an immersive research experience. Students will play active roles in each stage of the research. They will 1) develop the virtual reality simulation environment; 2) prepare data collection; 3) manage community engagement sessions in which participants experience disaster scenarios; 4) analyze collected data and explore the benefit/impact of integrating immersive technologies (i.e., VR) into resilience planning. 5) prepare a project report that summarizes the design and results of the research. Students will receive mentorship in project guidance and skill development including technical, analytical, communication, and writing skills from mentors. Training will include instruction in VR platform development, quantitative/qualitative data collection methods, and statistical/computational modeling. Students will also be mentored in effective science communication and public engagement, learning to translate research outcomes into accessible narratives for community stakeholders. The students will engage in regular meetings and discussions with advisors to ensure they are on track and address their questions. Together, this project will provide a comprehensive interdisciplinary research experience for students.

Quantifying the preferred food source of the endangered North Atlantic Right Whale using eDNA profiling

Project Location
University of Rhode Island

This project is open to:
full-time SURF only

Mentor(s)
Dr. Tatiana Rynearson (URI)
Sabine Angier (URI)

Project Description
The successful undergraduate will have the opportunity to join our NOAA-funded project to examine the foraging ecology of the endangered North Atlantic Right Whale (NARW). Objectives for the summer project include screening of samples collected from RI coastal waters using eDNA profiling methods. The student will learn and apply molecular biology and sterile techniques to conduct eDNA profiling and will learn and apply bioinformatics to analyze data obtained using eDNA profiling. We will analyze samples collected over nearly a decade and in every season of the year. Our results will be used to map the occurrence of prey items for the endangered NARW and used to inform modeling efforts that aim to predict NARW habitat usage now and in the future with the goal of establishing data driven protection measures for the NARWs. There may be the opportunity to work with NARW fecal samples to co-map ingested prey with potential prey fields. The successful undergraduate will meet and work with scientists at the University of Rhode Island and the National Oceanic and Atmospheric Administration (NOAA) and have the opportunity to discuss how this eDNA profiling project sits at the intersection of fundamental science and use-inspired science to influence management of endangered species.

The undergraduate will be mentored and supervised by Professor Rynearson and graduate student Sabine Angier. The student will learn and apply molecular biology and sterile techniques to conduct eDNA profiling and will learn and apply bioinformatics to analyze data obtained using eDNA profiling. In addition, the student will learn about key ethical approaches in the lab and lab safety. The undergraduate will participate in weekly lab meetings and will learn about science communication and collaboration. In terms of science communication, Professor Rynearson has been a board member and science director of the Metcalf Institute for Marine and Environmental Reporting. The networks and training that Professor Rynerson maintains will be part of the undergraduates summer experience (e.g. participation in the Metcalf summer program, participation in interviews with journalists, training in the “2-minute” elevator speech about the student’s research and training in clear and concise written communication.)

Developing a Living Resource for Germline Research in Sea Urchins through Modular Cohort Generation

Project Location
Roger Williams University

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Andy Rhyne (RWU)
Dr. Gery Wessel (Brown)

Project Description
This project will develop a living resource for germline research in sea urchins by addressing the most difficult stage of urchin aquaculture, the settlement and early juvenile period. The project will establish reliable procedures that guide larvae through settlement and metamorphosis into stable juvenile cohorts. To support future work on germline lineage and pigmentation genetics, we will design a modular system that maintains individuals in isolated screened enclosures while ensuring consistent water quality and controlled feeding. The student will use fabrication tools to design and print prototype enclosures in the wet lab, then test and refine these designs across multiple settlement trials. The work will generate a system that produces repeatable, generation-based cohorts needed for long term genetic studies. The project will create a reproducible resource that supports continued research on FMO related pigmentation pathways and strengthens Rhode Island's marine biotechnology capacity. The undergraduate fellow will play a central role in designing, prototyping, and testing a modular sea urchin rearing system that supports settlement and early juvenile survival. The student will co design the rearing modules by adapting the principles of oyster upweller systems to a smaller scale suitable for individual sea urchins. Working in the wet lab, the student will use 3D modeling software and the lab's fabrication tools to construct a working prototype that includes screened chambers, controlled water flow, and feeding access points. After fabrication, the student will culture sea urchin larvae, conduct settlement trials within the new modules and in standard rearing tanks, and collect data on settlement success and post settlement survival.

The student will be mentored jointly by the PI at Roger Williams University and Dr. Gary Wessel at Brown University. Mentorship will include weekly meetings, training in larval culture and fabrication methods, and guidance in record keeping, analysis, and communication of results.

THz Detection and Characterization of Biodegradable Marine Plastics and Coastal Water Chemistry

Project Location
Roger Williams University

This project is open to:
full-time SURF only

Mentor(s)
Dr. Ahmet Emin Akosman (RWU)
Dr. Allison Marn (RWU)

Project Description
Biodegradable polymers are increasingly used as sustainable alternatives to conventional plastics, yet their degradation behavior and impact in marine environments remain relatively unexplored. This project uses terahertz time-domain spectroscopy (THz-TDS) to detect and characterize the spectral signatures of biodegradable polymers such as PLA, PHA, and PBS, during controlled degradation in saltwater. The changes in polymer structures will be monitored to evaluate the breakdown products, which will alter the THz absorption properties of saltwater. The analytes will also be studied in THz chemical sensors already developed to assess the detection limits of particles in aqueous samples. The assessment of detection limits from the spectroscopic results will be performed through an AI framework including a neural network algorithm. The outcomes will offer a promising insight into understanding the degradation of polymers in saltwater, supporting environmental health crucial to the Blue Economy.

Students will participate in all stages of the study, including preparing the polymer samples, conducting controlled degradation in saltwater, preparing sensors with analytes, fabrication of new sensors, and THz time domain measurements, data post-processing and data analysis using AI algorithms. These stages will include tasks such as 3d fabrication, optical alignment, sample preparation, data collection and storage, and low-level coding procedures.

Exploring microbial adaptation to fluctuating and high salinity in Rhode Island waters

Project Location
Roger Williams University

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Jane Thibeault (RWU)

Project Description
Undergraduate researchers will gain hands-on experience investigating how bacterial communities respond to salinity fluctuations across Rhode Island's coastal environments, from freshwater rivers, to brackish transition zones where rivers meet the sea, to high-salinity ponds. Salinity naturally varies due to freshwater input, tidal mixing, and evaporation, and these fluctuations can alter microbial growth, community structure, and ecosystem function, yet individual strain tolerance remains poorly understood. Through this project, students will explore microbial ecology, experimental microbiology, and molecular biology while addressing a real-world environmental question. The student will collect water and sediment samples from a gradient of Rhode Island sites, isolate and culture bacterial strains, and measure growth across controlled salinity ranges in the laboratory. Sanger DNA sequencing will be used to identify strains and link physiological tolerance to genetic identity. By documenting which bacteria survive extreme or fluctuating conditions, the project will generate new insights into microbial adaptation and resilience, with implications for nutrient cycling, primary production, and overall ecosystem stability. This research experience is designed to support an undergraduate scientist who will gain hands-on experience interpreting results, troubleshooting experiments, and presenting findings, under structured mentorship that fosters ownership of an authentic research question. Through this project, the student will develop both technical and professional skills that prepare them for future research, internships, and STEM careers. At the same time, the project contributes scientific knowledge of Rhode Island's coastal microbiomes, providing valuable insight into microbial resilience in environments shaped by natural and human-driven salinity fluctuations.

Characterization of Foraminiferal Communities across Marsh Gradients for use in Coastal Restoration Biomonitoring

Project Location
University of Rhode Island

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Ying Zhang (URI)
Madison Geraci (URI)

Project Description
Salt marshes are essential to Rhode Island's blue economy. They help prevent coastal erosion, filter out nutrients and sediments from water, and support fisheries by providing vital spawning and nursery areas. However, rapid sea level rise poses a significant threat to these vital ecosystems. To address this, Thin-Layer Placement (TLP) of sediments is being implemented as an adaptation strategy. Yet, existing biomonitoring standards, which focus solely on vegetation, often fail to capture biodiversity indicators prior to the restoration of vegetation. This limits the ability to monitor sediment changes over the long term and to detect early signs of ecological stress. Foraminifera are single-celled microeukaryotic protists abundant in coastal benthic environments. They offer high diversity, rapid generation time, sensitivity to environmental changes, ecological relevance to the carbonate system, and responsiveness to pollution, making them ideal candidates for developing biological indices. Developing reliable foraminifera indices for salt marsh monitoring requires extensive data linking foraminifera population dynamics with vegetation and sediment features. However, documentation of Rhode Island's salt marsh foraminifera is limited, and even less is known about their distribution and seasonal dynamics. This project addresses these gaps by examining the composition, abundance, and diversity of salt marsh foraminifera communities using both morphological and molecular methods and through such analyses characterizing foraminifera biomarkers for building predictive metrics to assess sediment conditions and ecosystems health.

Students will learn various microscopy and imaging techniques for morphological characterization. Fieldwork involving sample collection from local salt marshes is also expected. Additional training opportunities in molecular work, such as DNA extraction, PCR amplification, and computational work, will also be available when aligned with the student's background and research interests. The primary goal is to support the characterization of foraminifera for creating a comprehensive morphotype-to-genotype database that can be applied to assess the ecological status of salt marshes in Rhode Island.

Impact of microplastics on benthic fish of Narragansett Bay

Project Location
Rhode Island College

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Anabela Resende da Maia (RIC)

Project Description
Nano and Microplastics (NMPs) have been detected throughout the Narragansett Bay with spatial and temporal variability. In general, areas of higher population density – upper Bay – have larger concentrations of microplastics. While we have some baseline data on water and sediment microplastics load in the Narragansett Bay, less is known about the loads in benthic fish. However, preliminary data have shown that all benthic fish species sampled from Narragansett Bay have some microplastics in their gastrointestinal tract. This study aims to sample benthic fish species in Narragansett Bay along a north-south gradient to determine a) in what tissues are microplastics present; b) what is the incidence and load of microplastics in different areas and species and c) which NMPs are more prevalent in benthic species. Students will be involved with fish sampling using rod and reel and beach seine and collect environmental samples alongside the fish. Students will also be involved in sample processing using clean techniques to avoid contamination with environmental microplastics. Samples will then be analyzed for load and type and a subset of samples will be further analyzed for NMP chemical classification using FTIR and Raman spectroscopy in collaboration with partner institutions. We aim to have a better understanding of NMP localization to different benthic fish species to inform lab experiments on controlled microplastics exposure.

Summer undergraduate research students will be involved in all steps of the project from species collection to sample processing and data analysis. All training needed will be provided. Dr. Maia will provide mentorship to the students involved through regular lab meetings and training in all the techniques including microplastics workflow for identification and quantification following all the safety training. Students will be involved with fish sampling using rod and reel and beach seine and collect environmental samples alongside the fish. Students will also be involved in sample processing using clean techniques to avoid contamination with environmental microplastics. Students will be encouraged to pursue other opportunities for Career Development offered through the EPSCoR SURF program as well as other partners. There will also be opportunities to develop educational activities on fish and microplastics to be deployed near local communities in collaboration with Woonasquatucket River Watershed Council (WRWC) and the Rhode Island Environmental Education Association (RIEEA).

Blue-Cycle: Emissions and Environmental Impacts of Recycling and Remanufacturing Plastic and Bioplastics in the Ocean State

Project Location
University of Rhode Island

This project is open to:
full-time SURF or SURF Flex

Mentor(s)
Dr. Vinka Oyandel-Craver (URI)
Dr. Jennifer Bissonnette (RISD)

Project Description
This collaborative project between the University of Rhode Island College of Engineering and the Rhode Island School of Design (RISD) Nature Lab will investigate the environmental impacts of recycling and remanufacturing bioplastics and recycled plastic composites used in innovative design applications. Students will characterize emissions and particulate generation during primary recycling processes such as mechanical shredding, thermal pressing, and filament extrusion, and during secondary fabrication processes, including CNC milling, laser cutting, vacuum forming, and injection molding. Recycled plastics and bio-based materials will be formed into standardized specimens and brick-like elements, then subjected to accelerated weathering to assess their durability and potential for microplastic release under simulated conditions. The project will integrate engineering analysis, design-driven material exploration, and life-cycle assessment to generate actionable guidance for safer, lower-emission fabrication pathways. Fellows will present their findings at the RI-NEST statewide symposium and at a poster session at URI, developing strong skills in cross-disciplinary research and science communication.