

**INTERNSHIP OPPORTUNITIES AT NOAA
SUMMER 2009**

1. Environmental Impacts of Marine Debris in Beaufort, North Carolina
2. Molecular Detection of Microorganisms to Enhance Environmental and Marine Animal Health Assessments
3. Oyster Disease Research and Chesapeake Bay Outreach
4. Aerosol Chemistry in the Arctic
5. Climate regime effects on fish life cycles and population dynamics
6. Key ecological processes that determine survival to recruitment in fish populations
7. Determine spawning timing and growth rates of post-larval and juvenile northern anchovy off Oregon and Washington
8. Developing Web-Based Portal for Real-Time Ocean Exploration and Research Data and Information Dissemination and Visualization
9. Determining the Biomass of Prey Species Consumed by Bottlenose Dolphin
10. Assessing the impacts of multiple stressors to water quality in Saginaw Bay
11. Environmental Observations on the Northeast U.S. Continental Shelf
12. Parasites of marine and estuarine fishes as signals for diet, habitat use, and life history traits
13. Ecology of Coastal Ocean Seascapes: An IOOS informed multi-scale study of habitat suitability for marine resource species
14. The importance of Pacific salmon and their marine derived nutrients in Salmon River basin streams of Idaho
15. Assessing response of seagrass growth following disturbance in North Carolina
16. Coastal Ecology Research Supporting Ecosystem-based Management, Maine.

1. ENVIRONMENTAL IMPACTS OF MARINE DEBRIS IN BEAUFORT, NORTH CAROLINA

Project Description: The intern will help conduct a social science study to determine the social perceptions regarding marine debris causes, environmental impacts, and suggestions for methods for marine debris reduction by: 1) recreational users of the Rachel Carson National Estuarine Research Reserve and, 2) commercial fishermen. In addition, the intern may participate in an ecological study characterizing marine debris, its accumulation, and biotic impacts to intertidal salt marsh communities of North Carolina. This internship will provide the opportunity for a student to not only participate in various stages of social science and ecological research, but also to learn the basics of salt marsh ecology and the potential impacts of marine debris and human intervention (restoration and management) on natural coastal habitats. The intern will become familiar with social science and/or ecological sampling design, techniques, and equipment. Fieldwork will include oral surveys to recreational users of the Reserve and to commercial fishermen, ecological marsh surveys, GPS mapping, debris collections and quantification, and participation in outreach cleanups with partner organizations. Lab work will include identification and quantification of specimens and integration of this information through the use of mapping software (including ArcGIS), databases, and reports.

Skills Required: Ability and willingness to work as part of a research team, learn new techniques, work outdoors in various weather conditions, and approach new people to conduct surveys. Although boat handling skills are not required, the intern should be comfortable traveling in and working on a small boat. Knowledge of specific field methods is not required, as these will be taught to the intern through hands-on experience.

Location: NOAA/ National Ocean Service / National Centers for Coastal Ocean Science, Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Road Beaufort, NC 28516, <http://www.ccfhr.noaa.gov/>

Number of Intern Slots: One or two

Intern Supervisor: Shay Viehman

2. MOLECULAR DETECTION OF MICROORGANISMS TO ENHANCE ENVIRONMENTAL AND MARINE ANIMAL HEALTH ASSESSMENTS

Project Description: The intern will investigate the use of culture and molecular methods to improve the assessment of coastal water quality and marine mammal health. Targets include fecal indicator bacteria, pathogens, and fecal source identification markers. Work will involve sample processing (microbiological culturing & filtering of environmental samples), molecular biological techniques (nucleic acid extraction, PCR amplification, gel electrophoresis, photodocumentation, qPCR), and data entry & data analysis.

Skills Required: Basic knowledge of standard microbiological practices, such as sterile technique. Familiarity with standard molecular biological practices, such as pipetting. Willingness to work outdoors and in a BSL-2 area. Ability to work as part of a research team.

Location: NOAA's Southwest Fisheries Science Center, La Jolla, California

Number of Intern Slots: One

Intern Supervisor: Dr. Kelly Goodwin

3. OYSTER DISEASE RESEARCH AND CHESAPEAKE BAY OUTREACH

Project description: The NOAA Chesapeake Bay Office and Old Dominion University (located in Norfolk, VA) seek an intern to support projects funded through the NOAA Oyster Disease Research Program and the NOAA Bay Watershed Education and Training (B-WET) program. The intern will have the opportunity to participate in all aspects of the oyster research project, which include 1) field sampling of oyster populations in the James River and in Delaware Bay; 2) data analysis of population

characteristics related to environmental conditions; and 3) applying the results of data analysis to the numerical modeling of oyster populations.

The University's B-WET project is a newly-funded initiative that focuses on establishing and/or strengthening a relationship between urban students and the Chesapeake Bay watershed. Key components to cultivating this relationship are hands-on, fieldwork-based experiences, which encourage teachers and students to get outside and interact with their watershed. Ultimately, the project hopes to increase interest of diverse, urban students in pursuing careers in earth/environmental science fields. The intern will work with project personnel to develop hands-on, fieldwork-based studies related to the Bay watershed with an emphasis on issues relevant to an urban watershed. The intern will also assist in the development of scientific investigations for teachers that will in part take place aboard the Old Dominion University research vessel the R/V *Slover*.

Opportunity: The intern will analyze historical and new oyster data sets using statistical approaches and software packages such as Excel and Matlab. The intern will have the opportunity to assist in preparation of project results for publication in peer-reviewed scientific journal and for presentation at national meetings. The intern will work closely with the project team of scientists, representing a diverse body of academia including Old Dominion University, the Virginia Institute of Marine Science, the Haskin Shellfish Research Laboratory, Rutgers University, and the University of Southern California.

The process of developing the field-based B-WET activities will provide the intern with experience in how to set up educational programs that are designed to conduct authentic, technology-supported scientific inquiry for an urban watershed and the Chesapeake Bay.

Skills required:

- willing to work under potentially physically demanding conditions in remote areas, especially coastal areas
- possess a positive attitude and be a good communicator
- be detail oriented and able to work well as part of a research team
- coursework in ecology and zoology helpful
- basic experience in collecting field data and laboratory procedures desirable

Location: Old Dominion University and Virginia field sites as needed

Intern supervisor: Eileen Hofmann (ODU); Ann Marie Chapman (NOAA)

Number of Intern Slots Available: one

4. AEROSOL CHEMISTRY IN THE ARCTIC

Project Description: The largest uncertainty in the radiative forcing of climate change over the industrial era is that due to atmospheric aerosol particles. Aerosol particles impact climate directly by absorbing or scattering incoming solar radiation and indirectly by affecting cloud properties such as extent, lifetime, and reflectivity. To gain a better understanding of aerosol distributions in the atmosphere, NOAA measures the chemical composition of aerosol particles at several northern hemisphere monitoring stations (<http://saga.pmel.noaa.gov/data/stations/>). This summer internship will involve chemical analysis of samples collected at the Alaskan monitoring stations. The intern will be trained to extract aerosol samples and analyze the extract by ion chromatography. Samples will also be collected in Seattle to test sampling systems.

Skills Preferred: One year of college chemistry.

Location: NOAA's Pacific Marine Environmental Laboratory in Seattle, WA.

Number of Slots: 2

Intern Supervisors: Trish Quinn and Tim Bates

5. CLIMATE REGIME EFFECTS ON FISH LIFE CYCLES AND POPULATION DYNAMICS

Project Description: The Coastal Ecology Branch is conducting research designed to better understand and anticipate the effects of climate change on fish populations. Fishes are expected to exhibit increases in virtually all aspects of their 'rates of living' – e.g., metabolic, ontogenetic, and ecological rates – as water temperatures increase. But beyond this general expectation of a direct effect of temperature on rates of living, refined details of these relationships should allow researchers to tailor predictions to the specifics of the species, their life-cycle features, and marine environments of particular concern. In this project we are using a combination of field, laboratory, and experimental data to address a series of questions on the direct and indirect effects of climatic variables on the life history, ecology, and population dynamics of resource fish species of the northeastern USA. The student will participate in field monitoring, laboratory experiments and/or analyses of archived data in addressing a component of this larger research effort. Among the student's duties and responsibilities are: 1) Collect and summarize data on effects of increases in water temperature, and in the variance in water temperature on the growth, development, and survival of fishes; 2) Analyze data, prepare presentation material, and present summary of project conducted while at the Howard Laboratory; 3) Participate in 2-day research cruises on Hudson River Estuary as part of ongoing assessments of fish populations near the margin of their geographic ranges; and 4) Support role in ongoing laboratory experiments and analyses. The student will work among other undergraduate and graduate students, research associates, and career NOAA research scientists.

Skills required: The student must be willing to work outdoors, on small boat (including overnight cruises), and in laboratory. He/she must be detail oriented, organized, history of completing assignments; comfortable working with a team; and listens and communicates well. Working familiarity with MS Office (Word/Excel/PowerPoint) is expected.

Location: NOAA Fisheries Northeast Fisheries Science Center, Highlands, New Jersey

Number of Intern Slots: One

Intern Supervisor: Dr. Christopher Chambers

6. KEY ECOLOGICAL PROCESSES THAT DETERMINE SURVIVAL TO RECRUITMENT IN FISH POPULATIONS

Project Description: The Coastal Ecology Branch is conducting research designed to better understand and anticipate the factors that determine which and how many young fish survive to recruitment to the adult population. We are addressing issues of habitat quality and mortality risk to young fish. During the summer of 2009 we will be quantifying predation risk in young fish by using a combination of field and laboratory methods. Among the student's duties and responsibilities are: 1) Plan, implement, and conduct supervised experimental assessment of predation risk on juvenile fishes of the Hudson River Estuary. This includes assembling predation arenas, collecting and maintaining prey and predators, monitoring predation outcomes, and associating outcomes with prey and predator attributes, e.g., body size, life stage; 2) Analyze data, prepare presentation material, and present summary of project conducted while at the Howard Laboratory; 3) Participate in 2-day research cruises on Hudson River Estuary as part of ongoing assessments of relative abundances of prey and predator fish species, and in the on-board and laboratory processing of the collected fish for lengths, weights, stomach contents, and extraction of otoliths; and 4) Support role in ongoing laboratory experiments and analyses. The student will work among other undergraduate and graduate students, research associates, and career NOAA research scientists.

Skills required: The student must be willing to work outdoors, on small boat (including overnight cruises), and in laboratory. He/she must be detail oriented, organized, history of completing assignments; comfortable working with a team; and listens and communicates well. Working familiarity with MS Office (Word/Excel/PowerPoint) is expected.

Location: NOAA Fisheries Northeast Fisheries Science Center, Highlands, New Jersey

Number of Intern Slots: One

Intern Supervisor: Dr. Christopher Chambers

7. DETERMINE SPAWNING TIMING AND GROWTH RATES OF POST-LARVAL AND JUVENILE NORTHERN ANCHOVY OFF OREGON AND WASHINGTON

Project Description: Both biological and physical sources of mortality influence year-class strength (recruitment) in fish populations, but these factors may be mediated by larval characteristics. In several fish species faster growing individuals are more likely to survive and recruit than slower growing individuals. Size selective mortality is thought to occur because fast-growing larval/juvenile fish spend less time when they are most vulnerable to predators (the stage-duration hypothesis).

Much uncertainty exists over the exact timing and location of anchovy spawning off Oregon and Washington, but ichthyoplankton surveys confirm that peak spawning occurs in coastal waters associated with the Columbia River plume between April and August. The primary objective of this study is to determine hatch date and estimate larval growth of northern anchovy captured in nearshore waters off Oregon and Washington using otolith microstructure analysis. These data will provide useful information on growth and survival processes during early life phases of northern anchovy.

The intern will have many opportunities to assist with field work on a much larger project documenting the estuarine and marine ecology of juvenile salmon and small coastal pelagic fishes. The data and analysis conducted by the intern may be suitable for a senior thesis.

The intern will be exposed to standard marine ecological research methods, allowing them to learn otolith microstructure analysis protocols, use of dissecting microscopes, and gain experience with computer data bases, growth modeling, and statistical analysis. Safe laboratory and field practices will also be taught.

Skills Required: Willingness to conduct lab and field work, paying meticulous attention to detail and safety, and willingness to occasionally assist with other research projects (including overnight trips on small/or large commercial and research vessels). Experience with Microsoft Excel and/or digital imaging software (Image Pro Plus) helpful, but not required.

Location: NOAA Fisheries, Northwest Fisheries Science Center (www.nwfsc.noaa.gov/), Hatfield Marine Science Center, Newport, Oregon (www.hmsc.oregonstate.edu).

Number of Intern Slots: One

Intern Supervisor: Dr. Robert Emmett

8. DEVELOPING WEB-BASED PORTAL FOR REAL-TIME OCEAN EXPLORATION AND RESEARCH DATA AND INFORMATION DISSEMINATION AND VISUALIZATION

Project Description: In 2008, NOAA commissioned the only Federal vessel dedicated to exploring our largely unknown ocean – the NOAA Ship *Okeanos Explorer*. Through paradigm changing telepresence technology, NOAA and its expedition partners will increasingly bring real-time excitement of ocean exploration into shore-based exploration command centers, classrooms, audiences in science centers, and indeed to anyone worldwide with Internet access, sharing the excitement of discovery through multiple pathways.

To aid this effort, we seek an intern capable of working with NOAA and Google personnel on the development of a web-portal centered on *Okeanos Explorer* expeditions including real-time visualization of geospatial and oceanographic datasets.

This internship will provide the opportunity for a student to not only participate in various stages of project development and design but also to learn about NOAA's unique capability to discover and investigate new ocean areas and phenomena. The intern will increase their proficiency in technology use for science, outreach and education and will be exposed to cutting edge technologies for conducting and communicating science.

Skills Preferred: Interest in ocean science, web-development, and exploration. Willingness to work as part of a team and learn new techniques and technologies. Students with proficient use of MS Office, Geographic Information Systems, KML, web development, and web-based visualization toolkits will excel in this internship.

Citizenship: Due to security restrictions at Stennis Space Center, the intern must be a US Citizen.

Location: NOAA's NESDIS/NODC/National Coastal Data Development Center located at Stennis Space Center, Mississippi. Possibility for travel to other NOAA locations or partner organizations as/if needed.

Number of Slots: One

Intern Supervisor: Sharon Mesick

9. DETERMINING THE BIOMASS OF PREY SPECIES CONSUMED BY BOTTLENOSE DOLPHIN

Project Description: The intern will participate in a study to determine the species and age classes of fish consumed by bottlenose dolphins. Stomach contents will be examined to determine obtain fish otoliths and other hard parts; otoliths will be identified by using a reference collection from known fish; otoliths will be digitized and measured to use size as a proxy for fish size; and a digital catalogue will be developed. The ultimate goal is to

evaluate the ecosystem relationship between bottlenose dolphins and the fish on which they prey. This internship provides an opportunity for an applicant to participate in dolphin necropsies, gain laboratory experience with microscopes and high-resolution digital photographic equipment and image software, and, if time allows, assist with interpreting the biomass of prey species consumed by dolphins.

Skills Required: Willingness to work primarily in a laboratory. Ability to work as part of a research team. Basic laboratory and data collection experience is helpful, as is experience with microscopes. Attention to detail and carefulness are necessary.

Location: NOAA Beaufort Laboratory, Beaufort, North Carolina

Number of Intern Slots: One

Intern Supervisor: Dr. Aleta Hohn, National Marine Fisheries Service at Beaufort

10. ASSESSING THE IMPACTS OF MULTIPLE STRESSORS TO WATER QUALITY IN SAGINAW BAY (LAKE HURON)

Project description: We are seeking an intern to participate in a project studying the impacts on multiple stressors on water quality in Saginaw Bay (western arm of Lake Huron). Harmful algal blooms (HABs) and rafts of floating benthic algae that wash up on the beaches are some indicators of poor water quality in Saginaw Bay, resulting in its listing as an 'Area of Concern' defined by the Great Lakes Water Quality Agreement. Many studies look at individual factors contributing to these water quality issues, but we know that multiple factors such as invasive species, changing land use patterns and climate change have interacting effects. One goal of this project is to develop viable management options for Saginaw Bay based on an ecological understanding of this system and the outcomes of various modeling approaches. The intern for this project will be part of a team of researchers working on Saginaw Bay this summer, and will be assisting with standard water quality sampling and processing, characterizing HAB populations, and *in situ* and laboratory experiments on benthic algal growth. This will be a field-intensive project, with most of the time spent at Saginaw Bay.

The project provides opportunities for the intern to gain field experience on small boats, particularly in water quality sampling and in designing and conducting *in situ* experiments. There will also be opportunity for learning lab techniques for water quality analysis, HAB identification, and algal productivity.

Skills Required: The intern must be willing to spend most of the summer in the field and be comfortable on small boats. Experience with water quality sampling, algal identification or field experimentation a plus. We are looking for someone who will work well as part of a team, is willing to work a flexible schedule and enjoys working in the field.

Location: NOAA Great Lakes Environmental Research Laboratory, 4840 S. State Rd, Ann Arbor, MI 48108. Lab work will be in Ann Arbor and field work will be based in Au Gres, MI (on shore of Saginaw Bay).

Number of intern slots: one

Intern supervisor: Dr. Juli Dyble Bressie

11. ENVIRONMENTAL OBSERVATIONS ON THE NORTHEAST U.S. CONTINENTAL SHELF

Project Description: The intern will participate in the physical oceanography program at the Northeast Fisheries Science Center. Activities include working on the Environmental Monitors on Lobster Traps program, a Conductivity-Depth-and-Temperature Sampling program, and other activities related to the measurement and distribution of oceanographic data from the northeast U.S. continental shelf.

This internship provides an opportunity for an applicant to work with organizing, analyzing, and making available oceanographic data collected by fisherman, research vessels and merchant vessels. The intern will gain experience with data analysis and the distribution of oceanographic data via the internet.

Skills Required: Ability to work as part of a research team. Computer experience with programs like Microsoft Word and Excel. Web page, GIS, and programming experience helpful.

Specific Outcomes: Temperature and salinity data collected during the first half of 2008 will be quality controlled and made available to the public through the internet. Commercial lobsterman will be notified of the data availability and their comments will be used to modify data collection and distribution systems

Location: Northeast Fisheries Science Center, Woods Hole Laboratory, Woods Hole Massachusetts www.nefsc.noaa.gov/epd/ocean/MainPage/emolt.html

Number of Intern Slots: One

Intern Supervisor: James Manning and Jon Hare

12. PARASITES OF MARINE AND ESTUARINE FISHES AS SIGNALS FOR DIET, HABITAT USE, AND LIFE HISTORY TRAITS

Project Description: The intern will participate in a study investigating food web dynamics (spatial and temporal) through macroparasite community analyses of juvenile Pacific salmon or other marine or estuarine fishes. Our current research examines the ecology of host-parasite interactions of anadromous and marine fishes in the Columbia River estuary and the Northeast Pacific Ocean. Primary projects focus on parasites of juvenile salmon as they make the transition from freshwater to estuarine and marine habitats to gain a better understanding of environmental factors that affect juvenile salmon survival and the potential effects of parasites on growth and survival of salmon populations. Our research examines parasites obtained through trophic interactions to gain a better understanding of fish diet, migration, and habitat use and in changing environmental conditions. In addition to studying parasite communities of juvenile salmon we also study parasites of Pacific sardines to gain a better understanding of migration patterns and habitat use to help delineate potential stock separation.

This internship provides a unique opportunity for an applicant to participate with a large team of marine and fisheries scientists examining ocean conditions and survival of juvenile Pacific salmon. The student would have the opportunity to participate in field collections in the Columbia River estuary as well as gaining experience with fish dissections, microscopy, community analyses, and project presentation.

Skills Required: Willingness to work outdoors as well as at a microscope. Ability to work as part of a research team. Attention to detail with interest in the big picture.

Location: NOAA's Northwest Fisheries Science Center field station at the Hatfield Marine Science Center of Oregon State University in Newport, Oregon

Number of Intern Slots: One

Intern Supervisor: Dr. Kym Jacobson

13. ECOLOGY OF COASTAL OCEAN SEASCAPES: AN IOOS INFORMED MULTI-SCALE STUDY OF HABITAT SUITABILITY FOR MARINE RESOURCE SPECIES

Project Description: The interns will join the Behavioral Ecology Branch in a multi-scale study of fisheries habitat ecology in the Mid-Atlantic Bight Coastal Ocean where physical oceanographic processes likely to affect dispersal, growth, mortality and reproduction are continuously monitored by a well developed, operational Integrated Ocean Observation System (IOOS; MARCOOS; <http://www.marcoos.us/>). Our approach blends both traditional field surveys and monitoring with advanced optical and acoustic techniques. We are also planning manipulative field experiments, and complementary laboratory studies to examine the effects of pelagic and benthic habitat characteristics on reproduction growth, mortality and dispersal processes.

Summer of 2009 projects include:

1. Seasonal pelagic and benthic habitat surveys of seascapes off Long Island and New Jersey.
2. High frequency monitoring of bivalve mollusk and fish settlement and physical oceanography at sites within the Long Island and New Jersey seascapes.
3. Laboratory studies of reproductive behavior including acoustic signaling of black sea bass.
4. Laboratory studies investigating habitat effects on predator-prey interactions involving early juvenile black sea bass and sea scallops as prey.
5. Pilot studies in the lab looking at larval black sea bass behavior

This internship provides an opportunity for an applicant to participate in state of the art field surveys informed by real time IOOS and shipboard measurements using advanced acoustic, optical and traditional equipment. In addition, interns will participate in the development and execution of laboratory and field experiments outlined above. Interns will provide assistance with sample sorting, data entry, and preliminary data analysis.

Skills Required: Willingness to work outdoors and aboard research vessels. Ability to work as part of a research team. Basic data collection experience and good computer skills would be very helpful.

Location: Behavioral Biology Branch, James Jay Howard Marine Sciences Laboratory, Highlands, New Jersey

Intern Supervisors: Dr. John Manderson, Dr. Beth Phelan, and Linda Stehlik

Number of Intern Slots: Four

14. THE IMPORTANCE OF PACIFIC SALMON AND THEIR MARINE DERIVED NUTRIENTS IN SALMON RIVER BASIN STREAMS OF IDAHO

Project Description: Thousands of rivers and streams dissecting the coastal lands surrounding the North Pacific Ocean once supported major populations of Pacific salmon and anadromous trout. Today, however, these once plentiful species are greatly reduced in both abundance and distribution. Recent work has highlighted that the importance of returning salmon goes far beyond the clear need for reproducing adults. Because more than 95% of the body mass of salmon is accumulated while fish are in the sea, the return of adults represents a transfer of nutrients from marine to freshwater and terrestrial habitats. The nutrients derived from adult salmon (marine-derived nutrients) are now recognized to play an important role in the ecology of the Pacific Northwest (Gresh et al. 2000).

The intern will participate in a study on the importance of returning adult salmon as sources of nutrients (i.e., fertilizer) to streams in the Salmon River Basin in Idaho. The project asks two questions: 1) Has the decline in the number of salmon returning to natal

streams over the last 150 years resulted in the inability of streams to support healthy salmon populations? 2) Are there ways to enhance productivity of these streams to improve conditions for threatened and endangered salmon? The intern will join our research team to assist with laboratory analyses and field research. Work will involve processing stable isotope and benthic invertebrate samples in Seattle and participation in summer field work in 18 salmon streams of the Salmon River in Idaho.

This internship offers an opportunity to participate in a large-scale ecological study designed to benefit endangered salmonids. Applicant will gain knowledge of Pacific salmon and their impacts on several aspects of stream ecology through field and laboratory work (water nutrients, primary productivity, aquatic invertebrate assemblage, avian composition, physical stream habitat, resident fish behavior, nutrient limitation experiments, stable isotope ratios, and more).

Skills Required: Since this position encompasses both field and laboratory aspects, we require a willingness to work long field days in streams in possible weather extremes and remote areas, and in a laboratory setting with a necessary for attention to detail. Also needed are flexibility and desire to work as part of a research team. Basic laboratory, field, and outdoor know-how experience are helpful.

Number of Intern Positions: One or two

Location: Northwest Fisheries Science Center (Seattle, WA), Field work in remote areas of Idaho

Intern Supervisor: Dr. Beth Sanderson

15. ASSESSING RESPONSE OF SEAGRASS GROWTH FOLLOWING DISTURBANCE IN NORTH CAROLINA

Project Description: This individual will participate in a study examining growth characteristics of disturbed seagrass beds using field observation and experimental techniques. This study will investigate how biological disturbance by rays, crabs, etc. affects the growth response of seagrass along bed margins. Insights gained from this study will also provide valuable information for designing effective seagrass restoration efforts. For this project, field work will be conducted within local sound waters near Beaufort, NC; experimental mesocosms will be maintained at the NOAA lab in Beaufort, NC. This project will provide a student an excellent learning opportunity; allowing the student to participate in the entirety of the project – from experimental design to data analysis. This individual will learn the basics of seagrass ecology and the role of ecological processes that structure landscapes. The intern will become familiar with ecological sampling design, techniques, and equipment. Fieldwork will include seagrass surveys, GPS use and management of a manipulative experiment.

Skills Required: Ability and willingness to work as part of a research team, learn new techniques, and work outdoors in various weather conditions. Although boat handling skills are not required, the intern should be comfortable traveling in and working on a

small boat. Familiarity with data entry and basic analysis is a plus. Knowledge of specific field methods is not required, as these will be taught to the intern through hands-on experience.

Location: NOAA/ National Ocean Service / National Centers for Coastal Ocean Science, Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Road Beaufort, NC 28516, <http://www.ccfhr.noaa.gov/>

Number of Intern Slots: 1

Intern Supervisor: Jud Kenworthy

16. COASTAL ECOLOGY RESEARCH SUPPORTING ECOSYSTEM-BASED MANAGEMENT, MAINE

Project Description: The Wells National Estuarine Research Reserve (Wells NERR) is part of the NOAA NERR system. Our mission is to support research, education and training programs to support ecosystem-based restoration and management of estuarine and coastal watershed resources. We are seeking interns to work as research team members during the 2009 field season. We expect earnest interest and appropriate academic background, but no prior training for these internships. We will be involved in several field and laboratory research projects (see below). Interns may choose to focus on one or more project, in consultation with Wells NERR Research staff prior to their arrival. Interns will have opportunities to participate in other projects during their stay as determined by student interests and project needs. Our 200-acre campus (including intern housing) is located adjacent to 2000 acres of salt marsh and estuary (Little, Webhannet, Ogunquit Rivers), that provide many of our study sites. We are located on the South coast of Maine, between and not far from Portsmouth, NH and Portland, ME.

Projects in brief:

A) NOAA Salt Marsh Restoration Success – ongoing performance evaluation of 5 marshes; 4 restoration and one reference site, with field collection/ measurements of permanent vegetation plots, ground water wells, soil organic matter, and transect elevations.

B) Nekton Larval Community Dynamics - ongoing monitoring of larval fish and macroinvertebrate species abundance in the Reserve's Webhannet River estuary, with weekly large plankton collections, sample processing, and species identification.

C) Wading Bird Salt Marsh Indicator Survey – ongoing monitoring of top-predator large wading birds as indicators of salt marsh ecological state; individual birds (herons, egrets, ibis) are identified and mapped at high tide throughout the Reserve's salt marshes 2-4 times weekly.

D) Marsh-Estuarine Food Web and Climate Change Interactions – experimental field (e.g. field enclosures/exclosures) and lab work (e.g. environmental chamber), testing hypotheses regarding the effects of increased temperature on the movement of energy and mercury through benthic and epibenthic invertebrates and small fish.

E) *Habitat-Mediated Interactions Between Native and Invasive Herbivores and Predators* – experimental field work (e.g. field enclosures/exclosures) to measure the influence of salt marsh plant habitat structure on invasive snail and crab interactions with native marsh fauna (benthic, epibenthic and nektonic species).

Opportunity: Interns will become proficient in project-specific field and lab procedures, which may include: plant, bird, and invertebrate and fish surveys/ collection /identification; sediment and soil core collection and lab processing; construction of field enclosures/exclosures; use of GPS and total survey station instrumentation; use of water level, salinity, temperature data-loggers; quantitative stereomicroscopy; soil core collection and lab processing. Interns must be prepared for the modest physical challenges of field work in marsh-estuarine habitats.

Skills required: No specific skills are required, but experience in collecting and organizing scientific data would be very helpful. Academic background should be in natural science (i.e. biology, chemistry or allied discipline).

Location: NOAA/Wells National Estuarine Research Reserve, Wells, Maine.
Free dormitory housing is available.

Intern Supervisor: Michele Dionne

Number of Intern Slots Available: one, two or three