

## FAU Postdoctoral Investigator Program in Ocean Science and Technology

Up to 5 Postdoctoral Investigator positions are available for the two-year period, July 1, 2010 to June 30, 2012, to conduct research in the following areas:

Climate Change in South Florida's Marine Ecosystems  
Marine Biomedical and Biotechnology  
Marine Ecology of the Indian River Lagoon  
Marine Underwater Optics

Postdoctoral research is primarily conducted at FAU's Harbor Branch Oceanographic Institute in Fort Pierce with a member of the resident HBOI faculty, who serves as the supervisor and mentor, with one or more co-mentors from other FAU colleges, departments, and centers.

**Qualifications for Application:** Applicants, who have received their Ph.D. or equivalent within three years of the date on which the postdoctoral investigator position would commence, are eligible to apply. Recipients must have completed their degree before the award can begin. Applicants should submit a cover letter and a statement of interest (no more than 2 pages in length) that addresses one or more of the proposed FAU research topics, a CV, and three letters of recommendation. Applicants will be selected on the basis of the strength of academic course work, research and development experience, publication record, letters of support, statement of interest, and whether members of the HBOI faculty and FAU faculty are available for collaboration and assistance. Applicants are encouraged to contact any of the mentors listed for topics of interest. Online application must be completed in order to be considered for each position: <https://jobs.fau.edu/>, reference position number 980728.

### Potential Research Topics (organized by Focus Area)

#### Climate Change in South Florida's Marine Ecosystems

##### **1. Interaction of Thermal and Ocean Acidification Effects on Corals and Benthic Macroalgae**

Corals and macroalgae on tropical reefs are living near their upper thermal tolerance level and are now further challenged by ocean acidification, which is rapidly increasing as part of human-induced climate change. We propose to study the interaction of higher temperatures and acidification on these critical ecological components of reefs through mesocosm experiments that allow control of pCO<sub>2</sub> and temperature.

Faculty mentors:

Dennis Hanisak, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/DennisHanisak/dhhome.php>

Marguerite Koch, Ph.D., College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/Koch-Rose.htm](http://www.science.fau.edu/biology/faculty_staff/Koch-Rose.htm)

Joshua Voss, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/JoshuaVoss/jvhome.php>

#### Marine Biomedical and Biotechnology

##### **2. Creation of New "Natural Product-Like" Libraries for Drug Discovery**

This project will link the synthetic organic chemistry expertise of Dr. Salvatore Lepore with the natural products chemistry skills of Dr. Amy Wright to create novel "natural product-like" libraries of compounds for biological screening. Natural products and enriched mixtures from the HBOI library will be used as starting materials which will be coupled together using simple reactions sometimes called "click" chemistry to prepare natural product chimeras, trimeras, etc., which will be tested in various assays available in the Medicines from the Sea Program.

Faculty mentors:

Amy Wright, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/AmyWright/awhome.php>

Salvatore Lepore, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/faculty/Lepore/index.html>

### **3. Discovery of Novel Marine Natural Products**

Marine plants, microbes, and invertebrates are important sources of novel natural products. This project will isolate and define the structures of chemically, ecologically, or pharmaceutically interesting natural products from the marine organisms currently available at FAU.

Faculty mentors:

Amy Wright, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/AmyWright/awhome.php>

Lyndon West, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/2008faculty/2009west.htm>

### **4. Identification of Novel Inhibitors – Pancreatic Cancer**

The following three projects are closely aligned. Applicants may address one or more projects in their statement of interest.

#### **4a. Identification of Novel Inhibitors of Inflammation to Be Used as Chemopreventatives of Pancreatic Cancer**

Patients with pancreatitis have a much more elevated risk of developing pancreatic cancer than the general population. The unique pure compound and peak fraction libraries of marine natural products of HBOI will be screened to identify inhibitors of inflammation, and hits will be validated via secondary and functional assays in pancreatic cancer cells.

Faculty mentors:

Esther Guzmán, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/EstherGuzman/eghome.php>

Vijaya Iragavarapu, Ph.D., College of Biomedical Sciences, [http://med.fau.edu/biomedical/Basic\\_scienced\\_faculty/Iragavarapu](http://med.fau.edu/biomedical/Basic_scienced_faculty/Iragavarapu)

#### **4b. Identification of Novel Inhibitors of Signaling Molecules Associated with the Etiology and Progression of Pancreatic Cancer**

Certain molecules important in signal transduction are aberrantly activated in pancreatic cancer, facilitating the initiation and/or progression of pancreatic cancer. The unique pure compound and peak fraction libraries of marine natural products of HBOI will be screened to identify inhibitors of these molecules, and hits will be validated via secondary and functional assays in pancreatic cancer cells.

Faculty mentors:

Esther Guzmán, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/EstherGuzman/eghome.php>

Ramaswamy Narayanan, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/2008faculty/2009narayanan.htm>

#### **4c. Identification of Novel Inhibitors of Signal Transduction Pathways Essential for the Proliferation of Cancer Stem Cells in Pancreatic Cancer**

Cancer stem cells are thought to cause the recurrence of cancers after long periods of remission. The unique pure compound and peak fraction libraries of marine natural products of HBOI will be screened to identify inhibitors of signal transduction molecules that are associated with the proliferation of cancer stem cells, and hits will be validated via secondary and functional assays in pancreatic cancer cells.

Faculty mentors:

Esther A. Guzmán, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/EstherGuzman/eghome.php>

Ramaswamy Narayanan, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/2008faculty/2009narayanan.htm>

## **Marine Ecology of the Indian River Lagoon (IRL)**

### **5. Biomarker-Assisted Hard Clam Broodstock Development**

The goal of the proposed project is to identify biomarkers of thermal and salinity tolerance in hard clams for use in implementing selective breeding programs, thereby increasing survival and production in the Florida hard clam aquaculture industry.

Faculty mentors:

John Scarpa, Ph.D., HBOI, [www.fau.edu/hboi/ProjectManagers/JohnScarpa/jshome.php](http://www.fau.edu/hboi/ProjectManagers/JohnScarpa/jshome.php)

John Baldwin, Ph.D., HBOI, [http://www.science.fau.edu/biology/faculty\\_staff/baldwin.htm](http://www.science.fau.edu/biology/faculty_staff/baldwin.htm)

Ed Proffitt, Ph.D., College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/proffitt.htm](http://www.science.fau.edu/biology/faculty_staff/proffitt.htm)

## **6. Development of Fixed and Mobile Autonomous Instrumentation Platforms for Water Sampling in the Indian River Lagoon**

This project will develop fixed and mobile autonomous instrumentation platforms in support of understanding the relationship of water quality in the IRL to seagrasses, macroalgae, and phytoplankton. Systems would be geared towards identifying water quality gradients related to freshwater discharges and providing sustained observations for studying the climate-related interannual variability in water quality.

Faculty mentors:

Dennis Hanisak, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/DennisHanisak/dhhome.php>

Karl von Ellenrieder, Ph.D., College of Engineering, <http://www.eng.fau.edu/homepages/ome/vonellenrieder.htm>

## **7. Eutrophication**

The following two projects are closely aligned. Applicants may address either or both projects in their statement of interest.

### **7a. Contribution of Septic Tanks to Pollution of the Indian River Lagoon**

Studies have suggested that on-site treatment and disposal systems (OSTDS, septic tanks) are a source of nutrient and bacterial pollution to the IRL. The relative pollutant loading contribution from septic tanks on the watersheds of the IRL needs to be better defined and quantified as a potential nutrient source contributing to nutrient over-enrichment and eutrophication of IRL seagrass communities.

Faculty mentors:

Brian Lapointe, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/BrianLapointe/blhome.php>

Daniel Meeroff, Ph.D., College of Engineering, <http://www.civil.fau.edu/~daniel/>

### **7b. Stormwater Discharges and Harmful Algal Blooms in South Florida's Coastal Waters**

Stormwater runoff from agricultural and urban areas has increased nutrient inputs to coastal waters in South Florida in recent decades. This research will characterize the effects of inlet discharges (Lake Worth, St. Lucie inlets) on nutrient concentrations and associated responses of harmful algal blooms in coastal reef communities.

Faculty mentors:

Brian Lapointe, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/BrianLapointe/blhome.php>

Dennis Hanisak, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/DennisHanisak/dhhome.php>

Bill Louda, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/2008faculty/2009loudw.htm>

## **8. Visual Ecology**

Applicants may address either project in their statement of interest.

### **8a. Ecological Impacts of Habitat Degradation upon the Visual Performance of Marine Fishes**

Water quality in portions of the Indian River Lagoon has degraded over the past 50 years due to agricultural runoff, urban development, and flood control measures that dramatically alter natural water flow. This project will examine the impact of this habitat degradation upon the visual performance of coastal marine fishes by correlating environmental parameters with visual spectral sensitivity and temporal resolution of marine fishes inhabiting the IRL and those sampled from ecologically similar, but more pristine habitats.

Faculty mentors:

Tamara Frank, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/TammyFrank/tfhome.php>

Stephen Kajiura, Ph.D., College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/Kajiura.htm](http://www.science.fau.edu/biology/faculty_staff/Kajiura.htm)

### **8b. Comparative Visual Ecology of Neonate Sea Turtles**

Marine animals often switch habitats at different life stages which includes changing visual environments, shifting prey and predators, and their detection of key stimuli. This research will compare marine turtle photoreceptor physiology and behavior relative to ecological shifts to understand marine turtle visual ecology and expand our understanding of habitat use.

Faculty Mentors:

Tammy Frank, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/TammyFrank/tfhome.php>

Jeanette Wyneken, Ph.D., College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/wyneken.htm](http://www.science.fau.edu/biology/faculty_staff/wyneken.htm)

## **9. Trophic Relations in the Indian River Lagoon**

The following two projects are related. Applicants may address either project in their statement of interest.

### **9a. Fish Ecology of the Indian River Lagoon: Connecting Seagrass Beds to Apex Predators**

While the economical importance of fish in the IRL is well characterized, there is a limited understanding of trophic relationships between seagrass beds and apex predators and how those relationships are impacted by anthropogenic stressors. This project, interfacing with other ongoing studies of IRL water quality, seagrass, and dolphins will characterize and analyze biological and ecological factors affecting fish populations, and their relationships to other trophic levels.

Faculty mentors:

Dennis Hanisak, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/DennisHanisak/dhhome.php>

Greg O'Corry-Crowe, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/GregOCorry-Crowe/>

Jon Moore, Ph.D., Honors College, [http://www.fau.edu/divdept/honcol/faculty\\_JonMoore.htm](http://www.fau.edu/divdept/honcol/faculty_JonMoore.htm)

### **9b. Plankton Ecology of the Indian River Lagoon**

Knowledge of lower level trophic energy transfers that fuel higher trophic levels, including fisheries, are lacking in the IRL. This project will examine phytoplankton-zooplankton relationships from an organismal and/or biochemical viewpoint, that may include (but not be limited to) symbiotic, life cycle, or trophic transfer processes.

Faculty mentors:

Dennis Hanisak, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/DennisHanisak/dhhome.php>

Paul Hargraves, Ph.D., HBOI

Bill Louda, Ph.D., College of Science, <http://www.science.fau.edu/chemistry/2008faculty/2009loudw.htm>

## **10. Genetic Marker Development for High Throughput Screening and Ancient DNA Analysis of Marine Species**

To remain on the cutting edge of the interface between ecological, behavioral, and evolutionary research, new molecular tools are needed to efficiently probe deeper into biological processes at multiple trophic levels in relation to environmental dynamics. This project will develop and apply single nucleotide polymorphism (SNP) technology and/or screening of gene coding regions to a series of marine species at different trophic levels in the IRL, from apex predators (marine mammals), to marine plants (seagrass, mangroves, salt marsh), and invertebrates (including oysters and reef associates).

Faculty mentors:

Greg O'Corry-Crowe, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/GregOCorry-Crowe/>

Ed Proffitt, Ph.D., HBOI, College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/proffitt.htm](http://www.science.fau.edu/biology/faculty_staff/proffitt.htm)

## **11. Oyster Restoration in SE Florida Estuaries: Development on Created Habitat and Molecular Assessment of Reproduction and Larval Sources**

This project will link field and lab methods in the study of oyster population biology, recruitment, and restoration success. The research will dovetail with on-going studies by the PIs on oyster reef restoration in SE Florida estuaries through use of molecular markers to determine relative contributions of local (intertidal and/or mangrove prop root) sources of larvae versus sources outside the estuary being restored.

Faculty mentors:

John Scarpa, Ph.D., HBOI, [www.fau.edu/hboi/ProjectManagers/JohnScarpa/jshome.php](http://www.fau.edu/hboi/ProjectManagers/JohnScarpa/jshome.php)

Susan Laramore, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/SusanLaramore/slhome.php>

Ed Proffitt, Ph.D., College of Science, [http://www.science.fau.edu/biology/faculty\\_staff/proffitt.htm](http://www.science.fau.edu/biology/faculty_staff/proffitt.htm)

## **Marine Underwater Optics**

### **12. High-Resolution Imaging through Turbulent Waters**

This project will combine experience in (a) underwater laser imaging and (b) optical imaging through atmospheric turbulence and other scattering structures to initiate research and secure funding for continuing research on underwater imaging in turbulence at resolutions much higher than ever achieved before.

Faculty mentors:

Fraser Dalglish, HBOI, <http://www.fau.edu/hboi/ProjectManagers/FraserDalglish/fdhome.php>  
William Rhodes, Ph.D, College of Engineering

### **13. *Applied Research in Autonomous Marine Sensor Networks Using Optics and Lasers***

This research includes neighbor localization techniques for multiple platform autonomous missions, as well as development of system architectures and advanced operational scenarios for distributed undersea laser imaging and communications networks. This project will be supported by significant underwater testing facilities and radiative transfer models within the Ocean Visibility and Optics Laboratory at HBOI.

Faculty mentors:

Fraser Dalglish, Ph.D., HBOI, <http://www.fau.edu/hboi/ProjectManagers/FraserDalglish/fdhome.php>

Ionut Cardei, College of Engineering, <http://www.cse.fau.edu/~icardei>

Mihaela Cardei, College of Engineering, <http://www.cse.fau.edu/~mihaela>, <http://wisenet.fau.edu/>

Hanqi Zhuang, Ph.D, College of Engineering, <http://www.eng.fau.edu/homepages/ee/zhuang.htm>