1. **Project Title:** Reconstructing past ocean temperatures from the South Pacific to better understand Antarctic Circumpolar Current variability and its impacts on global climate

**Project Location:** UMass Amherst Biogeochemistry Laboratory (Morrill Science Center)

**Supervisor:** Isla S. Castañeda, Associate Professor of Geosciences, University of Massachusetts-Amherst

**Project Summary/Description:** The Antarctic Circumpolar Current (ACC) is a primary driver of global thermohaline circulation as it redistributes water and heat between the Pacific, Atlantic and Indian Oceans. However, variability in the latitudinal positions of ACC frontal systems such as the Subantarctic Front remains poorly constrained over geologic time due to a lack of continuous marine sedimentary records. In order to better constrain the effect of the ACC on global climate and improve future climate models, it is important to reconstruct ACC dynamics over an extended time interval. Sea surface temperature (SST) reconstructions provide an efficient method with which to reconstruct ACC frontal changes, however, until recently no South Pacific SST records existed older than ~0.5 Ma. One South Atlantic SST record, from ODP Site 1090, offers the only existing constraint on Pliocene ACC dynamics to date. In this study, we will reconstruct past SST in the time interval from 3.5 to 1.5 million years ago using three different organic geochemical methods. One is based on lipids of alkenones (haptophyte algae, coccolithophorids), one is based on lipids of long-chain diols (produced by diatoms), and one is based on membrane lipids of thaumarchaeota (mesophyllic archaea that are abundant in the oceans). Together, these three methods will generate a robust SST record that will be examined to determine past shifts in the ACC and resulting impacts on global climate.

**Intern Responsibilities:** The student will work along with PhD student Rebecca Smith to extract organic compounds from ocean sediments collected recently on IODP Expedition 383 at Site U1450. Most of this project will require work in a fume hood – the student will use organic solvents to extract and isolate ancient molecules preserved in ocean sediments. These samples will then be analyzed by the student by gas and liquid chromatography and mass spectrometry to isolate temperature-sensitive compounds. The student will integrate compound peaks using ChemStation software, export the data to Microsoft Excel, and apply equations to calculate past sea surface temperature. We will provide detailed training for all steps.

**Skills Required:** This project is a laboratory-based research project. We have obtained ocean sediment (mud) samples from Site U1450 in the South Pacific Ocean. Required student skills include interest in studying past climate/ocean variability; ability to pay close attention to detail (it is important that laboratory procedures are followed carefully; we will provide training), good organizational skills, ability to communicate verbally and via email to other project members, and familiarity with making spreadsheets in Microsoft Excel. The student must be able to work in a fume hood (although no prior experience is required), which requires standing for several hours a day.

**Is housing provided (and is it free)?** No

**If no, how difficult is it to obtain housing near your facility?** It should be easy. There is ample rental housing available for students in the Amherst area, especially during the summer.

**Is a car necessary?** No – but student must be able to get to/from UMass campus. There is a PVTA bus stop right in front of the building.

**Is your facility willing/able to host international students?** Yes
2. **Project Title:** Characterizing habitat requirements, movements, and life stage linkages of river herring in Massachusetts watersheds

**Project Location:** Coastal Massachusetts freshwater lakes, rivers, and estuaries. Specifically, Chebacco Lake and Essex Bay (North Shore), Mystic Lakes and Mystic Estuary (Boston area), and Whitmans Pond and Weymouth/Back River Estuary (Weymouth).

**Supervisor:** Matt Devine

**Project Summary/Description:** The student will assist on a project investigating river herring (a native migratory fish) productivity in estuaries and coastal freshwater lakes and ponds in Massachusetts. River herring are an anadromous fish that are born in freshwater during the summer, migrate out to estuaries in the fall, occupy offshore marine habitats during winter, and return to spawn in their natal ponds in spring, much like Atlantic salmon. We are broadly interested in how migration patterns between the freshwater and marine environments are influenced by demographic (age, abundance) and environmental (temperature, flow) factors. Additionally, little is known about the growth and survival of juveniles in the various habitats they occupy, making habitat prioritization a challenge for managers. We intend to identify limits to production by intensively sampling estuaries and their associated headwater spawning ponds. The position is split between field work and lab work. For field work (15–20 days/month), juvenile fishes will be sampled at night in lakes and estuaries from a 16’ Jon boat using purse seines and beach seines. Additional sampling will take place for water quality, habitat quality, and zooplankton. When not in the field, students will be engaged in age and growth analysis which includes extracting, imaging, and ageing fish otoliths (tiny ear bones). Additionally, students will have the opportunity to assist with identifying zooplankton, entering data, and organizing samples. Additional opportunities with this position include developing a database and performing statistical and/or spatial analyses.

**Intern Responsibilities:**
Students will be challenged physically in the position. Field work responsibilities include:
- Working in a team of 3 on a 16’ Jon boat (25hp engine) to sample fish and water quality
- Sampling generally begins after sunset and continues until roughly 1-3am
- Hauling nets through the water from a boat to collect fish samples
- Measuring, identifying, collecting genetic material, and handling various fish species
- Collecting water samples for phosphorous and nitrogen
- Deploying and monitoring temperature loggers
- Sampling zooplankton using vertical tows from a plankton net
- Using GPS to navigate waterways at night
- Organizing, preparing, and cleaning sampling equipment
- Launching and loading boat and trailer
- Setting up and taking down camp (or assisting with check-in/check-out at hotels)
- Engaging with the public at boat ramps and on the water
- **And having fun on the water in beautiful coastal environments**

Students in the laboratory will be responsible for:
- Extracting otoliths from fish using dissecting microscope and jeweler forceps
- Mounting otoliths on glass slides using a hot plate and resin
- Imaging otoliths using ImagePro Insight Software
- Aging fish otoliths by counting and recording the number of rings (just like a tree!)
- Entering data into a Microsoft Excel database
- Organizing, labeling, and preserving water quality samples
- Calibrating sampling equipment such as temperature, pH, and conductivity probes
- Processing chlorophyll-a samples
**Skills Required:** Must be able to swim, be comfortable on boats, and willing to work at night over the water. Flexibility, problem-solving, teamwork, and communication skills are essential. MOCC boat safety training will be provided. Applicants with a strong background and interest in fishes and aquatic systems and have experience in field and laboratory settings are preferred.

**Is housing provided (and is it free)?** Partially. Housing is provided (and free) when in the field sampling but not otherwise. The position is based at UMass Amherst but will require extensive extended overnight travel (> 2 weeks at a time) to field sites. Lodging accommodations will vary and include hotels, university dorms, field stations, and camping. Students are responsible for their own accommodations while in Amherst and NOT in the field.

**Is a car necessary?** No, but perhaps helpful.

**Is your facility willing/able to host international students?** Yes.

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**Examples of field and laboratory work**

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3. **Project Title:** *Marine mammal bioacoustics*

**Project Location:** Woods Hole Oceanographic Institution, Woods Hole, MA

**Supervisor:** Laela Sayigh, Assistant Professor of Animal Behavior, Hampshire College

**Project Summary/Description:** Students will work on computer-based analyses of marine mammal acoustic data. Students will choose from a list of possible projects that will utilize existing datasets from several dolphin and whale species.

**Intern Responsibilities:** Computer-based analyses; there is no field component

**Skills Required:** None required, although any and all computer skills are welcome.

**Is housing provided (and is it free)?** No
**If no, how difficult is it to obtain housing near your facility?** WHOI housing is available for guest students at a cost of approximately $900/month for a shared room.

**Is a car necessary?** No, but makes life easier.

**Is your facility willing/able to host international students?** Yes

4. **Project Title:** *Effects of climate change on seabird foraging ecology*

**Location:** National Audubon Society Seabird Restoration Program (Maine) and DOI Northeast Climate Adaptation Science Center at UMass-Amherst

**Supervisors:** Paula Shannon, Seabird Sanctuary Manager, National Audubon Society Seabird Restoration Program; Michelle Staudinger, Science Coordinator, DOI Northeast Climate Adaptation Science Center, University of Massachusetts-Amherst

**Project Summary/Description:** Since 1987, the National Audubon Society Seabird Restoration Program has been monitoring diet or chick provisioning (foraging) data for multiple seabird species at colonies located on islands in the Gulf of Maine. The data generated from provisioning studies has provided valuable insight into keystone prey species for seabirds nesting in the Northeast U.S. and has contributed to policy decisions for regional fisheries. In collaboration with the Department of the Interior Northeast Climate Adaptation Science Center (NE CASC), we are looking for an intern to help collect provisioning data as well as conduct new ecological inquiries to better understand regional seabird diets in a changing climate.

**Intern Responsibilities:** The intern’s responsibilities will be split between time spent in the field helping collect seabird data and at the NE CASC located at the University of Massachusetts in Amherst, MA. Between mid-June and mid-July, the intern will go to a Maine island field camp for 2-3 weeks (rustic living conditions) to learn how seabird data is collected and be trained in seabird conservation techniques, working with the island supervisor and other team members. Field projects the intern will be involved with include bird banding, monitoring chick growth and survival, and conducting tern diet studies. Additional duties may include bird counts and weather data collection, invasive plant control, and interacting with island visitors. During the rest of the summer, the intern will choose a research focus area that includes chick provisioning, growth and related climate data from the Seabird Restoration Program. The intern will also conduct laboratory work processing tissue samples for stable isotope and other ecological analyses.

**Skills Required:** Good data management and quantitative analysis skills (e.g., proficiency in Excel; basic statistics are a plus); good organization skills and attention to detail, and the ability to live on an island with a small group
of people and conduct field work in changing weather conditions with rustic accommodations (sleep in a tent, no running water, limited solar electricity, etc.).

Is housing provided (and is it free)? On-island housing is provided. Housing in Amherst is not provided. If no, how difficult is it to obtain housing near your facility?

Is a car necessary? It will be necessary to be drive/be driven to the island departure site in Maine. A car is not necessary for Amherst.

Is your facility willing/able to host international students? Yes

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5. Project Title: Research into the stock structure of a federally-managed fish (Red Hake)

Project Location: NOAA NMFS Narragansett Laboratory, 28 Tarzwell Dr, Narragansett RI 02882

Supervisor: Katey Marancik, NOAA Fishery Biologist

Project Summary/Description: Earlier this year, a workshop on Red Hake stock structure identified areas of further research needed to better understand the structure of the Red Hake population. Interns will work collaboratively with NOAA researchers to complete a discrete project. The intern(s) will gain experience in field collections (if available), organizing, analyzing, and making available data collected by fisherman and research vessels, and with microscopes and image analysis equipment. The intern(s) will also receive mentoring on scientific writing and presentation, including preparation and practice of a scientific talk and/or poster.

Intern Responsibilities: Interns are expected to arrive on time each day ready to learn and ask questions, to work independently and as part of the team to get their project completed over the course of the internship. We do not have oceanographic survey’s available this summer, but will look for other field opportunities if the intern is interested.

Skills Required: Ability to work as part of a research team. Interest in learning more about how oceanography affects fisheries and ecosystem dynamics. Computer experience with programs like Microsoft Excel and Powerpoint. Webpage, GIS, and computer programming experience (R, MatLab, python) helpful depending on interests. We are looking for motivated students interested in completing a project and being a part of fisheries science first hand.

Is housing provided (and is it free)?
If no, how difficult is it to obtain housing near your facility? Housing is not provided. Past interns have had luck getting housing through URI. On campus housing is sometimes available: https://web.uri.edu/housing/ Additionally, here is the University’s off-campus housing list: http://www.uri.edu/commuter_housing/ and RI Craigslist: http://providence.craigslist.org/search/apa

Is a car necessary? A vehicle is not necessary for the work, but it does help considerably for getting to and from the lab and around the area.

Is your facility willing/able to host international students? No.

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6. **Project Title:** Improving estimation of Calanus energy density near foraging North Atlantic right whales.

**Project Location:** NOAA NMFS Narragansett Laboratory, 28 Tarzwell Dr, Narragansett RI 02882

**Supervisor name and contact info:** Harvey Walsh, NOAA Fishery Biologist

**Project Summary/Description:** Calanus copepods are one of the most abundant mesozooplankton of the Northwest Atlantic and are considered a top prey for many fish, seabirds, and marine mammals including the highly endangered North Atlantic right whale (NARW). The overall objective of the project is to characterize and contrast NARW prey resources in two regions of the Northwest Atlantic, the Nantucket Shoals of southern New England (SNE) and the southern Gulf of St. Lawrence. The intern would support research to improve estimates of Calanus energy density in SNE. The intern will work collaboratively with OCB researchers to complete a discrete project investigating relationships of prosome length measurement and dry weight to estimate oil sac volume, which may allow for improved estimates of Calanus energy content.

**Intern Responsibilities:** Interns are expected to arrive on time each day ready to learn and ask questions, to work independently and as part of the team to get their project completed over the course of the internship. We do not have oceanographic survey’s available this summer, but will look for other field opportunities if the intern is interested.

**Skills Required:** Ability to work as part of a research team. Interest in learning more about how oceanography affects fisheries and ecosystem dynamics. Previous use of microscopes and balances is desirable, but not required. Computer experience with programs like Microsoft Excel and Powerpoint. Computer programming experience (R, MatLab, python) helpful depending on interests. We are looking for motivated students interested in completing a project and being a part of fisheries science first hand.

**Is housing provided (and is it free)?** Housing is not provided.

**If no, how difficult is it to obtain housing near your facility?** Past interns have had luck getting housing through URI. On campus housing is sometimes available: https://web.uri.edu/housing/. Additionally, here is the University's off-campus housing list: http://www.uri.edu/commuter_housing/ and the RI Craigslist: http://providence.craigslist.org/search/apa

**Is a car necessary?** A vehicle is not necessary for the work, but it does help considerably for getting to and from the lab and around the area.

**Is your facility willing/able to host international students?** No

7. **Project Title:** Assessing the Sustainability and Resilience of Salt Marshes

**Project Location:** New England Coast, and Umass-Amherst

**Supervisors:** Jon Woodruff, Associate Professor; Brian Yellen, Assistant Professor, Dept. of Geosciences, University of Massachusetts Amherst

**Project Summary/Description:** Many policy makers and coastal planners are concerned about the ability of salt marshes to keep pace with accelerating sea level rise. Salt marshes provide essential habitat to many commercial fisheries and buffer the coasts against storm events. At a handful of marsh sites around New England, we are using passive data loggers and samples of marsh sediment to evaluate the current sediment supplies to these environments. Sediment is a vital ingredient to marshes to build elevation, stay above sea level, and remain healthy. Site specific methods involve mapping sediment availability and distribution via moored instrumentation, water sampling, and observations from boats, combined with a network of sediment traps. The project is also assessing regional controls on marsh health through a synthesis of existing GIS, oceanographic, and remotely sensed data.
**Intern Responsibilities:** The student will aid in field work and assist with all laboratory activities including bulk density, grain size, and loss on ignition to assess organic content of marsh sediments. Applicants should expect to tromp around in muddy environments, spend a few days at a time in the field, and do physically demanding work. We also encourage applicants who cannot do field work to apply, but please state in which non-field responsibilities you are interested.

**Skills Required:** Some experience with data analysis via Excel (or Matlab) and GIS is preferred, as well as an interest in outdoor field work that requires the participant sometimes to get wet and muddy.

**Is housing provided (and is it free)?** No, but summer rentals are available around UMass

**Is a car necessary?** No

**Is your facility willing/able to host international students?** Yes

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8. **Project Title:** *Investigating marine range expansions in the Gulf of Maine*

**Project Location:** UMass Amherst Gloucester Marine Station, Gloucester, MA

**Supervisor name and contact info:** Jordanna Barley, M.S. student; Brian Cheng, Assistant Professor, Dept. Environmental Conservation, UMass Amherst

**Project Summary/Description:** Climate change is causing species to alter their distributions, often resulting in range expansions towards the poles. Despite the fact that this pattern has been well documented across many taxa, the underlying mechanisms for range shifts are unclear. This project focuses on two east coast salt marsh crab species in the Gulf of Maine, the mud fiddler crab (*Uca pugnax*) and the purple marsh crab (*Sesarma reticulatum*).

**Why salt marsh crabs?** *Uca* and *Sesarma* both live in salt marshes along the east coast. *Uca* is currently experiencing a range expansion into the Gulf of Maine, inhabiting marshes north of their historic range. *Sesarma* has not seen similar expansion, which presents a unique opportunity to examine the differential effects of climate on these two species. Evidence suggests that purple marsh crabs contribute to salt marsh collapse on Cape Cod. Ocean warming could drive *Sesarma* to shift its distribution northward, potentially impacting salt marshes in the Gulf of Maine. This area is increasing in sea surface temperatures faster than 99% of the global ocean. Because *Uca* has already begun its’ expansion north, we can examine warming effects on this species evolutionary processes, a line of inquiry that is on the cutting edge of climate change research. Our project aims to understand the mechanisms underlying range limits and how ocean warming will affect this process. The intern will aid research with direct implications for the management and preservation of salt marshes, an ecosystem that provides benefits to people (e.g. storm protection) and provides critical habitat to many species.

**Intern Responsibilities:**

- Conduct fieldwork in salt marshes on Cape Cod and the northern shore of Massachusetts, both during the day and at night
- Collect crab specimens from the field
- Culture crab larvae, including feeding and preparation of feed (phytoplankton, rotifers, and *Artemia*), and cleaning of experimental set-up
- Aid in the set-up and maintenance of experimental design
- Proficiency with the statistical computing environment R is a plus, but not required
- You will have the opportunity to assist with other research being performed at the Gloucester Marine Station (fish and lobster predator-prey interactions)
Skills Required: The successful candidate will be motivated and willing to learn. We are looking for a student that can conduct fieldwork, endure hot, humid, and/or wet conditions. The ability to walk through marshes and mudflats carrying gear and a pack is essential. The successful candidate will also be instrumental in lab experiments at the Gloucester Marine Station. Ability to conduct meticulous work with attention to detail is a must. The student will be expected to work well in a team environment. Knowledge of ecological principles and husbandry techniques would be helpful, although not required.

Is housing provided (and is it free)? If no, how difficult is it to obtain housing near your facility? Housing is not provided, but the project is seeking a housing solution for all undergraduate and graduate students at Gloucester Marine Station. A housing subsidy may be available from the FCCMS program.

Is a car necessary? Use of a vehicle is ideal, but there may be opportunities to carpool with other interns and graduate students.

Is your facility willing/able to host international students? Yes

9. Project Title: Effects of Climate Change on Predator-Prey Interactions in an Ocean Warming Hotspot

Project Location: UMass Amherst Gloucester Marine Station, Gloucester, MA

Supervisors: Alysha Putnam, PhD student UMass Organismal and Evolutionary Biology; Brian Cheng, Assistant Professor, Dept. Environmental Conservation, UMass Amherst

Project Summary/Description: Climate change may disrupt biological communities via direct effects on individuals or indirect effects via ecological processes. For example, warming may induce changes in predation intensity, which may have radical consequences for prey. Yet, our understanding of climate effects on species interactions is poor. We are examining such effects in the Gulf of Maine (GOM), an ocean hotspot warming faster than virtually all of the global ocean. Here, American lobsters (Homarus americanus) are the most valuable species in North America ($484 million in revenue for 2018) and there is concern that this fishery may collapse. Ocean warming within the GOM may promote increased abundance of southern, predatory species. Black sea bass (Centropristis striata) are aggressive, territorial, generalist carnivores that feed on a variety of invertebrates and small fish and have recently shifted their range northward into the GOM.

Our project aims to quantify the effects of ocean warming on predator-prey interactions through the measurement of attack and prey escape velocities, critical components of this species interaction. In this project, we will use wild captured black sea bass and American lobsters from Gulf of Maine waters in mesocosm experiments at the Gloucester Marine Station. Additionally, survival of lobster from attack by black sea bass will be evaluated. This research will clarify our understanding of biological responses to climate change and is crucial for managers seeking to build resilient fisheries.

Intern Responsibilities:
- Conduct field work to assist in the collection of black sea bass and lobsters
- Assist in care of live organisms
- Keep track of daily observations in a detailed manner
- Perform and record regular measurement of water quality
- Aid and assist in the set up and performance of experimental work
- Develop and carry-out an independent project
- You will have the opportunity to assist with other research being performed at the Gloucester Marine Station

Skills Required:
- Experience with caring for live animals
- Organized and detail oriented
- Experience and proficiency in Microsoft Office suite (experience with the statistical computing environment R is helpful, but not required)
- Problem solving and adaptability skills
- Strong communication and interpersonal skills
- Efficient time management abilities

**Is housing provided (and is it free)?**

**If no, how difficult is it to obtain housing near your facility?** Housing is not provided, but the project is seeking a housing solution for all undergraduate and graduate students at Gloucester Marine Station. A housing subsidy may be available from the FCCMS program.

**Is a car necessary?** Use of a vehicle is ideal, but there may be opportunities to carpool with other interns and graduate students.

**Is your facility willing/able to host international students?** Yes.

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The next group of projects have set dates that are not flexible. FCCMS students selected for these internships will be paid through Shoals Marine Lab, with a stipend of $1500 for the entire summer. FCCMS will pay all room and board costs directly to SML. The internships above (not at SML) pay a stipend between $3200 and $4200, but students may be responsible for housing costs and will be responsible for food and other expenses.

10. **Project Title:** SHOALS MARINE LAB Marine Mammals

**Projects Location:** Shoals Marine Lab (7 miles off the coast of Portsmouth, NH

**Supervisors:**
- Dr. Nadine Lysiak (Assistant Professor, Suffolk University)
- Dr. Andrea Bogomolni (Postdoctoral Investigator, WHOI)
- Lisa Sette (Center for Coastal Studies)

**Project Summary/Description:**
One mile north of Appledore Island and the Shoals Marine Laboratory lies Duck Island and its surrounding rocky ledges, which are home to nearly a thousand harbor seals (*Phoca vitulina*) and gray seals (*Halichoerus grypus*) at the peak of summer. This important haul out site has allowed for ongoing research on seals in the Isles of Shoals since 2011 including: monitoring abundance estimates, photographic mark-recapture studies, individual and species-specific site fidelity, incidence of entanglement and injuries, and distributional and behavioral interactions of the two species.

**Intern Responsibilities:** Marine Mammal Undergraduate Researchers conduct 2-3 boat-based surveys of the Duck Island seal colony each week by photographing all seals along a standardized survey route. Back in the lab, researchers analyze and catalog the digital photos as well as associated behavioral and environmental data. Researchers also work with their mentors to design an independent research project based on archived and/or new data. Skills that students will learn throughout this program include photography, basic vessel-based research skills, marine mammal biology, data interpretation, and scientific data presentation. Researchers will be a part of the larger Shoals Undergraduate Research Group cohort and will participate in weekly discussions and lectures.

**Skills Required:**
Appropriate coursework in animal behavior, vertebrate biology, and/or marine mammals is strongly recommended. Interested students should be detail-oriented and comfortable working with data/spreadsheets using Microsoft Excel and other similar programs. Marine Mammal researchers spend several hours each week aboard SML research vessels conducting seal colony surveys, and therefore applicants should be comfortable on
boats and at sea. Knowledge of digital photography using high-quality DSLR cameras is ideal. Previous experience at SML is preferred, but not required. Relevant courses include Marine Mammal Biology, Anatomy & Function of Marine Vertebrates, Animal Behavior.

**Dates:** June 3 - August 9, 2020 (10 weeks)

**SML Research Symposium:** August 8, 2020

**Stipend:** $150/week
Includes room & board for 10 weeks, and roundtrip vessel transportation from Portsmouth, NH to Appledore Island. Researchers are responsible for their own transportation to/from Portsmouth, NH at the beginning and end of the program.

**Is your facility willing/able to host international students?** Yes

**11. Project Title:** SHOALS MARINE LAB Seabird Ecology and Conservation

**Projects Location:** Shoals Marine Lab (7 miles off the coast of Portsmouth, NH

**Supervisors:**
- Dr. Jennifer Seavey (Executive Director, SML)
- Dr. Liz Craig (Tern Conservation Program Manager, SML)
- Dr. Gemma Clucas (Postdoctoral Fellow, Cornell University)

**Project Summary/Description:** Shoals Marine Laboratory seeks a motivated undergraduate researcher to investigate questions of seabird ecology and conservation on the Isles of Shoals. Seabirds are valuable indicators of ecosystem processes and ocean health, as they can inform us about a diversity of aspects of the marine environment upon which they rely. Shoals Marine Laboratory is located amidst a diverse community of nesting seabirds (including gulls, terns, and alcids), providing an ideal environment to study seabirds and their interactions with the marine environment.

**Intern Responsibilities:** The Seabird Ecology and Conservation Undergraduate Researcher will work closely with Shoals Marine Laboratory and external mentors to conduct field research on questions related to seabird diet, foraging behavior and movement, exposure to environmental contaminants (e.g., plastic), and basic ecology and physiology. The researcher will gain hands-on experience in field collection and observational methods as well as laboratory techniques, and assist in other ongoing seabird research projects. The researcher will be a part of the larger Shoals Undergraduate Research Group cohort and will participate in weekly discussions and lectures.

**Skills Required:**
Appropriate coursework in wildlife ecology and/or ornithology preferred. Previous experience at SML is preferred, but not required. Relevant courses include ornithology and animal behavior.

**Dates:** June 3 - August 9, 2020 (10 weeks)

**SML Research Symposium:** August 8, 2020

**Stipend:** $150/week
Includes room & board for 10 weeks, and roundtrip vessel transportation from Portsmouth, NH to Appledore Island. Researchers are responsible for their own transportation to/from Portsmouth, NH at the beginning and end of the internship.

**Is your facility willing/able to host international students?** Yes

**12. Project Title:** SHOALS MARINE LAB Gull Population Ecology

**Projects Location:** Shoals Marine Lab (7 miles off the coast of Portsmouth, NH

**Supervisors:**
- Dr. Jennifer Seavey (Executive Director, SML)
- Dr. Liz Craig (Tern Conservation Program Manager, SML)
- Dr. Gemma Clucas (Postdoctoral Fellow, Cornell University)

**Project Summary/Description:** Shoals Marine Laboratory seeks a motivated undergraduate researcher to investigate questions of seabird ecology and conservation on the Isles of Shoals. Seabirds are valuable indicators of ecosystem processes and ocean health, as they can inform us about a diversity of aspects of the marine environment upon which they rely. Shoals Marine Laboratory is located amidst a diverse community of nesting seabirds (including gulls, terns, and alcids), providing an ideal environment to study seabirds and their interactions with the marine environment.

**Intern Responsibilities:** The Seabird Ecology and Conservation Undergraduate Researcher will work closely with Shoals Marine Laboratory and external mentors to conduct field research on questions related to seabird diet, foraging behavior and movement, exposure to environmental contaminants (e.g., plastic), and basic ecology and physiology. The researcher will gain hands-on experience in field collection and observational methods as well as laboratory techniques, and assist in other ongoing seabird research projects. The researcher will be a part of the larger Shoals Undergraduate Research Group cohort and will participate in weekly discussions and lectures.

**Skills Required:**
Appropriate coursework in wildlife ecology and/or ornithology preferred. Previous experience at SML is preferred, but not required. Relevant courses include ornithology and animal behavior.

**Dates:** June 3 - August 9, 2020 (10 weeks)

**SML Research Symposium:** August 8, 2020

**Stipend:** $150/week
Includes room & board for 10 weeks, and roundtrip vessel transportation from Portsmouth, NH to Appledore Island. Researchers are responsible for their own transportation to/from Portsmouth, NH at the beginning and end of the internship.

**Is your facility willing/able to host international students?** Yes

**12. Project Title:** SHOALS MARINE LAB Gull Population Ecology
**Project Location:** Shoals Marine Lab (7 miles off the coast of Portsmouth, NH

**Supervisors:**
Dr. Sarah Courchesne (Professor, Northern Essex Community College)
Mary Everett (UMass Lowell)

**Project Summary/Description:**
In the Gulf of Maine, populations of gulls have fluctuated dramatically during the past several decades, largely as a result of human activities. Gulls are apex predators in nearshore marine ecosystems and can significantly alter terrestrial habitats on breeding islands. Though gulls are a conspicuous presence in coastal New England, surprisingly little is known about their population biology.

The Gull Population Biology program is designed around a unique, long-term gull banding program initiated in 2004 on Appledore Island focused on Great Black-backed Gulls (GBBG) and Herring Gulls (HERG). Field-readable leg bands are used to facilitate resights of live birds both on and off the island, and during the breeding and non-breeding season. Thousands of GBBGs and HERGs have been banded and resighted by island researchers. The project receives numerous resights from private citizens who observe banded gulls in nearly every state on the Atlantic coast (and a few inland states). The data generated from this project is used to quantify adult survival rates, dispersal patterns by sex and age, age at first reproduction, and many other aspects of gull biology.

**Intern Responsibilities:** During the program, researchers will:

- Band adult and juvenile gulls of both species under the guidance of mentors.
- Conduct routine, on-island resights of banded gulls and assign nest IDs to all banded birds.
- Map nests using GPS.
- Monitor the reproductive success of banded gulls in key study areas via daily nest checks (# eggs, # eggs hatched, dates of hatch, chick survival to 10 days, chick fledging).
- Record data on gull diet.
- Participate in public outreach on and off Appledore Island.
- Participate in weekly discussions and lectures as part of the larger Shoals Undergraduate Research Group cohort.

**Skills Required:** Ability to work in the field in varying weather conditions in close proximity to nest-protecting birds. Attention to detail and accuracy in field reporting. Knowledge of bird biology/ecology helpful.

**Dates:** mid-May to Mid-July, 2020 (10 weeks)

**SML Research Symposium:** August 8, 2020

**Stipend:** $150/week
Includes room & board for 10 weeks, and roundtrip vessel transportation from Portsmouth, NH to Appledore Island. Researchers are responsible for their own transportation to/from Portsmouth, NH at the beginning and end of the program.

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