FIVE COLLEGE COASTAL AND MARINE SCIENCES INTERNSHIP PROGRAM
PROJECTS FOR SUMMER 2021
(as of Feb. 18, 2021)

1. **Project Title:** Seabird diets for a hot planet: Understanding seabird foraging ecology in the context of climate change

   **Location:** DOI Northeast Climate Adaptation Science Center at UMass-Amherst; field work to be conducted in collaboration with MA Audubon and MA Wildlife on Bird, Ram and Penikese Islands, Massachusetts.

   **Supervisors:** Dr. Michelle Staudinger, Science Coordinator, DOI Northeast Climate Adaptation Science Center, University of Massachusetts-Amherst

   **Project Summary/Description:** The Northeast coast of the United States is a seasonally important area for a variety of colonial nesting seabirds including Roseate, Common and Least Terns. This group of species migrates to the region to take advantage of highly productive waters during the warmer months to breed and provision their young. During this period, adult seabirds are place-based foragers and highly dependent on local abundances of prey resources to support chick growth and survival. Long-term diet studies of terns are conducted on northern populations (e.g., on the Maine Coastal Islands National Wildlife Refuge), which represent cold water habitats; however, the diets of southern colonies on Massachusetts and Connecticut Islands that represent warm water habitats have not been regularly monitored and are less well known. These islands are of high management importance because they support the majority of nesting pairs of Common and Roseate tern and are in a rapidly changing thermal habitat zone.

   A collaborative network of state, federal and nonprofit organizations are working to understand how prey resources are shifting due to climate change and the effects on tern nutrition and productivity. The Department of the Interior Northeast Climate Adaptation Science Center (NE CASC) seeks an intern to: 1) compile and synthesize diet data from historical and existing monitoring programs to create a comprehensive list of prey across Northeast tern colonies; 2) conduct in situ visual observations and collect video recordings of chick diets through provisioning studies conducted on Bird, Ram and Penikese Islands, located off the coast of Massachusetts; 3) evaluate video footage and transcribe provisioning observations collected in the field.

   **Intern Responsibilities:** The intern’s responsibilities will be split between the NE CASC located at the University of Massachusetts in Amherst, MA and in the field helping collect seabird diet data (if field work is allowed due to COVID-19). Between mid-June and mid-July, the intern will go to Bird, Ram and Penikese Islands and camp for short periods of time under rustic living conditions to assist seabird managers to collect seabird diet data. Additional duties may include bird banding, monitoring chick growth and survival, bird counts and weather data collection. During the rest of the summer, the intern will be responsible for transcription and synthesis of historical datasets, literature reviews, and data extraction and entry into a database.

   **Skills Required:** Good organizational skills and attention to detail are key. Proficiency in Excel; basic statistics and experience with ArcGIS are a plus. If field work is possible, 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)?** Housing in Amherst is not provided. On-island housing is provided if field work is possible.

   **Is a car necessary?** Yes, if field work component is possible with COVID; otherwise all work can be done remotely.

   **Can international students apply?** Yes (must have US SS# to be paid)
2. **Project Title**: Characterizing and assessing habitat requirements for the restoration of diadromous fishes in Massachusetts coastal watersheds

**Location**: Coastal Massachusetts freshwater lakes, rivers, and estuaries; specifically, Jones River Watershed and the Menemsha Pond Complex on Martha’s Vineyard, Massachusetts. Lab work will be conducted at the University of Massachusetts Amherst.

**Supervisors**: Asha Ajmani and James Garner (PhD students)
**Principal Investigator**: Dr. Michelle Staudinger, Science Coordinator, DOI Northeast Climate Adaptation Science Center, University of Massachusetts- Amherst

**Project Summary/Description**: Diadromous fishes including river herring (alewife and blueback), rainbow smelt, and American eels are ecologically and culturally important throughout the Northeast. This group of migratory fish species have experienced significant declines due to climate change, passage obstructions, habitat loss, and contaminants. Local restoration actions are important to increasing the resilience of critical spawning and nursery habitats, increased passage between freshwater and ocean environments, and improved water quality. Restoring diadromous fish populations benefit higher level predators and regional human communities including Tribal Nations, which rely on them as traditional subsistence foods.

We are seeking a student to assist with collection and processing of samples for biodiversity, habitat, and water quality studies in partnership with the Wampanoag Tribe of Gay Head (Aquinnah), located on Martha’s Vineyard, Massachusetts and in association with the Jones River Watershed Association. Work on this project will also include learning the methodology and assisting on validation studies for environmental DNA (eDNA), an emerging biodiversity monitoring technique. Results are anticipated to inform the development of long-term monitoring programs and assess the potential for restoration and adaptation actions for regional populations of diadromous fishes.

**Intern Responsibilities**: Please note: The ability to participate in field work may depend on UMass Amherst’s COVID-19 travel restrictions and regulations.

Field work for this position is physically demanding and may include:

- Collecting, filtering, and preserving water samples for eDNA analyses
- Working on a team to sample and collect fish, zooplankton and water quality data using a variety of methods including wading in streams and from a boat with nets
- Measuring and identifying fish and zooplankton
- Counting fish from video recordings
- Tagging fish for tracking and monitoring find scale habitat use
- Community engagement (communication to and interaction with the public; representation of the project at community events)

Laboratory responsibilities may include:

- eDNA sample analysis including DNA extraction and qPCR analysis
- Processing samples for chlorophyll a, total carbon/total nitrogen analyses
- Otolith extraction and aging of fish
- Zooplankton identification
- Environmental contaminant analysis
- Calibrating sampling equipment (e.g. temperature, pH, and conductivity probes)
- Organizing, labeling, and preserving samples
- Data organization and data entry

**Skills Required**: Applicants with a strong background and interest in fisheries and aquatic systems and that have experience in field and laboratory settings are preferred. Must be comfortable around water and able to swim,
be comfortable on boats, and be willing to work at night on the water. Diving skills a plus. Experience with word processing and spreadsheets required. Statistical skills a plus. Flexibility, problem-solving, teamwork, respect, and communication skills are essential. MOCC boat safety training will be provided. Must complete lab and fire safety training provided by UMass Amherst.

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

**Is a car necessary?** Yes, if field work component is possible with COVID, otherwise all work will be conducted in the laboratory.

**Can international students apply?** Yes (must have US SS# to be paid)

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3. **Project Title:** New England rocky intertidal community responses to climate change

**Location:** New England Coast, UMASS Amherst

**Supervisor(s):** Alysha Putnam, PhD student UMass Organismal and Evolutionary Biology
Principal Investigator: Dr. Brian Cheng, Assistant Professor, UMass Dept. Environmental Conservation

**Project Summary/Description:** Global climate is changing at an unprecedented rate, causing ecosystems and ecological communities to undergo drastic alteration. The Gulf of Maine is one of the most rapidly changing regions with ocean temperature increasing at greater rates than global averages and some foundational intertidal invertebrates are already declining as a result. Forecasting community level responses to climate change has previously been challenging due to species specific responses to stressors and the potential for indirect effects via species interactions. However, innovative methods have since allowed for the manipulation of abiotic stress such as increasing temperature in field experiments and subsequent measurement of community responses. This project focuses on how climate change will impact rocky intertidal invertebrate and algal assemblages in New England through passive warming field manipulation experiments. Warming of habitat substrate in situ will provide insight on how a warming climate will impact New England intertidal communities.

**Intern Responsibilities:** The student will aid in field work to deploy and routinely measure intertidal field manipulation experiments at rocky shore sites around New England. Applicants should expect to spend time outdoors conducting field work in hot, humid, and/or wet conditions. Field work will consist of roughly 50% of internship time and scheduling will be dependent on tides and weather, while the remaining portion of time will consist of data entry and data synthesis. In addition, the student will be part of the larger MACRO lab group and will participate in lab meetings and discussion and also have the opportunity to assist with other research being performed (marine crab range expansion project). Students could be based out of the Boston area or Amherst.

**Skills Required:** Interested students should be detail oriented, have good organization skills, and be able to work as part of a team. The ability to traverse rocky shorelines carrying equipment and a pack is essential. There may be some field sites that boating will be required to reach, therefore applicants should be comfortable on boats and at sea. Data collected from field experiments will require the student to have experience with Excel for data entry. Proficiency with the statistical computing environment R is a plus but not required.

**Is housing provided (and is it free)?** Housing is not provided, but supervisors can aid in finding housing.

**Is a car necessary?** Use of a car is ideal, unless student lives in Boston area already (housing comment above).

**Can international students apply?** Yes (must have US SS# to be paid)
4. **Project Title:** Effects of climate change on marine crab range expansion in the Gulf of Maine

**Location:** UMass Amherst main campus plus field work in coastal Massachusetts (Cape Cod and north shore)

**Supervisors:** Jordanna Barley, graduate student, Dept. of Environmental Conservation  
Principal Investigator: Dr. Brian Cheng, Assistant Professor, UMass Dept. Environmental Conservation;

**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. Our 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 in 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 gives us a unique opportunity to study the differences between these two species. Recently, purple marsh crabs have been shown to contribute to salt marsh collapse on Cape Cod. There is cause for concern if *Sesarma* does experience a range expansion because of the rapid sea surface temperature increase currently happening in the Gulf of Maine. This area is increasing in sea surface temperatures faster than 99% of the global ocean. A range expansion for the purple marsh crab could mean more salt marsh collapse as the species moves north. Because *Uca* has already begun its’ expansion north, we are seeking to understand how climate is altering an ongoing range expansion and how this may interact with evolutionary processes. 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 of crab larvae, including feeding and preparation of feed, and cleaning of experimental set-up  
- Aid in the set-up and maintenance of experiments  
- Proficiency with the statistical computing environment R is a plus, but not required  
- The intern will have the opportunity to assist with other research being done in our lab (marine intertidal fieldwork)

**Skills Required:** The successful candidate should be motivated and willing to learn. We are looking for a student that can conduct fieldwork, enduring hot, humid, and/or wet conditions. The ability to walk through marshes and mudflats carrying gear and a pack is essential. Ability to conduct meticulous work with attention to detail is a must. The student will be expected to work well in a team environment and pursue an independent project that the supervisors will aid in developing. Knowledge of ecological principles and husbandry techniques would be helpful, although not required.

**Is housing provided (and is it free)?** Housing is not provided, but supervisors can aid in finding housing.

**Is a car necessary?** Yes

**Can international students apply?** Yes (must have US SS# to be paid)

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5. **Project Title:** Center for Coastal Studies White Shark and Seal Research Programs

**Location:** Center for Coastal Studies, Provincetown, MA

**Supervisor:** Dr. Bryan Legare, CCS Seafloor Mapping Program; Doctoral Intern, UMass Dept. of Environmental Conservation

Established in 1976, the Center for Coastal Studies located in Provincetown, MA is a non-profit organization dedicated to understanding, preserving and protecting marine ecosystems and the coastal environment through applied research, education and public policy initiatives. CCS collaborates with local, national and international organizations and works with government agencies to promote environmental stewardship and develop policies and management strategies drawn from solid scientific research. CCS conducts research with emphasis on marine mammals of the western North Atlantic and on the coastal and marine habitats and resources of the Gulf of Maine; provides educational resources and programs that encourage the responsible use and conservation of coastal and marine ecosystems; and collaborates with other institutions and individuals whenever possible to advance the Center’s mission.

The Center for Coastal Studies White Shark Habitat Program and Seal Research Program seeks an undergraduate student intern to assist with field research focused on the nearshore behavior of White Sharks (*Carcharodon carcharias*) and Gray Seals (*Halichoerus grypus*). As white shark and gray seal populations in the Atlantic Northwest rebuild, a predictable seasonal aggregations takes place along Cape Cod, Massachusetts. White sharks pose a risk to public safety as white sharks hunt seals in the nearshore environment resulting in a rise of human and white shark interactions. The data collected is necessary to help researchers and managers best understand the ecology of these important predators.

The summer internship will involve the collection, management, and processing of data for several projects that examine the movement, behavior, and presence of white sharks and seals along the Coasts of Cape Cod. In addition, the student intern will help and experience various other programs at the Center for Coastal Studies, including interactions with the Fisheries, Education, Seafloor Mapping, Benthic Ecology, and Coastal Change programs.

**Intern Responsibilities:**

- Weekly field observations of white sharks and gray seal movements documenting behavior and location.
- Bi-weekly maintenance (memory card download and battery changes) of trail cameras on several beaches on Cape Cod.
- Entry of data collected from weekly surveys and data collected from trail cameras.

The intern will be trained on various pieces of equipment and software including but not limited to:

- ArcGIS, Qgis and/or R
- Theodolite and a Range finders
- Trail Cameras
- Handheld GPS

The intern will be exposed to other technologies including but not limited to:

- Data loggers (Temperature, Water level, Acoustic Doppler Current Profiler)
- Sidescan Sonar
- R10 RTK GPS
**Skills Required:** The applicant should be self-motivated and engaged. The majority of the field work involves short hikes along dune trails or the beach to various sites throughout the Cape Cod National Seashore (primarily Wellfleet, Truro and Provincetown). The applicant should be comfortable in a research vessel and able to occasionally lift equipment up to 50 pounds. Strong attention to details and note taking skills are preferred. The applicant will need to be located or willing to relocate to Cape Cod and must have a valid driver’s license and a car.

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

**Is a car necessary?** Yes

**Can international students apply?** Yes (must have US SS# to be paid)

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6. **Project Title:** *Characterizing habitat requirements, movements, and life stage linkages of river herring in coastal Massachusetts*

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

**Supervisors:** Dr. Adrian Jordaan, UMass Dept. of Environmental Conservation
Douglas Bishop, UMass Fisheries Research Technician

**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 hatch in freshwater during the spring and summer, migrate out to estuaries over the summer and fall, occupy offshore marine habitats during winter, and return to spawn in their natal ponds in spring. 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. Sampling will include other fish species, including winter flounder, tomcod and other estuarine species, 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.

**Can international students apply?** Yes (must have US SS# to be paid)